TEF GEOMETRY

Summer 2019

Semester 1

NOTES & ASSIGNMENTS

Monday	Tuesday	Wednesday	Thursday	Friday
June 17	June 18	June 19	June 20	June 21
Hr 1:Translations Hr 2:Reflections Hr 3: Rotations Hr 4: Unit 1 Review (Kaleidoscope?)	Hr 1: Unit 1 Review Hr 2: **Unit 1 Test** Hr 3: Points, Lines, and Planes Hr 4: Segments and their Measures	Hr 1: Angles and their measures Hr 2: Segment and Angle Bisectors Hr 3: Directed Line Segments & Lines in Coordinate Plane (slope, midpoint, distance) Hr 4: Constructions	Hr 1: Review Constructions & Unit 2 Review Hr 2: **Unit 2 Test** Hr 3: Identifying Angles Hr 4: Identifying Angles HW 2	Hr 1: Constructions of Parallel & Perpendicular Lines & Activity Hr 2: Proving Angle Relationships Hr 3: Proving Angle Relationships 2 Hr 4 :Midunit Review
June 24	June 25	June 26	June 27	June 28
Hr 1: Proving Lines Parallel Hr 2: Lines in the Coordinate Plane & Equation Writing Hr 3: Unit 3 Review Hr 4: **Unit 3 Test**	Hr 1: Congruent Triangles & CPCTC; Hr 1: Classifying Triangles Hr 2: SSS, SAS, ASA, AAS Hr 3: Identifying Congruent Triangles HW Hr 4:Proving Congruent Triangles	Hr 1: Proving Congruent Triangles Hr 2: Midsegment Hr 3 : Medians and Altitudes Hr 4: Unit 4 Review	Hr 1: **Unit 4 Test** Hr 2: Properties of Parallelograms Hr 3: Props of Quads Hr 4: Final Review	Hr 1: Final Review Hr 2: **Final (8-9:30am)** Hr 3: Ratios and Proportions Hr 4: Similar Figures

July 1	July 2	July 3	July 4	July 5
Hr 1: AA~SAS~ and SSS~ Hr 2: Side Splitter Hr 3:Dilations Activity/Notes Hr 4: Unit 6 Review	Hr 1: **Unit 6 Test** Hr 2: Pyth Thm Hr 3: Sp Rights (45-45-90 and 30-60-90) Hr 4: Pythagorean Snail Project	Hr 1:Intro Trig Hr 2: Finding Missing Sides Hr 3:Finding Missing Angles Hr 4:Trig Applications	**No School Holiday**	Hr 1: Angles of Elevation and Depression Hr 2:Unit 7 Review Hr 3:**Unit 7 Test** Hr 4:Circles & Tangents & Arcs and Central Angles
July 8	July 9	July 10	July 11	July 12
Hr 1: Inscribed Angles Hr 2: Other Angles Hr 3: Freaky Friends Hr 4: Equations of Circles	Hr 1: Unit 8 Review Hr 2: **Unit 8 Test** Hr 3: Volume Hr 4: Compound Vol	Hr 1: Volume Practice, Scale Factor Hr 2: Rotations Hr 3: Cross Sections (play-doh optional) Hr4: Unit 9 Review	Hr 1: **Unit 9 Test** Hr 2: Basic Prob Hr 3: Geo Prob Hr 4: Compound Prob	Hr 1: Conditional Prob Hr 2: Final Review Hr 3: Final Review/Final Hr 4: **Final**

GEOMETRY
DEFINTIONS/TERMS

Name:______________________________
Date:____________Period: __________

1. **If an angle is a right angle, then it measures 90°.**

2. **If an angle measures 90°, then it is a right angle.**

3. **If two angles sum up to 90°, then they are complementary.**

4. **If two angles are complementary, then they sum up to 90°.**

5. **If two angles are complementary to the same angle, then they are congruent.**

6. **If two angles are complementary to congruent angles, then they are congruent.**

7. **If two angles sum up to 180°, then they are supplementary.**

8. **If two angles are supplementary, then they sum up to 180°.**

9. **If two angles are supplementary to the same angle, then they are congruent.**

10. **If two angles are supplementary to congruent angles, then they are congruent.**

11. **If two angles (segments) have equal measures, then they are congruent.**

12. **If two angles (segments) are congruent, then they have equal measures.**

13. **If two angles are vertical angles, then they are congruent.**

14. **If two angles form a linear pair, then they are supplementary.**

15. **If a point is a midpoint, then it divides the segment into two congruent segments.**

16. **If a point divides a segment into two congruent segments, then it is a midpoint.**

17. **If a ray is an angle bisector, then it divides the angle into two congruent angles.**

18. **If a ray divides an angle into two congruent angles, then it is an angle bisector.**

19. **If two lines are // to the same line, then // to each other.**

20. **If two lines are perpendicular to the same line, then // to each other.**

WAYS TO PROVE RELATIONSHIPS OF ANGLES BASED ON PARALLEL LINES (21-25)

21. If two lines are //, then corresponding angles are congruent.

22. If two lines are //, then alternate interior angles are congruent.

23. If two lines are //, then alternate exterior angles are congruent.

24. If two lines are //, then consecutive interior angles are supplementary.

25. If two lines are //, then consecutive exterior angles are supplementary.

WAYS TO PROVE LINES ARE PARALLEL BASED ON ANGLE RELATIONSHIPS (26-30)

26. If corresponding angles are congruent, then // lines.

27. If alternate interior angles are congruent, then // lines.

28. If alternate exterior angles are congruent, then // lines.

29. If consecutive interior angles are supplementary, then // lines.

30. If consecutive exterior angles are supplementary, then // lines.

REVIEW OF ALGEBRA PROPERTIES

ADDITION PROPERTY	If a = b, then a + c = b + c.
SUBTRACTION PROPERTY	If a = b, then a – c = b – c.
MULTIPLICATION PROPERTY	If a = b, then a * c = b * c.
DIVISION PROPERTY	If a = b, then a / c = b / c.
REFLEXIVE PROPERTY	For any number a, a = a.
SYMMETRIC PROPERTY	If a = b, then b = a.
TRANSITIVE PROPERTY	If a = b and b = c, then a = c.
SUBSTITUTION PROPERTY	If a = b, then a can be substituted for b.
DISTRIBUTIVE PROPERTY	If a(b + c), then ab + ac.

SEGMENT ADDITION POSTULATE

If point K is between points J and L, then JK + KL = JL.

ANGLE ADDITION POSTULATE

If point R is on the interior of $\angle$PQS, then m$\angle$PQR + m$\angle$RQS = m$\angle$PQS.

Unit 1

Transformations

Translations in the Coordinate Plane

***Learning Targets:* Students will be able to construct translations in the coordinate plane.**
Students will be able to apply and convert different descriptions of translations.

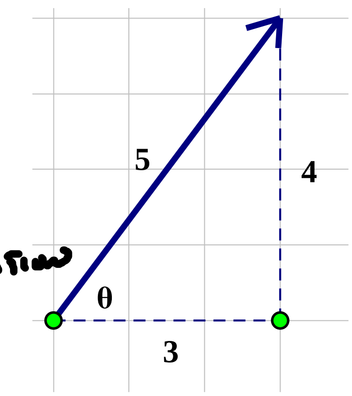
KEY TERMS

Coordinate Plane: → 2D → grid x-direction, y-direction

Origin: where x-axis, y-axis meet (0,0)

TRANSLATION ON THE COORDINATE GRID

A **translation** is defined by a fixed distance and a fixed direction. This motion is usually described by an arrow or a vector. The vector describes the horizontal and vertical shifts in the plane. For example, if we slide all points 3 to the right and 4 up we are defining a fixed distance and a direction.

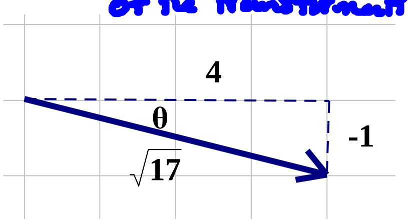


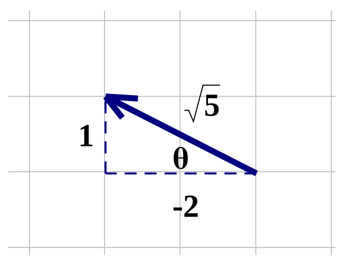
Translations are described in a few different way;

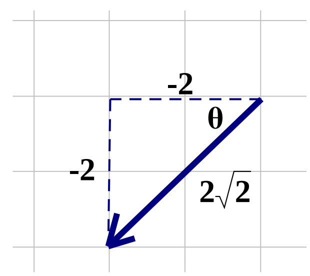
mapping notation: $T(x,y) \dashrightarrow (x+3, y+4)$ (maps to; orig point; how do I move it)

$T_{<3,4>}(x,y) = (x+3, y+4)$ (name of the transformation)

$T_{<3,4>}(x,y)$ vector notation







$T(x,y) \dashrightarrow (x+4, y-1)$ $\quad$ $T(x,y) \dashrightarrow (x-2, y+1)$ $\quad$ $T(x,y) \dashrightarrow (x-2, y-2)$

$T_{<4,-1>}(x,y) = (x+4, y-1)$ $\quad$ $T_{<-2,1>}(x,y) = (x-2, y+1)$ $\quad$ $T_{<-2,-2>}(x,y) = (x-2, y-2)$

1. Convert between vector component form and coordinate form.

   a) $T_{<-5,2>}(A) =$ (x-5, y+2) T (x,y) ------- > (x-5 , y+2)

   b) $T_{<0,-12>}(A) =$ (x, y-12) T (x,y) ------- > (x , y-12)

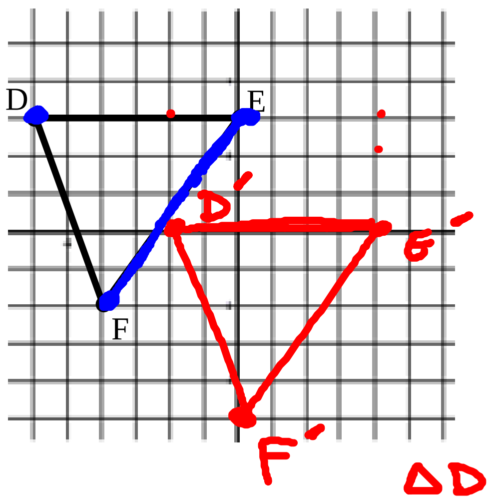
2. Write the coordinate rule that matches the description.

   a) 4 down and 3 right T (x,y) ------- > (x+3 , y-4)

   b) left 7 and down 2 T (x,y) ------- > (x-7 , y-2)

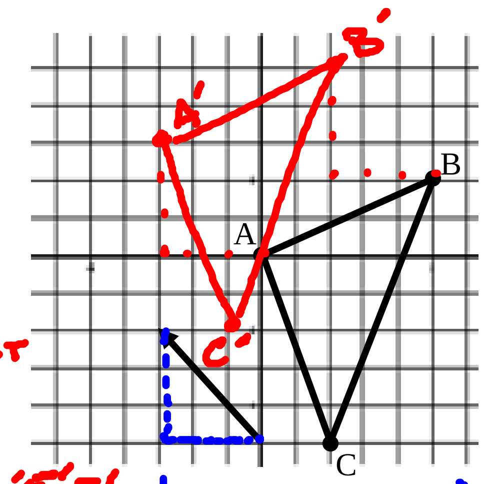
Translate the following figures.

3.



Congruent
↓
ΔDEF ≅ ΔD'E'F'

4.



$T_{<4,-3>}(\Delta DEF)$

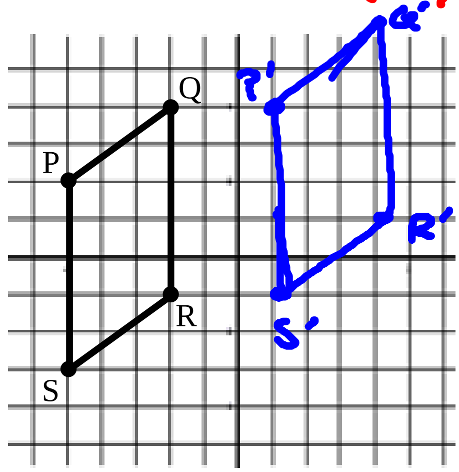
F(4,-2) → F'(0,-5)
E(0,3) → E'(4,0)
D(-5,3) → D'(-2,0)

Isometry: A transformation that maintains congruence

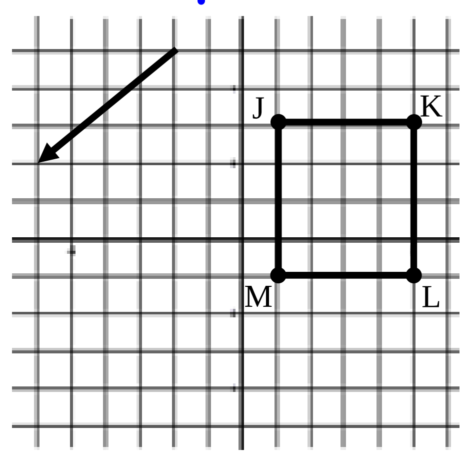
G<-3,3>(ΔABC)

A(0,0) → A'(-3,3)
B(5,2) → B'(2,5)
C(2,-5) → C'(-1,-2)

5.



6.



$T(x, y) - - \rightarrow (x+6, y+2)$

P(-5,2) → P'(-5+6, 2+2) = P'(1,4)
Q(-2,4) → Q'(-2+6, 4+2) = Q'(4,6)
R(-2,-1) → R'(-2+6, -1+2) = R'(4,1)
S(-5,-3) → S'(1,-1)

Translations HW

Geometry

Name: ______________________
Date: _____________ **Per:**______

1. Given a translation rule, determine the missing point.

   a) T (x,y) ----- > (x + 3, y – 5)   A (-4,7)   A' (______ , _____)

   b) T (x,y) ----- > (x + 1, y + 6)   A (______ , _____)   A' (4,-1)

2. Determine the translation rule from the pre-image and image.

   a) A (3,5)   A' (-1,3)   T (x,y) ----- > (_________ , _________)

   b) A (-4,11)   A' (3,0)   T (x,y) ----- > (_________ , _________)

3. Convert between vector component form and coordinate form.

   a) $T_{<0,-9>}(A) =$ T (x,y) ----- > (____________ , ____________)

   b) $T_{<-3,1>}(A) =$ T (x,y) ----- > (____________ , ____________)

4. Write the coordinate rule that matches the description.

   a) 5 up   T (x,y) ----- > (____________ , ____________)

   b) right 1 and down 7   T (x,y) ----- > (____________ , ____________)

5. What is the resultant translation of Point A after mapping T (x,y) followed by R (x,y).

a) A (-4,8)   T (x,y) ----- > (x + 3, y – 7)   A' (____ , ____)   R (x,y) ----- > (x – 8, y – 2)   A'' (____ , ____)

b) A (2,0)   T (x,y) ----- > (x – 1, y)   A' (____ , ____)   R (x,y) ----- > (x – 3, y + 3)   A'' (____ , ____)

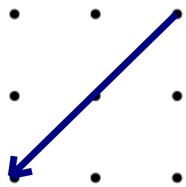
6. Can you find a shortcut to doing two translations from #5?

7. Describe the translation from the following Notation.

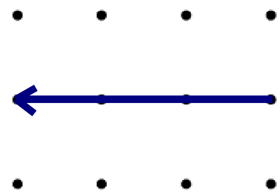
$T_{\langle -6,4 \rangle}$ ____

8. Determine the translation coordinate rule from the vector.

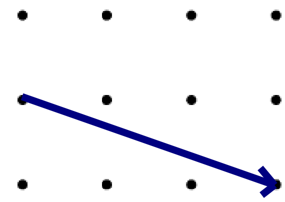
a) T (x,y) ----> (______,______)



b) T (x,y) ----> (______,______)

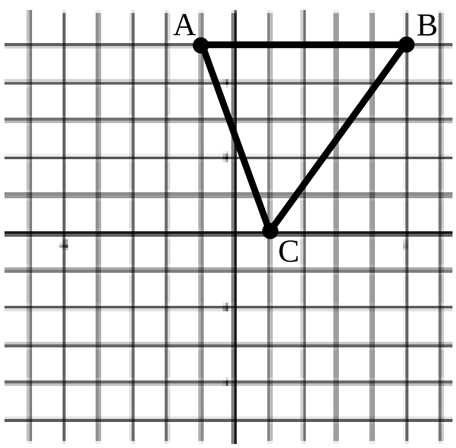


c) T (x,y) ----> (______,______)



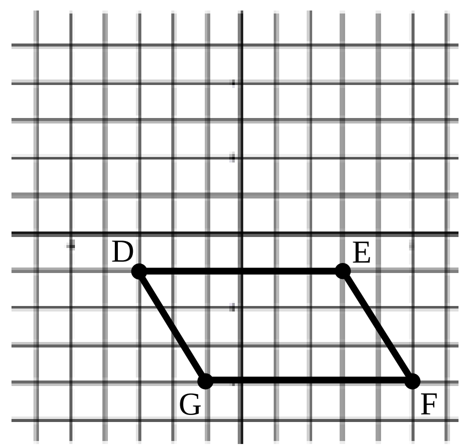
9. Translate the following figures.

a.



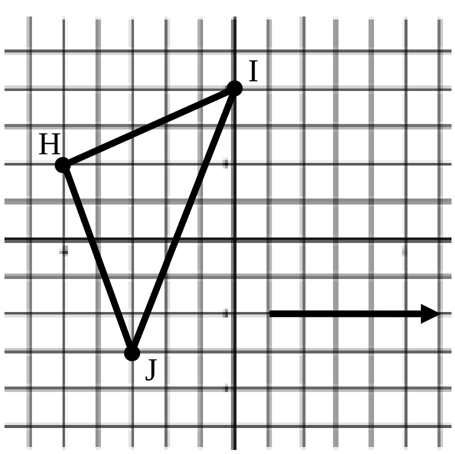
$T(x,y) \dashrightarrow (x-2, y-4)$

b.

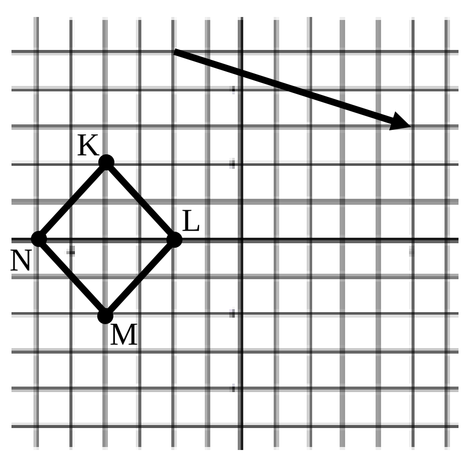


$T_{<-2,6>}(DEFG)$

c.



d.

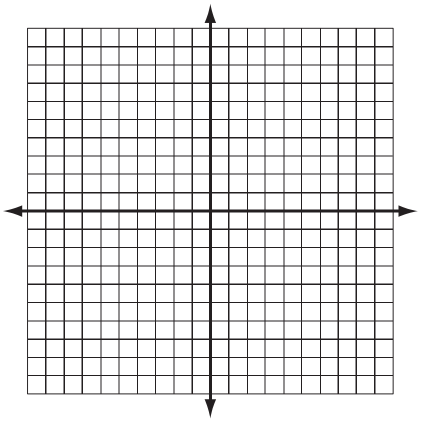


Optional Graphing Lines Review

Name________________________

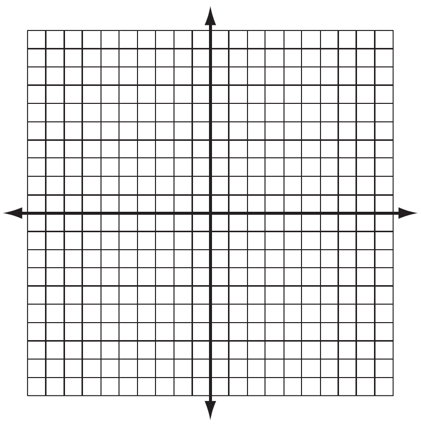
Graph each line and fill in the corresponding table of values. USE a straightedge.

1



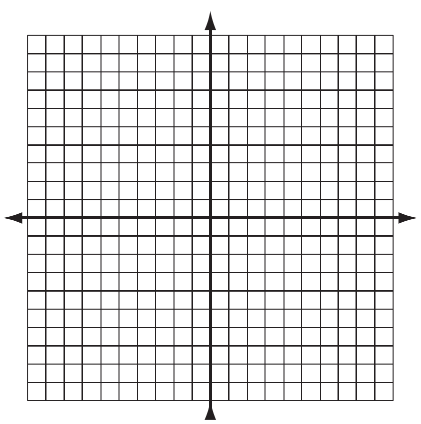
1) $y = x$

2



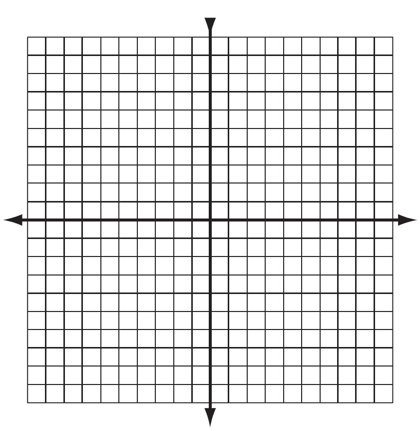
2) $y = -x$

3



3) $y = 3$

4

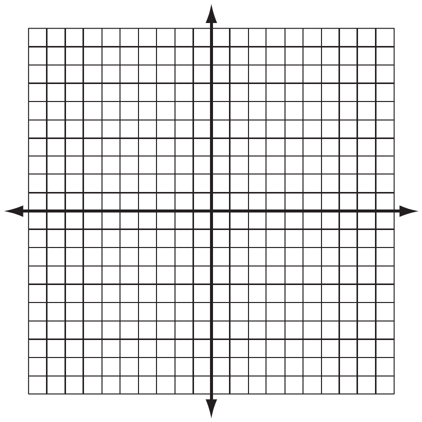


4) $x = -4$

Graphing Lines Review cont'd

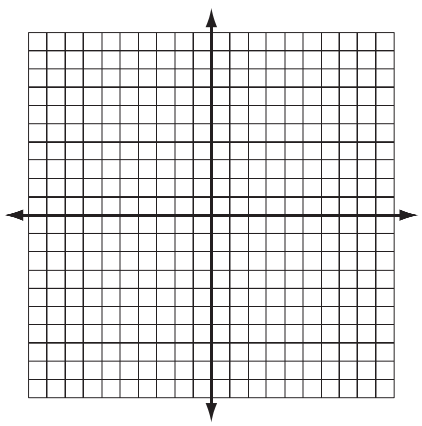
Graph each line and fill in the corresponding table of values. USE a straightedge.

5



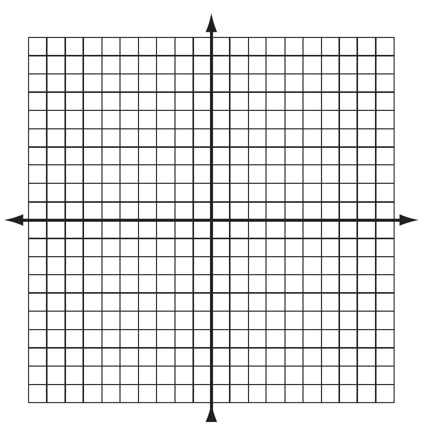
5) $y = -3$

6



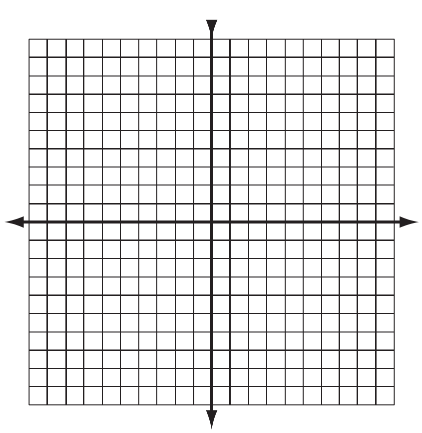
6) $x = 2$

7



7) $y = 2x + 1$

8



8) $y = -3x - 4$

Reflections in Coordinate Geometry

Learning Targets: Students will be able to identify and construct reflections in the coordinate plane.
Students will be able to explain and identify properties of reflections.

REFLECTION ON THE COORDINATE GRID

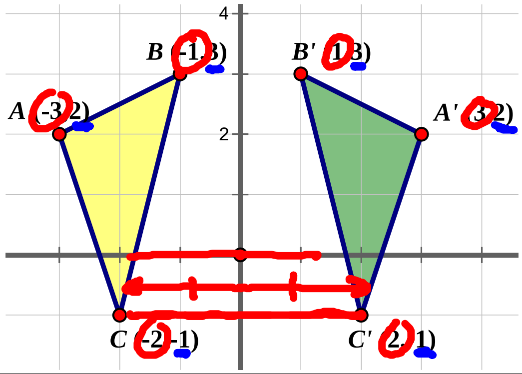
Reflection over the y-axis.

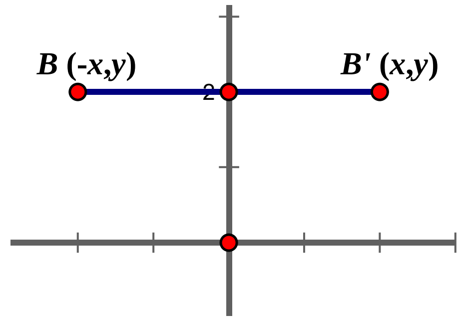
When we reflect over the y-axis y values are:

Stay The Same

x values are:

Opposites.





RULE FOR REFLECTION OVER THE *y*-axis $R_{y\text{-axis}}(x, y) = (-x, y)$

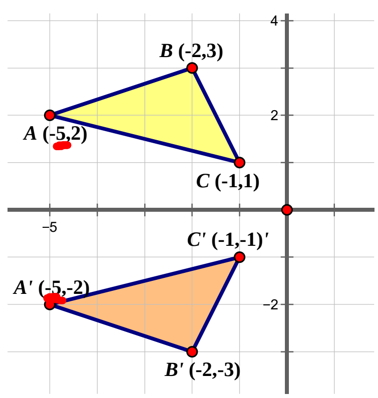
Reflection over the x-axis.

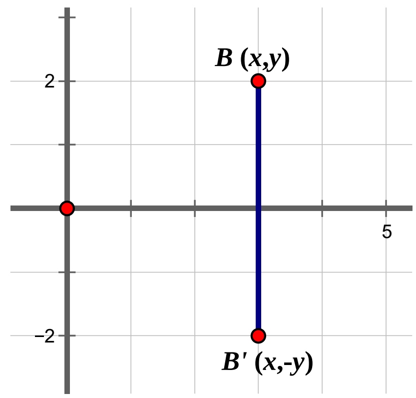
When we reflect over the x-axis x values are:

Stay The Same

y values are:

Opposite.



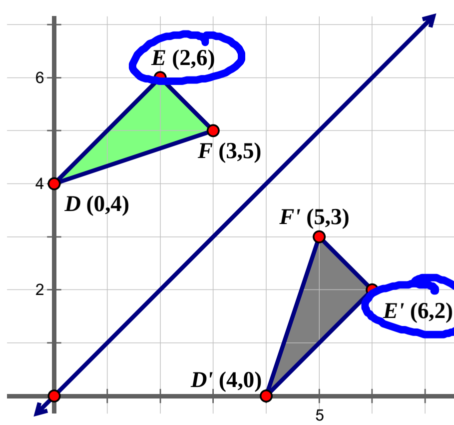


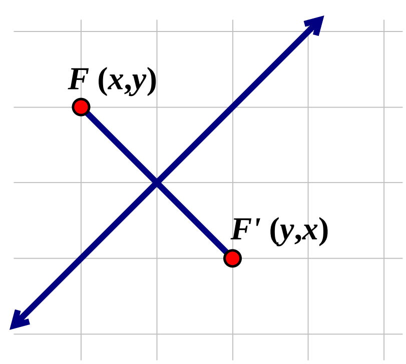
RULE FOR REFLECTION OVER THE *x*-axis $R_{x\text{-axis}}(x, y) = (x, -y)$

Reflection over the y = x line.

When we reflect over the y = x line, x and y values are

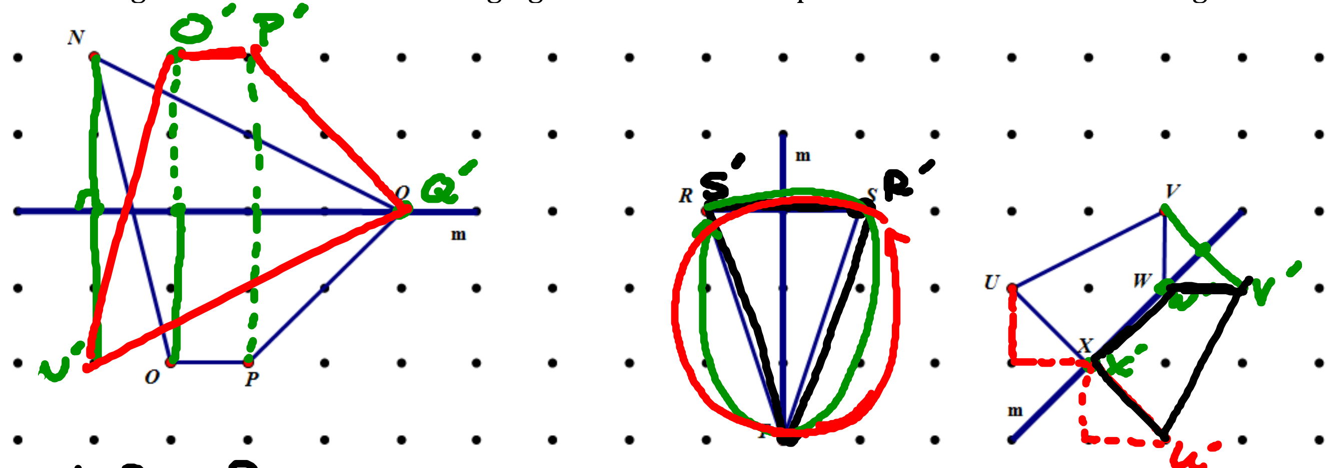
Switched.





RULE FOR REFLECTION OVER *y* = *x* $R_{y=x}(x, y) = (y, x)$

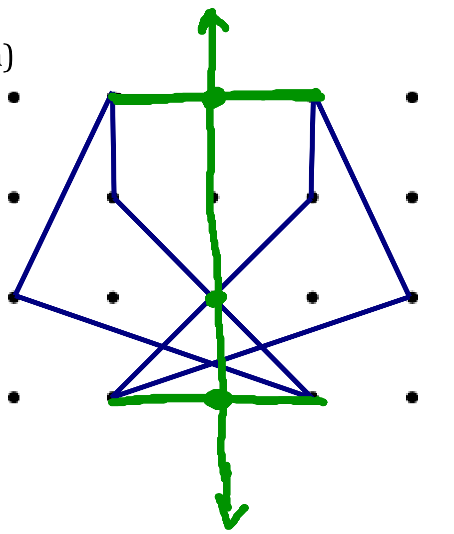
1. Use the grid to reflect the following figures over their respective line m. Label the image.



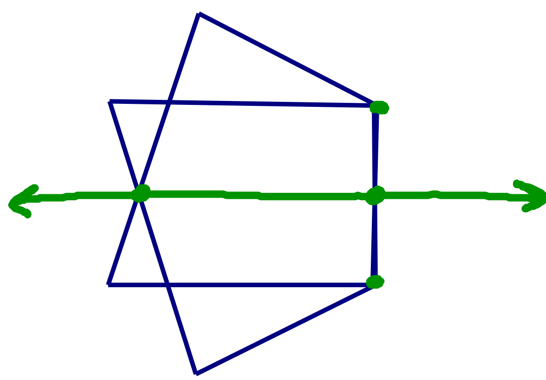
NOPQ → Pre-Image
N'O'P'Q' → Image

2. Determine the line of reflection for the following pre-image and images.

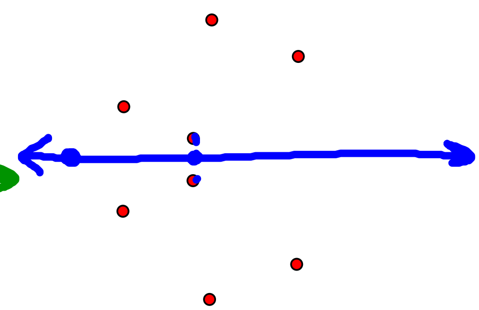
a)



b)



c)



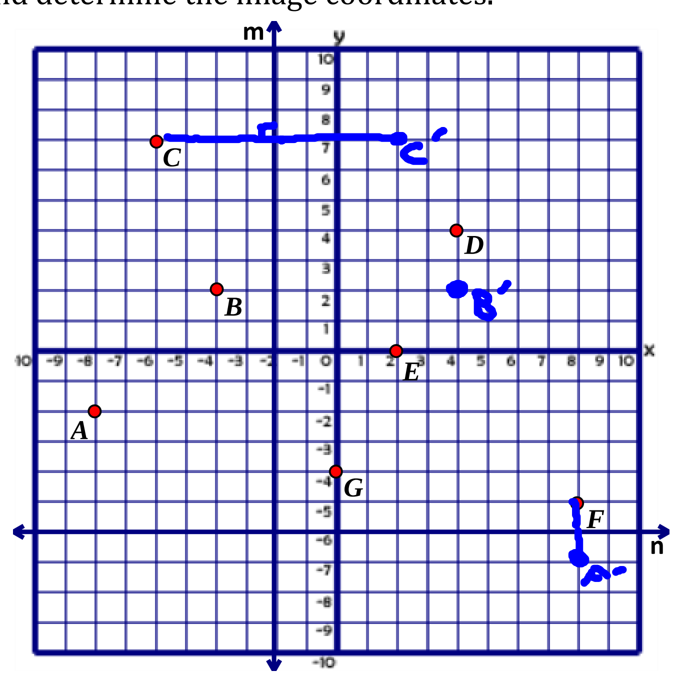
3. Determine the pre-image coordinates, then reflect it, and determine the image coordinates.

a) A = (-8 , -2) $R_{x\text{-}axis}(A)$ A ' = (-8 , 2)

b) B = (-4 , 2) $R_{y\text{-}axis}(B)$ B ' = (4 , 2)

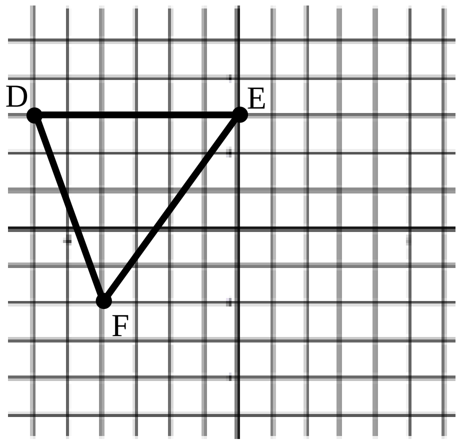
c) C = (-6 , 7) $R_m(C)$ C ' = (2 , 7)

d) F = (8 , -5) $R_n(F)$ F ' = (8 , -7)



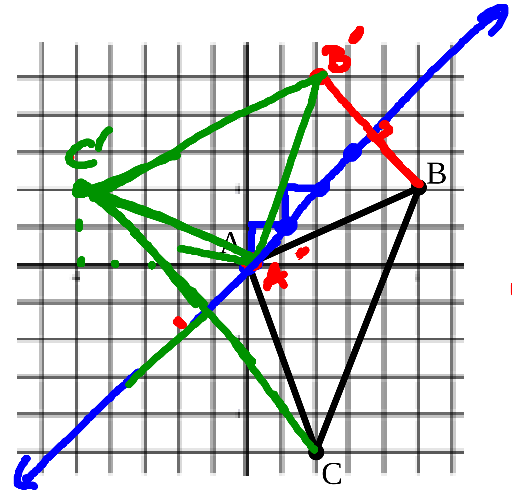
Reflect the following figures.

4.



$R_{y\ axis}(\Delta DEF)$

5.



$R_{y=x}(\Delta ABC)$

slope

$y = mx + b$

intercept

$y = x + 0$

slope $= 1 = \frac{1}{1}$

intercept $= 0$

$R_{y=x}(x, y) = (y, x)$

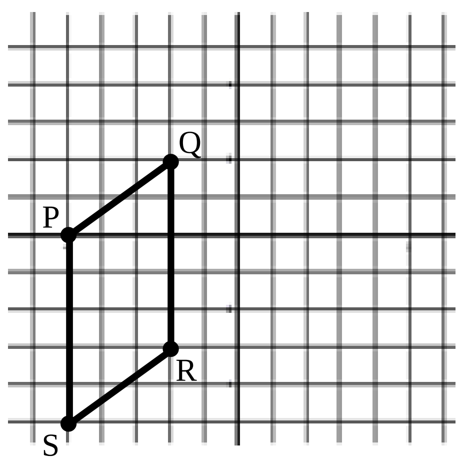
$A(0,0) \rightarrow A'(0,0)$

$B(5,2) \rightarrow B'(2,5)$

$C(2,-5) \rightarrow C'(-5,2)$

x	y
3	3
1	1
-2	-2

6.



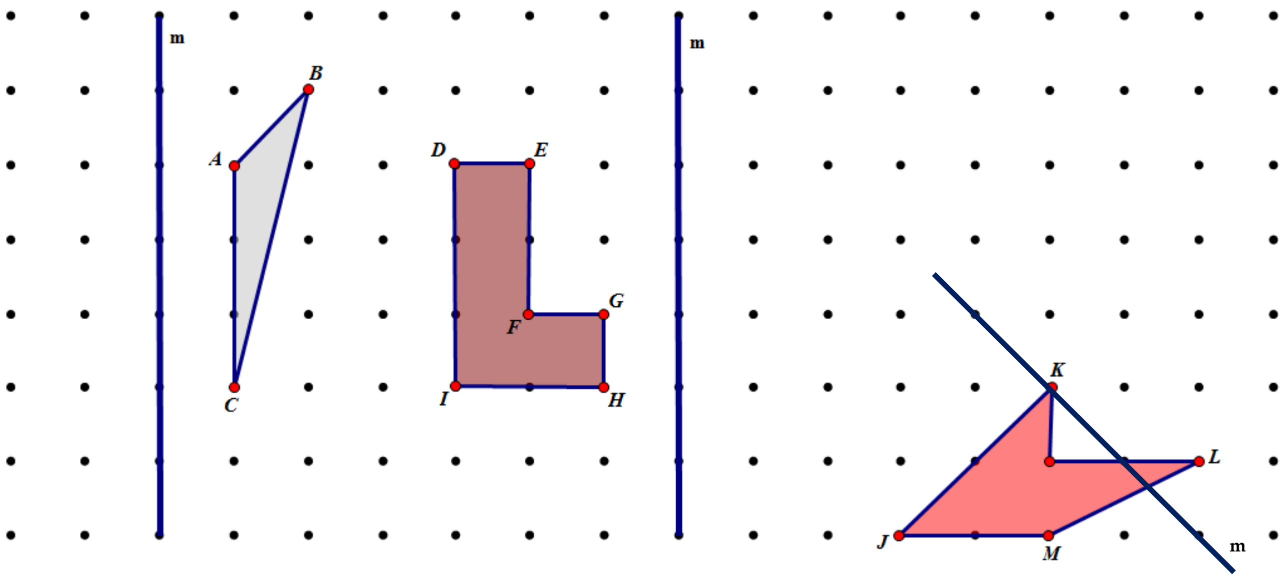
$R_{x\ axis}(PQRS)$

Reflection HW

Geometry

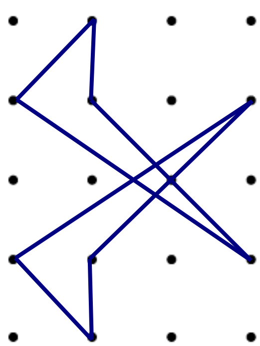
Name: ______________________
Date: ____________ **Per:**______

1. Use the grid or patty paper to reflect the following figures over their respective line *m*. Label the image.

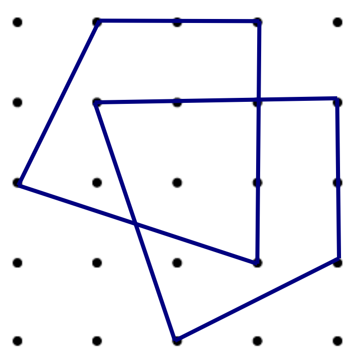


2. Determine the line of reflection for the following pre-image and images.

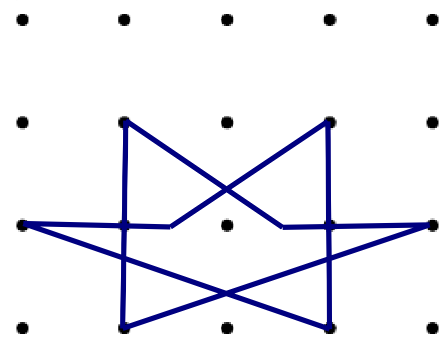
a)



b)



c)



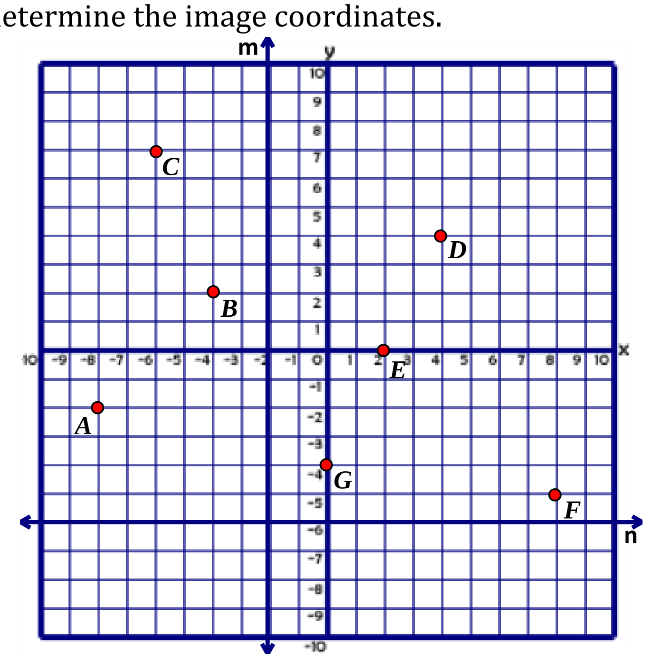
3. Determine the pre-image coordinates, then reflect it, and determine the image coordinates.

a) D = (___ , ___) $R_{x\text{-}axis}(D)$ D ‘ = (___ , ___)

b) E = (___ , ___) $R_{y\text{-}axis}(E)$ E ‘ = (___ , ___)

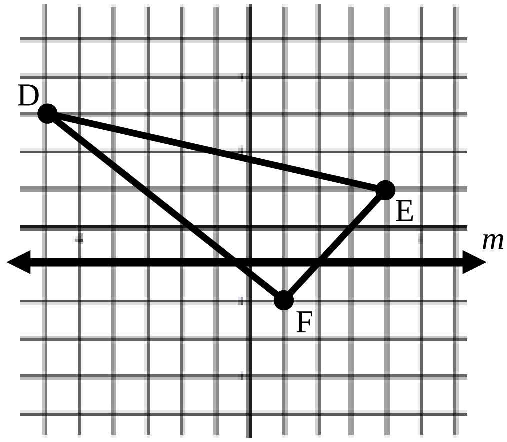
c) A = (___ , ___) $R_m(A)$ A ‘ = (___ , ___)

d) G = (___ , ___) $R_n(G)$ G ‘ = (___ , ___)



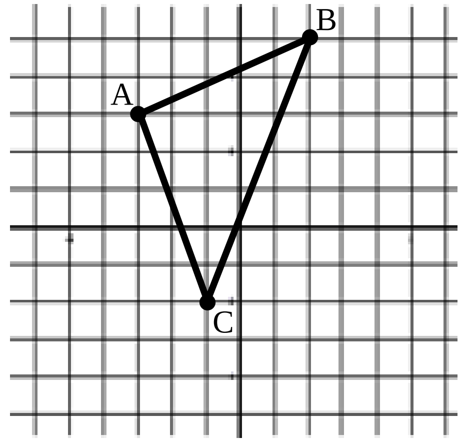
4. Reflect the following figures.

a)



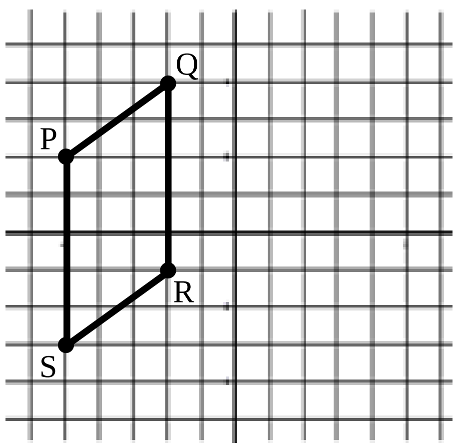
$R_m(\Delta DEF)$

b)



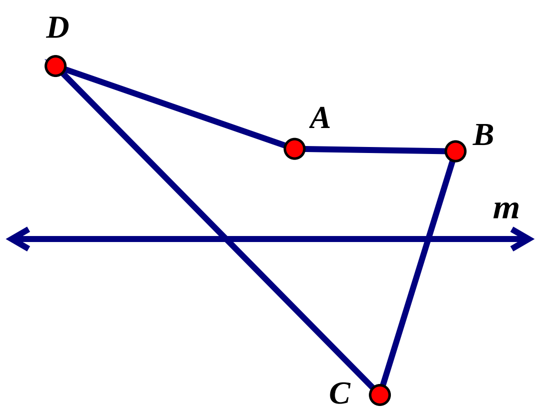
$R_{y\text{-}axis}(\Delta ABC)$

c)



$R_{y=x}(PQRS)$

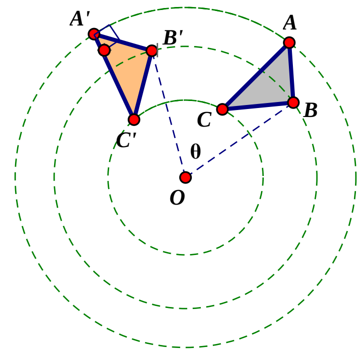
5. Use a compass and a straightedge to construct a reflection of the given figure.



Rotations in Coordinate Geometry

Learning Targets: Students will be able to identify and construct rotations in the coordinate plane. Students will be able to explain and identify properties of rotations.

KEY TERMS



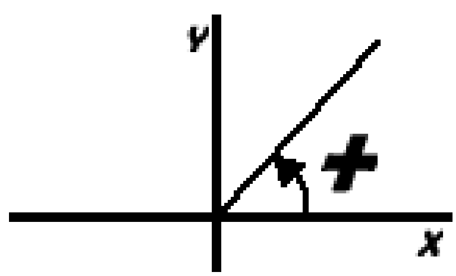
Rotation: TURN: WITH A CENTER and an Angle of ROTATION

Angle of Rotation ($R_{center, degree}$)

A **rotation** about a Point O through Θ degrees is an isometric transformation that maps every point P in the plane to a point P', so that the following properties are true;

ROTATION DIRECTION

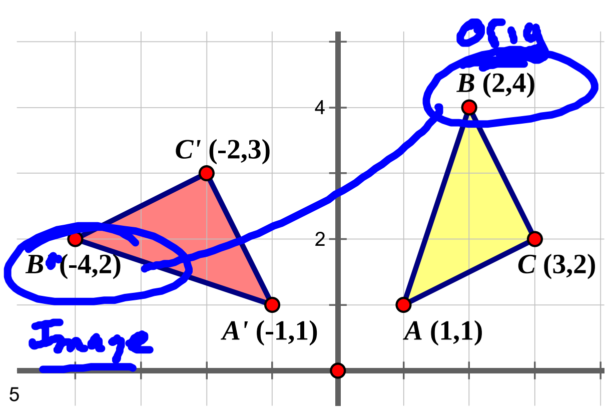
One full rotation is **360°**, this would return all points in the plane to their original location. Because a rotation can go in two directions along the same arc we need to define positive and negative rotation values. **COUNTERCLOCKWISE IS A POSITIVE DIRECTION**, and **CLOCKWISE IS A NEGATIVE DIRECTION**.

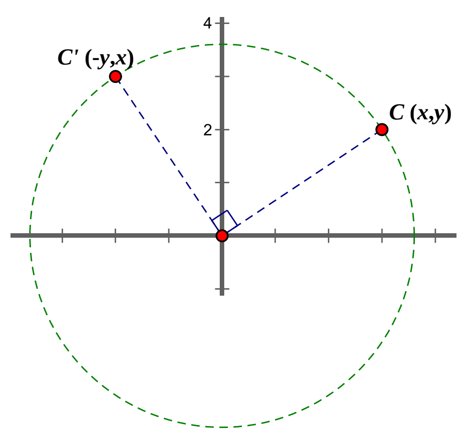


ROTATION ON THE COORDINATE GRID

Rotation of 90° about the Origin

When we rotate 90° about the origin, we see that the x and y coordinates are switch x & y and the y is opposite



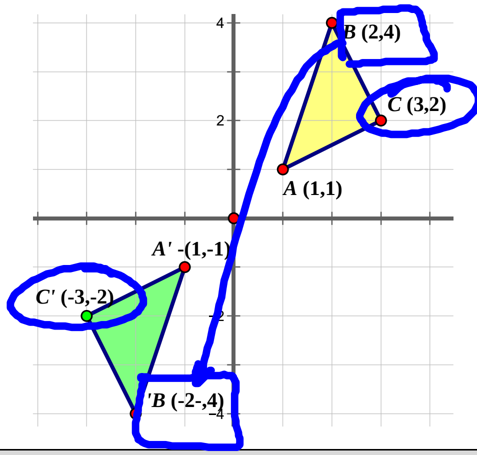


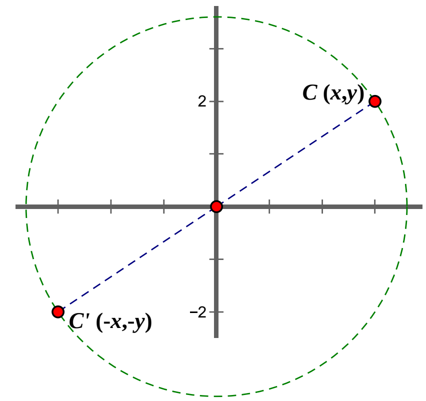
RULE FOR ROTATION BY 90° ABOUT THE ORIGIN $R_{O,90°}(x,y) = (-y,x)$

Rotation of 180° about the origin

When we rotate by 180° about the origin, we see the x and y coordinates

opposite of both





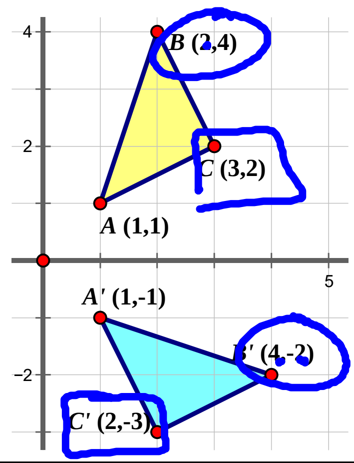
RULE FOR ROTATION BY 180° ABOUT THE ORIGIN $R_{O,180°}(x, y) = (-x,-y)$

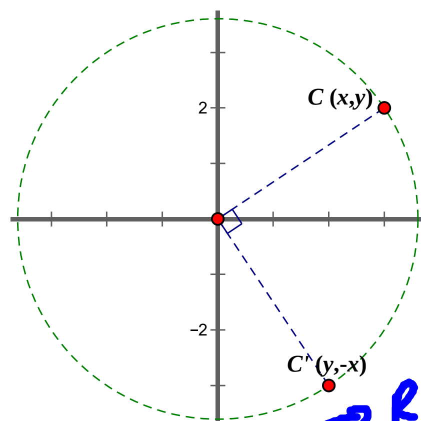
Rotation of 270°(-90°) about the Origin

When we rotate by 270° about the origin, we see that the x and y coordinates are

switch x & y

x is opposite



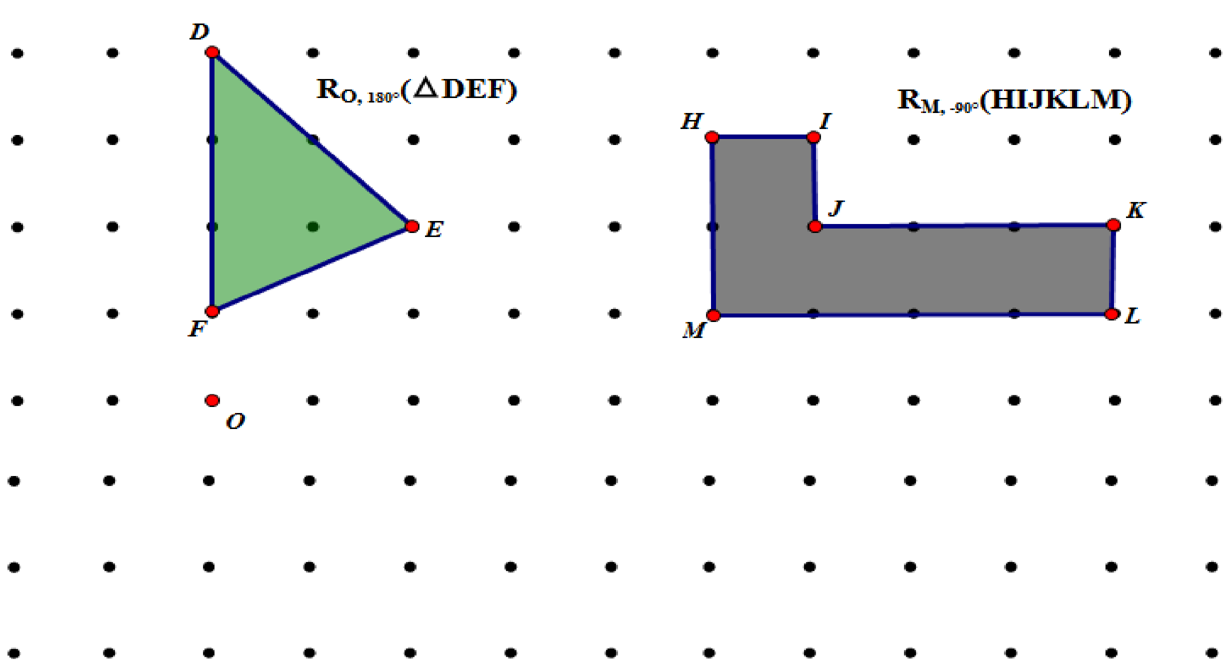


→ $R(0,-90°)$

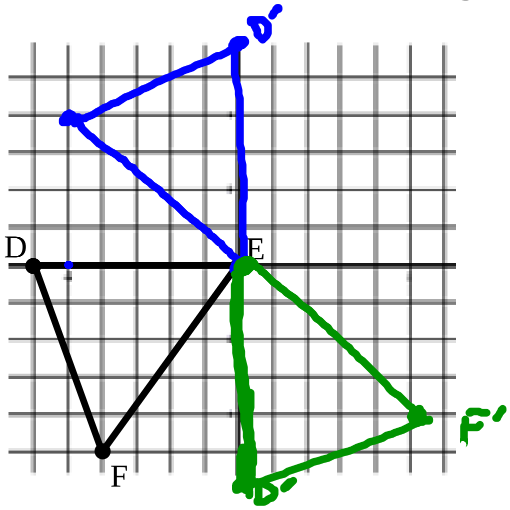
RULE FOR ROTATION BY 270° ABOUT THE ORIGIN $R_{O,270°}(x, y) = (y,-x)$

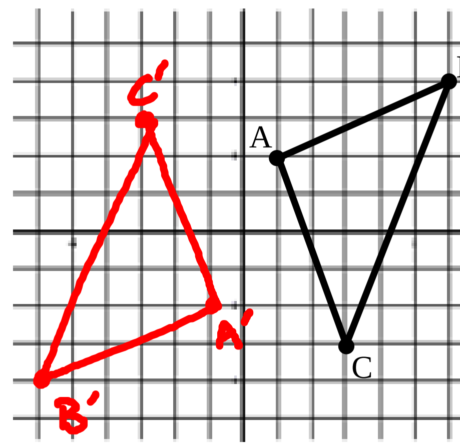
---

1. Use the grid to rotate the following figures. Label the image.



Determine the coordinates for the given rotation and plot the image





$R_{O,-90^\circ}(\Delta DEF)$

(x,y) → (y,−x)

$R_{O,90^\circ}$

D = (-6 , 0) D ' = (0 , 6) D' (0 , 6) (0 , -6)

E = (0 , 0) E ' = (0 , 0) E' (0 , 0) (0 , 0)

F = (-4 , -5) F ' = (-5 , 4) (5 , -4)

F' = (-5 , 4)

$R_{O,180^\circ}(\Delta ABC)$

(x,y) → (−x,−y)

A = (1 , 2) A ' = (-1 , -2)

B = (6 , 4) B ' = (-6 , -4)

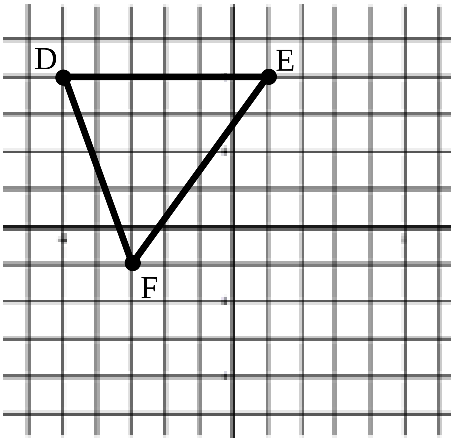
C = (3 , -3) C ' = (-3 , 3)

Rotation HW

Geometry

Name: ____________________
Date: ____________ **Per:**______

Determine the coordinates for the given rotation and plot the image.

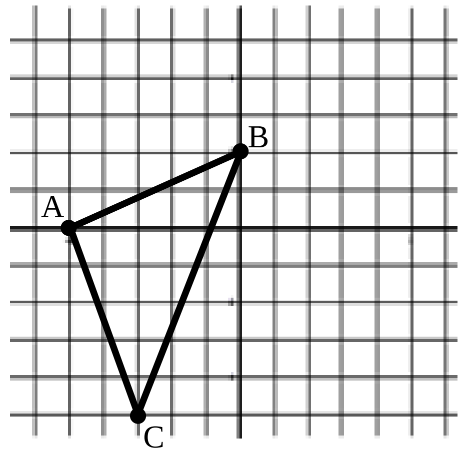
1.


$R_{O,-90^\circ}(\Delta DEF)$

D = (___ , ___) D ' = (___ , ___)

E = (___ , ___) E ' = (___ , ___)

F = (___ , ___) F ' = (___ , ___)

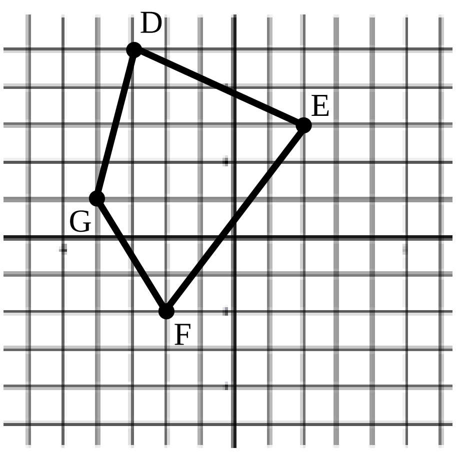
2.


$R_{O,270^\circ}(\Delta ABC)$

A = (___ , ___) A ' = (___ , ___)

B = (___ , ___) B ' = (___ , ___)

C = (___ , ___) C ' = (___ , ___)

3.


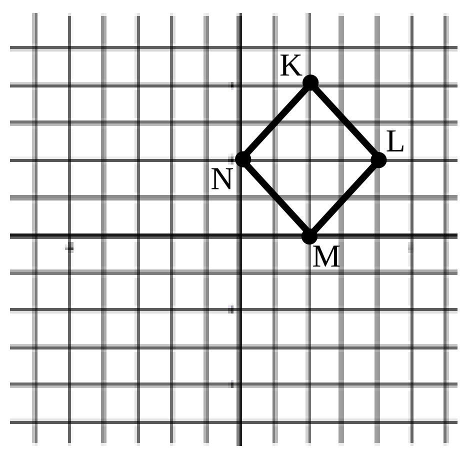
$R_{O,180^\circ}(DEFG)$

D = (___ , ___) D ' = (___ , ___)

E = (___ , ___) E ' = (___ , ___)

F = (___ , ___) F ' = (___ , ___)

G = (___ , ___) G ' = (___ , ___)

4.


$R_{O,90^\circ}(KLMN)$

K = (___ , ___) K ' = (___ , ___)

L = (___ , ___) L ' = (___ , ___)

M = (___ , ___) M ' = (___ , ___)

N = (___ , ___) N ' = (___ , ___)

5. Given a rotation about the origin, determine the missing point.

a) $R_{O,90^\circ}(A)$ $A(8,-2)$ A' (_____ , _____)

b) $R_{O,180^\circ}(A)$ $A(-3,4)$ A' (_____ , _____)

c) $R_{O,270^\circ}(A)$ $A(-7,-1)$ A' (_____ , _____)

6. Determine the name of the point that meets the given conditions.

a) $R_{G,60^\circ}(A) =$ _____

b) $R_{G,180^\circ}(B) =$ _____

c) $R_{G,300^\circ}(D) =$ _____

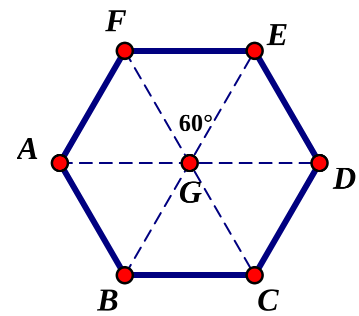
d) $R_{G,-120^\circ}($_______$) = \mathrm{B}$

e) $R_{G,240^\circ}(E) =$ _____

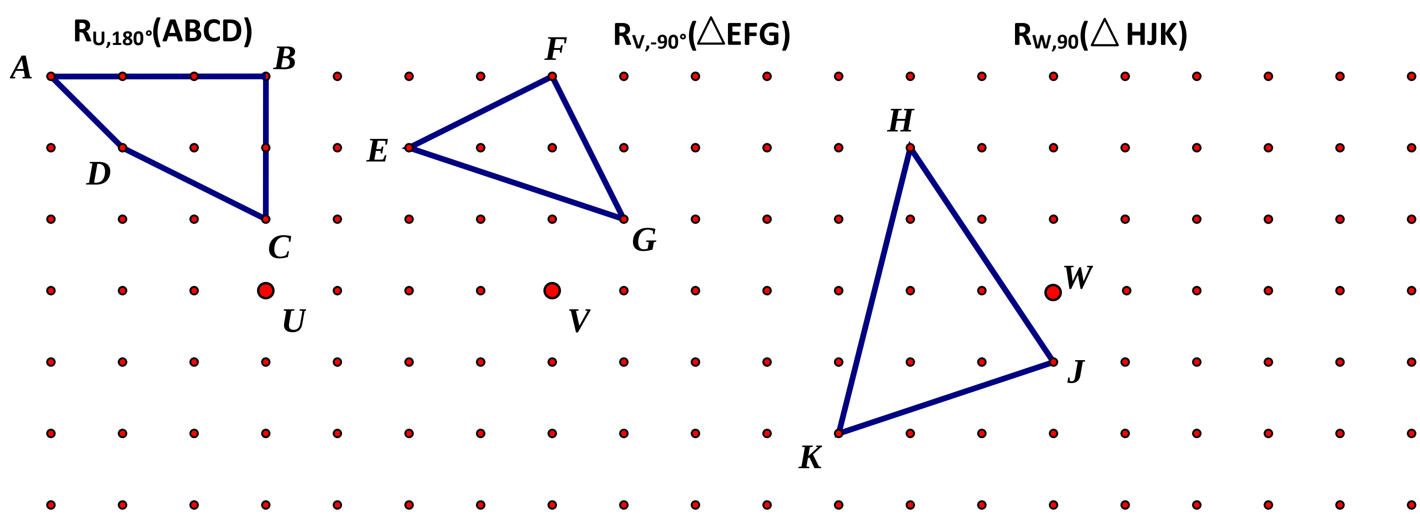
f) $R_{G,-240^\circ}(F) =$ _____

g) $R_{A,60^\circ}(B) =$ _____

h) $R_{C,120^\circ}(D) =$ _____



7. Rotate the following.

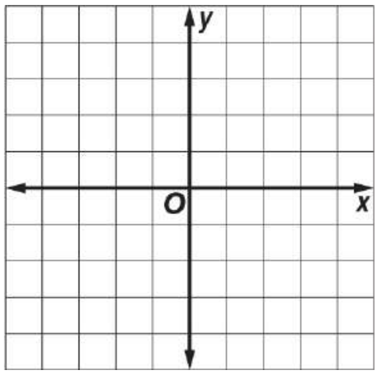


Geometry Unit 1 Review

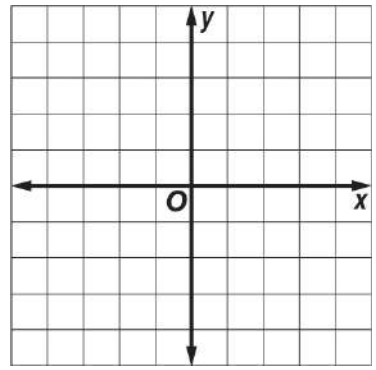
NAME: ______________________________Per___

Show ALL WORK for credit. This assignment is worth one point per completed problem.

1. Quadrilateral *ABCD* with vertices *A*(–3, 3), *B*(1, 4), *C*(4, 0), and *D*(–3, –3). Then rotate it 180 degrees.



2. Graph △*FGH* with vertices *F*(–3, –1), *G*(0, 4) and *H*(3, –1) and translate it 5 units up and 2 units to the right.



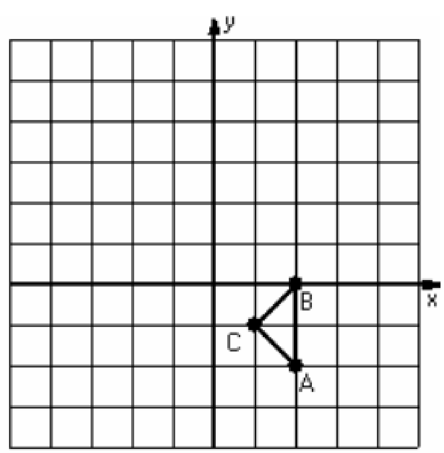
3. Using the △*FGH* with vertices *F*(–3, –1), *G*(0, 4) and *H*(3, –1):

Lacy performs the translation $(x, y) \rightarrow (x + 5, y + 3)$ to an object in the coordinate plane.
Kyle performs the translation $(x, y) \rightarrow (x - 4, y + 2)$ to the same object after Lacy.

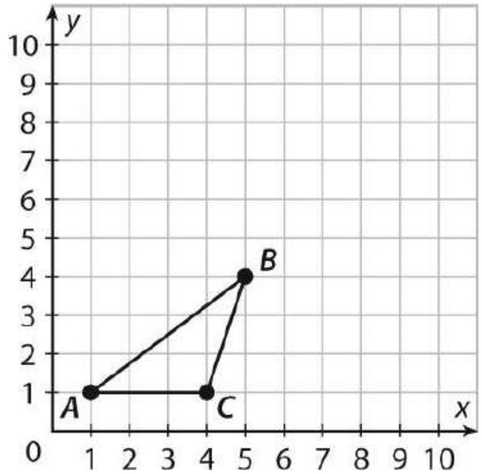
What single translation could have been done to achieve the same effect as Lacy and Kyle's combined translations? Would the result have been different if Kyle did his translation first? EXPLAIN.

4. Rotate triangle ABC 90 degrees counterclockwise about the origin. Graph this triangle in the coordinate plane below and label it triangle A'B'C'.

Then reflect triangle A'B'C' over the line $y = -x$. Graph this new triangle in the coordinate plane below and label it triangle A''B''C''.



For 5-6, use triangle ABC.



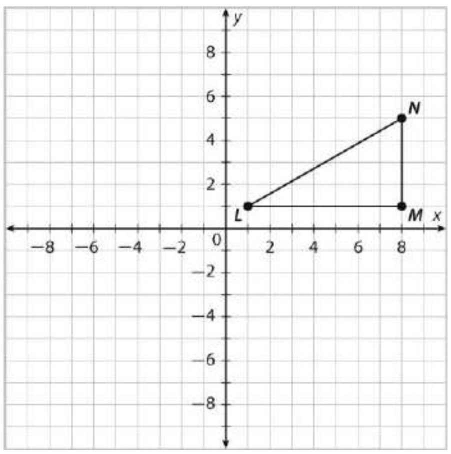
5. Triangle *ABC* will be translated 3 units right and 6 units up. Write a coordinate rule to describe the translation.

____

6. What will be the coordinates of the image of point *A*?

____

For 7-9, use triangle *LMN*.



7. What will be the coordinates of the image of point *M* after it is rotated 90° clockwise about the origin?

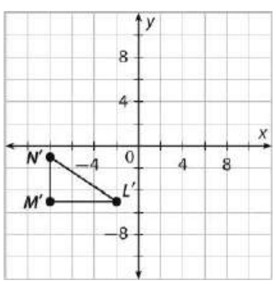
____

8. What counterclockwise rotation will create the same image as a 90° clockwise rotation about the origin?

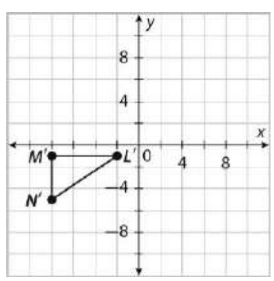
____

9. Which of these shows the image of triangle *LMN* after a 180° rotation about the origin?

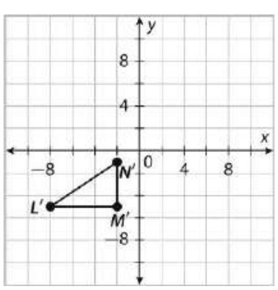
A



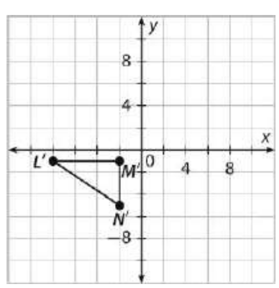
B



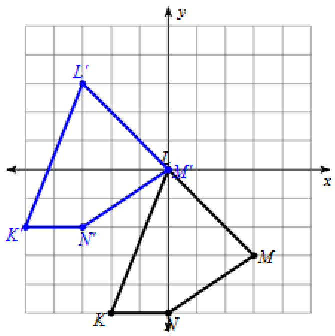
C

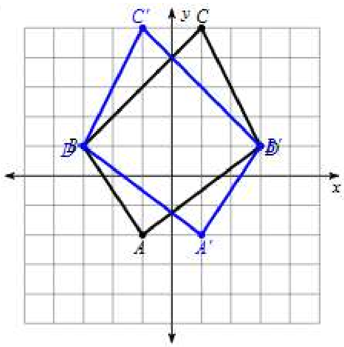


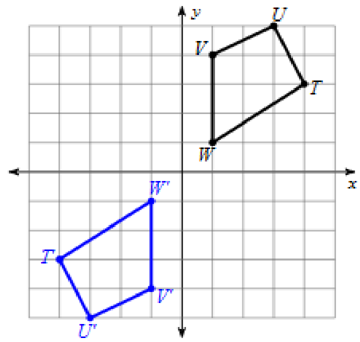
D

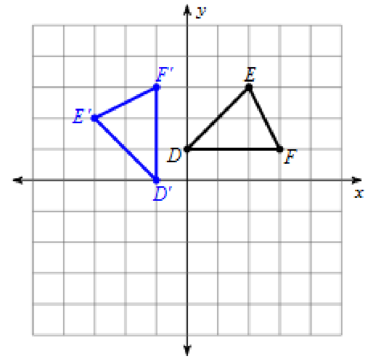


10. Write a coordinate rule to describe the each of the following transformations.









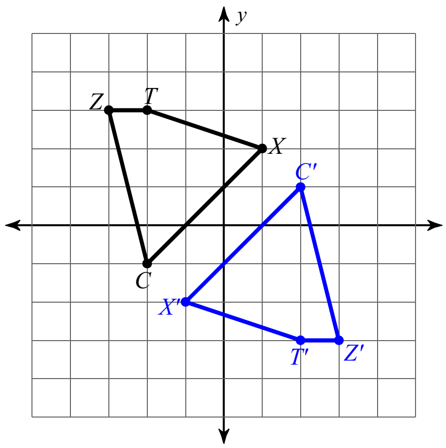
(x,y) → (___ , ___)   (x,y) → (___ , ___)   (x,y) → (___ , ___)   (x,y) → (___ , ___) Geometry Unit 1 Name___________________________________ ID: 1

Review All Transformations

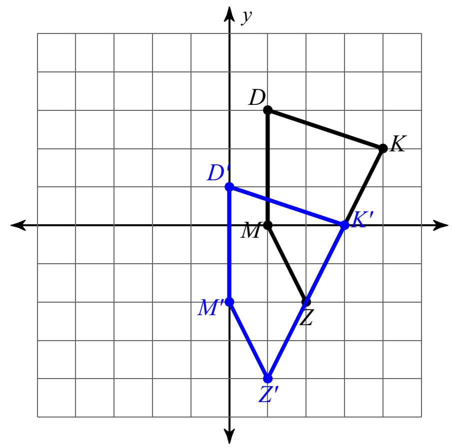
Date________________ Period____

Write a rule to describe each transformation.

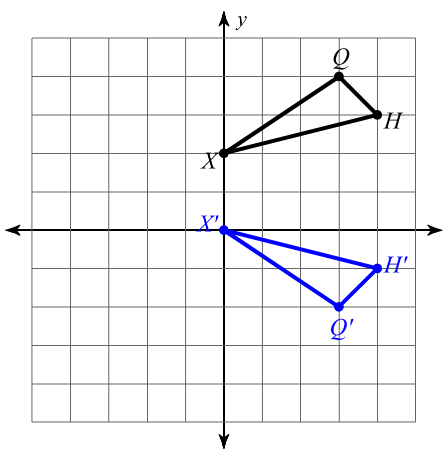
1)



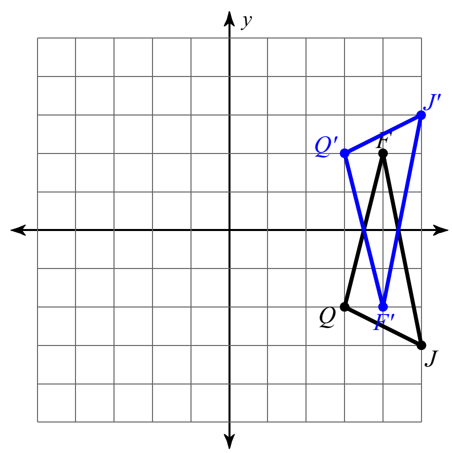
2)



3)

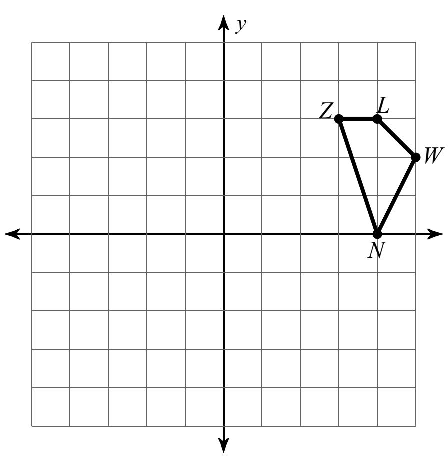


4)

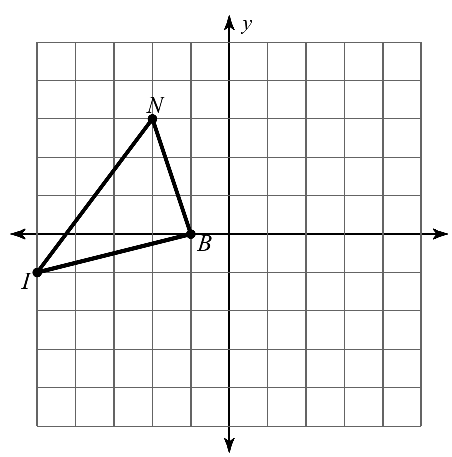


Graph the image of the figure using the transformation given.

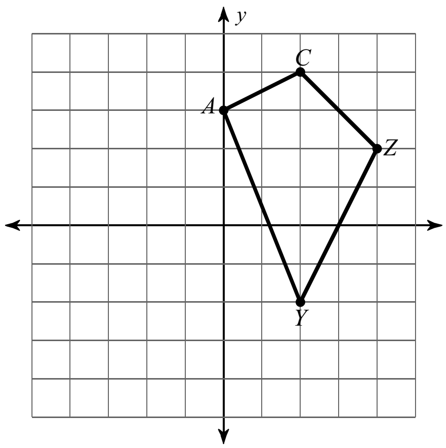
5) translation: $(x,\ y) \rightarrow (x - 3,\ y - 3)$



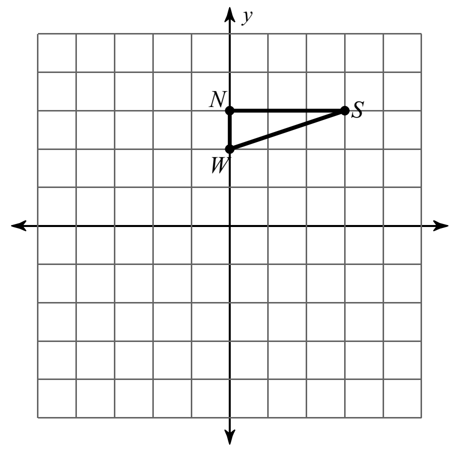
6) translation: $(x,\ y) \rightarrow (\ \ + 5,\ y - 1)$



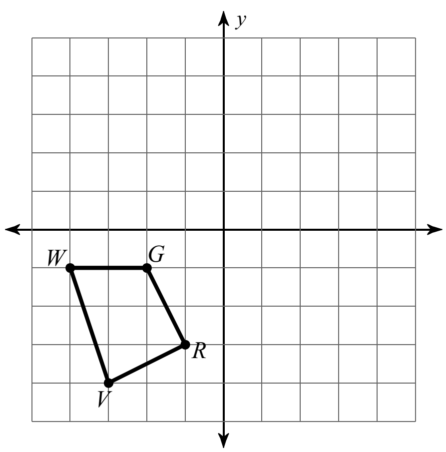
7) rotation 180° about the origin



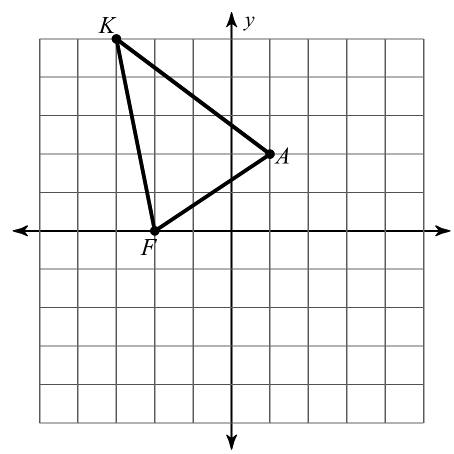
8) reflection across $y =$



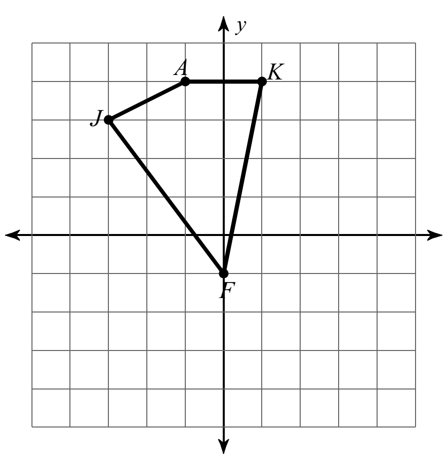
9) rotation 90° counterclockwise about the origin



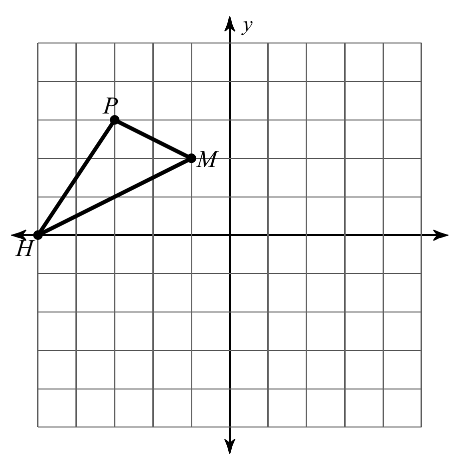
10) reflection across $y = -x$



11) reflection across the x-axis

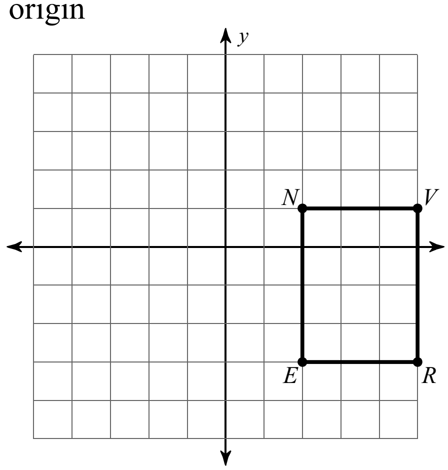


12) rotation 90° clockwise about the origin

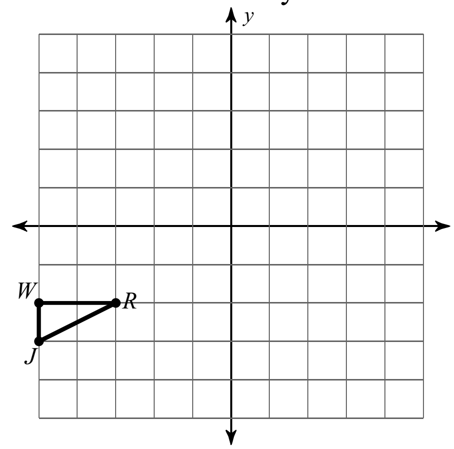


Find the coordinates of the vertices of each figure after the given transformation.

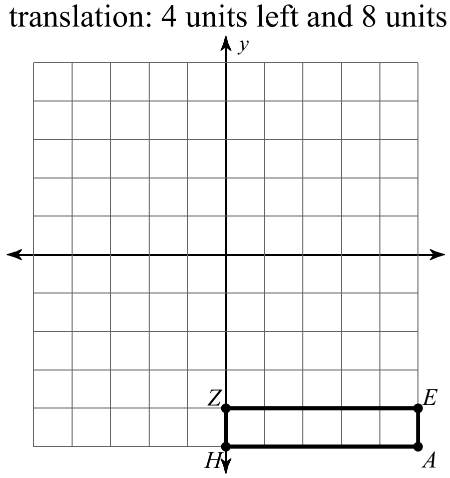
13) rotation 90° counterclockwise about the origin



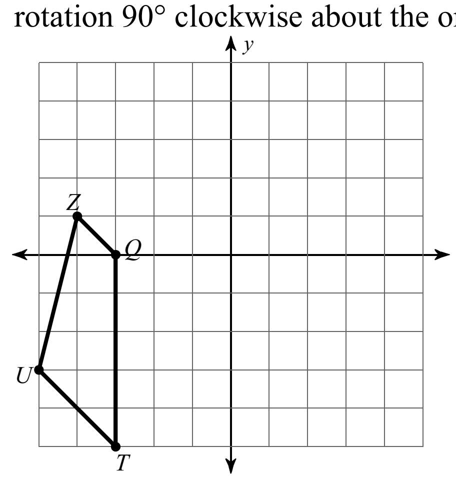
14) reflection across the y-axis



15) translation: 4 units left and 8 units up



16) rotation 90° clockwise about the origin



Unit 2

Constructions & Postulates

Points, Lines, and Planes

***Learning Targets:* Students will understand and apply the basic terminology of geometry.**
Students will be able to sketch diagrams of geometric figures.

A **definition** uses known words to describe a new word. In geometry, some words, such as *point, line, and plane* are **undefined terms**. Although these words are not formally defined, it is important to have a general agreement about what each word means.

UNDEFINED TERMS

Point: a dot; or a location in space
has no dimensions

Line: contains at least 2 points; one dimensional
extends infinitly in 2 directions (straight line)

Plane: a two dimensional shape which contains at
least 3 non linear points extends forever in 2 dimensions
a plane contains at least 2 lines

DEFINED TERMS

Collinear Points: points on the same line • P

Coplanar Points: points on the same plane

Line Segment: part of a line with 2 endpoints X M $\overline{XM}$

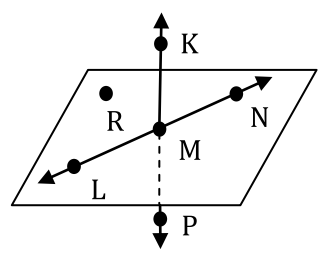
Ray: Part of a line with one endpoint E L $\overrightarrow{EL}$

Opposite rays: Two rays that share an endpoint and create a line.

1. a. Name three points that are collinear. L, M, N

   b. Name four points that are not coplanar. L, R, K, N

   c. Name three points that are not collinear.



2. a. Draw 3 collinear points A, B, C.

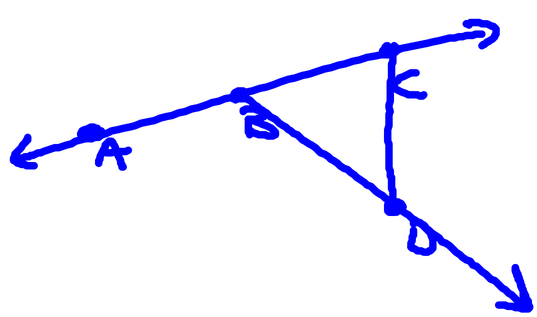
   b. Draw point D not collinear with ABC.

   c. Draw $\overleftrightarrow{AB}$. A B

   d. Draw ray $\overrightarrow{BD}$.

   e. Draw segment $\overline{CD}$.

   f. Name opposite rays. $\overrightarrow{BA}$ $\overrightarrow{BC}$



3. Draw a line. Label three points on the line and name a pair of opposite rays.

Properties
Definitions
Postulates
Theorems

POSTULATES

A postulate is a rule that is accepted without proof.

POINT, LINE AND PLANE POSTULATES — **SKETCH**

Through any two points there exists exactly 1 line.

A line contains at least 2 points.

If two lines intersect, then their intersection is exactly 1 point.

Through any three noncollinear points there exists exactly 1 plane.

If a plane exists, then it contains at least 3 points. or at least 2 lines

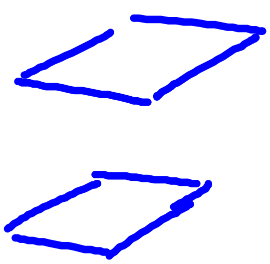
If two points lie in a plane, then the line containing them lies in the plane.

If two planes intersect, then their intersection is a line.

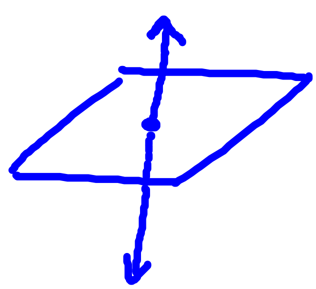
SKETCHING INTERSECTIONS OF LINES AND PLANES

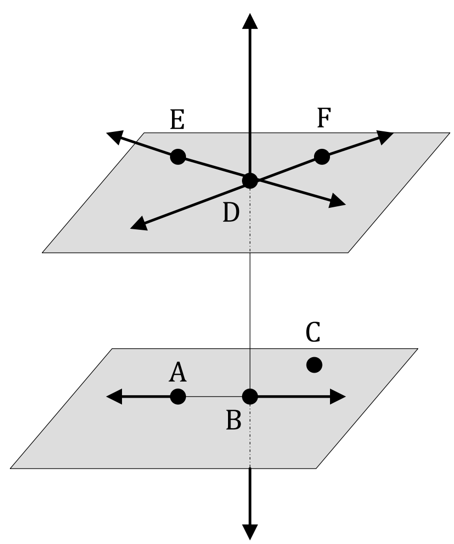
Two or more geometric figures intersect if they have one or more points in common. The intersection of the figures is the set of points the figures have in common.

4. Sketch two planes that do not intersect.



5. Sketch a line that intersects a plane in one point.





6. Answer True or False for the following:

a) Points A, B, and C are collinear. F
b) Points A, B, and C are coplanar. T
c) Point F lies on $\overleftrightarrow{DE}$. F
d) $\overleftrightarrow{DE}$ lies on plane DEF. T
e) $\overleftrightarrow{BD}$ and $\overleftrightarrow{DE}$ intersect. T
f) $\overleftrightarrow{BD}$ is the intersection of plane ABC and plane DEF. F

Points, Planes HW

Geometry

Name: ____________________
Date: _________ **Per:** _______

<u>Directions</u>: State which geometry term best describes the notation and then illustrate it.

	<u>Geometry Term</u>	**<u>Illustration</u>**
1. $\overrightarrow{PQ}$	_____________	
2. $\overleftrightarrow{PQ}$	_____________	
3. $\overrightarrow{QP}$	_____________	
4. $\overline{PQ}$	_____________	

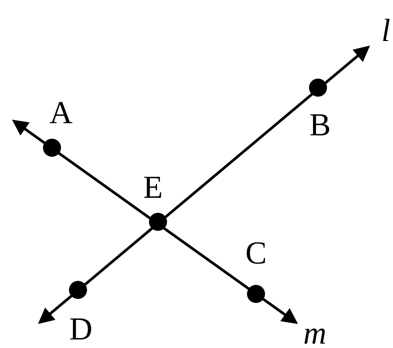
<u>Directions</u>: Decide whether the statement is true or false.

5. Point A lies on line *l*.

6. A, B, and C are collinear.

7. Point C lies on line *m*.

8. A, B, and C are coplanar.



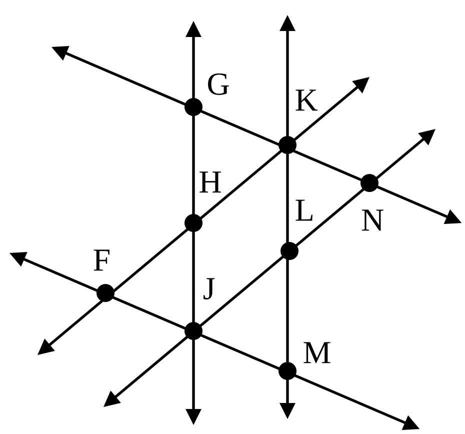
<u>Directions</u>: Name a point that is collinear with the given points.

9. F and H

10. K and L

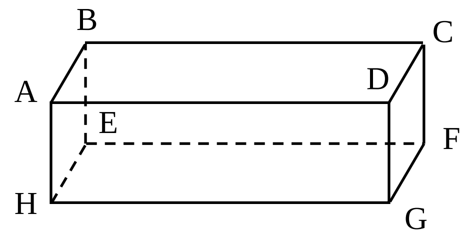
11. J and N

12. H and G



Directions: **Name a point that is coplanar with the given points.**

13. A, B, and C



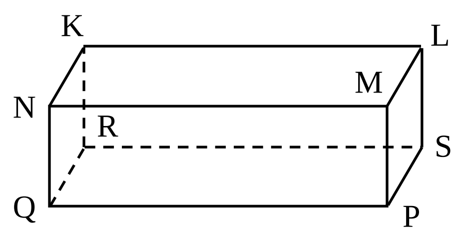
14. G, A, and D

15. B, C, and F

16. A, B, and F

Directions: **Name all points that are not coplanar with the given points.**

17. P, Q, and R



18. N, K, and L

19. S, P, and M

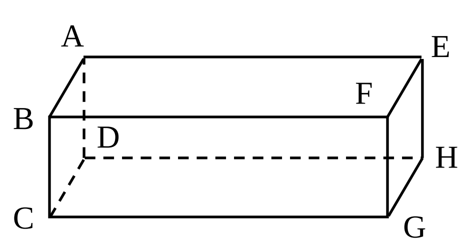
20. Q, K, and L

Directions: **Sketch the lines, segments, and rays.**

21. Draw four points J, K, L, and M no three of which are collinear. Then sketch $\overleftrightarrow{LM}$, $\overline{KL}$, $\overrightarrow{JK}$, and $\overrightarrow{MJ}$.

Directions: **Fill in each blank with the appropriate response based on the points labeled in the diagram.**

22. $\overleftrightarrow{BA}$ and $\overleftrightarrow{AE}$ intersect at _______ .



23. Plane ABC and plane CHG intersect at ______________ .

24. Plane ADH and plane ABF intersect at ______________.

Optional Radical Review & Extra Practice Name________________________

Prime Factorization to Simplify Square Roots

Period____

Simplify.

1) $\sqrt{8}$ $= \sqrt{4 \cdot 2}$ $= 2\sqrt{2}$

2) $\sqrt{18}$

3) $\sqrt{20}$ $= \sqrt{2 \cdot 10}$ $= \sqrt{2 \cdot 2 \cdot 5}$ $= 2\sqrt{5}$

$\sqrt{4 \cdot 5}$ $2\sqrt{5}$

4) $\sqrt{32}$

5) $\sqrt{72}$ $= \sqrt{9 \cdot 8}$ $= \sqrt{9 \cdot 4 \cdot 2}$ $= 3 \cdot 2\sqrt{2}$ $= 6\sqrt{2}$

6) $\sqrt{100}$

7) $\sqrt{150}$ $= \sqrt{25 \cdot 6}$ $= 5\sqrt{6}$ → EXACT ANSWER

Simplify

8) $\sqrt{192}$

9) $\sqrt{384}$

10) $\sqrt{448}$

Extra OPTIONAL Practice. Simplify

11) $\sqrt{125}$

12) $\sqrt{27}$

13) $\sqrt{36}$

14) $\sqrt{75}$

15) $\sqrt{216}$

16) $\sqrt{96}$

17) $\sqrt{105}$

18) $\sqrt{50}$

19) $\sqrt{70}$

20) $\sqrt{343}$

21) $\sqrt{20}$

22) $\sqrt{18}$

23) $\sqrt{175}$

24) $\sqrt{48}$

25) $\sqrt{128}$

26) $\sqrt{42}$

27) $\sqrt{16}$

28) $\sqrt{252}$

29) $\sqrt{108}$

30) $\sqrt{32}$

31) $\sqrt{192}$

32) $\sqrt{200}$

33) $\sqrt{196}$

34) $\sqrt{72}$

35) $\sqrt{256}$

Segments and Their Measures

***Learning Targets:** Students will be able to understand and apply the segment addition postulate.*
Students will be use the distance formula to calculate measures of segments.

Postulates: True without Proof (Accepted without proof)

vs.

Theorems: Statement Proven to Be True

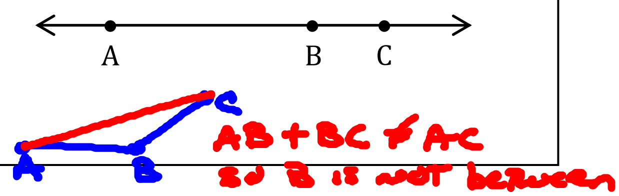
$\overline{AB}$ → segment AB (picture)
AB → distance from A to B (number)

SEGMENT ADDITION POSTULATE

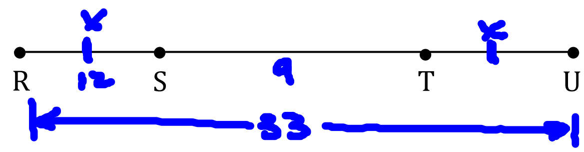
If B is between A and C, then AB + BC = AC.

If AB + BC = AC, then B is between A and C.

NOT BETWEEN



1. RS = TU, ST = 9, RU = 33



a) Find RS

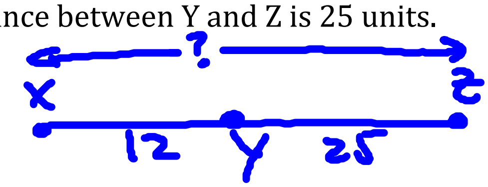
x + 9 + x = 33
2x + 9 = 33
2x = 24
x = 12
RS = 12

2x + 9 = 33
−9 −9
2x = 24

b) Find SU.

SU = ST + TU
SU = 9 + 12
SU = 21

2. Y is between X and Z. Find the distance between points X and Z if the distance between X and Y is 12 units and the distance between Y and Z is 25 units.



? = 12 + 25
= 37

DISTANCE FORMULA

If A (x_1, y_1) and B (x_2, y_2) are points in a coordinate plane, then the distance between A & B is....

AB = $\sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$

3. Find the length of the segments.

AC =

Formula

$\sqrt{(3-^-1)^2 + (2-1)^2}$

$= \sqrt{4^2 + 1^2}$

$= \sqrt{16+1}$

$= \sqrt{17}$

~~AD~~ =

Method 2

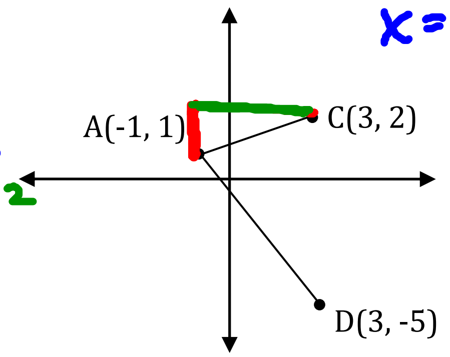
△ Pyth Th.

$AC^2 = 1^2 + 4^2$

$AC^2 = 1 + 16$

$AC^2 = 17$

$AC = \sqrt{17}$



$x^2 = 4$

$x = 2$ or -2

CONGRUENT SEGMENTS

If two segments are congruent, then ____.

If two segments have ______________________, then _______________________.

If AB = CD, then __________________.

4. a) In example 3, is $\overline{AC} \cong \overline{AD}$?

b) If $\overline{DE}$ is congruent to $\overline{AC}$ in example 3, then DE = _______.

Segments and their Measures HW

Geometry

Name: ____________________
Date: _________ **Per:** _______

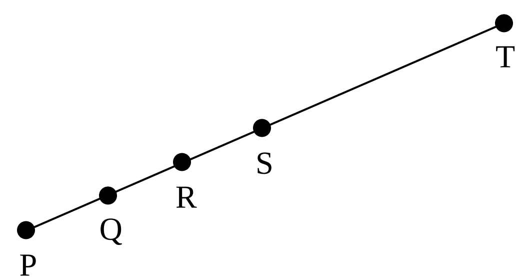
Directions: Draw a sketch of the three collinear points. Then write the Segment Addition Postulate for the points.

1. E is between D and F.

2. M is between N and P.

3. H is between G and J.

Directions: In the diagram of the collinear points, PT = 20, QS = 6, and PQ = QR = RS. Find each length.



4. QR

5. RS

6. PQ

7. ST

8. RP

9. RT

10. SP

11. QT

<u>Directions</u>: Suppose M is between L and N. Use the Segment Addition Postulate to solve for the variable. Then find the lengths of the segments.

12. LM = 3x + 8

MN = 2x – 5

LN = 23

x = ____________

LM = __________

MN = _________

LN = __________

13. LM = 7y + 9

MN = 3y + 4

LN = 143

y = ____________

LM = __________

MN = _________

LN = __________

<u>Directions</u>: Use the Distance Formula to decide whether $\overline{PQ} \cong \overline{QR}$.

14. P (4, -4)

Q (1, -6)

R (-1, -3)

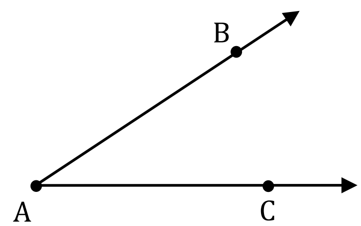
PQ = __________

QR = __________

Angles and Their Measures

Learning Targets: ***Students will be able to understand and apply the angle addition postulate.***
Students will be able to classify angles as acute, right, obtuse, or straight.

Angle: when two rays (segments) intersect at a point ← vertex



Measure of an Angle: To indicate the measure of ∠A we write ∡A or m∠A.
Angles are measured in degrees.

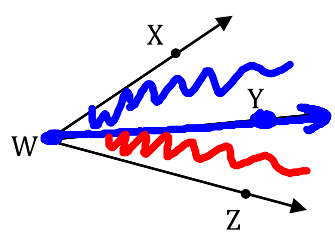
Congruent Angles: Angles that have the same measure are congruent.
↓
≅

$\angle BAC \cong \angle DEF$

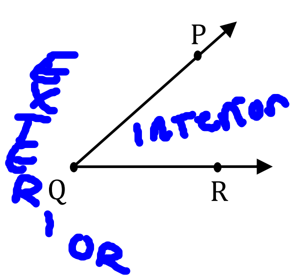
Adjacent Angles: Share a common vertex and side, but have no interior in common.

1. Name the adjacent angles in the figure.

∠XWY
∠YWZ

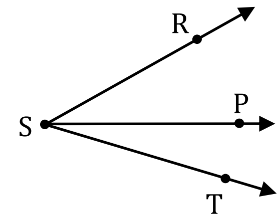


INTERIOR AND EXTERIOR OF ANGLE



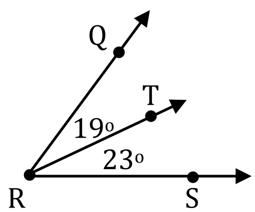
ANGLE ADDITION POSTULATE

If P is in the interior of $\angle RST$, then $\angle RSP + \angle PST = \angle RST$.

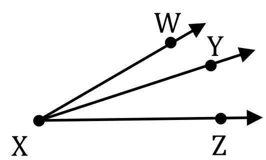


2. Find the measure of the following angles:

a) $m\angle QRS =$ ________



b) If $m\angle WXZ = 48^\circ$ *and* $m\angle YXZ = 31^\circ$ then $m\angle WXY =$ ________.



3. If the $m\angle ABC = 88°$ then, solve for x.

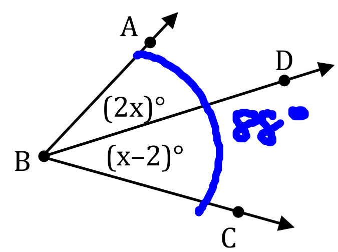
Angle Add Postulate

$2x + x - 2 = 88$

$3x - 2 = 88$

$3x = 90$

$x = 30$



CLASSIFYING ANGLES

An angle that measures **greater than 0° and less than 90°** is called an Acute angle.

An angle that measures **90°** is called a Right angle.

An angle that measures **greater than 90° and less than 180°** is called an Obtuse angle.

An angle that measures **180°** is called a Straight angle.

Vertical Angles, Linear Paris & Adjacent Angles

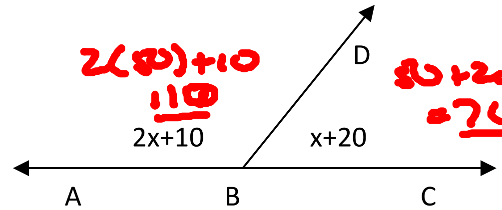
1) Angle ABC is a straight angle

$2x+10+x+20=180^\circ$

$3x+30=180$

$3x=150$

$x=50$



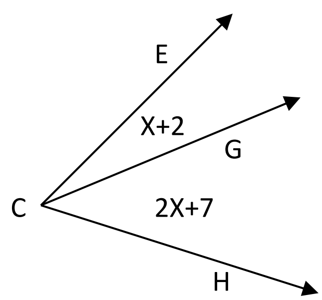
$2(50)+10$
110

$50+20$
$=70$

A Linear Pair
Are 2 Adjacent ∠'s
That form a straight ∠.

Find the value of x and the size of each angle in degrees.

2)



$x+2+2x+7=60$

$3x+9=60$

$3x=51$

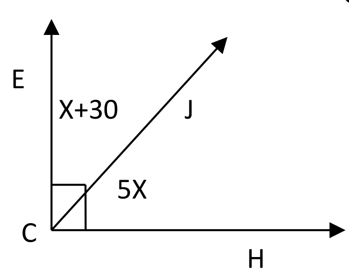
$x=17$

$\angle ECG = 17+2 = 19$

$\angle GCH = 2(17)+7 = 41$

If $m\angle ECH = 60^\circ$, find the value of x and the size of each angle in degrees.

3)



$5x+x+30=90$

$6x+30=90$

$6x=60$

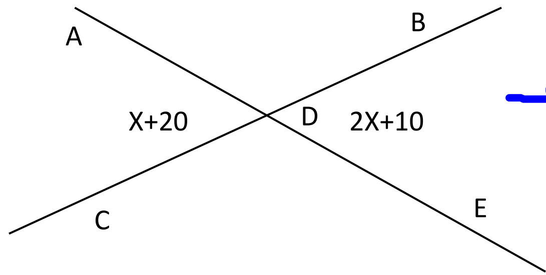
$x=10$

$\angle ECJ = 10+30 = 40$

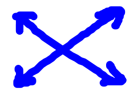
$\angle JCH = 5(10) = 50$

Find the value of x and the size of each angle in degrees.

4)



Adjacent
Bisected
Linear Pair



VERTICAL Angles → Two ∠'s that share a vertex and create 2 intersecting lines.

$x+20 = 2x+10$

$10 = x$

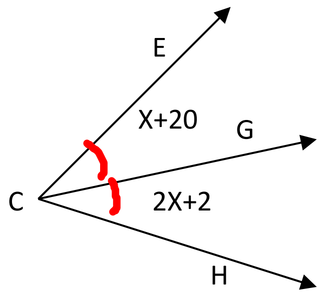
Find the value of x and the size of each angle in degrees.

Vertical Angle Theorem

→ Vertical Angles Are Congruent

$x+a=180$, $y+a=180$ } $x+a=y+a$ so, $x=y$

5)



$x+20=2x+2$

$18=x$

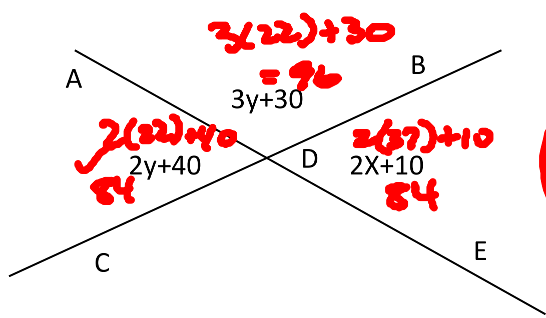
$\angle ECG = 18+20 = 38$

$\angle GCH = 2(18)+2 = 38$

$\angle ECH = 38+38 = 76$

$\overrightarrow{CG}$ bisects $\angle ECH$. Find the value of x and the size of each angle in degrees [there are 3 angles].

6)



$2y+40=2x+10$

$2y+40+3y+30=180$

$5y+70=180$

$5y=110$

$y=22$

$2(22)+40=2x+10$

$44+40-10=2x$

$74=2x$

$37=x$

Find the value of x & y and the ~~size of each angle in degrees.~~

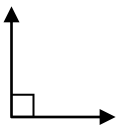
Angles and their Measures HW

Geometry

Name: ____________________
Date: _________ **Per:** _______

Directions: Match the angle with the classification

A. Acute
B. Obtuse
C. Right
D. Straight

1) 

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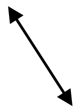
2) 

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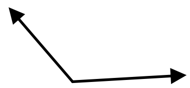
3) 

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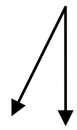
4) 

____

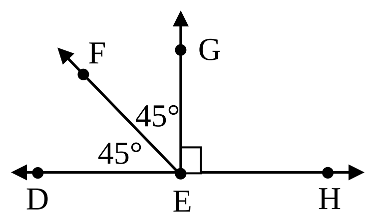
5) m ∠ A = 180° ____________

6) m ∠ B = 90° ____________

7) m ∠ C = 100° ____________

8) m ∠ D = 45° ____________

Directions: Use the diagram to answer the questions.



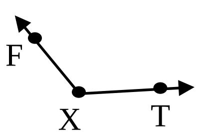
9) Is ∠ DEF ≅ ∠FEG? ____________

10) Is ∠ DEG ≅ ∠HEG? ____________

11) Are ∠DEF and ∠FEH adjacent? ____________

12) Are ∠GED and ∠DEF adjacent? ____________

Directions: Name the vertex of the angle using correct notation.

13) 

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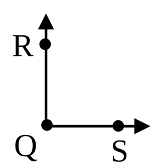
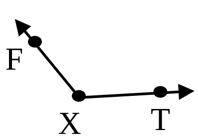
14) 

____

Directions: Express the angle in two different forms (example: ∠KWX and ∠XWK)

15) 

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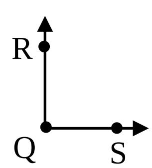
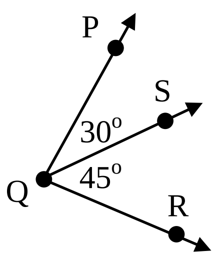
16) 

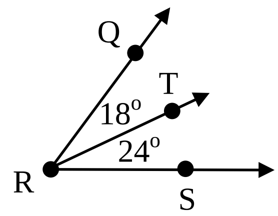
____

<u>Directions</u>: Use the *<u>angle addition postulate</u>* to find the measure of the unknown angle.

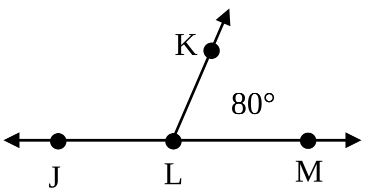
17) m∠ PQR=____________



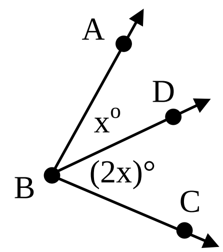
18) m∠ QRS=____________



19) m∠ JLK= ____________

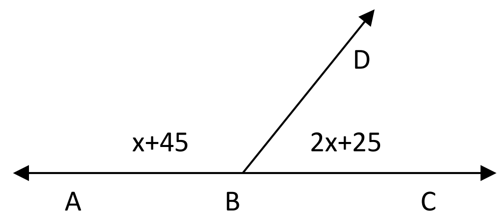


20) If m∠ABC = 90°, solve for x.



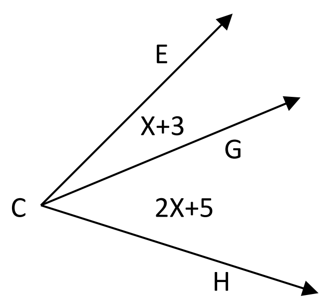
HW cont'd	Vertical Angles, Linear Pairs, & Adjacent Angles	Name______________________________ Per_____

1) Angle ABC is a straight angle



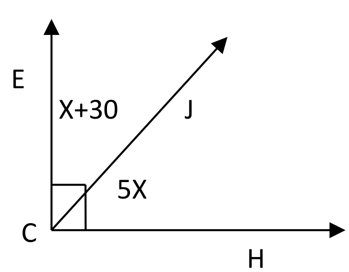
Find the the size of each angle in degrees.

2)



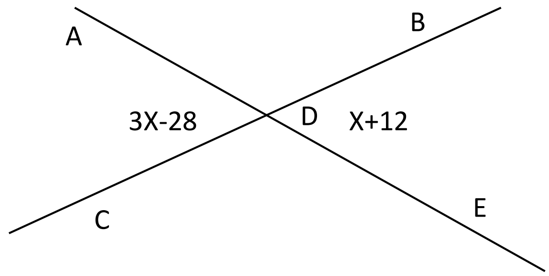
If $m\angle ECH = 70^{\circ}$, find the size of each angle in degrees.

3)



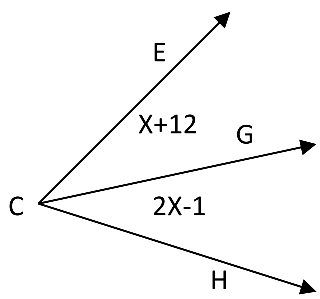
Find the size of each angle in degrees.

4)



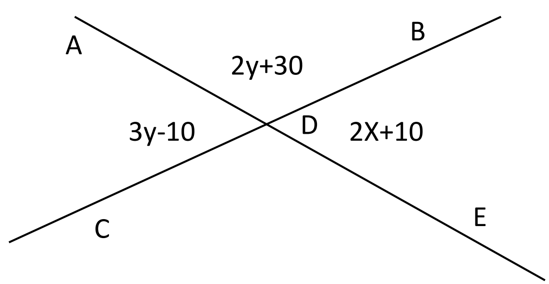
Find the size of each angle in degrees.

5)



$\overrightarrow{CG}$ bisects $\angle ECH$. Find the size of each angle in degrees [there are 3 angles].

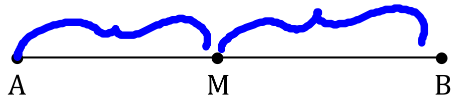
6)



Find the value of x & y and the size of each angle in degrees.

Segment and Angle Bisectors

Learning Targets: Students will understand the concept of bisecting a segment or an angle.
Students will be able to apply the midpoint formula.



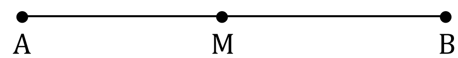
Midpoint:

If a point is a midpoint of a segment, then it creates two equal segments.

If a point creates two equal segments, then it is the midpoint.

Bisect: → to "cut" a geometric figure into two equal "pieces"

A midpoints is a bisector

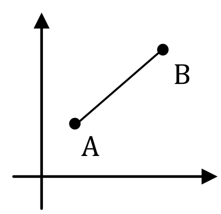


Segment Bisector: a segment that "cuts" geometric figures in half

THE MIDPOINT FORMULA

If A (x_1, y_1) and B (x_2, y_2), then…

M = $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$



1. Find the coordinates of the midpoint of $\overline{AB}$ with endpoints A(-2, 3) and B(5, -2).

$$M=\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)=\left(\frac{-2+5}{2}, \frac{3+-2}{2}\right)$$
$$=\left(\frac{3}{2}, \frac{1}{2}\right)$$

2. The midpoint of $\overline{JK}$ is M(1, 4). One endpoint is J(-3, 2). Find the coordinates of the other endpoint.

$$M=\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$$
$$(1,4)=\left(\frac{-3+x}{2}, \frac{2+y}{2}\right)$$

$(2)1=\left(\frac{-3+x}{2}\right)2$

$2=-3+x$

$5=x$

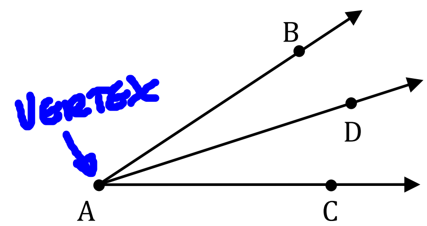
$(2)4=\left(\frac{2+y}{2}\right)2$

$8=2+y$

$6=y$

$(5,6)$

BISECTING AN ANGLE

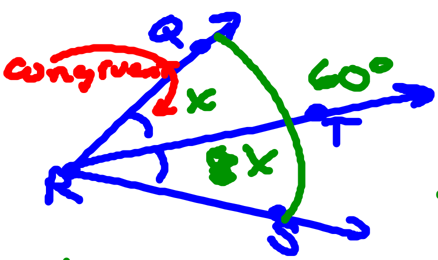


ANGLE BISECTOR

If a ray is an angle bisector, then it "cuts" the angle in 2 equal parts

If a ray creates 2 congruent angles from 1 angle, then it is the angle bisector.

3. $\overrightarrow{RT}$ bisects $\angle$QRS.
Given that m$\angle$QRS = 60°, what are the measures of $\angle$QRT & $\angle$TRS?



$\frac{60}{2} = 30$

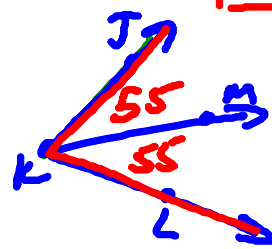
$\angle QRT = 30°$

$\angle TRS = 30°$

$\angle$ → measure of $\angle$

m$\angle$

4. $\overrightarrow{KM}$ bisects $\angle$JKL.
The measures of the two congruent angles are (2x+7)° and (4x–41)°.
Find the measures of all angles.



$2x+7 = 4x-41$

$48 = 2x$

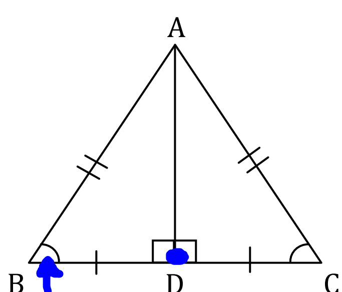
$24 = x$

$\angle JKM = 2(24)+7 = 55$

$\angle MKL = 4(24)-41 = 55$

$\angle JKL = 2(55) = 110$

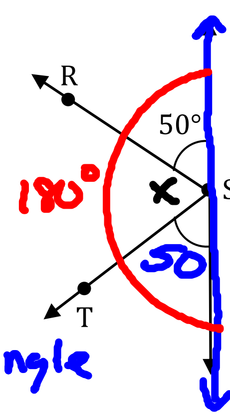
5. Name the ≅ parts.



$\angle B$

NO!

6. Find the measure of ∠RST.



STRAIGHT Angle → 180°

② $50 + x + 50 = 180°$

$x + 100 = 180°$

$x = 80°$

① $\angle RST = 80°$

Segments and Angle Bisectors HW

Geometry

Name: ____________________
Date: _________ **Per:** _______

<u>Directions</u>: Find the coordinates of the midpoint of a segment with the given endpoints.

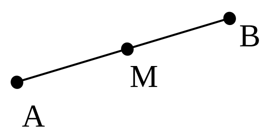
1. A (0, 0)
   B (–8, 6)

2. C (10, 8)
   D (–2, 5)

3. S (0, –8)
   T (–6, 14)

4. V (–1.5, 8)
   W(–0.5, –1)

<u>Directions</u>: Find the coordinates of the other <u>endpoint</u> of the segment given one endpoint and a midpoint.



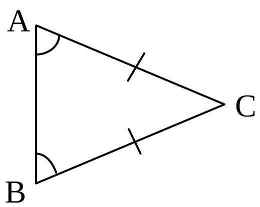
5. A (2, 6)
   M (1, –1)

6. B (3, –12)
   M (2, –1)

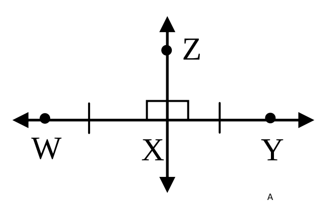
7. A (6, 7)
   M (10, –7)

<u>Directions</u>: Use the marks on the diagram to name the congruent segment and congruent angles.

8.

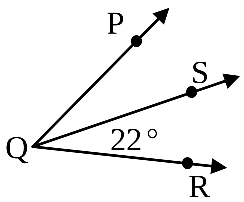


9.



Directions: $\overrightarrow{QS}$ **is the angle bisector of** $\angle PQR$**. Find the two angle measures not given in the diagram.**

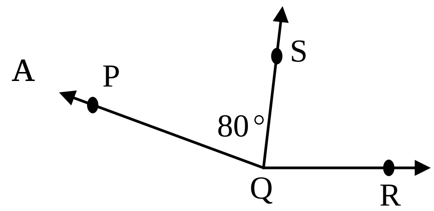
10.



$m\angle$ ________ = ______°

$m\angle$ ________ = ______°

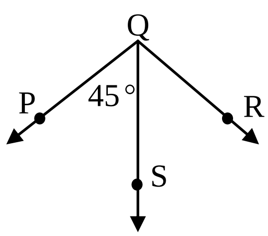
11.



$m\angle$ ________ = ______°

$m\angle$ ________ = ______°

12.

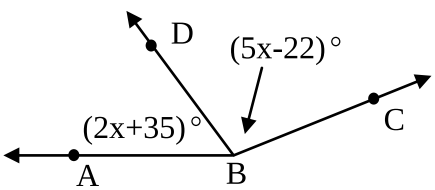


$m\angle$ ________ = ______°

$m\angle$ ________ = ______°

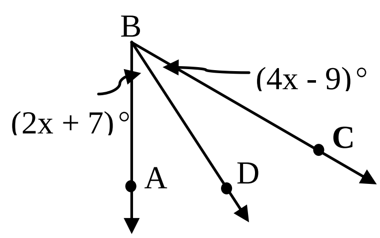
Directions: $\overrightarrow{BD}$ **bisects** $\angle ABC$**. Find the value of x.**

13.



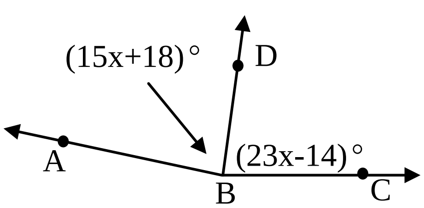
x = _________

14.



x = _________

15.



x = _________

Geometry NOTES

Name_______________________________

Partitioning a Line Segment

Directed Line Segment: a segment that has a direction (vector)

Partitioning a Line Segment: to divide a segment into equal pieces.

Ratio: a comparison of two objects (lengths) written as a fraction or with a colon as : for us!

Example: Let $\overline{LM}$ be the directed line segment from $L(-4,1)$ to $M(5,-5)$. What are the coordinates of the point that partitions the segment in the ratio 2 to 1?

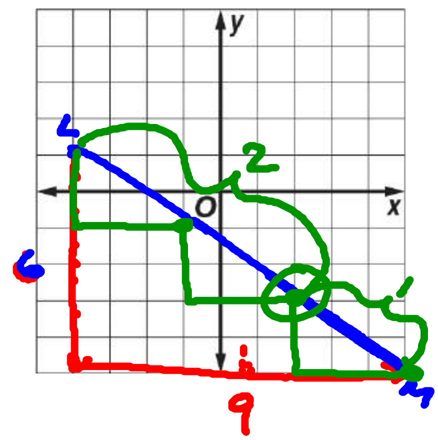
Step 1: Graph $\overline{LM}$ on the coordinate plane using a straightedge.

Step 2: Identify the movement from point *L* to point *M*.

x dir: 9, $\frac{9}{3}$, x-dir = 3

y-dir: −6, $\frac{-6}{3}$, y-dir = −2

Ratio 2:1, Total pieces = 3



Step 3: Beginning at point *L*, move down 2 units and right 3 units to the point $(-1,-1)$.

Repeat the process two more times to reach the points at (2,-3) and $M(5,-5)$.

The points (-1,-1) and (2,-3) divide $\overline{LM}$ into 3 congruent parts.

Let *P* be the point with the coordinates (2,-3).

Then the ratio of *LP* to *PM* is 2 to 1.

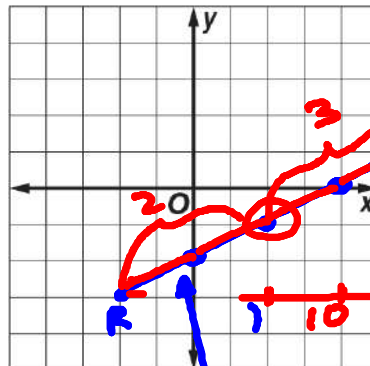
So, the point that partitions the directed line segment $\overline{LM}$ in the ratio 2 to 1 is (2,-3).

Directed Line Segment Assignment

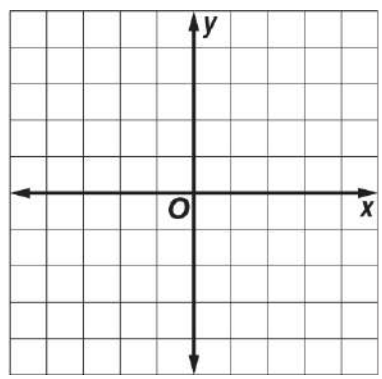
Show ALL Work! Graphs are provided to help you, but are not required.

1. In the example we did in class, how can you show that the point at $(-1,-1)$ and $(2,-3)$ divide $\overline{LM}$ into three congruent parts?

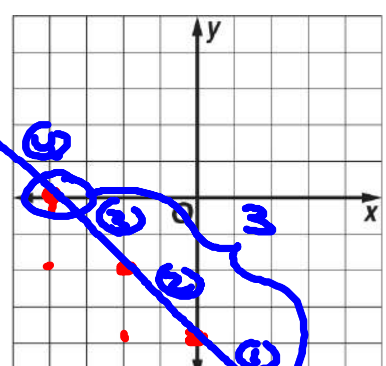
2. $\overline{RS}$ is the directed line segment from $R(-2,-3)$ to $S(8,2)$. What are the coordinates of the point that partitions the segment in the ratio of 2 to 3?



3. Point C lies on the directed line segment from $A(5,16)$ to $B(-1,2)$ and partitions the segment in the ratio 1 to 2. What are the coordinates of C?



4. The endpoints of $\overline{XY}$ are $X(2,-6)$ and $Y(-6,2)$. What are the coordinates of point P on $\overline{XY}$ such that XP is $\frac{3}{4}$ of the distance from X to Y?



Coordinate Plane: Distance and Midpoint

WARM UP: Simplify.

1. $\sqrt{20}$ 2. $\sqrt{180}$ 3. $\sqrt{84}$ 4. $\sqrt{72}$

Recall, the Pythagorean Theorem states that ______________________________, with a and b being the lengths of the legs of a right triangle, and c being length of the hypotenuse.

In the coordinate plane, the ______________________________ is an application of the Pythagorean Theorem, and is a strategy that can be used to find the lengths of segments in the coordinate plane, or the ____________________ between ______________________.

THE DISTANCE FORMULA:

$$d = \sqrt{(x - x)^2 + (y - y)^2}$$

EX.

1. Use the distance formula:

$J(-3,-1) \quad K(3,3)$

$d = \sqrt{(-3-3)^2 + (-1-3)^2}$

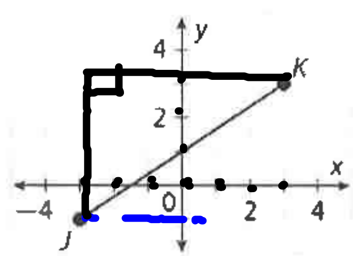
$= \sqrt{(-6)^2 + (-4)^2}$

$= \sqrt{36+16} = \sqrt{52} = 2\sqrt{13}$

$-6^2 = -36$

$(-6)^2 = 36$

Calculate the length of $\overline{JK}$.



2. Draw a right triangle ($\overline{JK}$ is the hypotenuse) and use the Pythagorean Theorem instead:

$JK^2 = 4^2 + 6^2$

$JK^2 = 16 + 36$

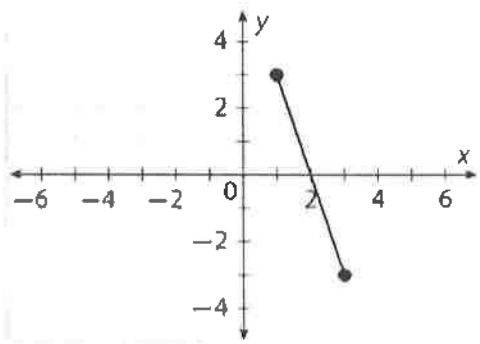
$\rightarrow JK^2 = 52$

$JK = \sqrt{52} = 2\sqrt{13}$

Coordinate Plane: Distance and Midpoint HOMEWORK

Check

State the midpoint of each line segment.

1. 

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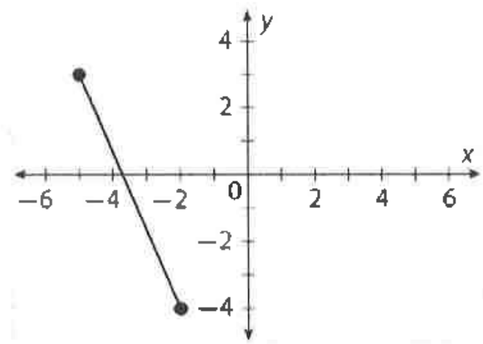
2. 

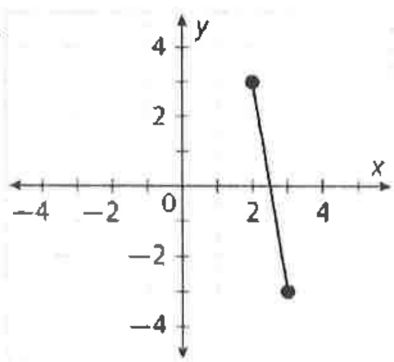
____

3. Segment with endpoints at (–4, 10) and (–6, –2) $\left(\frac{-4+-6}{2}, \frac{10+-2}{2}\right) = (-5, 4)$

4. Segment with endpoints at (–1, 15) and (3, 0) $\left(\frac{-1+3}{2}, \frac{15+0}{2}\right) = \left(1, \frac{15}{2}\right)$

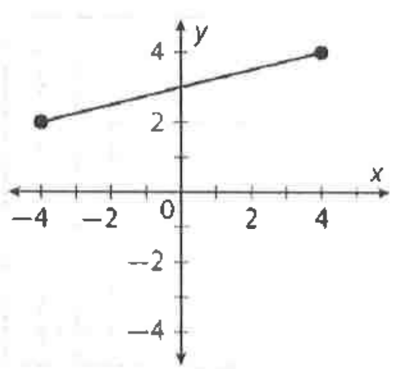
5. Segment with endpoints at (2, –3) and (–2, –5) ______________________

Create a right triangle with the segment as the hypotenuse.
Then calculate the length.

6. 

____

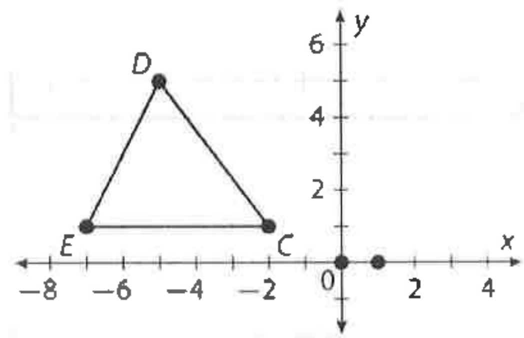
____

7. 

____

____

13. Is $\triangle CDE$ a scalene, isosceles, or equilateral triangle?
(Hint: First, find the measure of each side.)



A What is CD? ________________

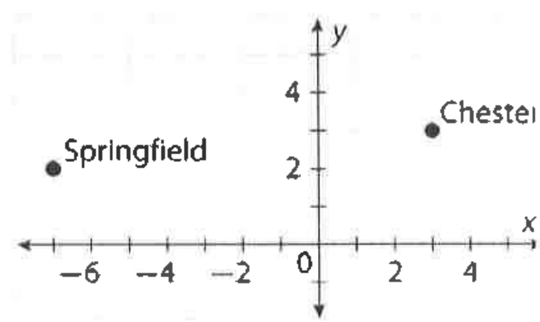
B What is DE? ________________

C What is CE? ________________

D Classify $\triangle CDE$ by its sides. ________________

14. A map is shown on a coordinate system as shown. What is the distance on the map between Springfield and Chester? Each unit is 1 cm.

____



15. The map legend states that 1 cm = 5 miles. What is the real distance between cities?

Constructions of Segments and Angles

***Learning Targets:* Students will be able to define and identify key terms such as: bisect, midpoint, and angle bisector.**
Students will be able to bisect a segment and angle using a compass.

KEY TERMS

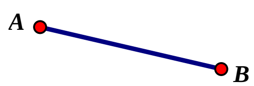
Bisect:

Midpoint (segment bisector):

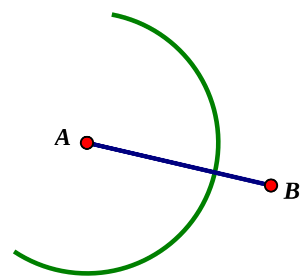
Angle Bisector:

Bisect A Segment

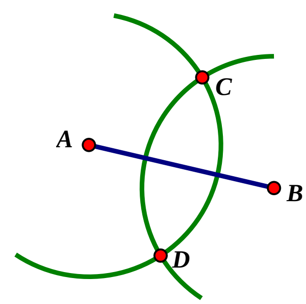
(a) Given $\overline{AB}$



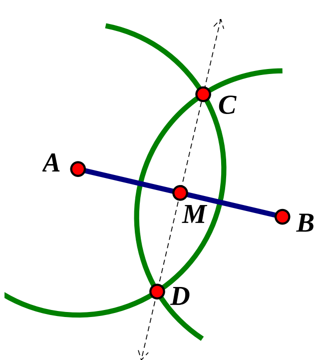
(b) Place your pointer at A, extend your compass so that the distance exceeds half way. Create an arc.



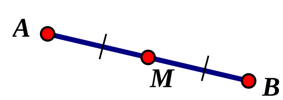
(c) Without changing your compass measurement, place your point at B and create the same arc. The two arcs will intersect. Label those points C and D.



(d) Place your straightedge on the paper so that it forms $\overleftrightarrow{CD}$. The intersection of $\overleftrightarrow{CD}$ and $\overline{AB}$ is the bisector of $\overline{AB}$.

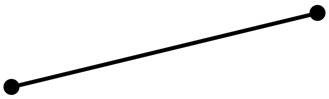


(e) I labeled it M, because it is the midpoint of $\overline{AB}$.

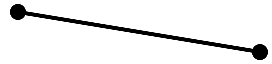


Bisect the given segment.

EX. 1:

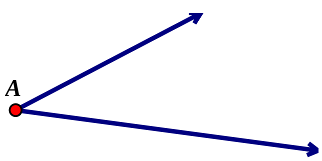


EX. 2:

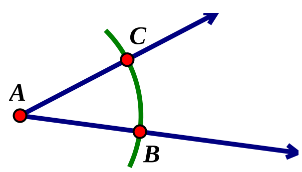


Bisect An Angle

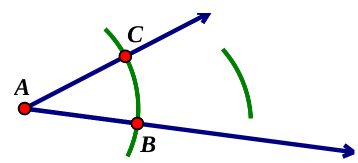
(a) Given an angle.



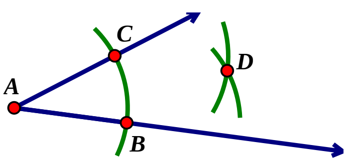
(b) Create an arc of any size, such that it intersects both rays of the angle. Label those points B and C.



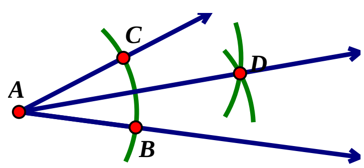
(c) Leaving the compass the same measurement, place your pointer on point B and create an arc in the interior of the angle.



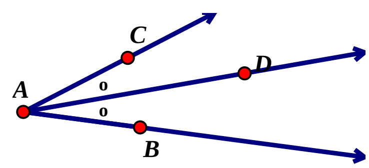
(d) Do the same as step (c) but placing your pointer at point C. Label the intersection D.



(e) Create $\overrightarrow{AD}$. $\overrightarrow{AD}$ is the angle bisector.

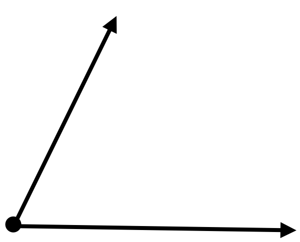


(f) $\overrightarrow{AD}$ is the angle bisector.

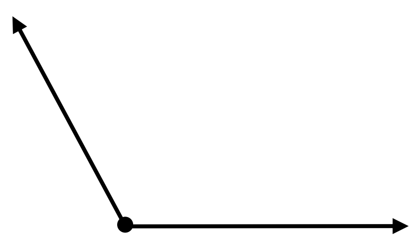


Bisect the given angle.

EX. 3:



EX. 4:



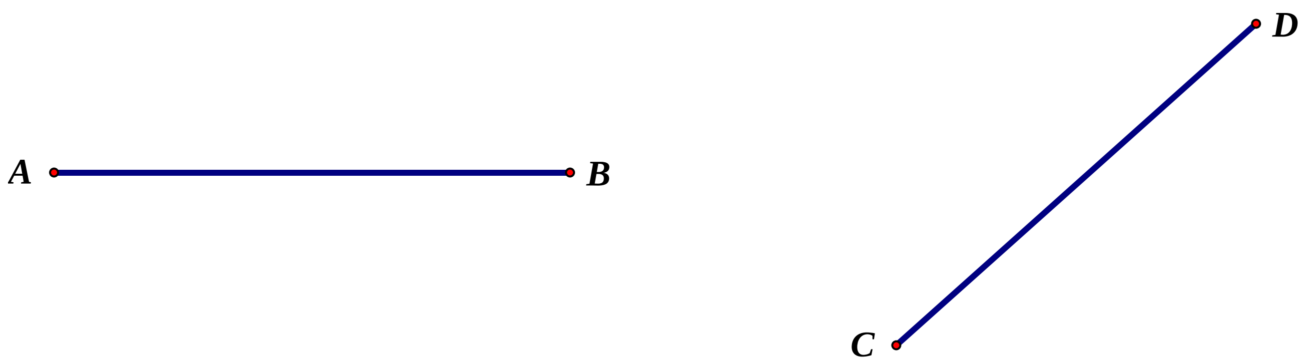
Construction of Segments HW

Geometry

Name: ____________________
Date: _________ **Per:** _______

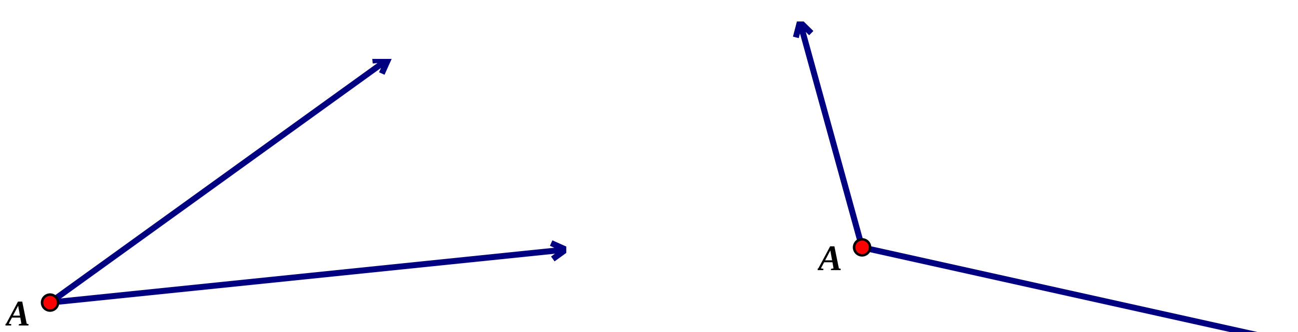
1. What does it mean to bisect something?

2. Given $\overline{AB}$ & $\overline{CD}$. Use the midpoint construction to find the midpoint of $\overline{AB}$ & $\overline{CD}$.



3. After learning the midpoint construction, Sally realizes that she could determine one-fourth the length of a segment. How could she do this? Explain and use your midpoint construction to determine the exact length of $\frac{1}{4}EF$.

4. Given ∠A, construct the angle bisector, ray $\overrightarrow{AD}$.



Constructions of Segments and Angles

***Learning Targets:** Students will be able to define and identify key terms such as: point, line, line segment, ray, angle, and congruence.*

Students will be able to construct a congruent segment and angle using a compass.

KEY TERMS

Point:

Line:

Line Segment:

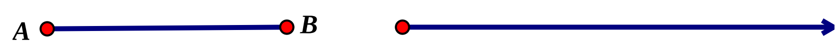
Ray:

Angle:

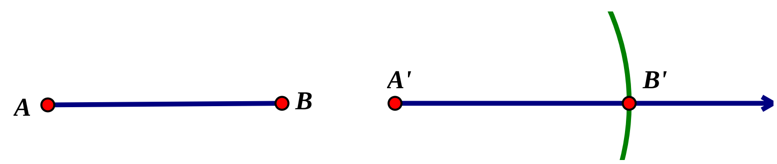
Congruence:

Copying A Segment

(a) Using your compass, place the pointer at Point A and extend it until reaches Point B. Your compass now has the measure of AB.

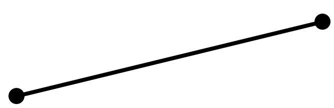


(b) Place your pointer at A', and then create the arc using your compass. The intersection is the same radii, thus the same distance as AB. You have copied the length AB.

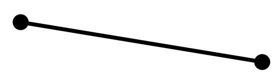


Copy the given segment.

EX. 1:

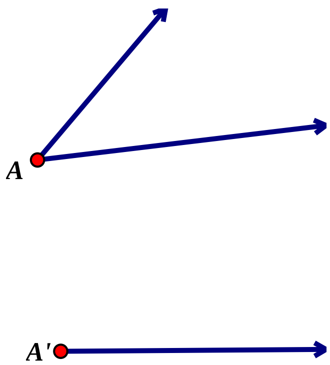


EX. 2:

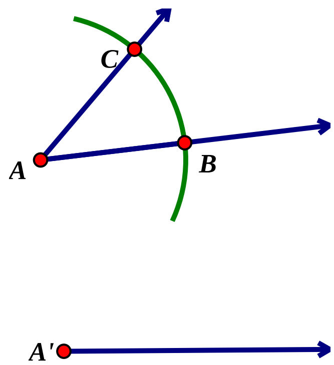


Copy An Angle

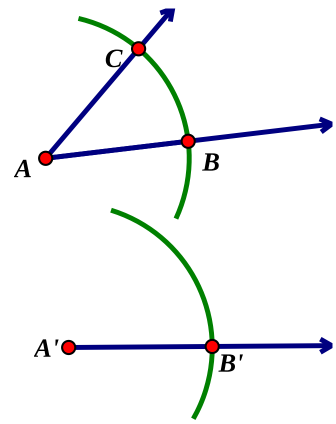
(a) Given an angle and a ray.



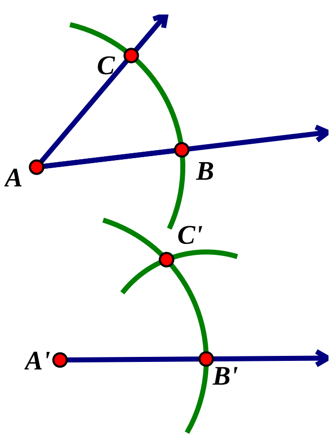
(b) Create an arc of any size, such that it intersects both rays of the angle. Label those points B and C.



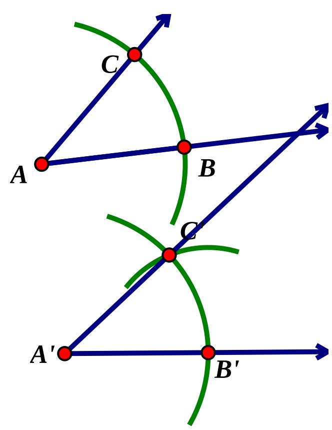
(c) Create the same arc by placing your pointer at A'. The intersection with the ray is B'.



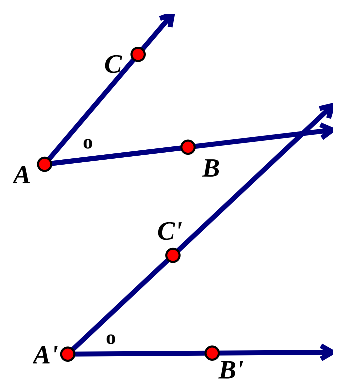
(d) Place your compass at point B and measure the distance from B to C. Use that distance to make an arc from B'. The intersection of the two arcs is C'.



(e) Draw the ray $\overrightarrow{A'C'}$

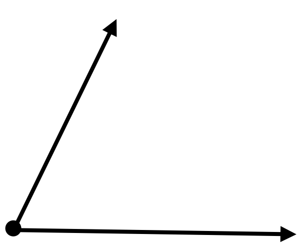


(f) The angle has been copied.

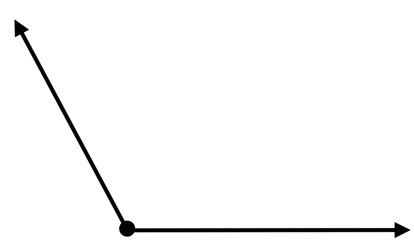


Copy the given angle.

EX. 3:



EX. 4:

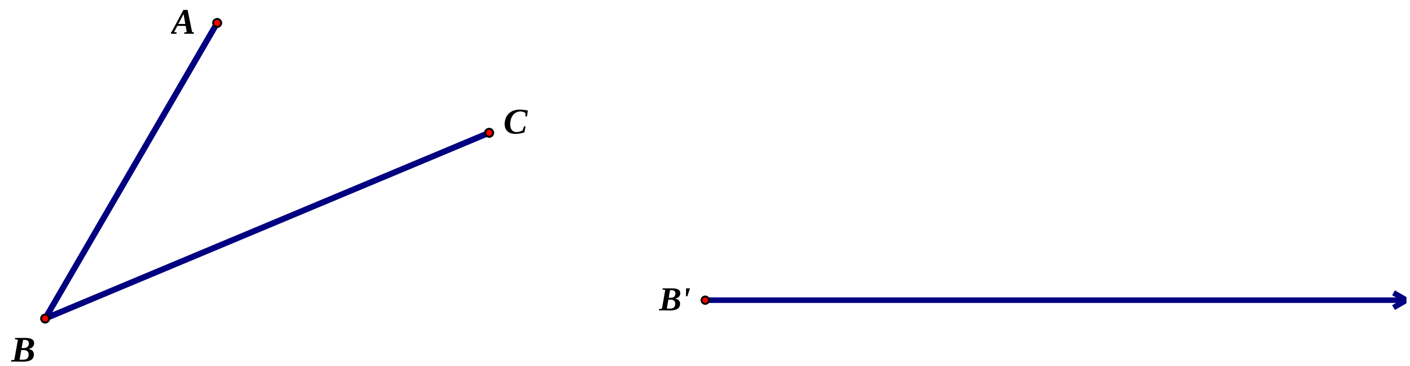


Constructions of Angles HW

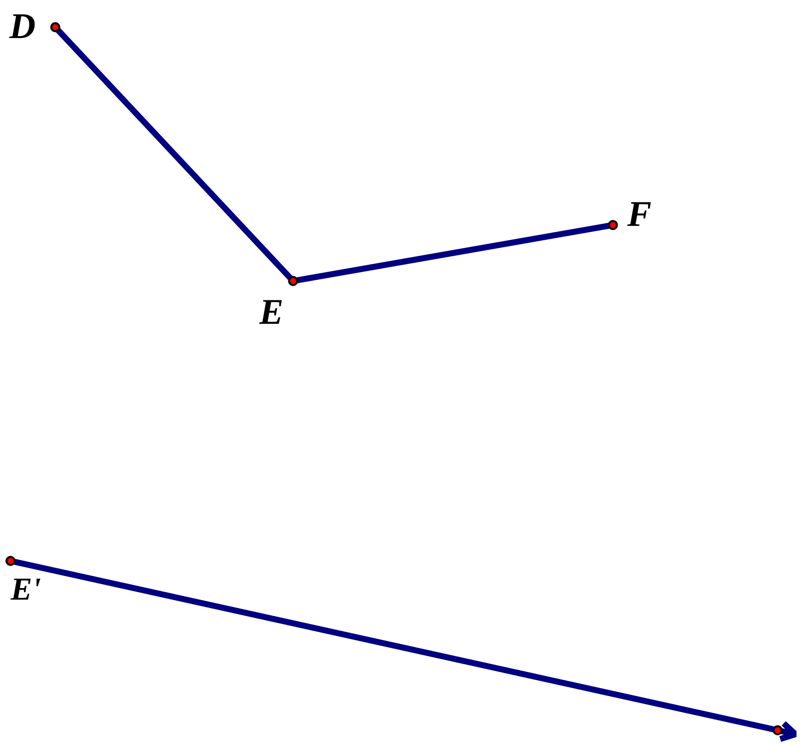
Geometry

Name: ____________________
Date: _________ Per: _______

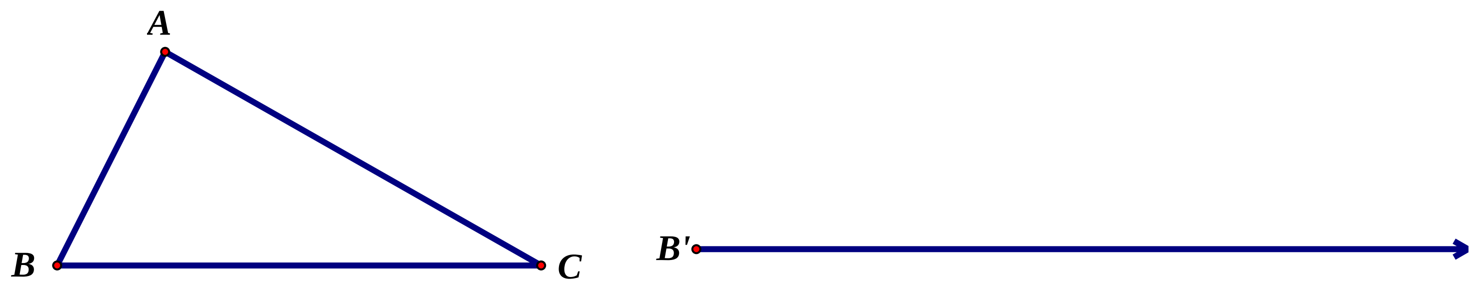
1. Given $\angle ABC$. Make a copy of $\angle ABC$, $\angle A'B'C'$.



2. Given $\angle DEF$. Make a copy of $\angle DEF$, $\angle D'E'F'$.



3. Given ΔABC, construct a copy of it, ΔA'B'C'.



Name________________________ Period _____

Segments and Angles

Geometry 3.2

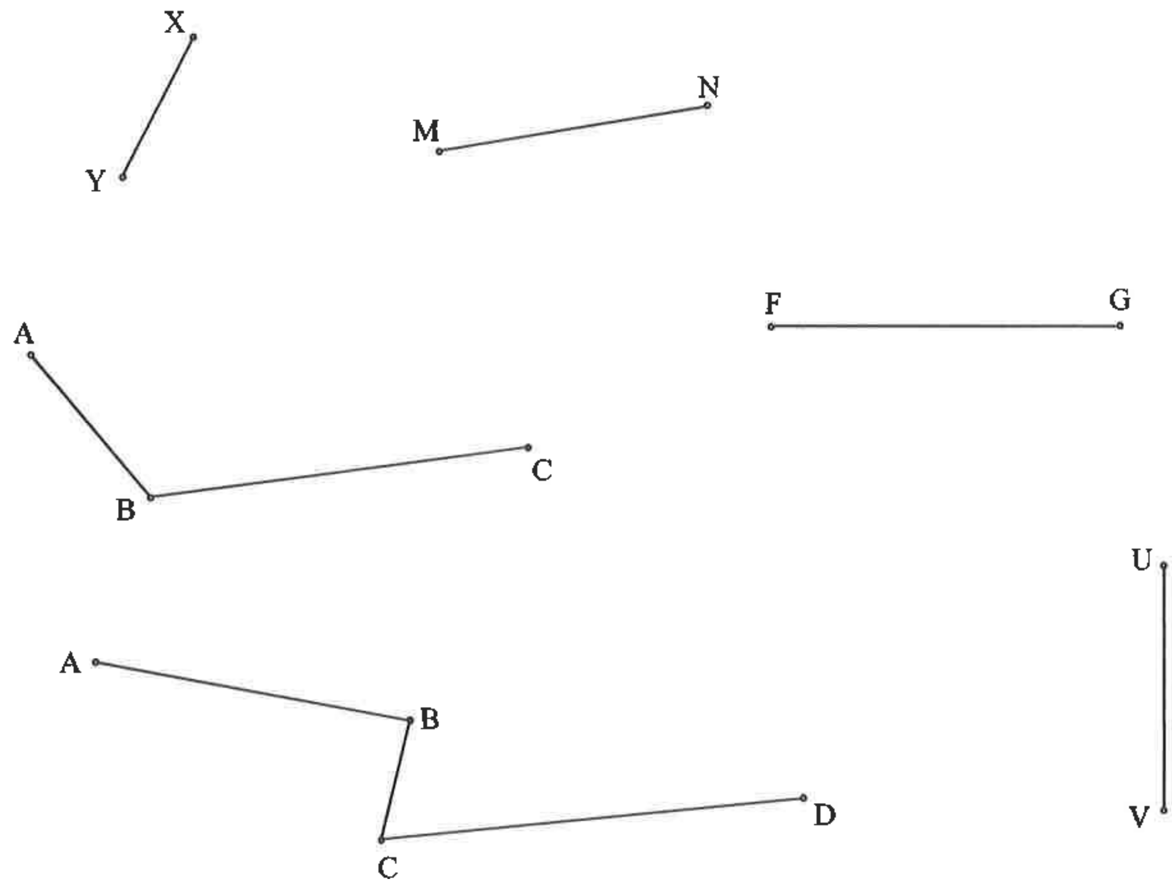
All constructions done today will be with Compass and Straight-Edge ONLY.

Constructing a perpendicular bisector: Follow the steps shown by Mr. Batterson on the board to bisect the line below with a perpendicular.

What is the relationship of points F and G to all points along the perpendicular bisector?

____

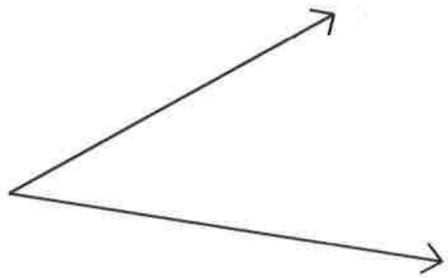
Construct a perpendicular bisector for each segment below.

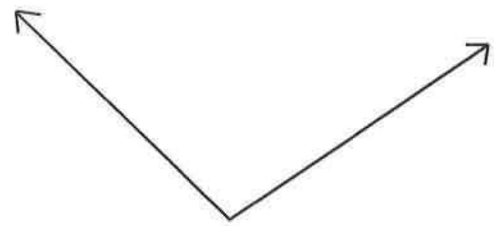


Name_______________________ Period ______

Angle Bisecting/ Review

Follow the steps shown on the board to bisect each angle below:

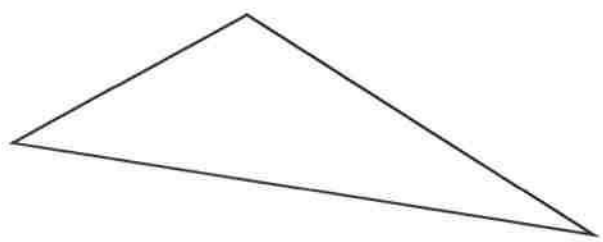


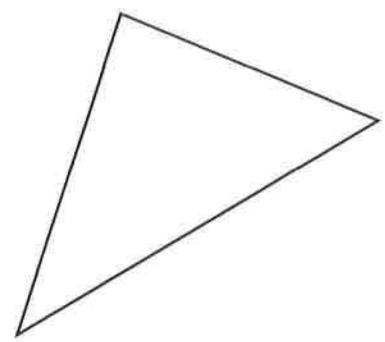


What is the relationship between the angle's rays and its bisector?

____

Bisect all three angles of each triangle below.

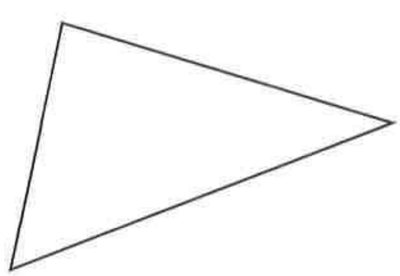




What happened? What is the significance? Why did this happen?

____

Circumscribe a circle about the triangle below, and inscribe a circle within it.

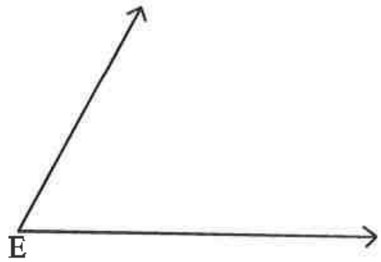


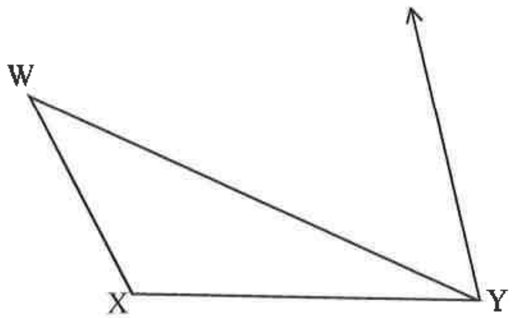
Name________________________ Period ______

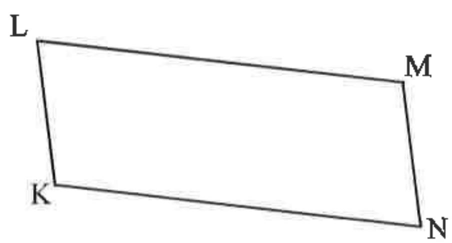
Segments and Angles

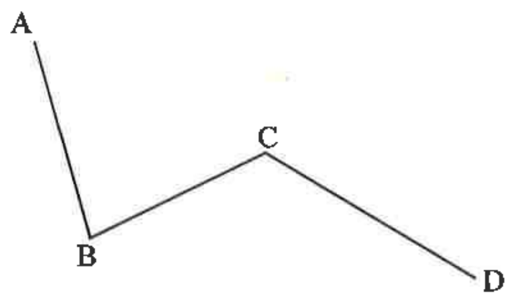
Geometry 3.1

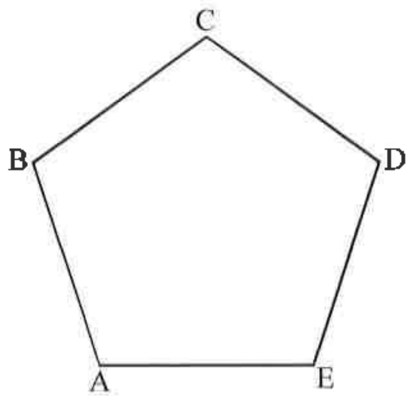
Use what you have learned to duplicate each of the objects below:





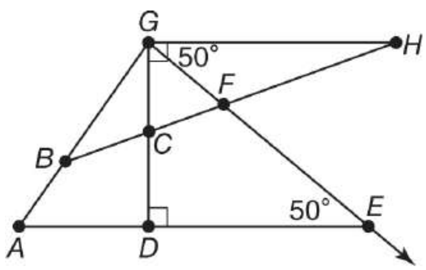






Vocabulary Terms – you will be expected to know/understand all of the terms below.

Acute angle	Exterior	Ray
Adjacent angles	Interior	Right angle
Angle	Intersection	Skew
Angle Addition Postulate	Line	Segment Addition Postulate
Angle bisector	Linear pair	Segment bisector
Collinear	Line segment	Supplementary angles
Complementary angles	Obtuse angle	Theorem
Congruent	Opposite rays	Undefined term
Construction	Perpendicular	Vertex
Coplanar	Plane	Vertical angles
Degree	Point	
Distance	Postulate	



Name an angle or angle pair that satisfies each condition.

1. Name two obtuse vertical angles.

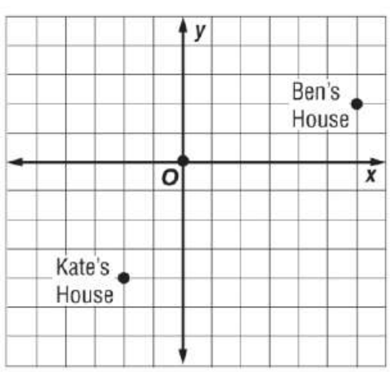
2. Name a linear pair with vertex *B*.

3. Name an angle not adjacent to, but complementary to ∠*FGC*.

4. Name an angle adjacent and supplementary to ∠*DCB*.

5. **PIZZA** Ralph has sliced a pizza using straight line cuts through the center of the pizza. The slices are not exactly the same size. Ralph notices that two adjacent slices are complementary. If one of the slices has a measure of $2x^o$, and the other a measure of $3x^o$, what is the measure of each angle?

6. **MAPPING** Ben and Kate are making a map of their neighborhood on a piece of graph paper. They decide to make one unit on the graph paper correspond to 100 yards. First, they put their homes on the map as shown below.

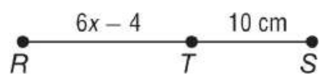


a. How many yards apart are Kate's and Ben's homes?

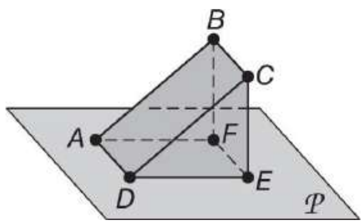
b. Their friend Jason lives exactly halfway between Ben and Kate. Mark the location of Jason's home on the map.

c. How far does Jason live from Ben?

7. Find the value of x if RS = 24 centimeters.



Use the figure for #8-10.



8. Name five planes shown in the figure.

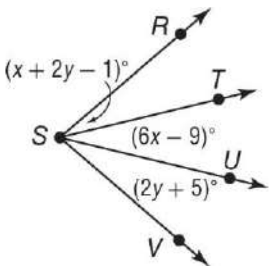
9. Name a line that is coplanar with $\overleftrightarrow{AD}$ and $\overleftrightarrow{AB}$.

10. Name a point that is collinear with point B.

11. The midpoint of a line segment AB is (1, 2). Point A coordinates are (3, –3) and point B coordinates are (x, 7). Find the value of x.

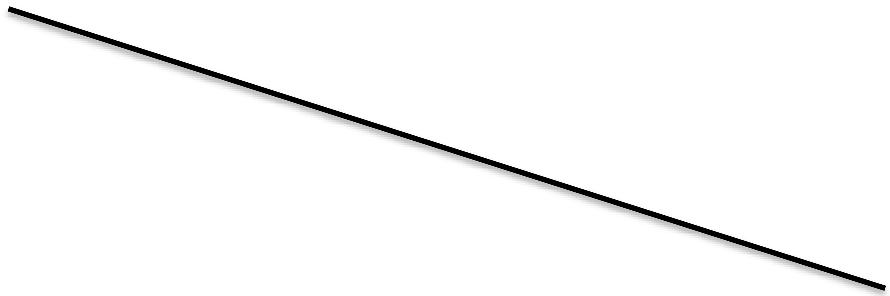
12. Find the value of y if S is the midpoint of $\overline{RT}$, T is the midpoint of $\overline{RU}$, $RS = 6x + 5$, $ST = 8x - 1$, and $TU = 11y + 13$.

13. Find $m\angle RST$ if $\overrightarrow{ST}$ bisects $\angle RSU$ and $\overrightarrow{SU}$ bisects $\angle TSV$.

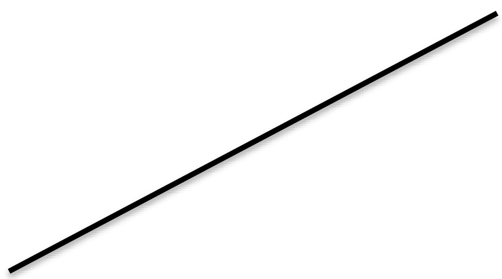


Unit 2 Review NAME: ______________________________________

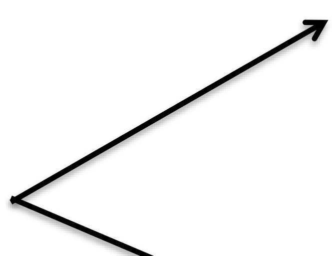
14. Construct a new segment half as long as the segment given below.



15. Construct the perpendicular bisector of the segment below and find the midpoint.



16. Construct an angle congruent to the angle below and bisect the angle.

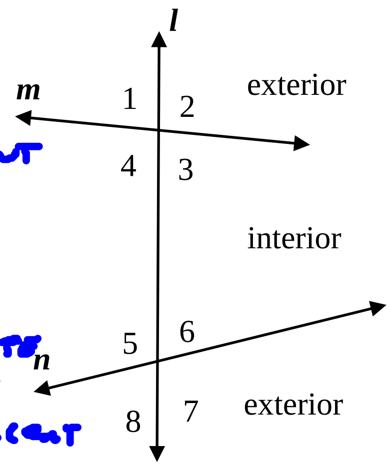


Unit 3

Lines & Logic

Identifying Angles

***Learning Targets:** Students will be able to identify and name angles formed by transversals.*
Students will be able to identify and evaluate vertical angles, linear pairs, adjacent angles, and non-adjacent angles.



KEY TERMS

Transversal: a line that intersects two or more lines, but not at the same point
line l

Corresponding Angles:
Angles in the same position in relation to the transversal. ∠2, ∠6

Alternate Interior Angles:
2 ∠'s in the interior (between 2 lines) on opposite side of the transversal, but not adjacent

Alternate Exterior Angles:
2 ∠'s in the exterior on opposite sides of the transversal, but not adjacent → can't be on the same side

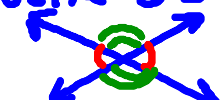
Consecutive Interior Angles: → Same-side Interior Angles
2 interior ∠'s on the same-side of the transversal

Consecutive Exterior Angles:
2 exterior ∠'s on the same side of the transversal

Complementary (Complement):
2 ∠'s that add to 90°

Supplementary (Supplement):
2 ∠'s that add to 180°

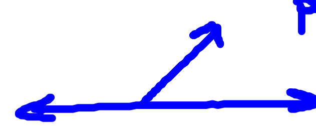
Vertical Angles:
Two opposite ∠'s formed by intersecting lines



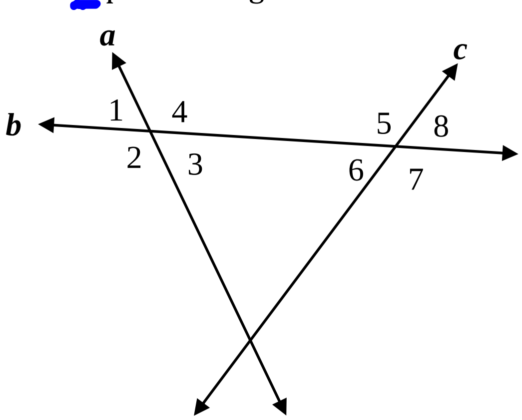
Adjacent Angles:

Two ∠'s that share a side and a vertex, but no interior points

Linear Pairs:
Two adjacent angles that add to 180°

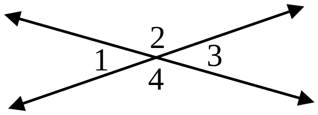


1. List all pairs of angles that fit the description.



a) Corresponding Angles: ∠1, ∠5 / ∠2, ∠6 / ∠7, ∠3 / ∠8, ∠4
b) Alternate Exterior Angles: ∠1, ∠7 / ∠2, ∠8 /
c) Alternate Interior Angle: ∠4, ∠6 / ∠3, ∠5 /
d) Consecutive Interior Angles: ∠3, ∠6 / ∠4, ∠5 /
e) Consecutive Exterior Angles: ∠1, ∠8 / ∠2, ∠7 /

2. In the diagram shown, $\angle 1$ has a measure of $60°$. Find the $m\angle 2$ and $m\angle 3$.



Vertical Angles: ______________________

Linear Pairs: ________________________

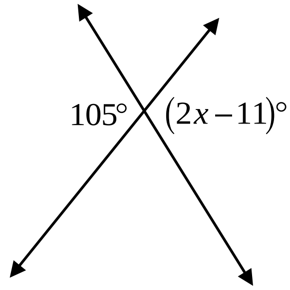
$m\angle 1 = 60°$

$m\angle 2 =$

$m\angle 3 =$

$m\angle 4 =$

3. Solve for x.

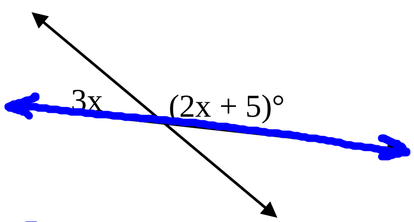


$2x - 11 = 105$

$2x = 116$

$x = 58$

4. Solve for x.



$3x + 2x + 5 = 180°$

$5x + 5 = 180$

$5x = 175$

$x = 35$

5. Given that $m\angle A = 55°$, find it's complement and supplement.

$55 + x = 90$

$x = 35$

$55 + y = 180°$

$y = 125$

6. $\angle X$ and $\angle Y$ are supplementary. Find the measure of each angle if $m\angle X = 6x - 1$ and $m\angle Y = 5x - 17$.

$6x - 1 + 5x - 17 = 180$

$11x - 18 = 180$

$11x = 198$

$x = 18$

7. $\angle P$ and $\angle Q$ are complementary. The measure of $\angle Q$ is 4 times the measure of $\angle P$. Find the measure of each angle.

$$\begin{cases} P + Q = 90 \\ Q = 4P \end{cases}$$

$P + 4P = 90$

$5P = 90$

$\angle P = 18$ $\quad Q = 4(18) = 72$

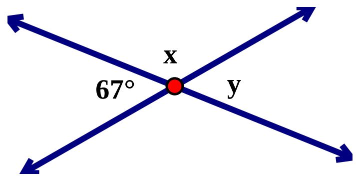
Identifying Types of Angles HW

Geometry

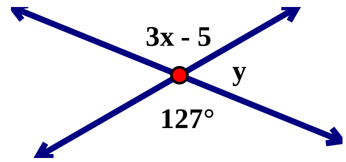
Name: ____________________
Date: ____________ Per:_____

1. Solve the following.

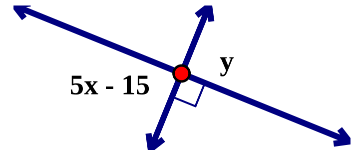
a) x = ______ y = ______



b) x = ______ y = ______



c) x = ______ y = ______



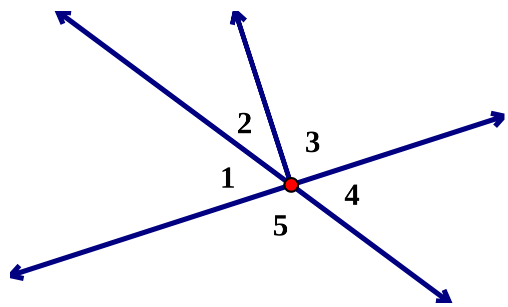
2. ∠5 and ∠3 are vertical angles. T or F

3. ∠1 and ∠5 are a linear pair. T or F

4. ∠4 and ∠3 are adjacent angles. T or F

5. ∠4 and ∠1 are vertical angles. T or F

6. ∠3 and ∠4 are a linear pair. T or F



7. If ∠A and ∠B are supplements and m∠A = 150°, what is m∠B? _________

8. If ∠A and ∠B are complements and m∠A = 27°, what is m∠B? _________

9. If ∠A and ∠B are vertical angles and m∠A = 36°, what is m∠B? _________

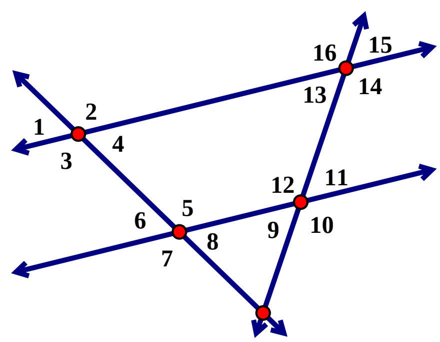
10. If ∠A and ∠B are a linear pair and m∠A = 2x+8 and m∠B = 3x+2, what is the measure of ∠A and ∠B?

11. If ∠A and ∠B are vertical angles and m∠A = 7x–5 and m∠B = 4x+10, what is the measure of ∠A and ∠B?

12. If $\angle A$ and $\angle B$ are supplementary and $m\angle A = 5x+30$ and $m\angle B = 3x-2$, what is the measure of $\angle A$ and $\angle B$?

13. If $\angle A$ and $\angle B$ are complementary and $m\angle A = 7x+5$ and $m\angle B = x+5$, what is the measure of $\angle A$ and $\angle B$?

14. Provide the name of the following relationships.



a) $\angle 1$ & $\angle 6$ ______________

b) $\angle 2$ & $\angle 7$ ______________

c) $\angle 16$ & $\angle 14$ ______________

d) $\angle 14$ & $\angle 11$ ______________

e) $\angle 1$ & $\angle 7$ ______________

f) $\angle 6$ & $\angle 5$ ______________

g) $\angle 15$ & $\angle 10$ ______________

h) $\angle 1$ & $\angle 2$ ______________

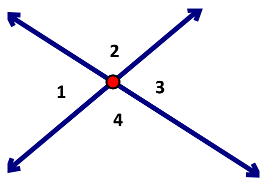
i) $\angle 13$ & $\angle 12$ ______________

j) $\angle 16$ & $\angle 9$ ______________

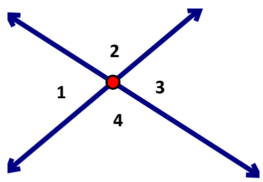
Types of Angles HW 2	**Geometry**	**Name:** ____________________ **Date:** ____________ **Per:**______

Solve for x.

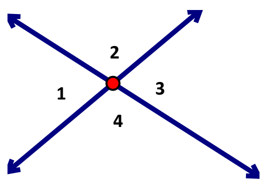
1. If m∠2 = 124° and m∠4 = 3x + 1, then:



2. If m∠1 = 62° and m∠3 = 4x – 2 , then:



3. If m∠1 = 48° and m∠2 = 4x + 4 , then:



Decide if the given statements are true or false.

4. ∠A and ∠B are vertical angles, then if m∠A = 70°, then m∠B = 110°. T or F
5. ∠A and ∠B are vertical angles, then if m∠A = 3x, then m∠B = 5x–2x. T or F
6. If ∠A and ∠B are a linear pair, then ∠A and ∠B are complementary. T or F
7. If ∠A and ∠B are supplementary angles, then ∠A and ∠B are a linear pair. T or F
8. ∠A and ∠B are a linear pair, then if m∠A = 43°, then m∠B = 137°. T or F
9. If ∠A and ∠B are a vertical angles, then ∠A and ∠B are also adjacent angles. T or F
10. If ∠A and ∠B are a linear pair, then m∠A + m∠B = 180°. T or F
11. If ∠A and ∠B are vertical angles, then ∠A ≅ ∠B. T or F

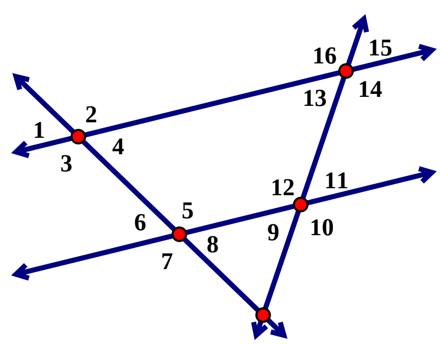
12. If ∠A and ∠B are a linear pair and m∠A = 5x+22 and m∠B = 9x+18, what is the measure of ∠A and ∠B?

13. If $\angle A$ and $\angle B$ are vertical angles and $m\angle A = 5x-8$ and $m\angle B = 3x+14$, what is the measure of $\angle A$ and $\angle B$?

14. If $\angle A$ and $\angle B$ are supplementary and $m\angle A = 5x+5$ and $m\angle B = 8x+6$, what is the measure of $\angle A$ and $\angle B$?

15. If $\angle A$ and $\angle B$ are complementary and $m\angle A = 5x+6$ and $m\angle B = 11x+4$, what is the measure of $\angle A$ and $\angle B$?

16. Provide the name of the following relationships.



a) $\angle 1$ & $\angle 8$ ______________ b) $\angle 3$ & $\angle 6$ ______________

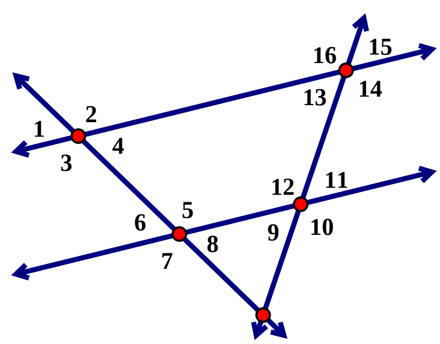
c) $\angle 16$ & $\angle 13$ ______________ d) $\angle 15$ & $\angle 13$ ______________

e) $\angle 2$ & $\angle 8$ ______________ f) $\angle 10$ & $\angle 16$ ______________

g) $\angle 5$ & $\angle 3$ ______________ h) $\angle 5$ & $\angle 9$ ______________

i) $\angle 13$ & $\angle 9$ ______________ j) $\angle 11$ & $\angle 5$ ______________

17. Provide the name of the following relationships.



a) $\angle 4$ & $\angle 5$ ______________ b) $\angle 5$ & $\angle 7$ ______________

c) $\angle 10$ & $\angle 11$ ______________ d) $\angle 3$ & $\angle 13$ ______________

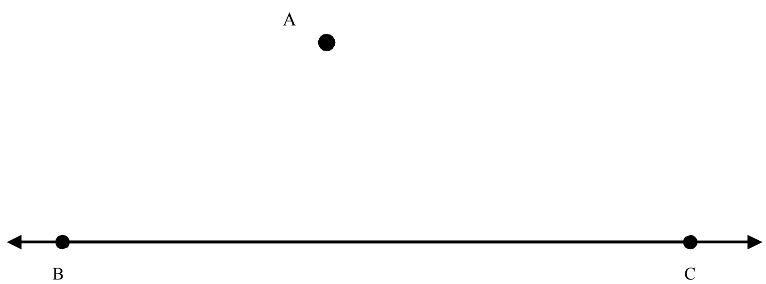
e) $\angle 1$ & $\angle 7$ ______________ f) $\angle 14$ & $\angle 10$ ______________

g) $\angle 6$ & $\angle 4$ ______________ h) $\angle 5$ & $\angle 6$ ______________

Constructions of Parallel & Perpendicular Lines

Learning Targets: Students will be able to perform basic constructions with a straightedge and compass, such as parallel lines.

CONSTRUCTION #1: Construct a segment parallel to the given line going through the given point A.



1. Use a straightedge to draw a transversal line going through point A and the given line. The two intersecting lines now form an angle.
2. With your compass point on the vertex of the angle, draw an arc that intersects both sides of the angle.
3. Keeping that same measurement, move your compass point to A and make the same arc.
4. Return to the original arc: using the compass, measure across it.
5. Repeat that measure onto the second arc.
6. Draw the line that goes through point A and the point of intersection of the arcs from step 5.

CONSTRUCTION #2: Construct the line perpendicular to the given line going through the given point OFF the line.

1. Place the compass point on A and draw an arc that intersects the given line in two places.
2. From EACH of those points of intersection, make an arc above or below the line.
3. These 2 arcs will intersect at a point. Draw the line that goes through this point of intersection and point A.

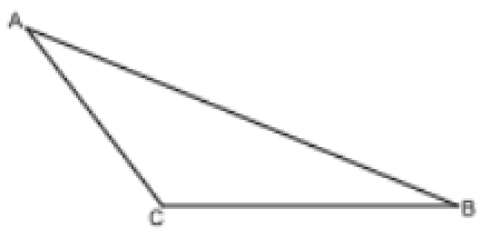
CONSTRUCTION #3: Construct the line perpendicular to the give line, going through the given point ON the line.

1. Place the compass point on A and draw an arc that intersects the given line in two places.
2. From EACH of those new points of intersection, make an arc above AND below the line.
3. These arcs will intersect at 2 points. Draw the line that goes through these points of intersection and point A.

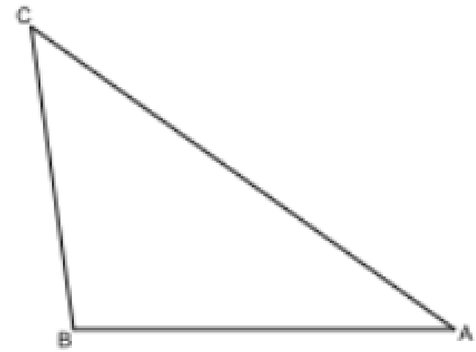
PRACTICE

Construct the perpendicular bisector of side AB of each triangle.

1)

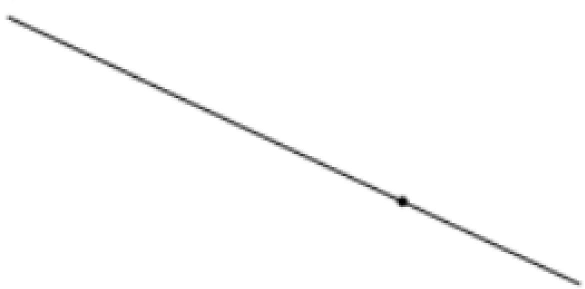


2)

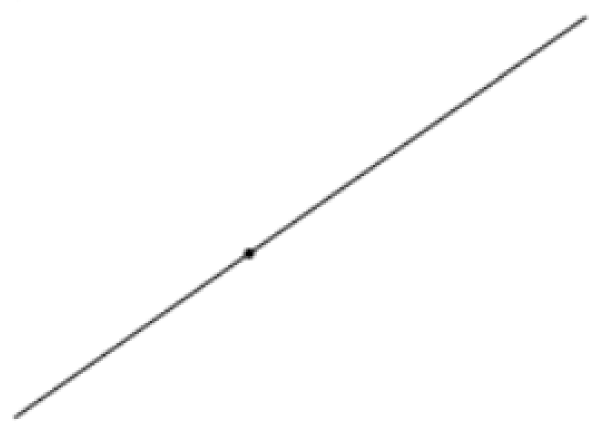


Construct a line segment perpendicular to the segment given through the point given.

3)



4)



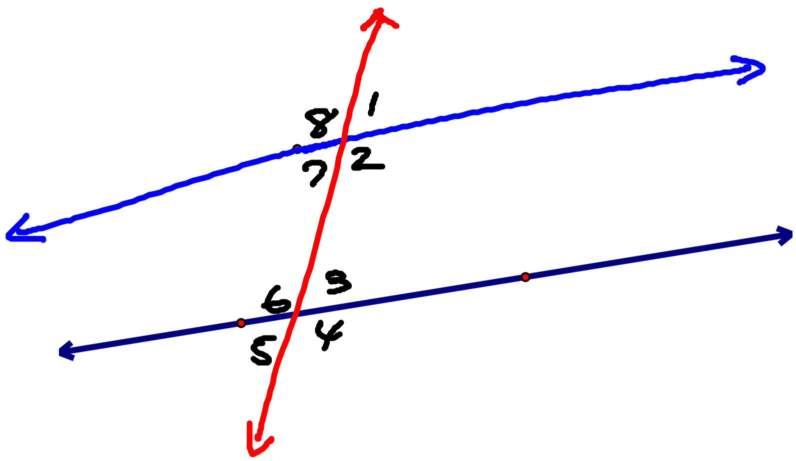
GEOMETRY Name:______________________
Unit #3 Activity Date:__________Period: ________

KEY TERMS

Parallel Lines: Two lines on the same plane that never intersect (same slope).

Transversal: A line that passes through two lines in the same plane at two distinct points.

Use the diagram to complete the following.



1. Draw a line parallel to the given line through the given point.

2. Draw a transversal.

3. At this point, there should be eight visible angles. Label them one through eight.

4. Name all of the following angles:

   a) Corresponding Angles: ∠1, ∠3 / ∠2, ∠4 / ∠8, ∠6 / ∠5, ∠7 /

   b) Alternate Interior Angles: ∠2, ∠6 / ∠3, ∠7 /

   c) Alternate Exterior Angles: ∠5, ∠1 / ∠4, ∠8

   d) (Consecutive) Interior Angles: ∠7, ∠6 / ∠2, ∠3 /
   Same-side

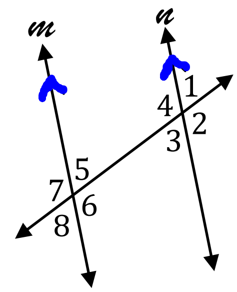
   e) (Consecutive) Exterior Angles: ∠8, ∠5 / ∠1, ∠4 /

   f) Linear Pair: ∠5, ∠6 / ∠3, ∠4 / ∠8, ∠7 / ∠1, ∠2 / ∠6, ∠3 /
   ∠7, ∠2 / ∠5, ∠4 / ∠8, ∠1

   g) Vertical Angles: ∠5, ∠3 / ∠6, ∠4 / ∠8, ∠2 / ∠7, ∠1 /

We will be exploring the relationships of angles and parallel lines in our current chapter. With the diagram given, discuss with your group angles relationships (≅ or 180°) that can be explained through transformations (translations, rotations, or reflections) or basic angle knowledge. Make sure that you have clear explanations of your findings and can back it up with facts. We will explore five angle relationships.

*****VERIFY EACH ANGLE RELATIONSHIP AND EXPLANATION WITH YOUR TEACHER*****



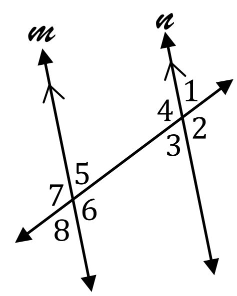
ALT. EXT. ∠'s

1. Name of Angles ($\angle 1 \& \angle 8$): ALTERNATE EXT. ∠'s

Relationship of Angles: $\angle 1 \cong \angle 8$

Explanation: TRANSLATED ∠1 TO ∠5 and then ROTATED TO ∠8

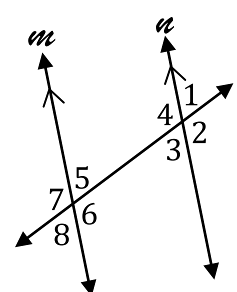
ISOMETRIES



2. Name of Angles ($\angle 4 \& \angle 7$): Corresponding ∠'s

Relationship of Angles: Congruent

Explanation: Translate ∠4 to ∠7



Same-Side Int ∠'s

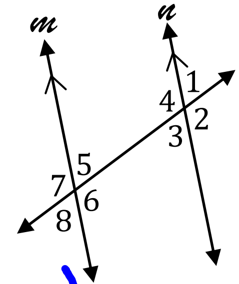
3. Name of Angles ($\angle 3 \& \angle 6$): Consecutive Int. ∠'s

Relationship of Angles: Supplementary (add to 180°)

Explanation: ∠3 and ∠2 are a linear pair → ($\angle 3 + \angle 2 = 180°$

$\angle 2 \cong \angle 6$ by a translation

Since $\angle 3 + \angle 2 = 180 \Longrightarrow \angle 3 + \angle 6 = 180°$

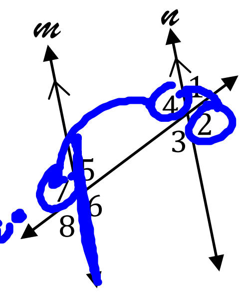


4. Name of Angles (∠5 & ∠3): ALT INT. ∠'s

Relationship of Angles: ∠5 ≅ ∠3

Explanation: ∠5 ROTATE 180° TO ∠8 (∠5 ≅ ∠8)

TRANSLATE ∠8 (∠5) TO ∠3



5. Name of Angles (∠2 & ∠8): Consecutive EXT ∠'s

Relationship of Angles: ∠2, ∠8 Supplementary ∠2 + ∠8 = 180°

Explanation: ROTATE ∠2 TO ∠4 ∠2 ≅ ∠4

TRANSLATE ∠4 → ∠7 ∠4 ≅ ∠7

and ∠7 + ∠8 = 180 ∠2 ≅ ∠7

∠2 + ∠8 = 180

---

① Corresponding Angle Postulate If ____ then ____

If two parallel lines are cut by a transversal, then the corresponding angles are congruent

need for the Th. to work

② ALT. INT ∠ Th.

If ∥, then the ALT INT ∠'s are ≅

③ Consecutive INTER. ∠ Th.

If ∥, then the Consec INT ∠'s add to 180°

④ ALT EXT. ∠ Th.

If ∥, the ALT EXT ∠'s are ≅

⑤ Consec. EXT ∠ Th.

If ∥, the consec EXT ∠'s add to 180°

∥ parallel

⊥ perpendicular

≅ → Congruent

Proving Angle Relationships

***Learning Targets:** Students will be able to recognize and apply algebraic and geometric properties.*
Students will be able to complete two-step proofs (Logical L's).
Students will be able to prove relationship of angles based on parallel lines.

KEY TERMS

Addition Property: If a = b, then $a + c = b + c$

Subtraction Property: If a = b, then $a - c = b - c$

Multiplication Property: If a = b, then $ac = bc$

Division Property: If a = b, then $\frac{a}{c} = \frac{b}{c}$ $c \neq 0$

Reflexive Property: For any number a, $a = a$

Symmetric Property: If a = b, then $b = a$

Transitive Property: If a = b and b = c, then $a = c$

Substitution Property: If a = b, then a can be substituted for b.

Distributive Property: If a(b + c), then $ab + ac$

Use the property to complete the statement.

1. **Symmetric property of equality**: If $m\angle A = m\angle B$, then ______________________.
2. **Transitive property of equality**: If $BC = CD$ and $CD = EF$, then ______________________.
3. **Substitution property of equality**: If $LK + JM = 12$ and $LK = 2$, then ______________________.
4. **Subtraction property of equality**: If $PQ + ST = RS + ST$, then ______________________.
5. **Division property of equality**: If $3(m\angle A) = 90°$, then ______________________.

Two Column Proof: Two column proofs are used to prove or verify a statement. They include a column of statements and a column of reasons that justify the statements. The reason column contains definitions, accepted facts (postulates), or previously proven theorems. In addition to the two columns, a two column proof contains given information and what is to be proved. In most cases a diagram is also part of the proof.

****Always start with the "givens".****

****The last statement is what you're trying to find or prove.****

Prove Statement

Complete each logical argument with an appropriate conclusion and reason.

6.

Statement	Reasons
1. $\angle XYZ$ is a right angle	**1. Given**
2. $\angle XYZ = 90°$	2. Right ∠'s = 90° Definition of a Right ∠

7.

Statement	Reasons
1. $\angle 3$ & $\angle 4$ are supplementary	**1. Given**
2. $\angle 3 + \angle 4 = 180°$	2. suppl. ∠'s add to 180°

8.

Statement	Reasons
1. $m\angle F + m\angle G = 90°$	**1. Given** definition of complementary ∠'s
2. ∠F, ∠G are complementary	2. Complementary ∠'s add to 90°

9.

Statement	Reasons
1. $\angle ABC$ & $\angle DBE$ are vertical	**1. Given** Vertical ∠ Theorem.
2. $\angle ABC \cong \angle DBE$	2. Vertical ∠'s are ≅

<u>Reasons For Angle Relationships (Not Based On Lines Being Parallel)</u>

If an angle is a right angle, then it measures 90°.

If an angle measures 90°, then it is a right angle.

If two angles sum up to 90°, then they are complementary.

If two angles are complementary, then they sum up to 90°.

If two angles sum up to 180°, then they are supplementary.

If two angles are supplementary, then they sum up to 180°.

If two angles (segments) have equal measures, then they are congruent

If two angles (segments) are congruent, then they have equal measures.

If two angles are vertical angles, then they are congruent.

If two angles form a linear pair, then they are supplementary.

Reasons For Angle Relationships (Based On Lines Being Parallel)

If two lines are //, then corresponding angles are congruent.

If two lines are //, then alternate interior angles are congruent.

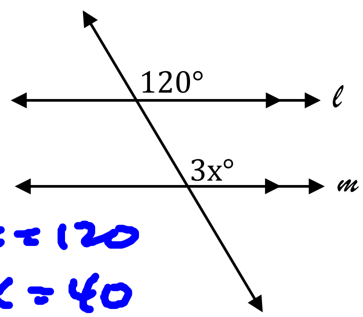
If two lines are //, then alternate exterior angles are congruent.

If two lines are //, then consecutive interior angles are supplementary.

If two lines are //, then consecutive exterior angles are supplementary.

Line ℓ and m are parallel. Find the value of x. Explain your reasoning.

10.



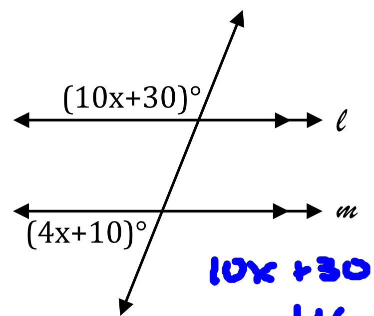
$3x = 120$

$x = 40$

x = 40

Reason: if //, corresp ∠'s are ≅

11.



$10x + 30 + 4x + 10 = 180°$

$14x + 40 = 180$

$14x = 140$

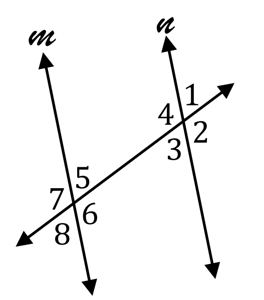
$x = 10$

x = 10

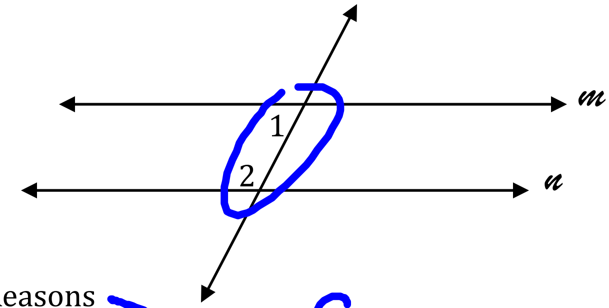
Reason: if // the consec. ext ∠'s add to 180°

Paragraph Proof: A proof written in paragraph form.

12. Using a paragraph proof, explain why $\angle 4 \cong \angle 6$ ($m // n$).



13. Complete the two column proof.



Given: $m \parallel n$

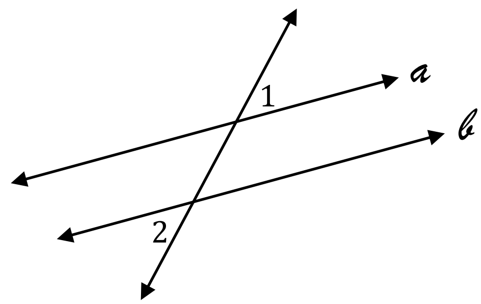
$m\angle 1 = 110°$

Prove: $m\angle 2 = 70°$ ← GOAL!

Statements	Reasons
1. $m \parallel n$, $m\angle 1 = 110°$ ✓	1. Given ✓
2. $\angle 1 + \angle 2 = 180°$	2. if ∥, the consec int ∠'s add to 180°
3. $110° + \angle 2 = 180°$	3. Substitution Prop.
4. $\angle 2 = 70°$ ✓	4. Subtraction Prop

{Def. / Post / Theorem / Property}

14. Complete the two column proof.



Given: $a \parallel b$

$m\angle 1 = 120°$

Prove: $m\angle 2 = 120°$

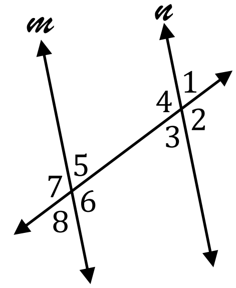
Statements	Reasons

Proving Angle Relationships HW

Geometry

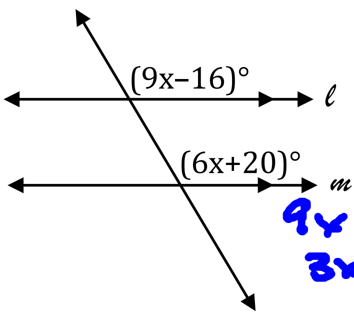
Name: ____________________
Date: ____________ **Per:**______

1. Explain why ∠4 and ∠5 are supplementary through transformations ($m // n$).



Line ℓ and m are parallel. Find the value of x.

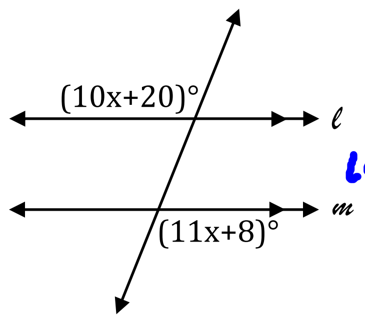
2.



9x − 16 = 6x + 20
3x = 36
x = 12

Angle Name: Correspon ∠'s
Angle Relationship: ≅
x = 12
Reason: if ∥, Corresp ∠'s ≅

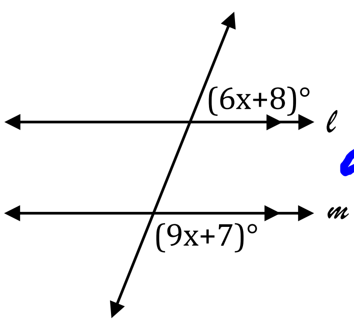
3.



10x + 20 = 11x + 8
12 = x

Angle Name: ALT EXT ∠'s
Angle Relationship: ≅
x = 12
Reason: if ∥, ALT EXT ∠'s ≅

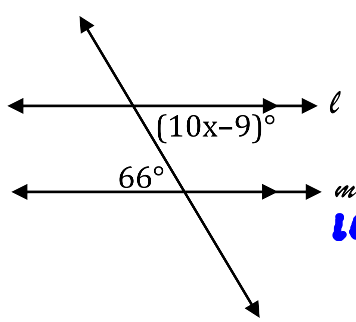
4.



9x+7+6x+8=180
15x + 15 = 180
15x = 165
x = 11

Angle Name: Same-Side EXT ∠'s
Angle Relationship: add to 180°
x = 11
Reason: if ∥, Consec EXT ∠'s are supplementary

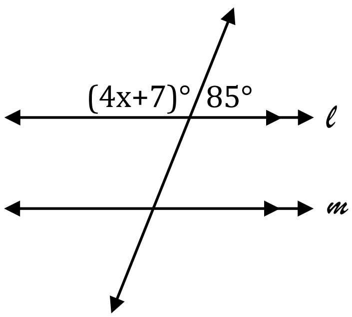
5.



10x − 9 = 66
10x = 75
x = 75/10
x = 7.5

Angle Name: ALT INT ∠'s
Angle Relationship: ≅
x = ____________
Reason: if ∥, the ALT INT ∠'s are ≅

6.



Angle Name: ______________

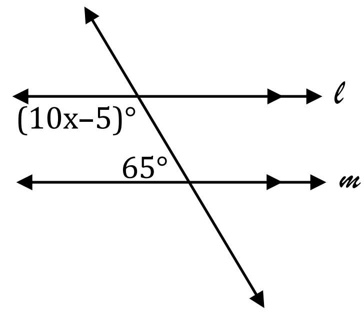
Angle Relationship: ______________

x = ______________

Reason: ______________________________________

____

7.



Angle Name: ______________

Angle Relationship: ______________

x = ______________

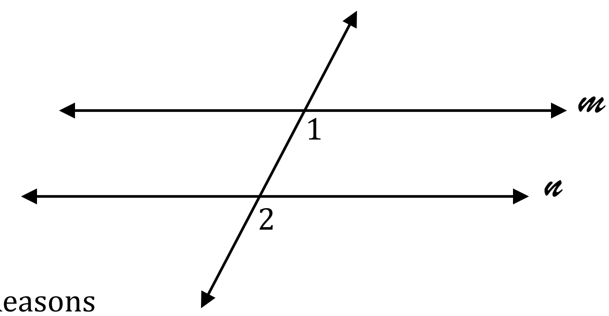
Reason: ______________________________________

____

8. Complete the two column proof.

Given: $m \parallel n$

Prove: $\angle 1 \cong \angle 2$

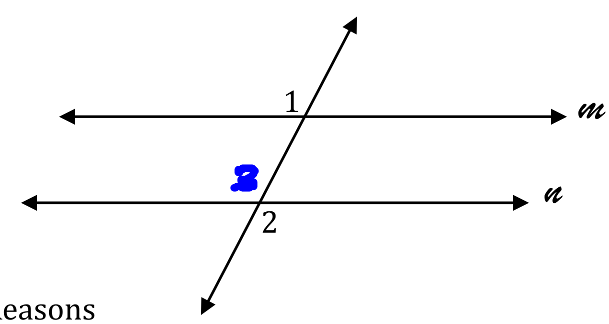


Statements	Reasons

9. Complete the two column proof.

Given: $m \parallel n$

Prove: $m\angle 1 = m\angle 2$ } Prove the ALT EXT ∠. Theorem.



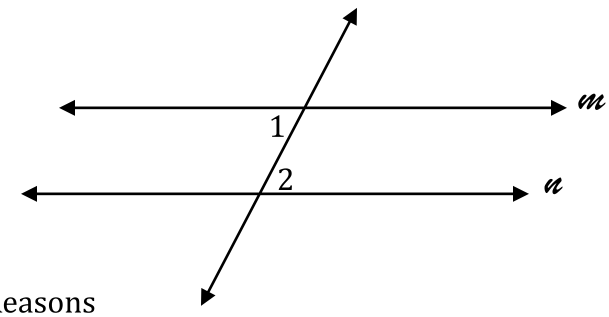
Statements	Reasons

10. Complete the two column proof.

Given: $m \parallel n$

$m\angle 1 = 67°$

Prove: $m\angle 2 = 67°$

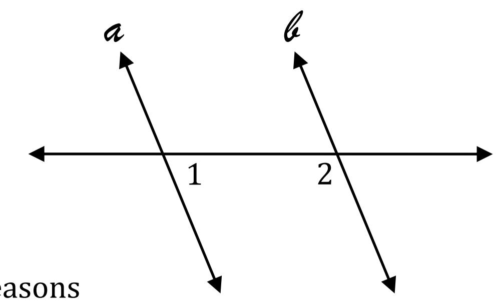


Statements	Reasons

11. Complete the two column proof.

Given: $a \parallel b$

Prove: $\angle 1$ and $\angle 2$ are supplementary

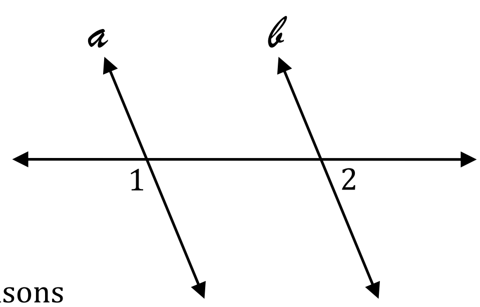


Statements	Reasons

12. Complete the two column proof.

Given: $a \parallel b$

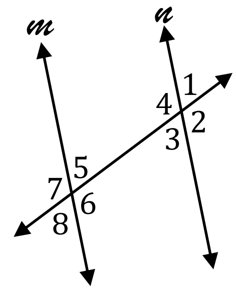
Prove: $m\angle 1 + m\angle 2 = 180°$



Statements	Reasons

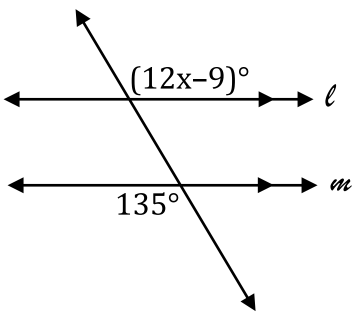
Proving Angle Relationships 2	**Geometry**	**Name:** ____________________ **Date:** _____________ **Per:**______

1. Explain why $\angle 2 \cong \angle 7$ through transformations ($m // n$).



Line ℓ and m are parallel. Find the value of x.

2.



Angle Name: _______________

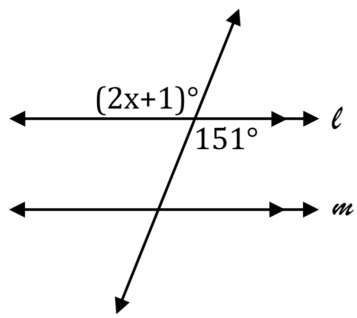
Angle Relationship: _______________

x = _______________

Reason: ______________________________________

____

3.



Angle Name: ___________________

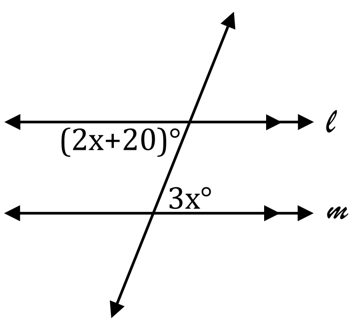
Angle Relationship: _______________

x = _______________

Reason:_______________________________________

____

4.



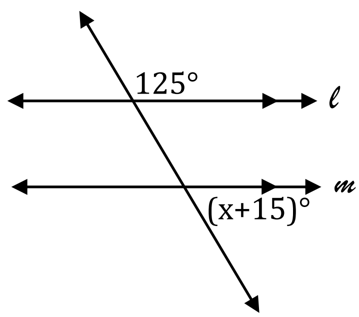
Angle Name: _______________

Angle Relationship: _______________

x = _______________

Reason: ______________________________________

5.



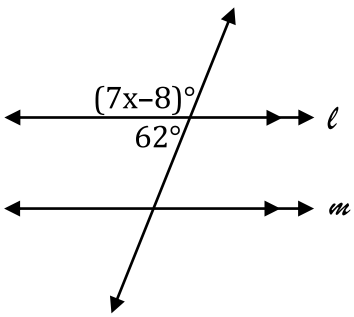
Angle Name: ___________________

Angle Relationship: _______________

x = _______________

Reason:_______________________________________

6.



Angle Name: ________________

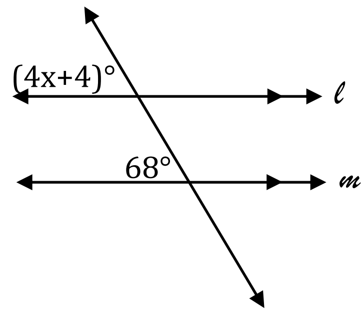
Angle Relationship: ________________

x = _______________

Reason: ____

____

7.



Angle Name: ____________________

Angle Relationship: ________________

x = _______________

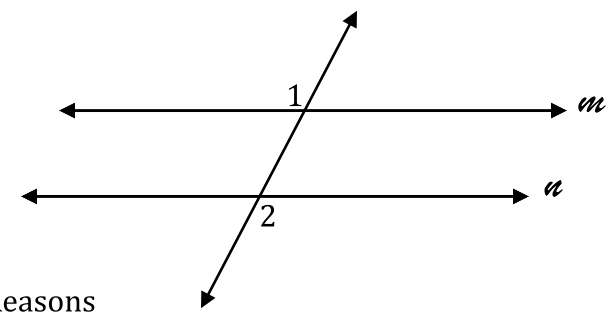
Reason:____

____

8. Complete the two column proof.

Given: $m \parallel n$

Prove: $\angle 1 \cong \angle 2$



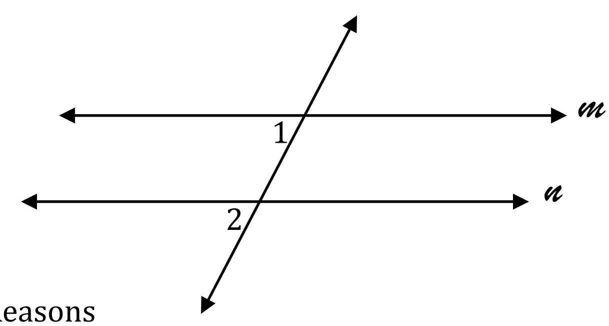
Statements	Reasons

9. Complete the two column proof.

Given: $m \parallel n$

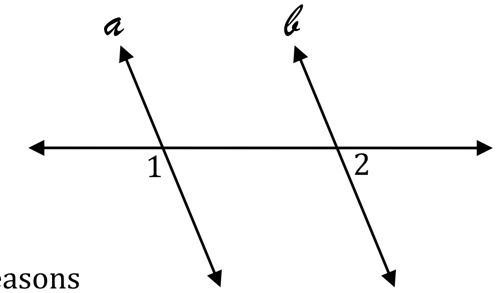
$m\angle 1 = 51°$

Prove: $m\angle 2 = 51°$



Statements	Reasons

10. Complete the two column proof.

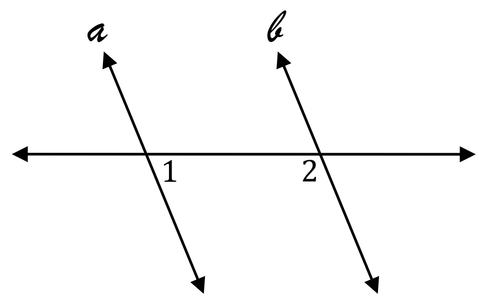


Given: $a \parallel b$

Prove: $\angle 1$ and $\angle 2$ are supplementary

Statements	Reasons

11. Complete the two column proof.



Given: $a \parallel b$

$m\angle 1 = 48°$

Prove: $m\angle 2 = 132°$

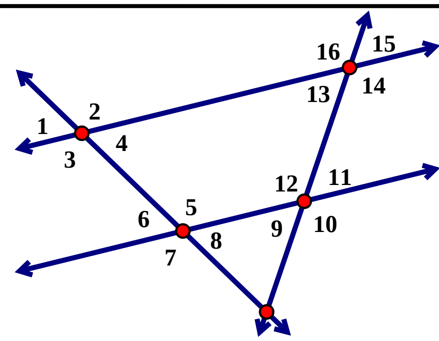
Statements	Reasons

Midunit Review

Geometry

Name: ____________________
Date: ____________ **Per:**_____

1. Provide the name of the following relationships.



a) ∠4 & ∠8 ____________ b) ∠3 & ∠4 ____________

c) ∠13 & ∠15 ____________ d) ∠9 & ∠15 ____________

e) ∠9 & ∠16 ____________ f) ∠8 & ∠9 ____________

g) ∠11 & ∠13 ____________

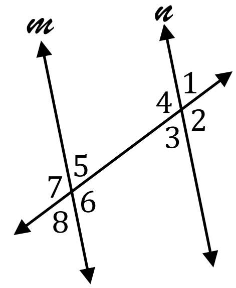
2. If ∠A and ∠B are supplementary and m∠A = 5x+12 and m∠B = 11x+8, what is the measure of ∠A and ∠B?

3. If ∠C and ∠D are vertical angles and m∠C = 10x+8 and m∠D = 14x–16, what is the measure of ∠C and ∠D?

4. If ∠E and ∠F are a linear pair and m∠E = 8x+18 and m∠F = 3x+19, what is the measure of ∠E and ∠F?

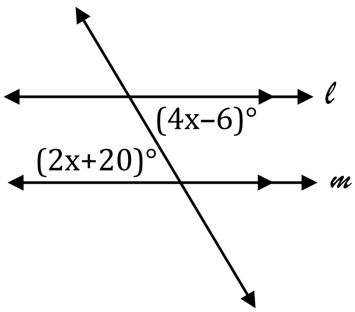
5. If ∠G and ∠H are complementary and m∠G = 6x+9 and m∠H = 9x+6, what is the measure of ∠G and ∠H?

6. Explain why $\angle 1$ and $\angle 7$ are supplementary through transformations ($m // n$).



Line ℓ and m are parallel. Find the value of x.

7.

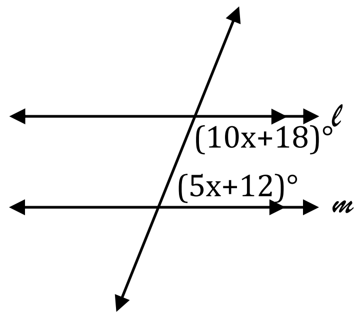


Angle Name: ________________

Angle Relationship: ________________

x = _______________

8.

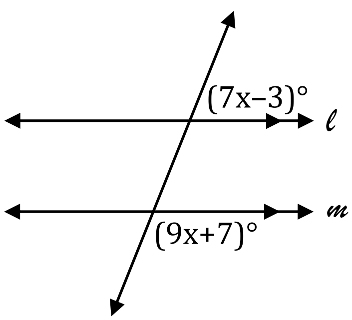


Angle Name: ____________________

Angle Relationship: ________________

x = _______________

9.

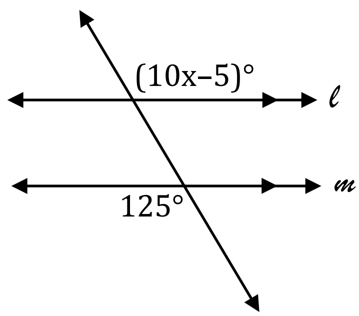


Angle Name: ________________

Angle Relationship: ________________

x = _______________

10.



Angle Name: ____________________

Angle Relationship: ________________

x = _______________

Name the property that is being demonstrated.

11. If $3x + 4 = 12$, then $3x = 8$. ______________________________

12. If $AB - CD = 14$ and $AB = 10$, then $10 - CD = 14$. ______________________________

13. If $x = 8$ and $8 = z$, then $x = z$. ______________________________

Proving Lines Parallel

Learning Targets: Students will be able to complete two-step proofs (Logical L's).
Students will be able to prove lines are parallel based on relationships of angles.

Complete each logical argument with an appropriate conclusion and reason.

1. Statement / Reasons

Statement	Reasons
1. $m\angle 3+m\angle 4=90°$	**1. Given**
2.	**2.**

2. Statement / Reasons

Statement	Reasons
1. $\angle ABC$ & $\angle XYZ$ are supplementary	**1. Given**
2.	**2.**

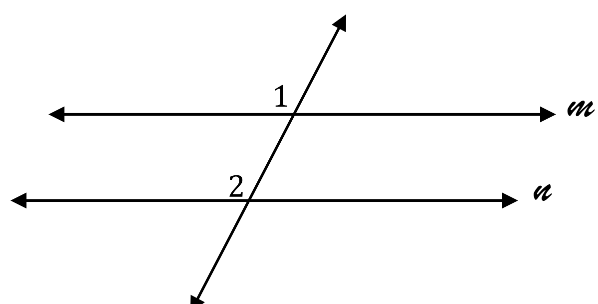
3. Statement / Reasons

Statement	Reasons
1. $\angle F$ and $\angle G$ are a linear pair	**1. Given**
2.	**2.**

4. Statement / Reasons

Statement	Reasons
1. $m\angle ABC=m\angle DBE$	**1. Given**
2.	**2.**

5. Complete the two column proof.



Given: *m* // *n*
$m\angle 1 = 110°$
Prove: $m\angle 2 = 110°$

Statements	Reasons

Reasons For Parallel Lines (Based On Relationship Of Angles)

If corresponding angles are congruent, then //.

If alternate interior angles are congruent, then //.

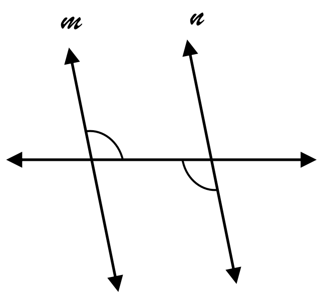
If alternate exterior angles are congruent, then //.

If consecutive interior angles are supplementary, then //.

If consecutive exterior angles are supplementary, then //.

Is it possible to prove lines *m* and *n* are parallel? If so, explain your reasoning.

6.

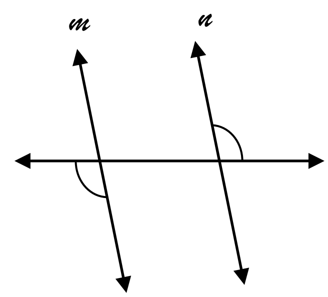


Circle: Yes or No

Reason: ________________________________

____

7.

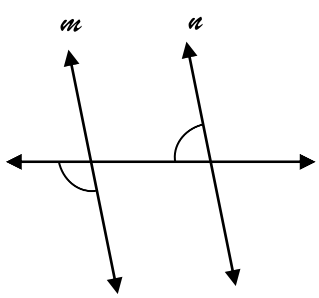


Circle: Yes or No

Reason: ________________________________

____

8.

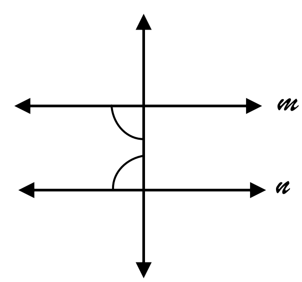


Circle: Yes or No

Reason: ________________________________

____

9.

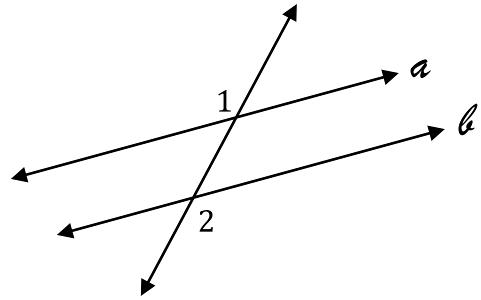


Circle: Yes or No

Reason: ________________________________

____

10. Complete the two column proof.

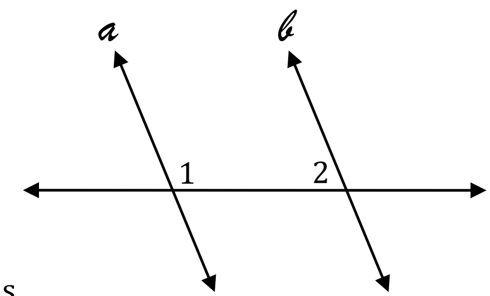


Given: m∠1 = 140°
m∠2 = 140°

Prove: *a* // *b*

Statements	Reasons

11. Complete the two column proof.



Given: m∠1 = 118°
m∠2 = 62°

Prove: *a* // *b*

Statements	Reasons

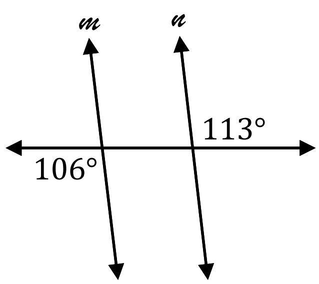
Proving Lines Parallel HW

Geometry

Name: ______________________
Date: _____________ Per:______

Is it possible to prove lines *m* and *n* are parallel? If so, explain your reasoning.

1.

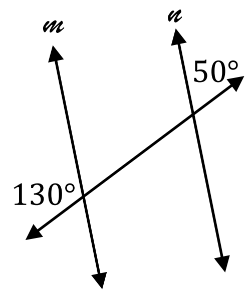


Circle: Yes or No

Reason: ______________________________

____

2.

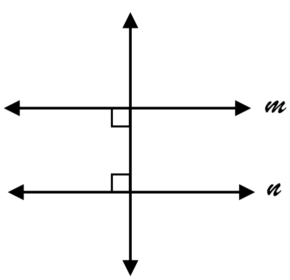


Circle: Yes or No

Reason: ______________________________

____

3.

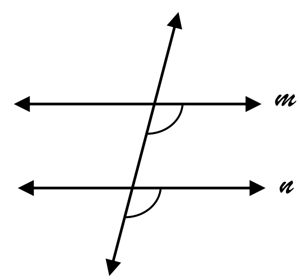


Circle: Yes or No

Reason: ______________________________

____

4.

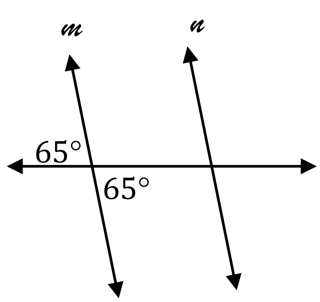


Circle: Yes or No

Reason: ______________________________

____

5.

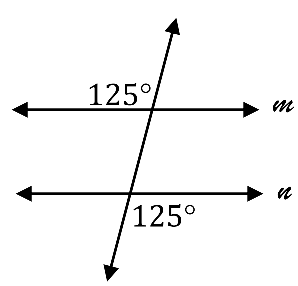


Circle: Yes or No

Reason: ______________________________

____

6.

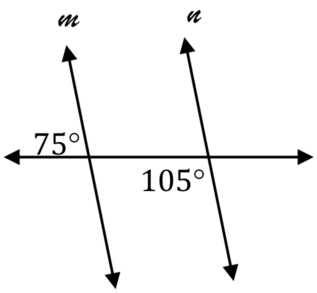


Circle: Yes or No

Reason: ______________________________

____

7.

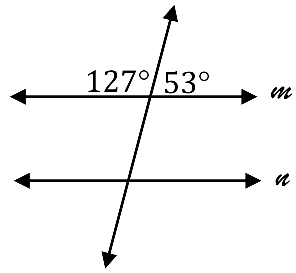


Circle: Yes or No

Reason: ______________________________

____

8.



Circle: Yes or No

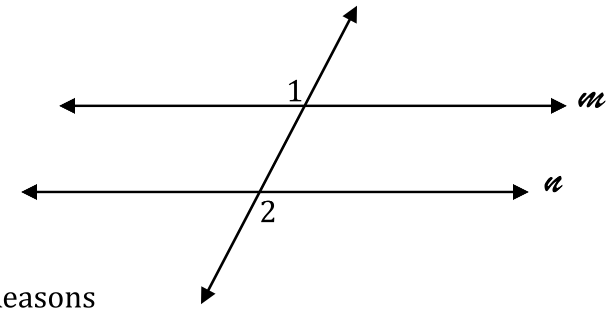
Reason: ______________________________

____

9. Complete the two column proof.

Given: $\angle 1 \cong \angle 2$

Prove: $m \parallel n$

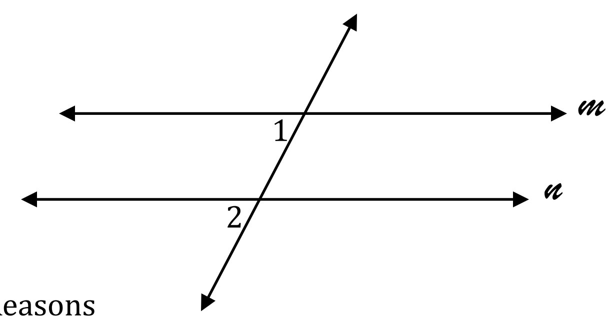


Statements	Reasons

10. Complete the two column proof.

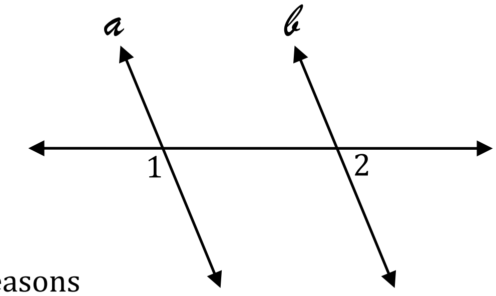
Given: $m\angle 1 = 51°$
$m\angle 2 = 51°$

Prove: $m \parallel n$



Statements	Reasons

11. Complete the two column proof.

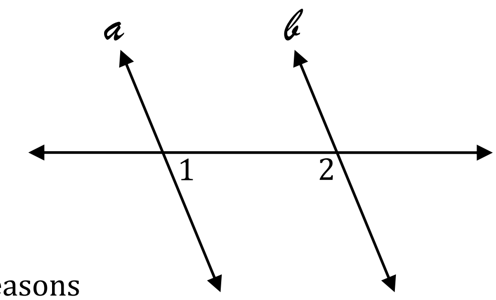


Given: $\angle 1$ and $\angle 2$ are supplementary

Prove: $a \parallel b$

Statements	Reasons

12. Complete the two column proof.



Given: $m\angle 1 + m\angle 2 = 180°$

Prove: $a \parallel b$

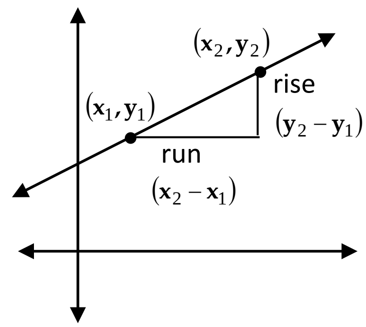
Statements	Reasons

Lines in the Coordinate Plane –Focus on Slope & Equation Writing

Learning Targets: Students will be able to find the slopes of lines.
Students will be able to identify parallel lines based on their slopes.
Students will be able to write equations of parallel lines.

REMEMBER

slope (m) $= \dfrac{\textbf{rise}}{\textbf{run}} = \dfrac{\Delta y}{\Delta x} = \dfrac{y_2 - y_1}{x_2 - x_1}$



Ex. 1) Find the slope of the line that passes through the given points.

a) (6, 2) and (8, 8)

b) (–5, 5) and (7, 4)

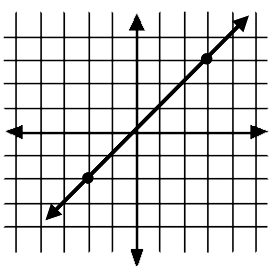
* You can use the slope of two lines to tell whether the lines are parallel!!

SLOPES OF PARALLEL LINES POSTULATE

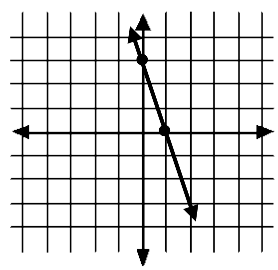
In a coordinate plane, two nonvertical lines are parallel if and only if they have the same slope. Any two vertical lines are parallel.

Ex. 2) Find the slope of each line. Are the lines parallel?

a)



b)



REMEMBER

slope-intercept form: y = mx + b

point-slope form: $y - y_1 = m(x - x_1)$

Ex. 4) Write an equation of the line that passes through point (5, 6) and has a slope of –1.

Ex. 5) Write an equation of a line that passes through point (–1, 2) and is parallel to a line with the equation $y = \frac{2}{3}x - 2$

<u>**SLOPES OF PERPENDICULAR LINES POSTULATE**</u>

In a coordinate plane, two non-vertical lines are perpendicular if and only if the product of their slopes is -1. Vertical and horizontal lines are perpendicular.

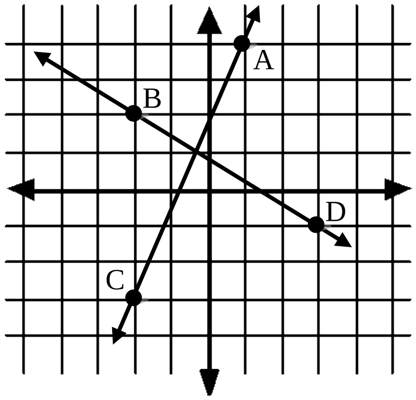
*The slopes of perpendicular lines are ________________________ ____________________________.

Ex. 1) Lines a and b are perpendicular. The slope of line a is given. What is the slope of line b?

a) $m_a = -2$ **b)** $m_a = \frac{3}{4}$ **c)** $m_a = -\frac{5}{2}$

Ex. 2) Find the slope of $\overleftrightarrow{AC}$ **and** $\overleftrightarrow{BD}$**. Decide whether** $\overleftrightarrow{AC}$ **is perpendicular to** $\overleftrightarrow{BD}$**.**

a)



Ex. 3) Decide whether the lines are perpendicular.

a) line p: y = 2x + 5

line q: $y = \frac{1}{2}x + 5$

$m_p = 2$

$m_q = \frac{1}{2}$

No, they are not opposites. (reciprocals) or

$2 \cdot \frac{1}{2} = 1 \neq -1$

b) line a: 4x – 2y = 6

line b: 2x + 4y = 6

$4x - 2y = 6$

$\frac{-2y}{-2} = \frac{-4x}{-2} + \frac{6}{-2}$

$y = \boxed{2}x - 3$

$2x + 4y = 6$

$\frac{4y}{4} = \frac{-2x}{4} + \frac{6}{4}$

$y = -\frac{2}{4}x + \frac{6}{4}$ $m = \boxed{-\frac{1}{2}}$

Yes, the slopes are opp. reci. or

$2(-\frac{1}{2}) = -1$ ✓

Ex. 4) Line *j* is perpendicular to the line with the equation y = $\frac{1}{3}x + 4$ and line *j* passes through point (1, 5). Write an equation for line *j*.

$\frac{1}{3}$

opp recip

$-\frac{3}{1} = -3$

$m_0 = \frac{1}{3}$ $m_1 = -3$

$\boxed{y - 5 = -3(x - 1)}$

OR

$y - 5 = -3x + 3$

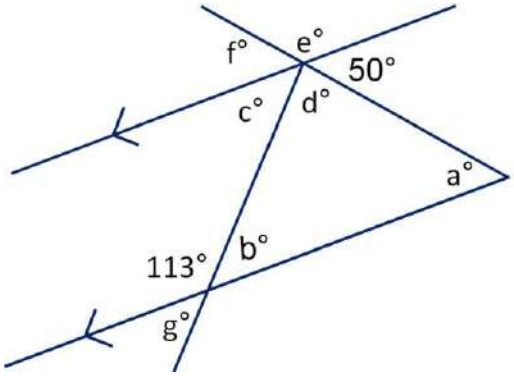
$\boxed{y = -3x + 8}$

Ex. 5) Write an equation parallel to y = 2*x* – 4 through (2, 3). Then write an equation perpendicular to y = $\frac{1}{3}x - 2$ through point (0, 5).

a) y = 2*x* - 4

b) $y = \frac{1}{3}x - 2$

AB =



1. Use the diagram below to solve for the following:

a =

b =

c =

d =

e =

f =

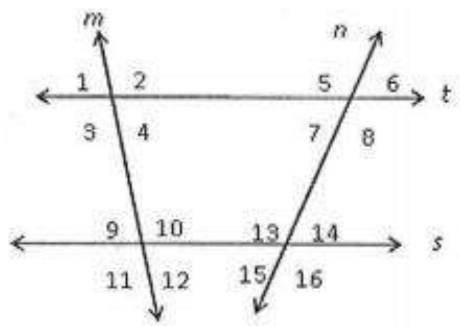
g =

2. Explain how you solved for the measure of angle c in problem #1.

____

____

____



3. Given: $t \parallel s$, $m\angle 2 = 97°$, $m\angle 6 = 83°$
Find the measures of the following angles.

a) $m\angle 3 =$

b) $m\angle 9 =$

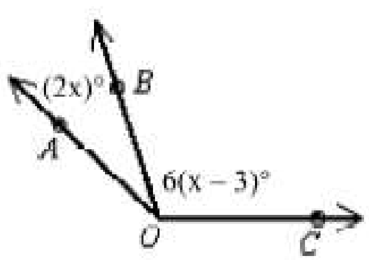
c) $m\angle 10 =$

d) $m\angle 5 =$

e) $m\angle 7 =$

f) $m\angle 16 =$

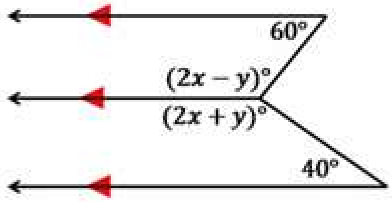
4. Use the figure below to complete the two-column proof.



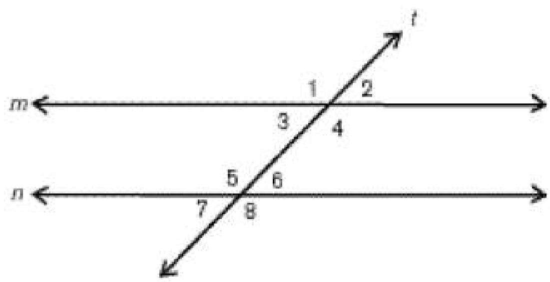
Drawing not to scale

Statement	Reason
$m\angle AOB + m\angle BOC = m\angle AOC$	
$2x + 6(x - 3) = 150$	
$2x + 6x - 18 = 150$	
$8x - 18 = 150$	
$8x = 168$	
$x = 21$	

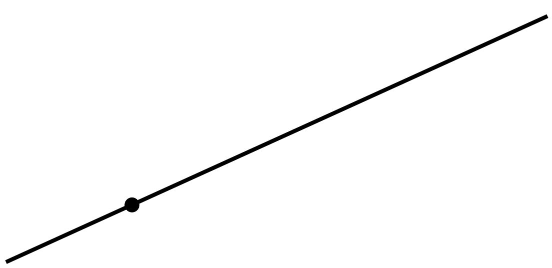
5. Solve for x and y.
   Hint: https://www.youtube.com/watch?v=OjGU7LeZA8s



6. Given: $m \parallel n$
   Prove: $m\angle 1 + m\angle 7 = 180$

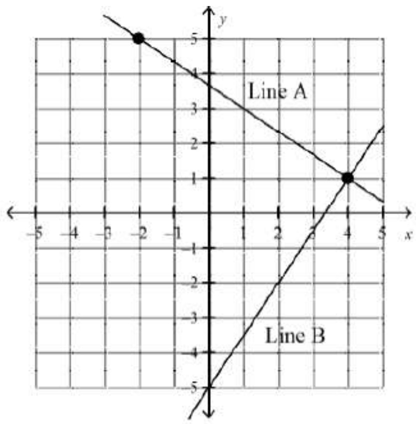


7. Construct a line perpendicular to the given line, through the given point on the line.



8. Construct a line parallel to the given line.

Use the graph below to answer questions 9-12.



9. Describe the relationship of line A and B, using slope as evidence.

10. Draw a line parallel to line A.
11. Write the equation of that parallel line you drew for #5. Your final equation needs to be in slope-intercept form.

12. What is the relationship between line B and the line that you drew for #5? Explain your reasoning.

Unit 4

Triangles

Congruent Triangles and CPCTC

***Learning Targets:** Students will be able to identify and name congruent triangles.*
Students will be able to name corresponding parts of congruent triangles.
Students will be to solve for parts of congruent triangles.

KEY TERMS

Congruent: Two figures that have the same size (measurements) and shape (# of sides, # of angles)
≅

Congruence Statement:
A statement that relates the ≅ parts $\triangle ABC \cong \triangle DEF$

Corresponding (Sides and Angles):
The sides and angle that "match up" by congruence or similarity

CPCTC:
Corresponding Parts of Congruent Triangles are Congruent

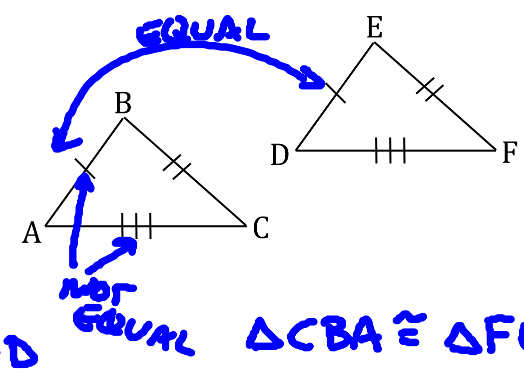
Two geometric figures are **congruent** if they have the same **size** and **shape**.

When two figures are congruent, there is a correspondence between their angles and sides such that **corresponding angles are congruent** and **corresponding sides are congruent**.

When naming congruent triangles, you must name them in **corresponding order**.

CORRESPONDING PARTS

Corresponding Angles	Corresponding Sides
$\angle BAC \cong \angle EDF$ $\angle A \cong \angle D$	$\overline{AB} \cong \overline{DE}$
$\angle ABC \cong \angle DEF$ ($\angle CBA$)	$\overline{BC} \cong \overline{EF}$
$\angle BCA \cong \angle EFD$	$\overline{AC} \cong \overline{DF}$



Name the congruent triangles three different ways.

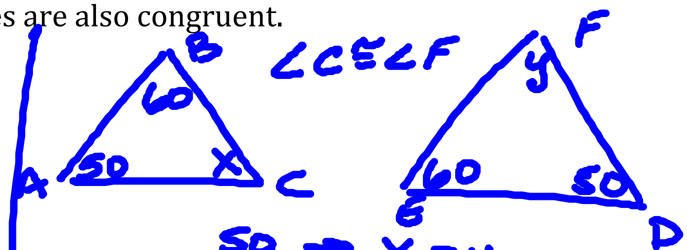
$\triangle ABC \cong \triangle DEF$ $\triangle BCA \cong \triangle EFD$ $\triangle CBA \cong \triangle FED$

1. Given $\Delta ABC \cong \Delta RST$, list all of the corresponding sides and angles that are congruent.

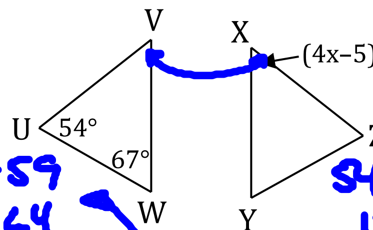
Corresponding Angles	Corresponding Sides
$\angle BAC \cong \angle SRT$ / $\angle A \cong \angle R$	$\overline{AB} \cong \overline{RS}$
$\angle B \cong \angle S$	$\overline{BC} \cong \overline{ST}$
$\angle C \cong \angle T$	$\overline{AC} \cong \overline{RT}$

Triangle Sum Theorem: The ∠'s in a △ add to 180°

THIRD ANGLE THEOREM: If two angles of one triangle are congruent to two angles of another triangle, then the third angles are also congruent.



2. ΔUVW ≅ ΔZXY. Find the value of x.



If ΔABC ≅ ΔTUV, then complete the following statements.

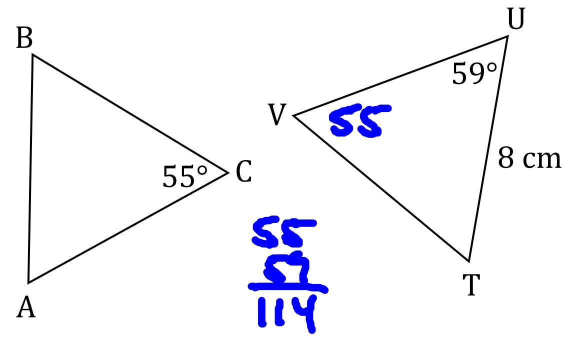
3. $\angle A \cong$ ∠T

4. $\overline{VT} \cong$ $\overline{CA}$

5. ΔVTU ≅ ΔCAB

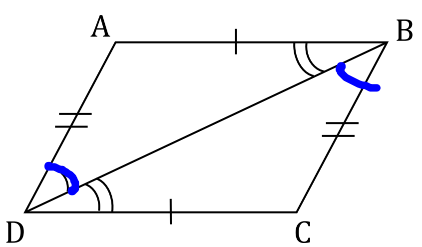
6. BC = UV

7. $m\angle A =$ m∠T = 66°



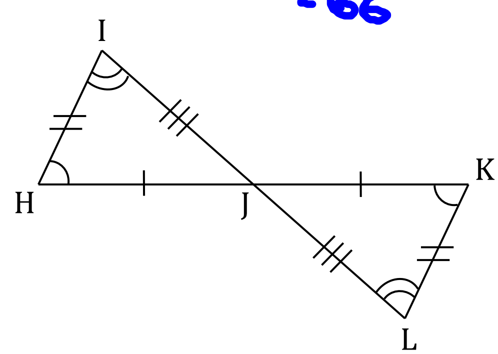
Write the congruence statement for the given triangles.

8.



Δ DAB ≅ Δ BCD

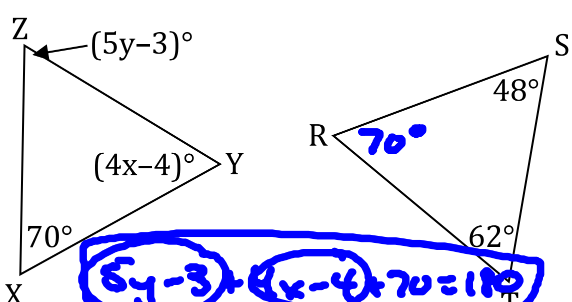
9.



Δ ________ ≅ Δ ________

Use the given information to find the values of x and y.

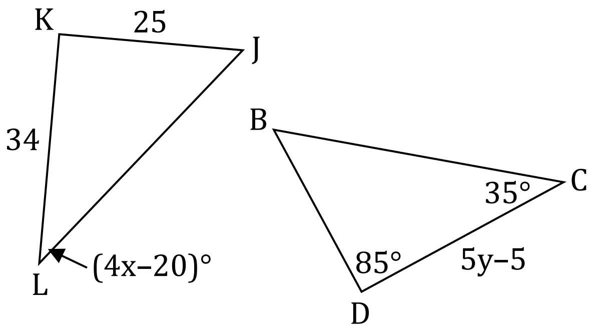
10. ΔXYZ ≅ ΔRST



x = 13

y = 13

11. $\Delta KJL \cong \Delta DCB$



x = ______________

y = ______________

≅ Δ's and CPCTC HW

Complete the following based on the congruence statement.

1. $\Delta CAP \cong \Delta HAT$

1a. $\overline{AP} \cong$ ____________

1b. $\angle PCA \cong$ __________

1c. $\overline{AT} \cong$ ____________

Given $\Delta MAT \cong \Delta RUG$, list all of the corresponding sides and angles that are congruent.

2. Corresponding Angles | Corresponding Sides

________________________ ________________________

________________________ ________________________

________________________ ________________________

Given $LMNO \cong PQRS$, list all of the corresponding sides and angles that are congruent.

3. Corresponding Angles | Corresponding Sides

________________________ ________________________

________________________ ________________________

________________________ ________________________

________________________ ________________________

If $\Delta DEF \cong \Delta HGF$, then complete the following statements.

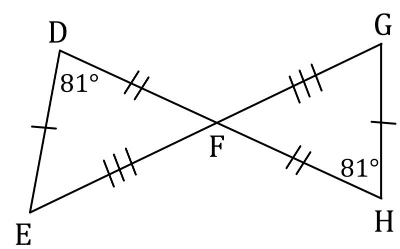
4. $\angle DEF \cong$ _________

5. $\overline{FG} \cong$ _________

6. $\Delta FDE \cong$ _________

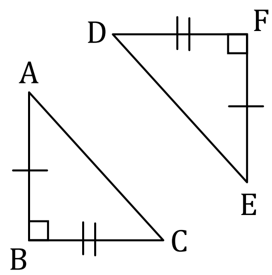
7. DE = _________

8. $\angle G \cong$ _________



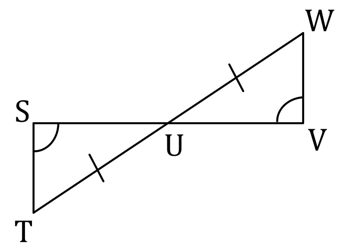
Write the congruence statement for the given triangles.

9.



Δ ____________ ≅ Δ ____________

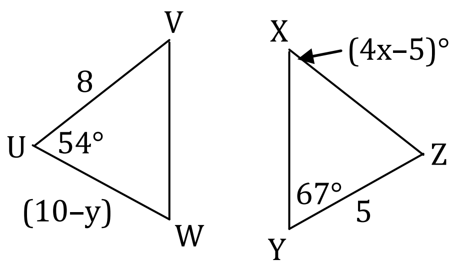
10.



Δ ____________ ≅ Δ ____________

Use the given information to find the values of x and y.

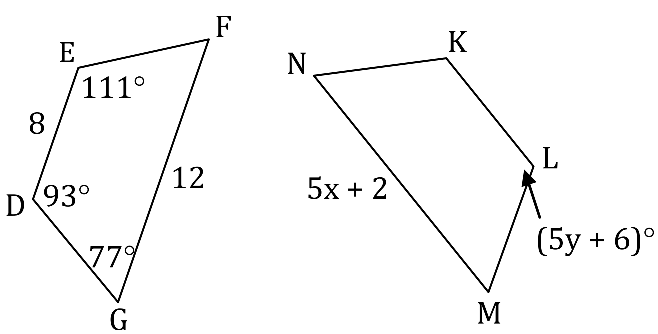
11. ΔUVW ≅ ΔZXY



x = ____________

y = ____________

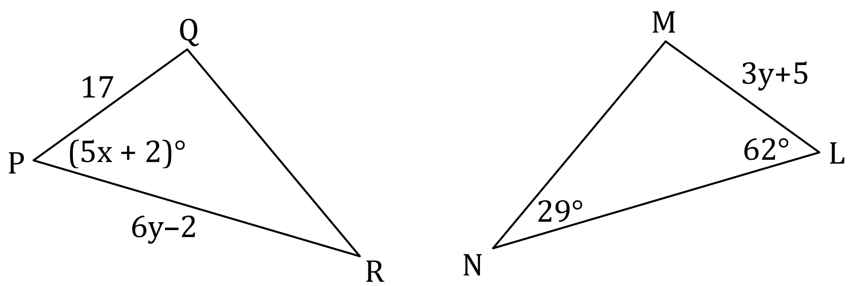
12. DEFG ≅ KLMN



x = ____________

y = ____________

13. ΔPQR ≅ ΔLMN



x = ____________

y = ____________

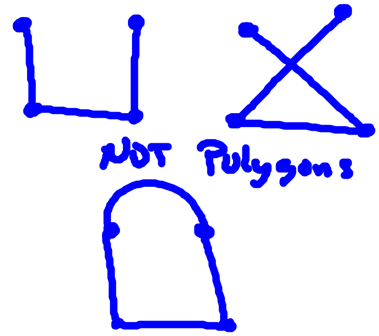
m∠LMN = ______

NL = ____________

Classifying Triangles

***Learning Targets:** Students will be able to classify triangles based on sides and angles.*
Students will be able to solve for parts of triangles.

Polygon: a closed figure made of segment where all the segment end at their intersection with another segment



KEY TERMS

Triangle: A Polygon with 3 sides.

∠'s

Acute Triangle: Δ with all ∠'s less than 90°

Obtuse Triangle: Δ with 1 ∠ greater than 90°

Right Triangle: Δ with 1∠ = 90°

Equiangular Triangle: Δ with all angles = (all 60°)

sides

Scalene Triangle: Δ with all sides unequal

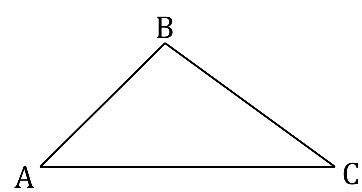
Isosceles Triangle: Δ with 2 equal sides

Equilateral Triangle: Δ with 3 sides equal

TRIANGLE SUM THEOREM

The sum of the measures of the interior angles of a triangle is ______.

m∠ABC + m∠BAC + m∠ACB = 180°

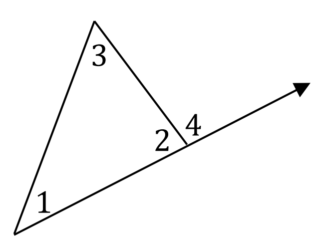


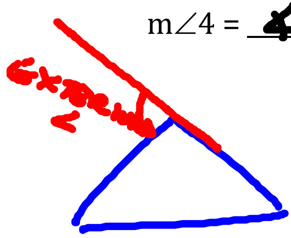
EXTERIOR ANGLE THEOREM

The measure of an exterior angle of a triangle is equal to the sum of the measures of the two Remote Interior angles.

← NOT Touching

m∠4 = ∡1 + ∡3





∡1 + ∡2 + ∡3 = 180° Δ sum th

∡2 + ∡4 = 180° A Linear Pair Adds to 180

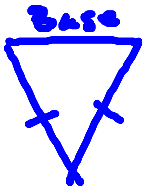
∡1 + ∡2 + ∡3 = ∡2 + ∡4 Subst.

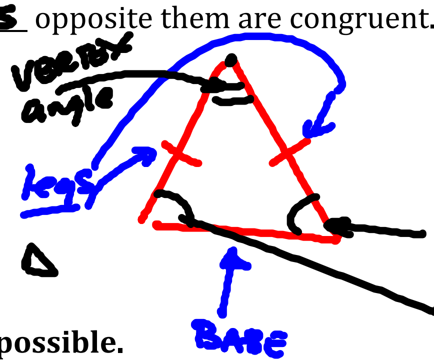
∡1 + ∡3 = ∡4 Subtraction

BASE ANGLES THEOREM

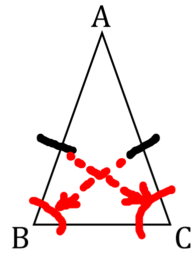
If two <u>sides</u> of a triangle are congruent, then the <u>∠'s</u> opposite them are congruent.

If $\overline{AB} \cong \overline{AC}$, then $\angle ABC \cong \angle ACB$.

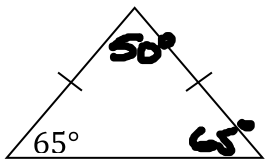


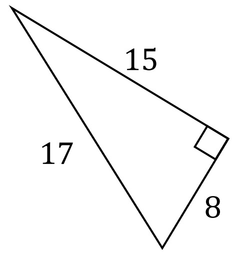


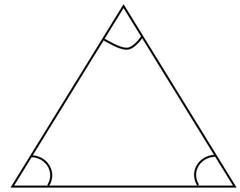
ISOSCELES Δ



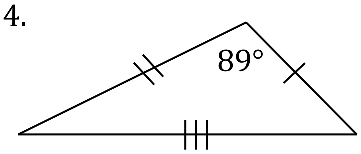
Classify each of the following triangles as specific as possible.

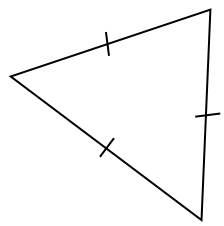
1. 

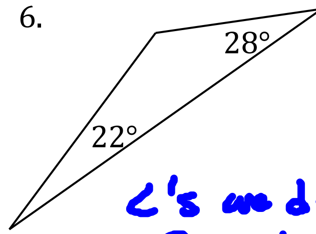
2. 

3. 

1. Acute Isosceles Δ
2. Right Scalene Δ
3. Equiangular & Equilateral

4. 

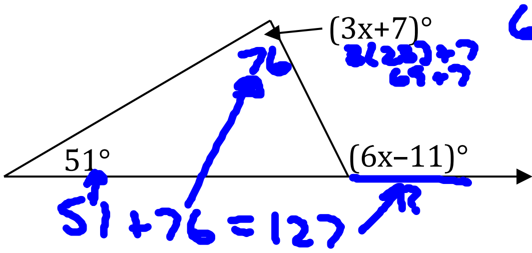
5. 

6. 

∠'s are diff
The sides are diff

4. Acute Scalene Δ
5. Equilateral
6. Obtuse Scalene

Write an equation and solve for x. Then find the measure of the exterior angle.

7. 

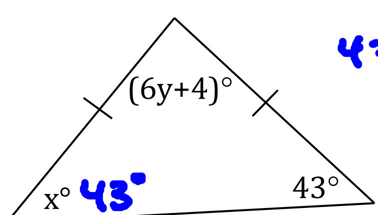
6x−11 = 51+(3x+7)
6x−11 = 51+3x+7
6x−11 = 3x+58
3x = 69
x = 23

x = 23

Measure of ext. ∠ = 127°

ext ∠ = 6(23)−11
= 138−11 = 127

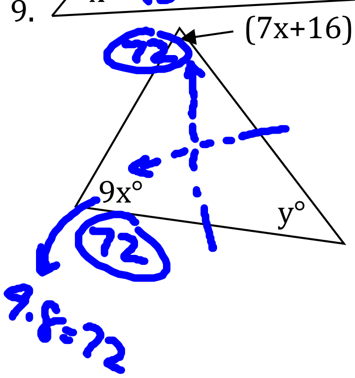
Solve for x and y in each of the following.

8. 

43+43+6y+4=180
90+6y = 180
6y = 90
y = 15

x = 43°

y = 15

9. 

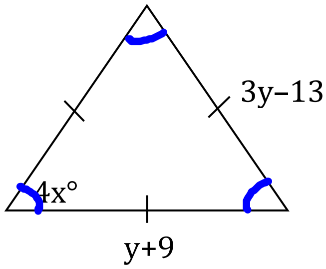
9x = 7x+16
2x = 16
x = 8

72+72+y=180
144+y=180
y=36

x = 8

y = 36

10.



$4x = 60$
$x = 15$

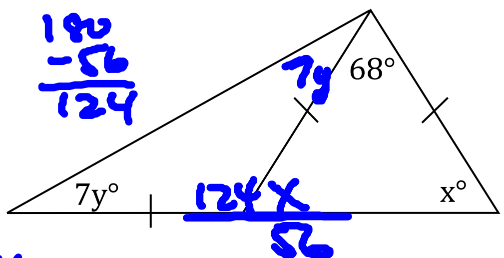
$3y - 13 = y + 9$
$2y = 22$
$y = 11$

x = 15

y = 11

11.

180
-56
124



$2x + 68 = 180$
$2x = 112$
$x = 56$

$14y + 124 = 180$ OR $56 = 14y$
$14y = 56$
$y = 4$

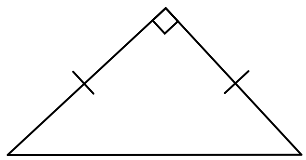
x = 56

y = 4

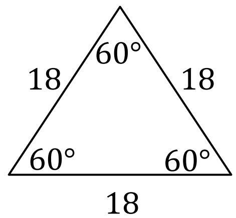
CLASSIFYING Δ's HW

Classify each triangle by side and angle. Then classify the figure as specific as possible.

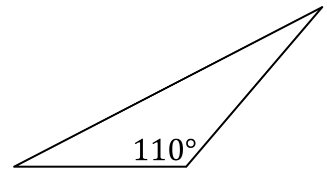
1.



2.



3.



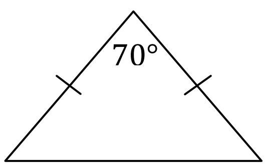
Sides: ____________________ Sides: ____________________ Sides: ____________________

Angles: ____________________ Angles: ____________________ Angles: ____________________

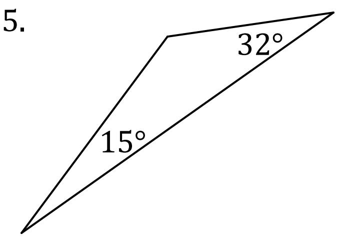
Name: ____________________ Name: ____________________ Name: ____________________

Classify each of the following triangles as specific as possible.

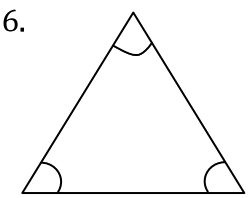
4.



5.



6.



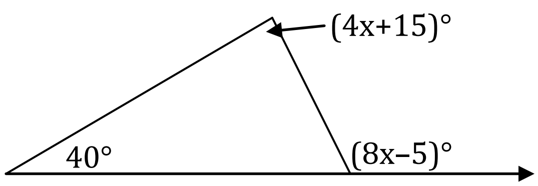
4. ____________________

5. ____________________

6. ____________________

Write an equation and solve for x. Then find the measure of the exterior angle.

7.

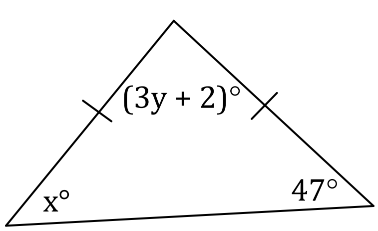


x = ____________________

Measure of ext. ∠ = ________

Solve for x and y in each of the following.

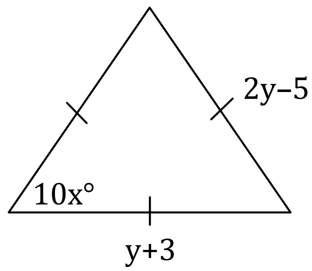
8.



x = ____________________

y = ____________________

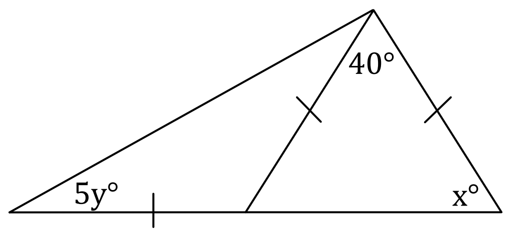
9.



x = ____________________

y = ____________________

10.



x = ____________________

y = ____________________

Given ΔDOG ≅ ΔCAT, list all of the corresponding sides and angles that are congruent.

11. Corresponding Angles | Corresponding Sides

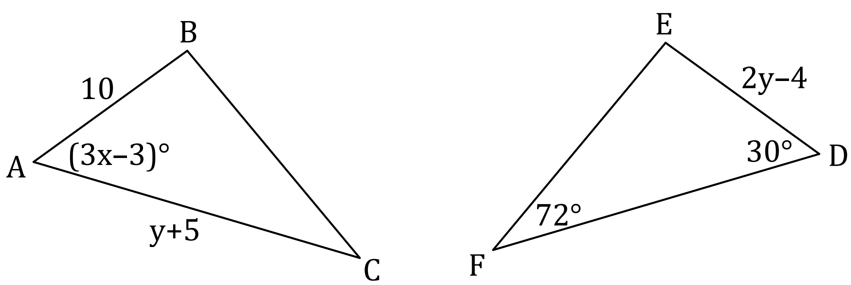
____________________ ____________________

____________________ ____________________

____________________ ____________________

Given ΔABC ≅ ΔDEF, find the value of x and the measure of ∠ABC.

12.

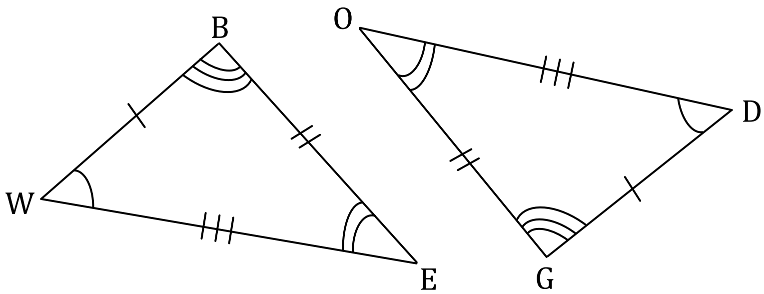


x = ____________________

m∠ABC = ____________

Write a triangle congruence statement for the two congruent triangles.

13.



Δ __________ ≅ Δ __________

Identifying Congruent Triangles- SSS and SAS

***Learning Targets:** Students will be able to use postulates and theorems to identify and name congruent triangles.*

CPCTC
Δ's have 6 parts

SIDE-SIDE-SIDE (SSS) POSTULATE

If three __Sides__ of one triangle are congruent to three __Sides__ of a second triangle, then the two triangles are __congruent__

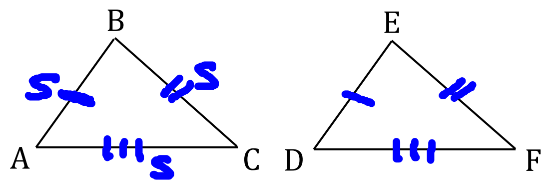
If **S**ide $\overline{AB} \cong \overline{DE}$

Side $\overline{BC} \cong \overline{EF}$

Side $\overline{AC} \cong \overline{DF}$

Then Δ_____ $\cong \Delta$______

$\Delta ABC \cong \Delta DEF$



SIDE-ANGLE-SIDE (SAS) POSTULATE

angle that the two sides create

If the two sides and the __included__ angle of one triangle are __congruent__ to two sides and the __included__ angle of a second triangle, then the two triangles are __congruent__.

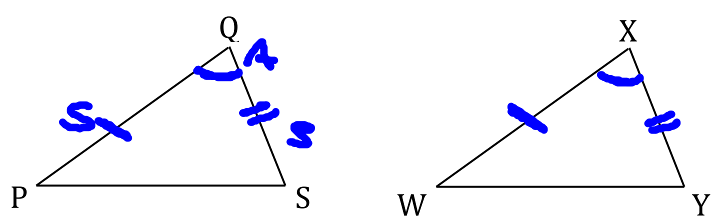
If **S**ide $\overline{PQ} \cong \overline{WX}$

Angle $\angle PQS \cong \angle WXY$

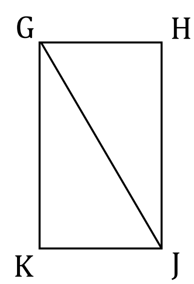
Side $\overline{QS} \cong \overline{XY}$

Then Δ______ $\cong \Delta$_______

$\Delta PQS \cong \Delta WXY$



1. Name the included angle between the pair of sides given.



a) $\overline{GK}$ & $\overline{KJ}$ $\angle KGJ$

b) $\overline{KJ}$ & $\overline{JG}$ $\angle KJG$

c) $\overline{HG}$ & $\overline{GJ}$ $\angle HGJ$

d) $\overline{GJ}$ & $\overline{JH}$

Identifying Congruent Triangles- ASA and AAS

***Learning Targets:** Students will be able to use postulates and theorems to identify and name congruent triangles.*

ANGLE-SIDE-ANGLE (ASA) POSTULATE

(The side between the two angles)

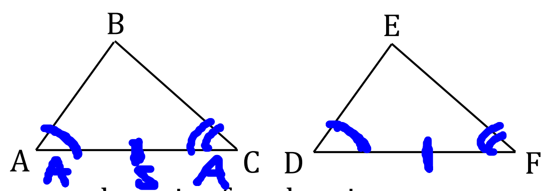
If two angles and the __included__ side of one triangle are congruent to two angles and the __included__ side of a second triangle, then the two triangles are __congruent__

If **A**ngle $\angle BAC \cong \angle EDF$

Side $\overline{AC} \cong \overline{DF}$

Angle $\angle BCA \cong \angle EFD$

Then Δ______ $\cong \Delta$_______ ($\Delta ABC \cong \Delta DEF$)



2. Name the included side between the pair of angles given.

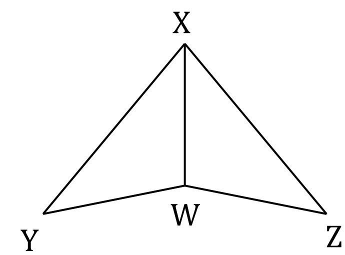
a) $\angle WZX$ and $\angle ZXW$ — $\overline{XZ}$

b) $\angle YWX$ and $\angle WXY$ — $\overline{WX}$

c) $\angle WXY$ and $\angle XYW$ — $\overline{XY}$

d) $\angle ZXW$ and $\angle XWZ$

e) $\angle XWZ$ and $\angle WZX$



ANGLE-ANGLE-SIDE (AAS) POSTULATE

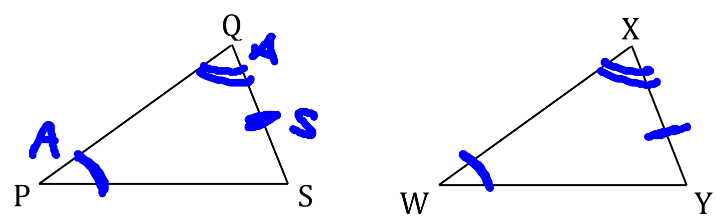
If the two angles and a __non included__ side of one triangle are congruent to two angles and a __non-included__ side of a second triangle, then the two triangles are __congruent__

If **A**ngle $\angle QPS \cong \angle XWY$

Angle $\angle PQS \cong \angle WXY$

Side $\overline{QS} \cong \overline{XY}$

Then Δ______ $\cong \Delta$_______ ($\Delta PQS \cong \Delta WXY$)



Postulate
SSS
SAS
ASA
AAS

AAA?
SSA

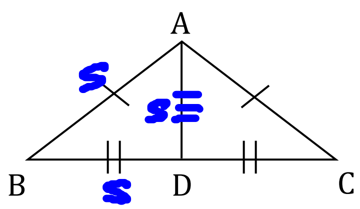
HL Theorem
Hypotenuse Leg Theorem
If in 2 Right Δ's the Hypotenuse of one Right Δ is equal to the Hyp of the other Right Δ and one leg of one Rt Δ is $\cong$ to one leg of the other Rt Δ, then the Δ's are $\cong$

3. Can you draw two different triangles with all three angles congruent? (AAA)

4. Can you draw two different triangles with one pair of angle congruent and the two pairs of consecutive sides congruent? (SSA)

Decide whether it is possible to prove the triangles are congruent. List all of the congruent parts and then state which postulate we would use to prove the triangles are congruent. Write the triangle congruent statement if we have enough information. If we cannot prove the triangles congruent, then write "Not Enough Information."

5.



Congruent Parts

Given { 1. $\overline{AB} \cong \overline{AC}$
2. $\overline{BD} \cong \overline{CD}$

Reflexive prop → 3. $\overline{AD} \cong \overline{AD}$

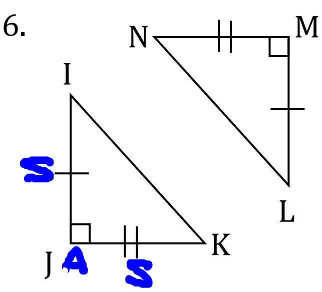
Reason

SSS ≅ Post.

Triangle Congruent Statement

$\triangle ABD \cong \triangle ACD$

6.



Congruent Parts

1. $\overline{IJ} \cong \overline{LM}$
2. $\overline{JK} \cong \overline{MN}$
3. $\angle M \cong \angle J$

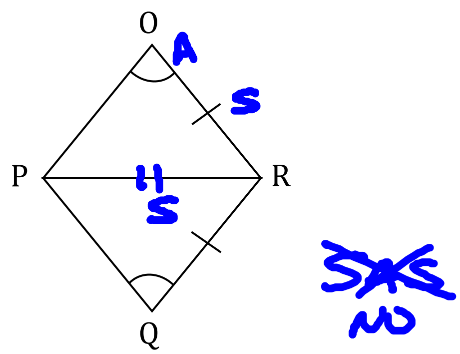
Reason

SAS ≅ Th.

Triangle Congruent Statement

$\triangle IJK \cong \triangle LMN$

7.



Congruent Parts

1. $\angle O \cong \angle Q$
2. $\overline{OR} \cong \overline{QR}$
3. $\overline{PR} \cong \overline{PR}$

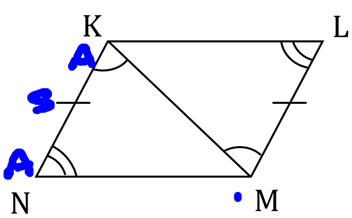
Reason

NOT ENOUGH INFO!

Triangle Congruent Statement

____

8.



Congruent Parts

1. $\angle L \cong \angle N$
2. $\angle LMK \cong \angle NKM$
3. $\overline{KN} \cong \overline{ML}$

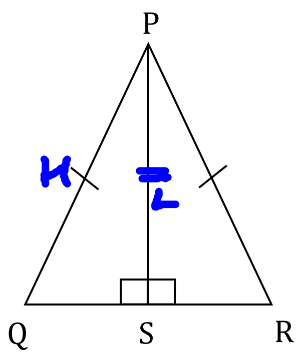
Reason

ASA

Triangle Congruent Statement

$\triangle NKM \cong \triangle LMK$

9.



Congruent Parts

1. $\overline{QP} \cong \overline{RP}$
2. $\angle QSP \cong \angle RSP$
3. $\overline{PS} \cong \overline{PS}$

Reason

HL

Triangle Congruent Statement

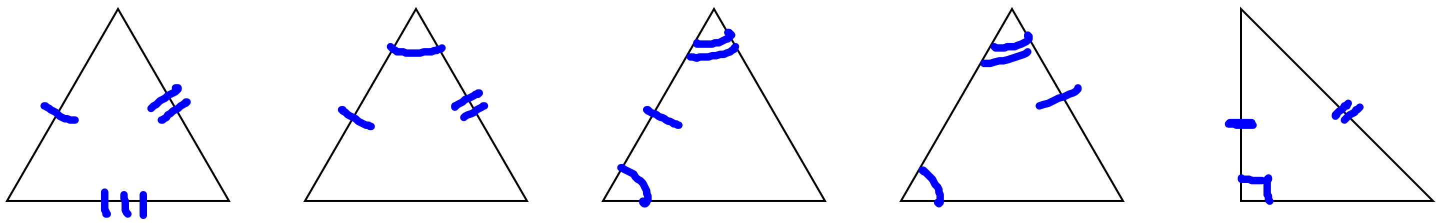
$\triangle QPS \cong \triangle RPS$

Identifying Congruent Triangles HW

Geometry

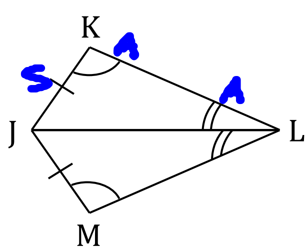
Name the five ways to prove triangles are congruent then tick mark the diagram to illustrate it.

1. SSS
2. SAS
3. ASA
4. AAS
5. HL



Decide whether it is possible to prove the triangles are congruent. List all of the congruent parts and then state which postulate we would use to prove the triangles are congruent. Write the triangle congruent statement if we have enough information. If we cannot prove the triangles congruent, then write "Not Enough Information."

6.



Congruent Parts

1. ∠K ≅ ∠M
2. $\overline{KJ} \cong \overline{MJ}$
3. ∠KLJ ≅ ∠MLJ

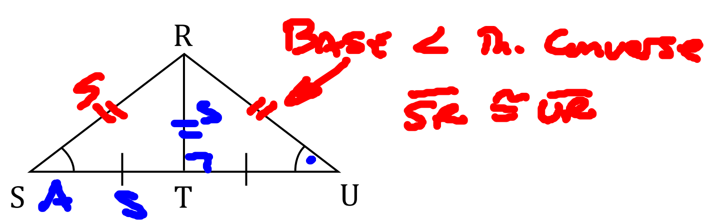
Reason

AAS

Triangle Congruent Statement

△JKL ≅ △JML

7.



Congruent Parts

1. ∠S ≅ ∠U
2. $\overline{ST} \cong \overline{UT}$
3. $\overline{RT} \cong \overline{RT}$

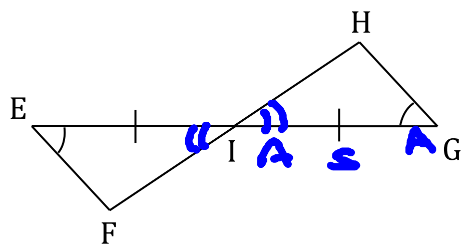
Reason

SAS

Triangle Congruent Statement

______

8.



Congruent Parts

1. $\angle E \cong \angle G$
2. $\overline{EI} \cong \overline{GI}$
3. $\angle EIF \cong \angle GIH$

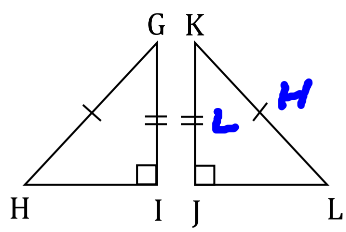
Reason

ASA

Triangle Congruent Statement

$\triangle EIF \cong \triangle GIH$

9.



Congruent Parts

1. $\angle I \cong \angle J$
2. $\overline{HG} \cong \overline{LK}$
3. $\overline{IG} \cong \overline{JK}$

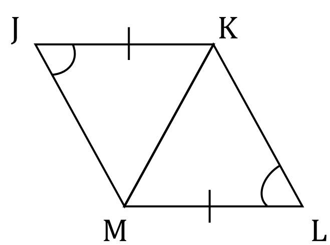
Reason

HL

Triangle Congruent Statement

$\triangle HGI \cong \triangle LJK$

10.



Congruent Parts

1. ________
2. ________
3. ________

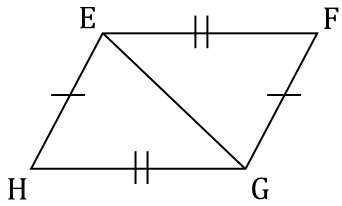
Reason

____

Triangle Congruent Statement

____

11.



Congruent Parts

1. ______________________

2. ______________________

3. ______________________

Reason

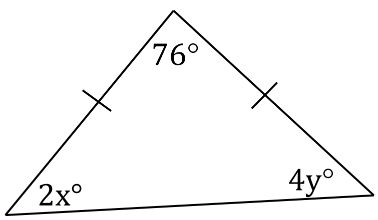
____

Triangle Congruent Statement

____

Solve for x and y in each of the following.

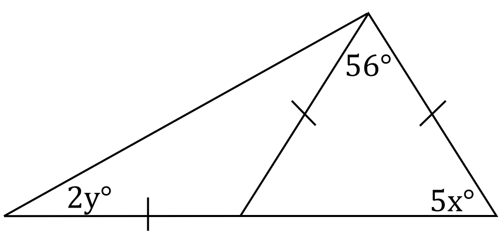
12.



x = ______________

y = ______________

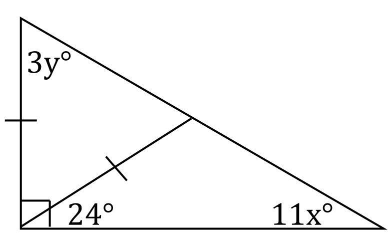
13.



x = ______________

y = ______________

14.



x = ______________

y = ______________

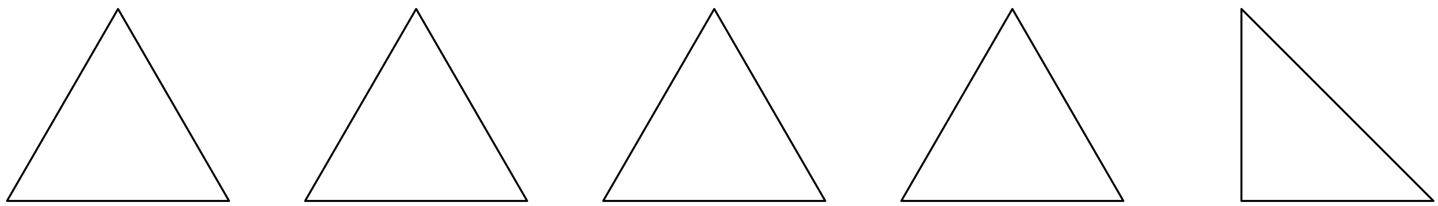
Identifying Congruent Triangles 1

Geometry

Name: ______________________
Date: _____________ Per:______

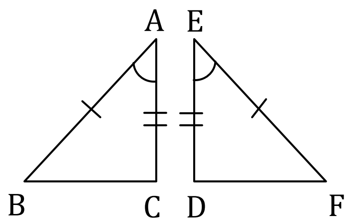
Name the five ways to prove triangles are congruent then tick mark the diagram to illustrate it.

1. ____________ 2. ____________ 3. ____________ 4. ____________ 5. ____________



Decide whether it is possible to prove the triangles are congruent. List all of the congruent parts and then state which postulate we would use to prove the triangles are congruent. Write the triangle congruent statement if we have enough information. If we cannot prove the triangles congruent, then write "Not Enough Information."

6.



Congruent Parts

1. ______________________________
2. ______________________________
3. ______________________________

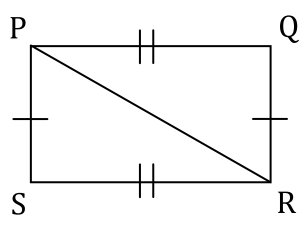
Reason

____

Triangle Congruent Statement

____

7.



Congruent Parts

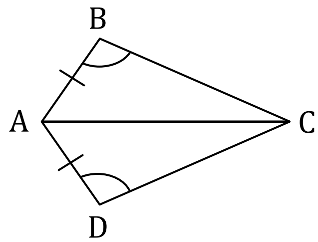
1. ______________________________
2. ______________________________
3. ______________________________

Reason

____

Triangle Congruent Statement

8.



Congruent Parts

1. ______________________________

2. ______________________________

3. ______________________________

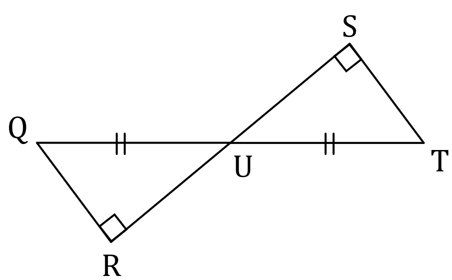
Reason

____

Triangle Congruent Statement

____

9.



Congruent Parts

1. ______________________________

2. ______________________________

3. ______________________________

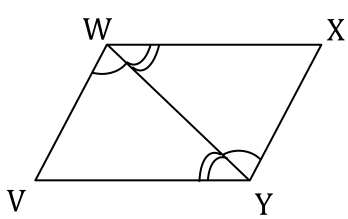
Reason

____

Triangle Congruent Statement

____

10.



Congruent Parts

1. ______________________________

2. ______________________________

3. ______________________________

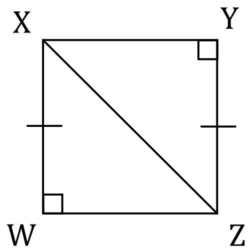
Reason

____

Triangle Congruent Statement

____

11.



Congruent Parts

1. _____________________________

2. _____________________________

3. _____________________________

Reason

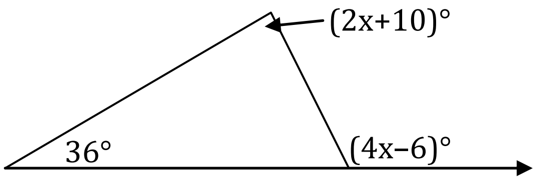
____

Triangle Congruent Statement

____

Write an equation and solve for x. Then find the measure of the exterior angle.

12.

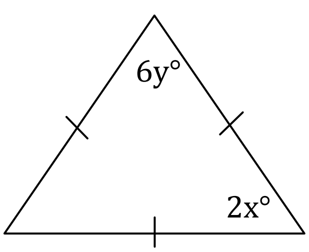


x = ____________________

Measure of ext. ∠ = _______

Solve for x and y in each of the following.

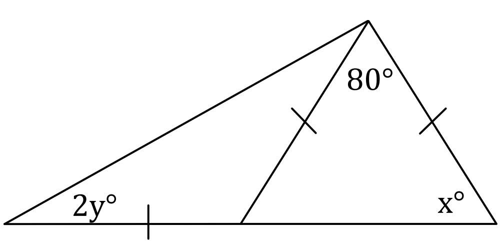
13.



x = ____________________

y = ____________________

14.



x = ____________________

y = ____________________

Proving Congruent Triangles (Day 1)

Learning Targets: Students will be able to prove triangles are congruent.

KEY TERMS

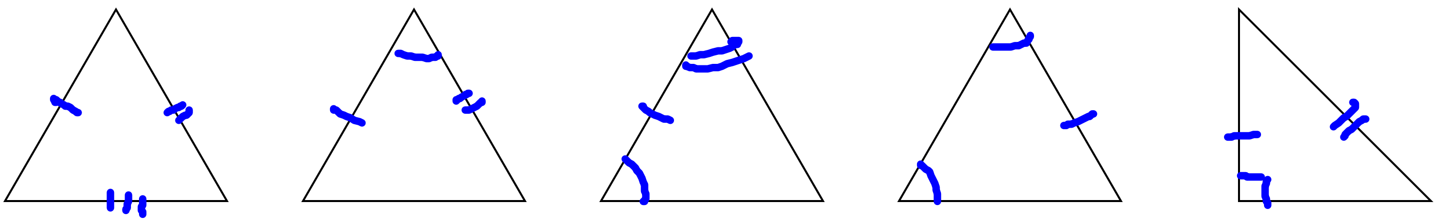
Not the definitions

Midpoint: → Midpoint creates 2 ≅ segments

Angle Bisector: → Angle bisector creates 2 ≅ angles

Name the five ways to prove triangles are congruent then tick mark the diagram to illustrate it.

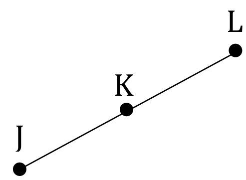
1. SSS 2. SAS 3. ASA 4. AAS 5. HL



6. Complete the two column proof.

Given: K is the midpoint of $\overline{JL}$

Prove: $\overline{JK} \cong \overline{KL}$



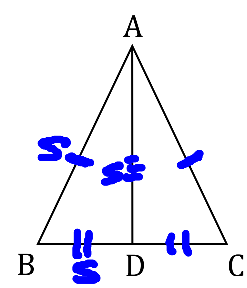
Statements	Reasons

7. Complete the two column proof.

Given: D is the midpoint of $\overline{BC}$

$\overline{AB} \cong \overline{AC}$

Prove: $\Delta ADB \cong \Delta ADC$

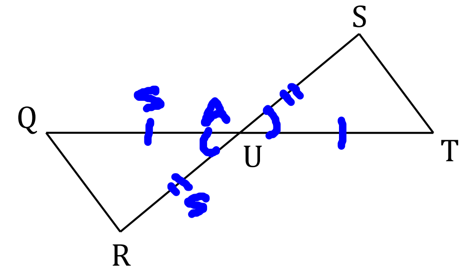


Statements	Reasons
1. D is the midpt of $\overline{BC}$ $\overline{AB} \cong \overline{AC}$	1. Given
2. $\overline{BD} \cong \overline{CD}$	2. A midpoint creates 2 ≅ segments.
3. $\overline{AD} \cong \overline{AD}$	3. Reflexive Prop
4. $\Delta ADB \cong \Delta ADC$	4. SSS ≅ Th.

8. Complete the two column proof.

Given: U is the midpoint of $\overline{QT}$
U is the midpoint of $\overline{SR}$

Prove: ΔQUR ≅ ΔTUS

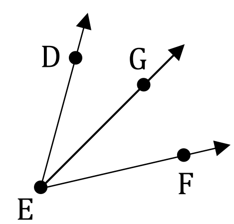


Statements	Reasons
1. U is the midpt of $\overline{QT}$ U is the midpt of $\overline{SR}$	1. Given
2. $\overline{QU} \cong \overline{TU}$ $\overline{SU} \cong \overline{RU}$	2. midpoint creates 2 ≅ segment
3. ∠QUR ≅ ∠TUS	3. Vertical ∠'s are ≅
4. ΔQUR ≅ ΔTUS	4. SAS ≅ Th.

9. Complete the two column proof.

Given: $\overrightarrow{EG}$ bisects $\angle DEF$

Prove: $\angle DEG \cong \angle GEF$

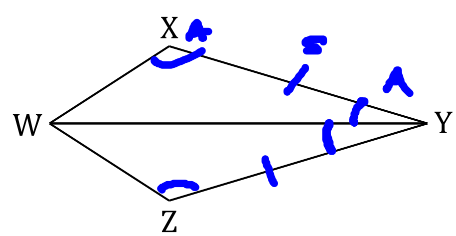


Statements	Reasons

10. Complete the two column proof.

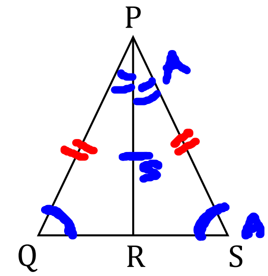
Given: $\overline{WY}$ bisects $\angle XYZ$
$\angle WXY \cong \angle WZY$
$\overline{XY} \cong \overline{ZY}$

Prove: ΔWXY ≅ ΔWZY



Statements	Reasons
1. $\overline{WY}$ bisects ∠XYZ ∠WXY ≅ ∠WZY $\overline{XY} \cong \overline{ZY}$	1. Given
2. ∠XYW ≅ ∠WYZ	2. Angle Bisector creates 2 ≅ angles
3. ΔWXY ≅ ΔWZY	3. ASA ≅ Th.

11. Complete the two column proof.



Given: $\overline{PR}$ bisects $\angle QPS$
$\angle PQS \cong \angle PSR$

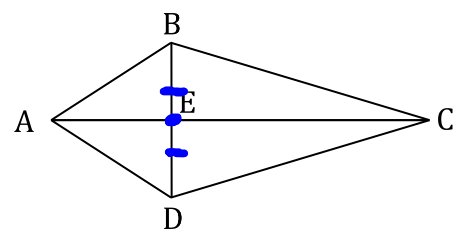
Prove: $\Delta PQR \cong \Delta PSR$

Statements	Reasons
1. $\overline{PR}$ bisect $\angle QPS$ $\angle PQS \cong \angle PSR$	1. Given
2 $\angle QPR \cong \angle SPR$	2. A Bisected ∠ Creates 2 ≅ ∠'s
3. $\overline{PR} \cong \overline{PR}$ ALT: $\overline{PQ} \cong PS$	3. Reflexive Prop ALT Base ∠ Th. Converse
4. $\Delta PQR \cong \Delta PSR$	4. AAS ≅ Th. ALT ASA ≅ Th.

12. Complete the two column proof.

Given: E is the midpoint of $\overline{BD}$
$\overline{AC}$ bisects $\angle BAD$
$\angle ABD \cong \angle ADB$

Prove: $\Delta AEB \cong \Delta AED$



Statements	Reasons

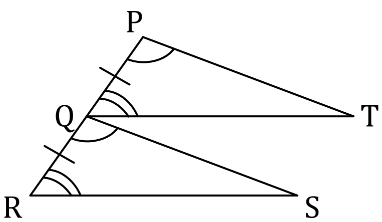
Proving Triangles Congruent

Geometry

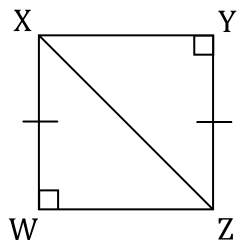
Name: ____________________
Date: ____________ **Per:** ______

Decide whether it is possible to prove the triangles are congruent. List all of the congruent parts and then state which postulate we would use to prove the triangles are congruent. Write the triangle congruent statement if we have enough information. If we cannot prove the triangles congruent, then write "Not Enough Information."

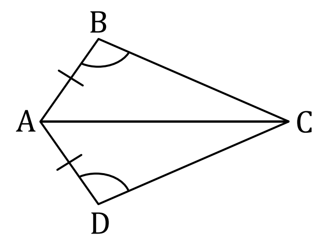
1.



2.



3.



Congruent Parts

____
____
____

Reason

____

Triangle Congruent Statement

____

Congruent Parts

____
____
____

Reason

____

Triangle Congruent Statement

____

Congruent Parts

____
____
____

Reason

____

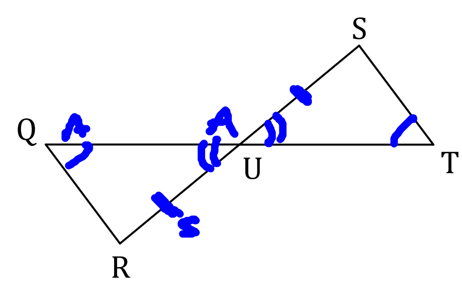
Triangle Congruent Statement

____

Complete the two column proof.

4. **Given**: U is the midpoint of $\overline{RS}$
$\angle UQR \cong \angle UTS$

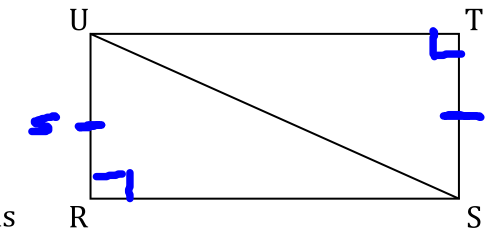
Prove: $\Delta UQR \cong \Delta UTS$



Statements	Reasons
1. U is the midpoint of $\overline{RS}$ $\angle UQR \cong \angle UTS$ ✓	1. Given
2. $\overline{RU} \cong \overline{SU}$	2. midpt create 2 ≅ segments
3. $\angle RUQ \cong \angle SUT$	3. Vert ∠'s are ≅
4 $\Delta UQR \cong \Delta UTS$	4. AAS ≅ Th.

5. **Given:** $\overline{UR} \cong \overline{ST}$
$\angle URS$ is a right angle
$\angle UTS$ is a right angle

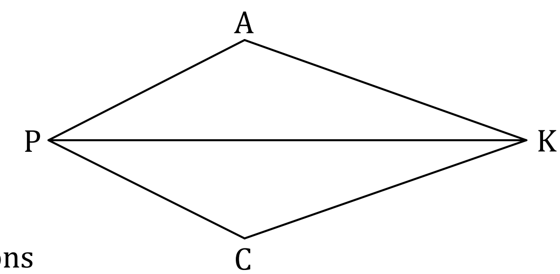
Prove: $\Delta RSU \cong \Delta TUS$



Statements	Reasons
1. $\overline{UR} \cong \overline{ST}$ $\angle URS$ is a Rt $\angle$ $\angle UTS$ is a Rt $\angle$	1. Given

6. **Given:** $\overline{PA} \cong \overline{PC}$
$\overrightarrow{PK}$ bisects $\angle APC$

Prove: $\Delta PAK \cong \Delta PCK$

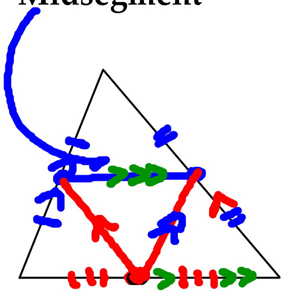


Statements	Reasons

Midsegment Theorem

Learning Targets: Students will be able to apply properties of the midsegment of a triangle.

Midsegment –

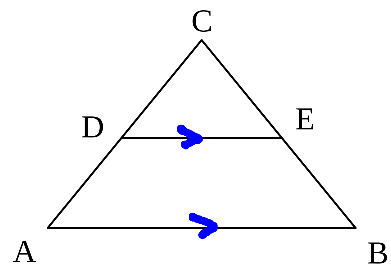


Every triangle has 3 midsegments.

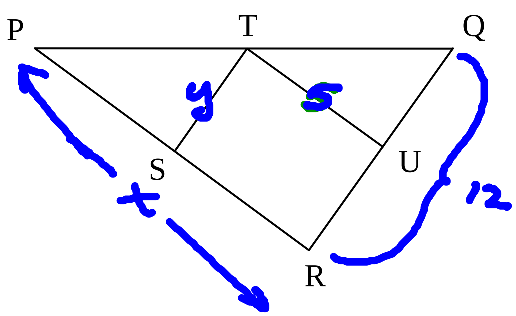
MIDSEGMENT THEOREM

The segment connecting the midpoints of 2 sides of a triangle is parallel to the third side and is 1/2 the length of the third side.

$DE = \frac{1}{2}(AB)$ or $AB = 2(DE)$



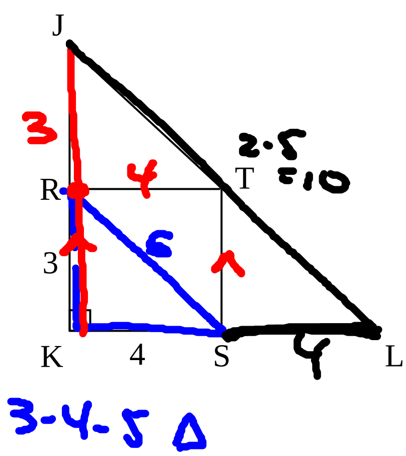
Ex. 1) $\overline{ST}$ and $\overline{TU}$ are midsegments of ΔPQR and TU = 5 and RQ = 12. Find PR and ST.



$5 = \frac{1}{2}x$
$x = 10$
$PR = 10$

$y = \frac{1}{2}(12)$
$y = 6$
$ST = 6$

Ex. 2) Use the diagram of ΔJKL where R, S, and T are the midpoints of the sides. RK = 3, KS = 4, and $\overline{JK} \perp \overline{KL}$.



a) Find RS. = 5

$3^2 + 4^2 = (RS)^2$
$9 + 16 = RS^2$
$RS^2 = 25$
$RS = 5$

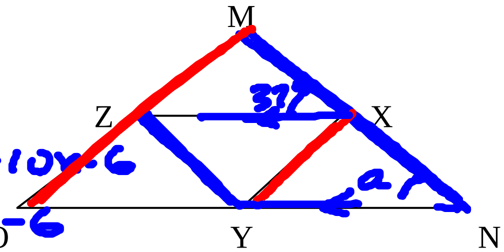
b) Find JK. 6

c) Find RT. 4

d) Find the perimeter of ΔJKL.

6 + 8 + 10
= 24

Ex. 3) Use the diagram of ΔMNO, where X, Y, and Z are the midpoints of the sides.



a) If YZ = 3x + 1 and MN = 10x – 6, then YZ = __7__

$YZ = \frac{1}{2}MN$

$3x + 1 = \frac{1}{2}(10x - 6)$ or $2(3x+1) = 10x - 6$

$3x + 1 = 5x - 3$ $\quad$ $6x + 2 = 10x - 6$

$4 = 2x$ $\quad$ $8 = 4x$

$2 = x$ $\quad$ $2 = x$

$YZ = 3(2)+1$

$= 7$

b) If XY = x – 1 and MO = 3x – 7, then MO = ________

$XY = \frac{1}{2}MO$

$x - 1 = \frac{1}{2}(3x - 7)$ → $2(x-1) = 3x - 7$

$2x - 2 = 3x - 7$

$5 = x$

$MO = 3(5) - 7 = 8$

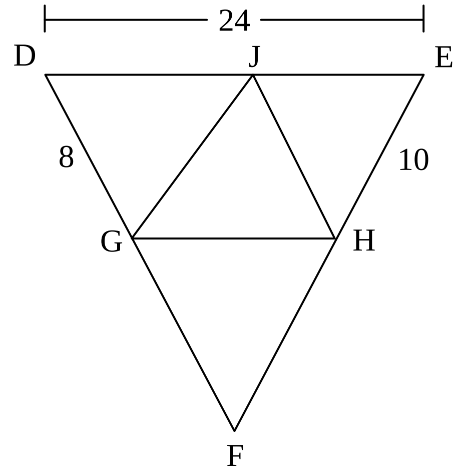
c) If m∠MXZ = 37°, then m∠MNO = __37°__

Midsegment HW

Geometry

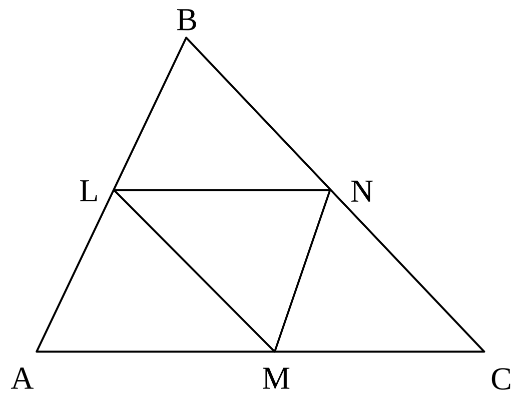
Name:________________________
Date:_____________ **Period:**____

Directions: G, H, and J are midpoints of ΔDEF.



1. $\overline{DE}$ // ___________
2. $\overline{JH}$ // ___________
3. EF = ___________
4. GH = ___________
5. DF = ___________
6. JH = ___________
7. Find the perimeter of ΔGHJ _____________

Directions: L, M, and N are midpoints of ΔABC.

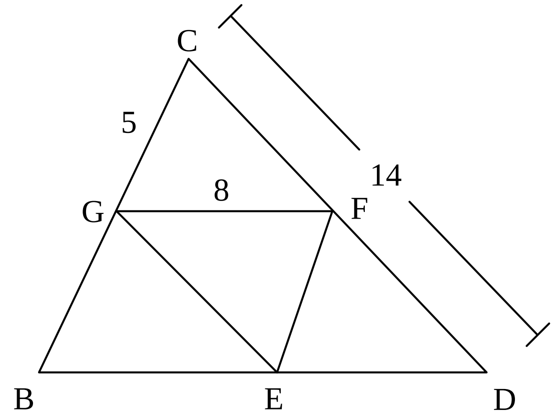


8. $\overline{LM}$ // ___________
9. $\overline{AB}$ // ___________
10. If AC = 20, then LN = ___________
11. If MN = 7, then AB = ___________
12. If NC = 9, then LM = ___________
13. If LM = 3x + 7, and BC = 7x + 6, then LM = __________

14. If MN = x – 1, and BA = 6x – 18, then BA = __________

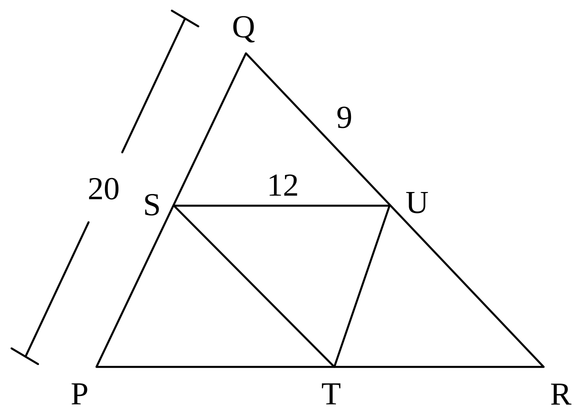
Directions: **E, F, and G are midpoints of ∆BCD.**

15. Find the perimeter of ∆BCD: __________



Directions: **S, T, and U are midpoints of ∆QPR.**

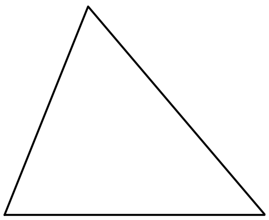
16. Find the perimeter of ∆QPR: __________



Medians and Altitudes

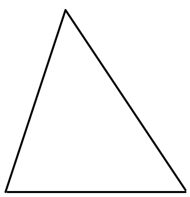
***Learning Targets:* Students will be able to apply properties of medians of a triangle.**
Students will be able to construct altitudes of a triangle.

Median–

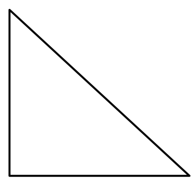


Every triangle has _______ medians.

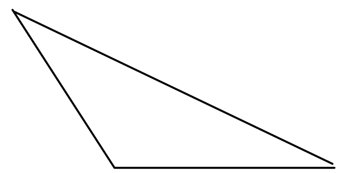
The point of concurrency of the medians is called the ________________________.



Acute



Right

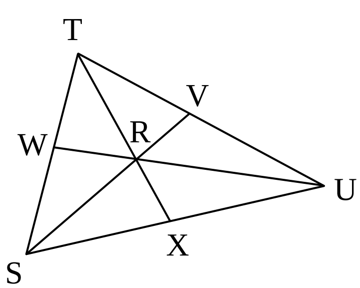


Obtuse

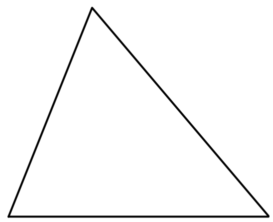
* **The centroid is the balancing point.**

<u>CONCURRENCY OF MEDIANS</u>
The medians of a triangle intersect at a point that is 2/3 of the distance from each vertex to the midpoint of the opposite side.

Ex. 1) R is the centroid of ΔSTU and SR=16.
Find SV and RV.

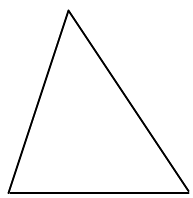


Altitude–

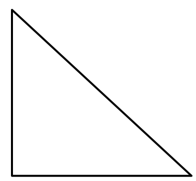


Every triangle has ________ altitudes.

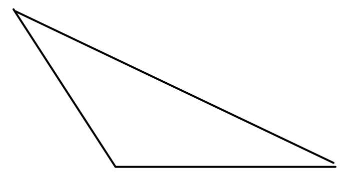
The point of concurrency of the altitudes is called the ________________________.



Acute



Right

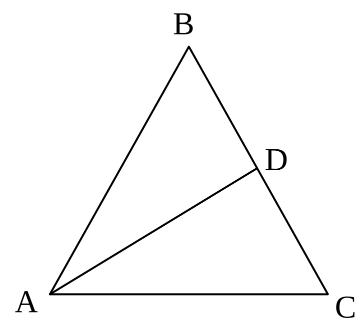


Obtuse

<u>CONCURRENCY OF ALTITUDES</u>
The lines containing the altitudes of a triangle are concurrent.

Ex. 2) Use the diagram and given information to decide in each case if $\overline{AD}$ is either

- a perpendicular bisector
- an angle bisector
- a median
- an altitude.



a) $\overline{DB} \cong \overline{DC}$

b) $\angle BAD \cong \angle CAD$

c) $\overline{DB} \cong \overline{DC}$ and $\overline{AD} \perp \overline{BC}$

d) $\overline{AD} \perp \overline{BC}$

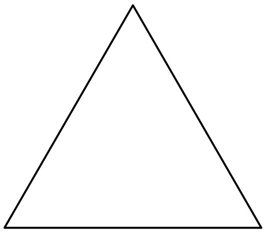
Medians and Altitudes HW

Geometry

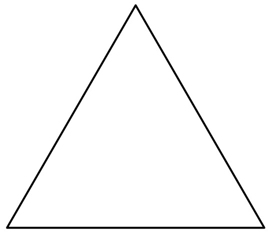
Name:_________________________
Date:_____________ **Period:**____

<u>Directions</u>: Construct each of the following for the given triangle. Tick mark your diagram.

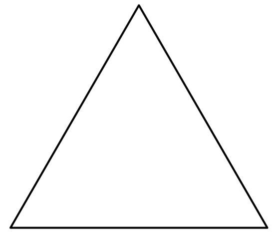
1. Perpendicular Bisector



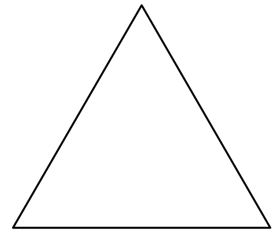
2. Angle Bisector



3. Median

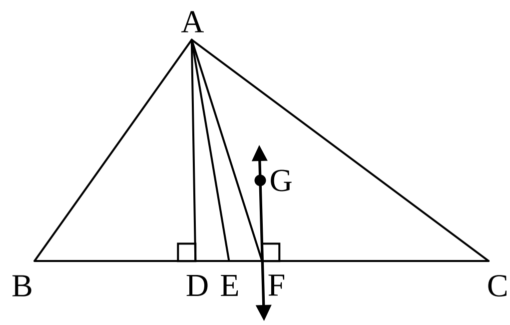


4. Altitude



<u>Directions</u>: Use the diagram and the given information to match the special segments.

Given: $\angle BAE \cong \angle EAC$ and $\overline{BF} \cong \overline{FC}$



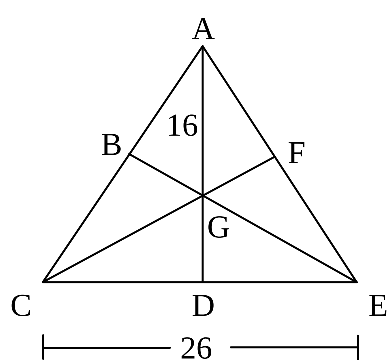
5. median   A. $\overline{AD}$

6. altitude   B $\overline{AE}$

7. perpendicular bisector   C. $\overline{AF}$

8. angle bisector   D. $\overline{GF}$

<u>Directions</u>: The medians of $\triangle$ACE meet at point G.

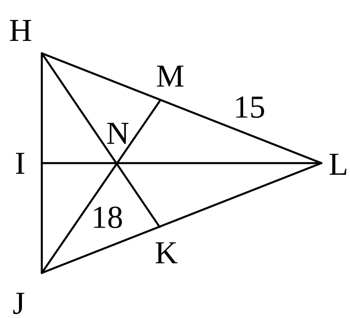


9. Find DG.

10. Find AD.

11. Find CD.

<u>Directions</u>: The medians of $\triangle$HJL meet at point N.

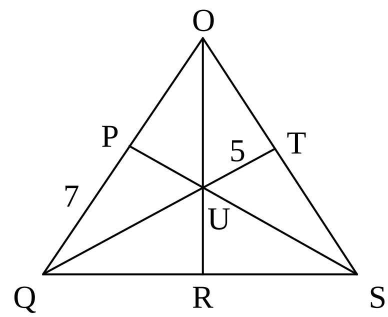


12. Find NM.

13. Find JM.

14. Find HM.

<u>Directions</u>: The medians of △OQS meet at point U.

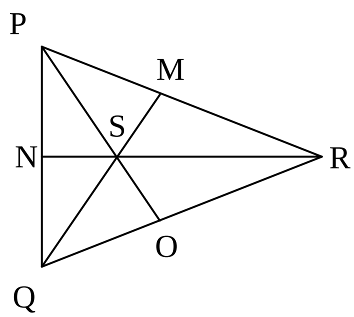


15. Find QU.

16. Find QT.

17. Find OQ.

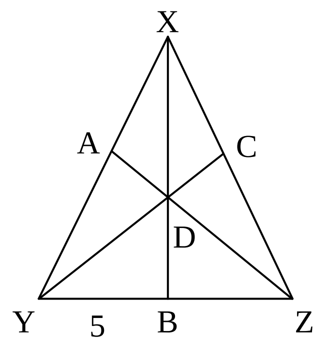
<u>Directions</u>: The medians of △PQR meet at point S and RN = 21.



18. Find NS.

19. Find SR.

<u>Directions</u>: The medians of △XYZ meet at point D and XB = 36.



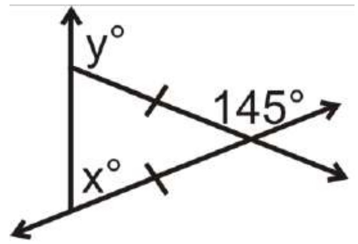
20. Find XD.

21. Find DB.

22. Find YZ.

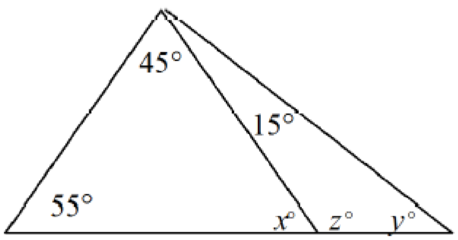
23. Find BZ.

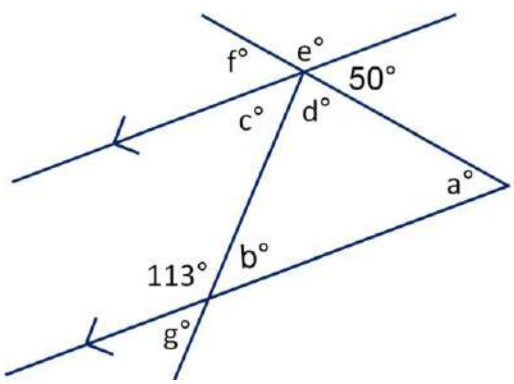
1. Use the diagram to the right to solve for x and y.



2. What is the measure of the vertex angle of an isosceles triangle if one of the base angles measures 34 degrees?

3. Find the measure of angles x, y, and z.





4. Solve for the following:

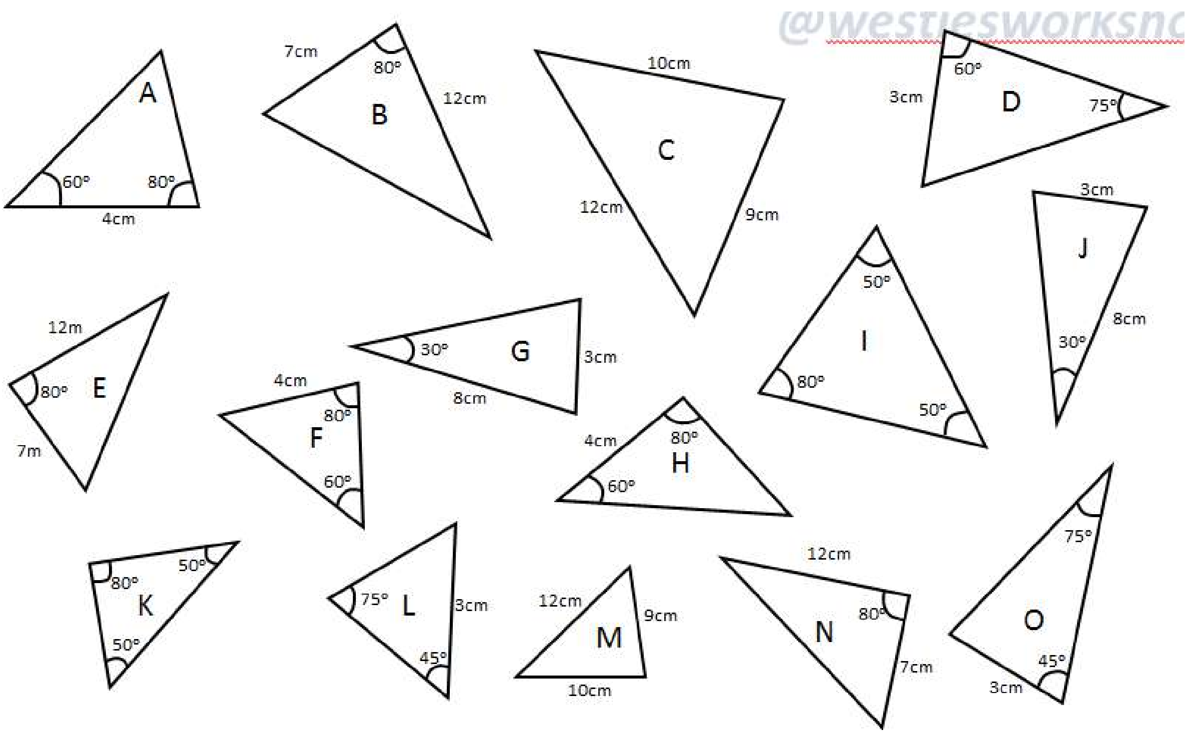
a =	e =
b =	f =
c =	g =
d =	

5. Explain how you solved for the measure of angle c in problem #8.

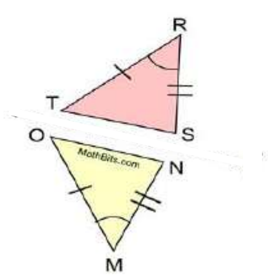
____

____

6. Match the all the congruent triangles and give a reason.
Diagram is NOT to scale!!



Use the figure below to answer #11-14.



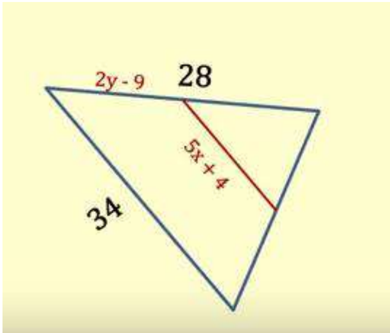
7. Complete the following statement: $\triangle TRS \cong \triangle$ ______

8. What postulate or theorem allows us to say that these triangles are congruent?

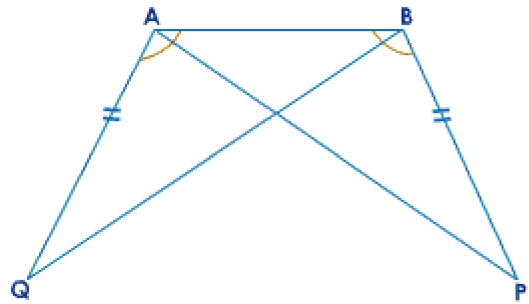
9. Name the single rigid motion that is evidence that these two triangles are congruent.

10. Solve for x, if the $m\angle T = 4x - 3$ and $m\angle O = 45 - 2x$

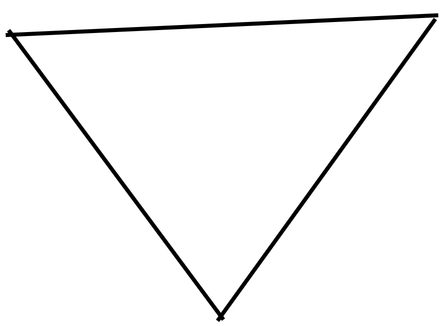
11. Solve for x and y.



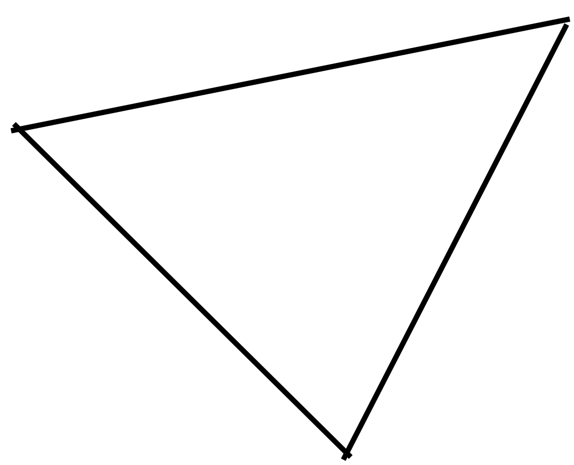
12. Using the diagram to the right,
prove that $\overline{AP} \cong \overline{BQ}$.



13. Construct the 3 medians of the given triangle.



14. Construct the 3 altitudes of the given triangle.



Unit 5

Quadrilaterals & Coordinate Proofs

Properties of Parallelograms

***Learning Targets:** Students will be able to determine the properties of parallelograms.*
Students will be able to apply properties of parallelograms to find missing values.

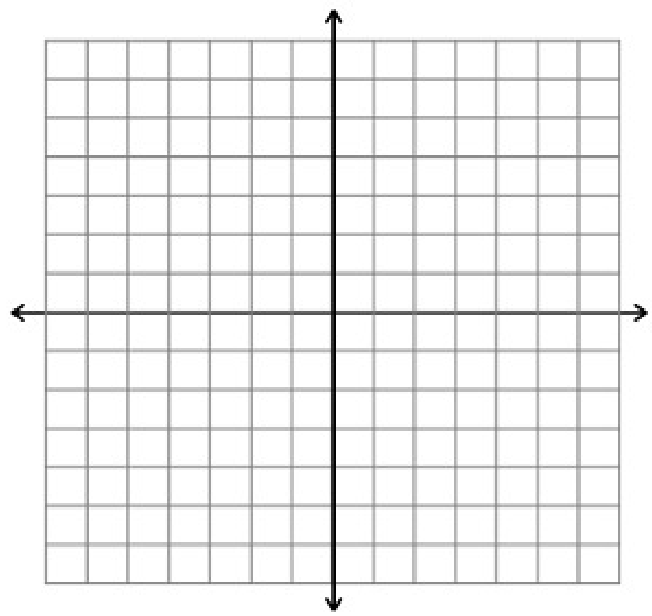
Distance Formula:

Slope Formula:

Midpoint Formula:

1. Plot the points A, B, C, and D.

   A (2, 0)
   B (3, 4)
   C (-2, 6)
   D (-3, 2)



2. Find the slope of each side.

   Slope of $\overline{AB}$ =

   Slope of $\overline{CD}$ =

   Slope of $\overline{BC}$ =

   Slope of $\overline{AD}$ =

3. Based on the slopes, what can you conclude about parallelograms?

4. What is the definition of a parallelogram?

5. Find the length of each side.

Length of $\overline{AB}$ =

Length of $\overline{CD}$ =

Length of $\overline{BC}$ =

Length of $\overline{AD}$ =

6. Based on the lengths of the sides, what can you conclude about parallelograms?

7. Use the midpoint formula to find the midpoint of each of the two diagonals.

Midpoint of $\overline{AC}$ =

Midpoint of $\overline{BD}$ =

8. Based on the midpoints of the diagonals, what can you conclude about parallelograms?

9. Based on your findings and previous knowledge, which triangles are congruent? How do you know this?

10. Based on what you know about parallel lines, what other special angle relationships exist?

11. List the five properties of a parallelogram:

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________

Properties of Parallelograms

Geometry

Name: ____________________
Date: ____________ **Per:**______

1. What is the definition of a parallelogram?

List the properties of a parallelogram.

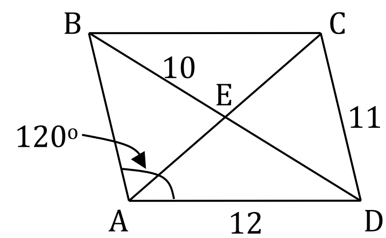
2. If a quadrilateral is a parallelogram, then ____

3. If a quadrilateral is a parallelogram, then ____

4. If a quadrilateral is a parallelogram, then ____

5. If a quadrilateral is a parallelogram, then ____

Find the missing measure in parallelogram ABCD. Explain your reasoning using a property.



6. DE = ____________

____

____

7. BA = ____________

____

____

8. BC = ____________

____

____

9. m∠CDA = ____________

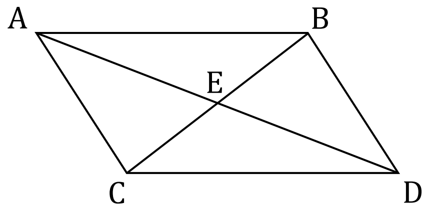
____

____

10. m∠BCD = ____________

____

11. Find AE in the parallelogram if BC = 9 and AD = 14.



AE = ________________

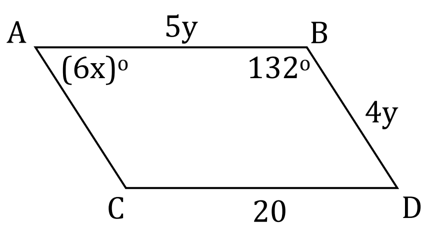
12. LMNO is a parallelogram. If ON = 9x–3, LM = 8x+7, MN = 3y–2, OL = 4y–8, find the values of x and y.

x = ________________

y = ________________

Solve for x and y. Then find the requested measures.

13. ABCD is a **parallelogram**.



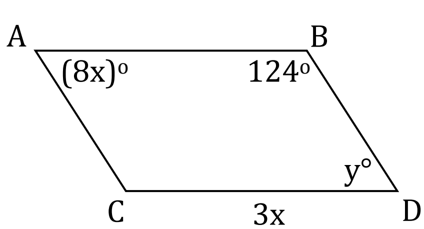
x = ________________

y = ________________

m∠D = ________________

AC = ________________

14. ABCD is a **parallelogram**.



x = ________________

y = ________________

m∠A = ________________

AB = ________________

Properties of Rectangles, Rhombuses, and Squares

***Learning Targets:* Students will be able to determine the properties of special parallelograms.**
Students will be able to apply properties of special parallelograms to find missing values.

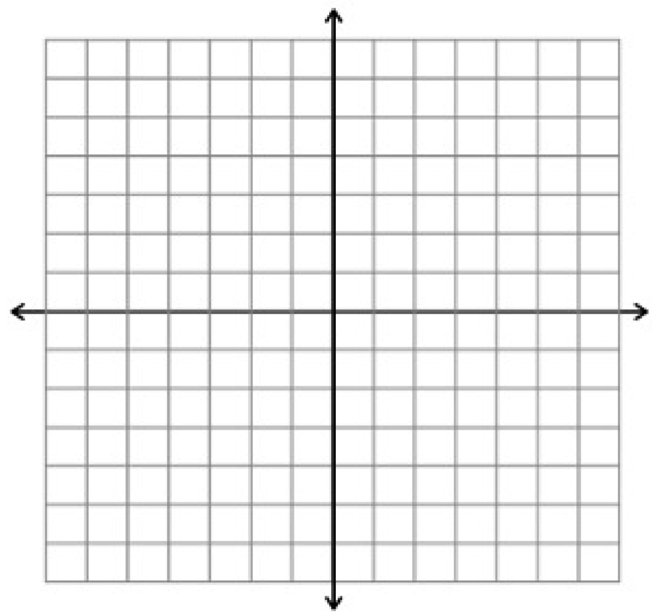
KEY TERMS

Parallelogram:

Pythagorean Theorem:

1. Plot the points A, B, C, and D.

   A (0, 0)
   B (-4, 0)
   C (-4, 3)
   D (0, 3)



2. What is the definition of a rectangle?

3. List all the properties of a rectangle:

1. ______________________________ 2. ______________________________
3. ______________________________ 4. ______________________________
5. ______________________________ 6. ______________________________
7. ______________________________

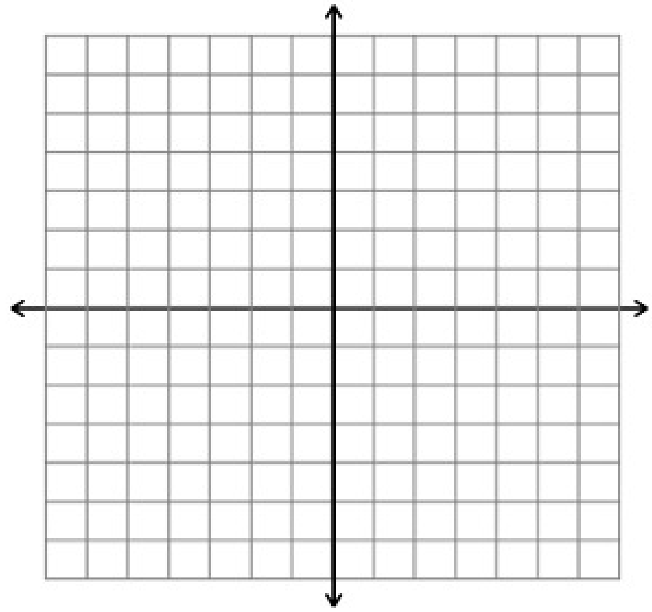
4. Plot the points A, B, C, and D.

A (1, 0)

B (2, -5)

C (-3, -4)

D (-4, 1)



5. What is the definition of a rhombus?

6. List all the properties of a rhombus:

1. ______________________ 2. ______________________

3. ______________________ 4. ______________________

5. ______________________ 6. ______________________

7. ______________________ 8. ______________________

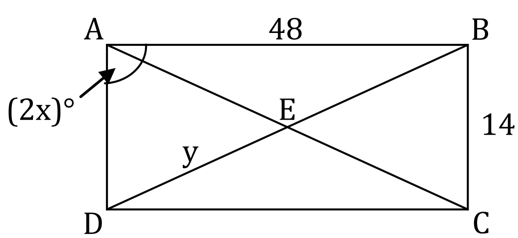
*****A quadrilateral is a <u>square</u> if and only if it is a ____________________ and a ________________________.*****

7. List all properties of a square:
   1. ____
   2. ____
   3. ____

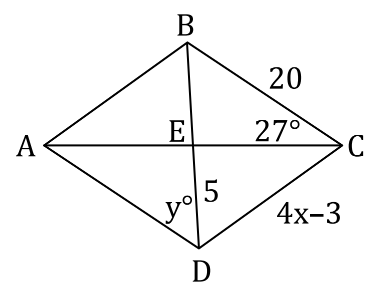
8. Decide whether the statement is *always, sometimes*, or *never* true.
   a) A square is a rectangle.
   b) A rectangle is a square.
   c) A rhombus is a square.
   d) A parallelogram is a rectangle.

Find the value of x and y.

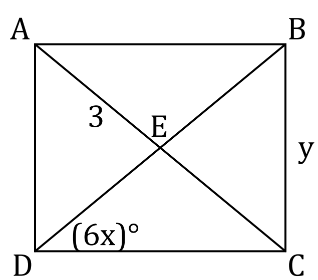
9. ABCD is a **rectangle**.



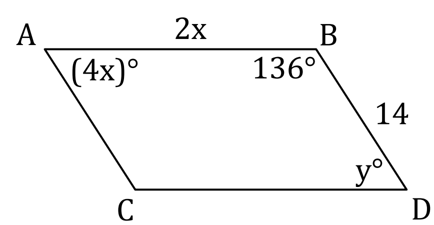
10. ABCD is a **rhombus**.



11. ABCD is a **square**.



12. ABCD is a **parallelogram**.



Properties of Rectangles, Squares and Rhombuses

Geometry

Name: ____________________
Date: ____________ **Per:** ______

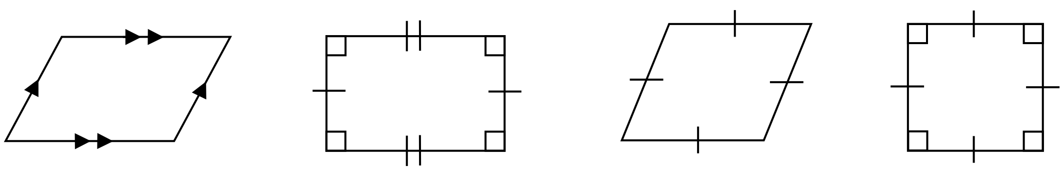
Decide whether the statement is <u>A</u>lways, <u>S</u>ometimes, or <u>N</u>ever true.

1. A rectangle is a parallelogram. A S N
2. A parallelogram is a rhombus. A S N
3. A rectangle is a rhombus. A S N
4. A square is a rectangle. A S N

Which of the following quadrilaterals have the given property?

5. __________	Opposite sides are congruent.	A. Parallelogram
6. __________	All angles are congruent.	B. Rectangle
7. __________	The diagonals are congruent.	C. Rhombus
8. __________	Diagonals bisect opposite angles.	D. Square

Circle each quadrilateral for which the statement is true.

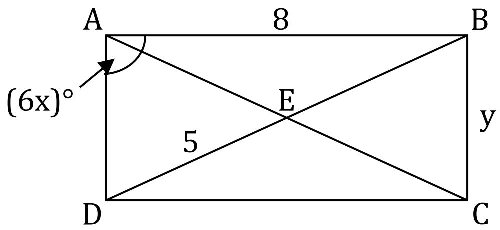


Parallelogram Rectangle Rhombus Square

9. It is equiangular.	Parallelogram	Rectangle	Rhombus	Square
10. It is equiangular and equilateral.	Parallelogram	Rectangle	Rhombus	Square
11. The diagonals are perpendicular.	Parallelogram	Rectangle	Rhombus	Square
12. Opposite angles are congruent.	Parallelogram	Rectangle	Rhombus	Square
13. The diagonals bisect each other.	Parallelogram	Rectangle	Rhombus	Square
14. Consecutive angles are supplementary.	Parallelogram	Rectangle	Rhombus	Square

Find the value of x and y.

15. ABCD is a **rectangle**.



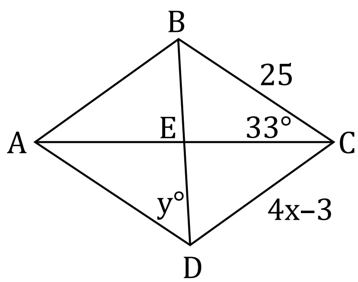
x = ____________________

y = ____________________

m∠DAB = _____________

DB = __________________

16. ABCD is a **rhombus**.



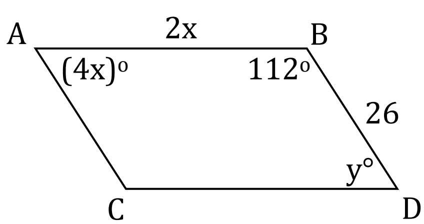
x = ____________________

y = ____________________

m∠AEB = _____________

AB = __________________

17. ABCD is a **parallelogram**.



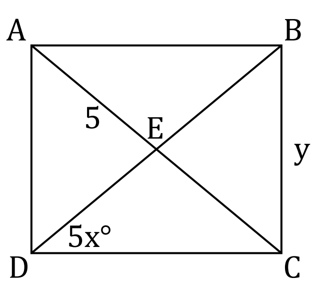
x = ____________________

y = ____________________

m∠ACD = _____________

CD = __________________

18. ABCD is a **square**.



x = ____________________

y = ____________________

m∠DEA = _____________

EB = __________________

<u>Properties of Kites and Trapezoids</u>

***Learning Targets:** Students will be able to determine the properties of kites and trapezoids.*
Students will be able to apply properties of kites and trapezoids to find missing values.

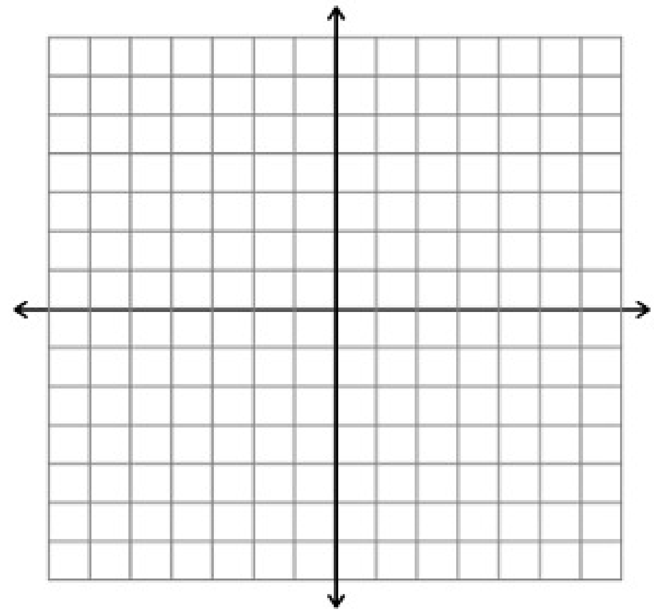
1. Plot the points A, B, C, and D.

   A (-4, 3)

   B (-1, 4)

   C (6, 3)

   D (-6, -1)

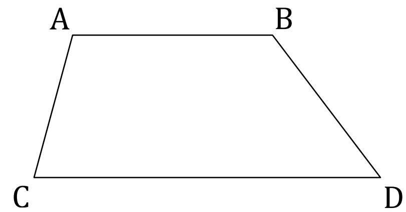


2. What is the definition of a trapezoid?

3. What type of angles do you see within the trapezoid?

4. List all the properties of a trapezoid: 1. ______________________________

5. Name the parts of a trapezoid.



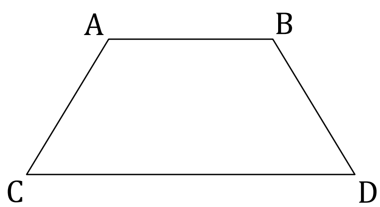
<u>*SPECIAL CASE***</u>**

6. An isosceles trapezoid has____.

7. If a trapezoid is ***<u>isosceles</u>***, then ____.

8. If a trapezoid is ***<u>isosceles</u>***, then ____.

9. Tick mark the diagram to show that is it an isosceles trapezoid.



10. List all properties of an isosceles trapezoid:

1. ____
2. ____
3. ____
4. ____

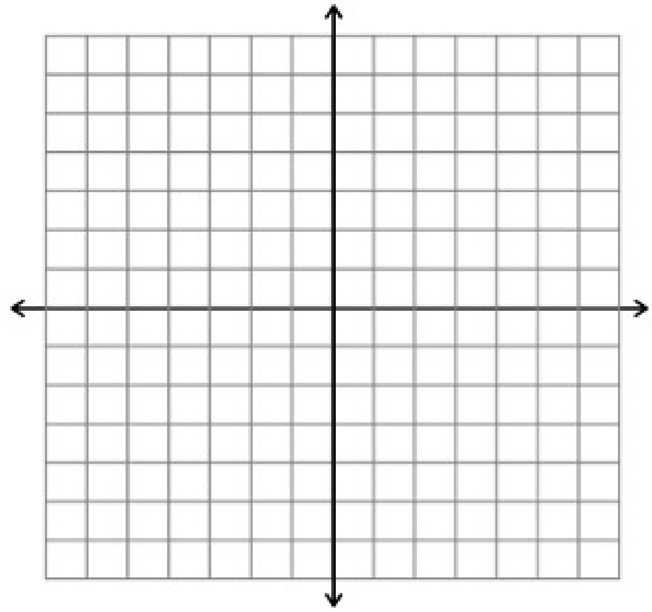
11. Plot the points A, B, C, and D.

A (4, 3)

B (6, -1)

C (2, -3)

D (-3, 2)



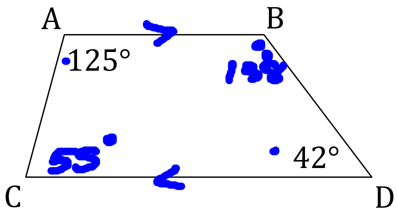
12. What is the definition of a kite?

13. List all properties of a kite:

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________

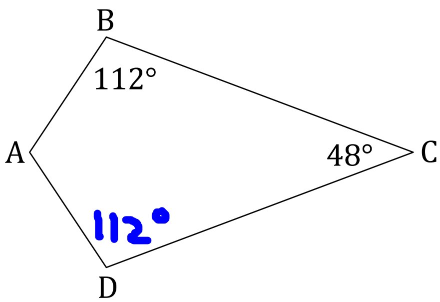
ABCD is a trapezoid. Find the measures of the missing angles.

14.



ABCD is a kite. Find the measures of EACH missing angle.

15.



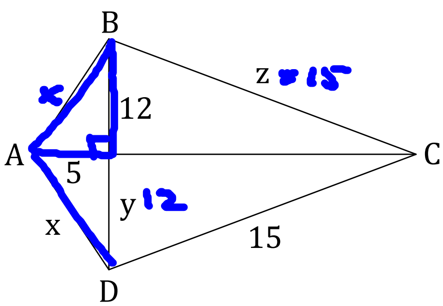
112 + 112 = 224

224 + 48 = 272

360 − 272 = 88°

ABCD is a kite. Find the value of the variables.

16.



$5^2 + 12^2 = x^2$

$25 + 144 = x^2$

$x^2 = 169$

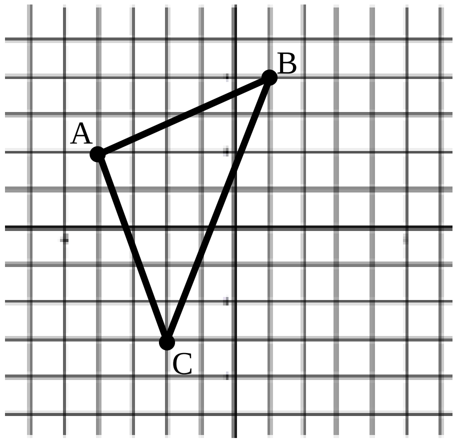
$x = \sqrt{169} = 13$

Classifying Quadrilaterals (Transformations/Coordinate Geometry)

Learning Targets: Students will be able to classify quadrilaterals using transformations and coordinate geometry.

1. Classify the quadrilateral using the given transformation and coordinate geometry.

a) $R_{O,180^\circ}(\Delta ABC)$

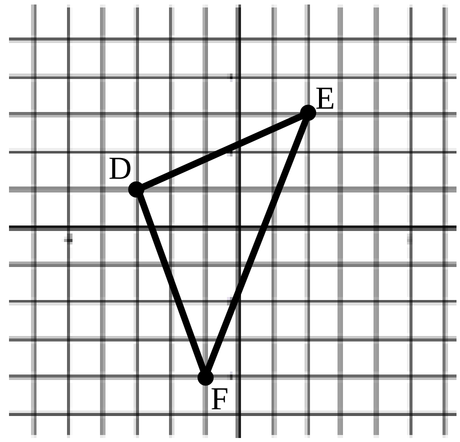


A = (____ , ____) A ' = (____ , ____)

B = (____ , ____) B ' = (____ , ____)

C = (____ , ____) C ' = (____ , ____)

b) Using ΔA'B'C' and ΔDEF create a quadrilateral.



A' = (____ , ____) D = (____ , ____)

B' = (____ , ____) E = (____ , ____)

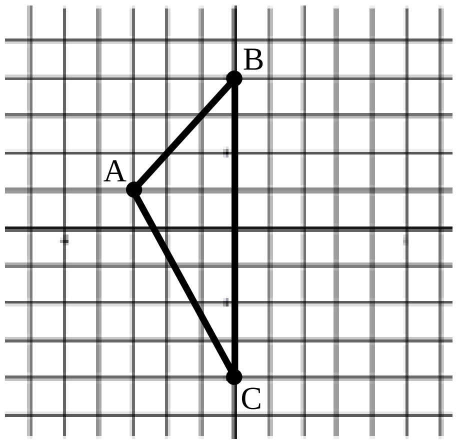
C' = (____ , ____) F = (____ , ____)

c) Classify the type of quadrilateral ΔA'B'C' and ΔDEF form. Use coordinate geometry as evidence!!

d) In words, explain why you chose your classification.

2. Classify the quadrilateral using the given transformation and coordinate geometry.

a) $R_{y\ axis}(\Delta ABC)$

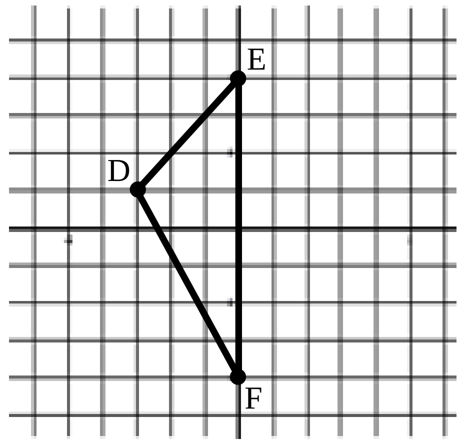


A = (___ , ___) A ' = (___ , ___)

B = (___ , ___) B ' = (___ , ___)

C = (___ , ___) C ' = (___ , ___)

b) Using ΔA'B'C' and ΔDEF create a quadrilateral.



A' = (___ , ___) D = (___ , ___)

B' = (___ , ___) E = (___ , ___)

C' = (___ , ___) F = (___ , ___)

c) Classify the type of quadrilateral ΔA'B'C' and ΔDEF form. Use coordinate geometry as evidence!!

d) In words, explain why you chose your classification.

Final Review

Cumulative
Units 1-5

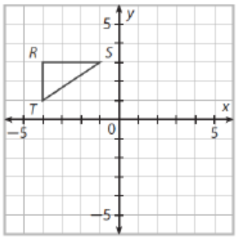
TVUSD Name ____
Geometry

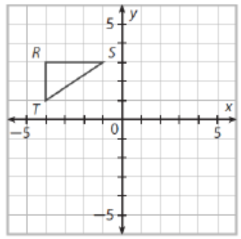
Semester 1 Re-Engagement
Transformations

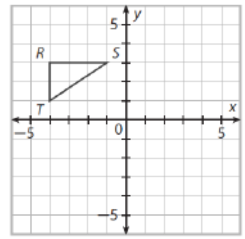
1. Apply each rule to the given pre-image, and describe the transformation.
   a) (x, y) → (-y, x) b) (x, y) → (x + 3, y - 4) c) (x, y) → (x, -y)

   ___________________ ___________________ ___________________

   ___________________ ___________________ ___________________





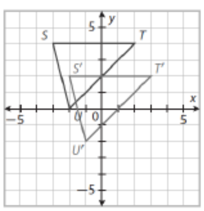


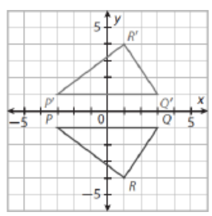
2. Which one(s) of the above results is a congruent shape by rigid motion? ____________

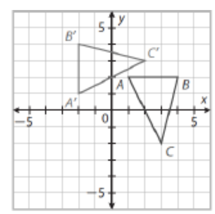
3. Write the rule for each transformation shown, and describe the transformation.
   a) (x, y) → (,) b) (x, y) → (,) c) (x, y) → (,)

   ___________________ ___________________ ___________________

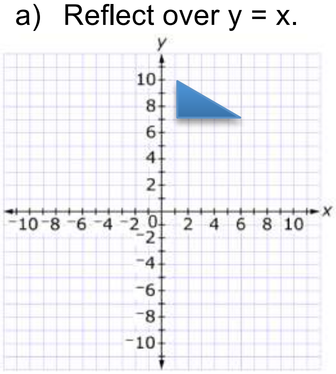
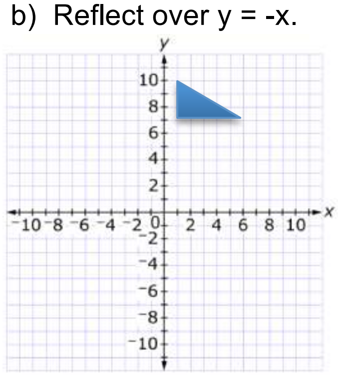
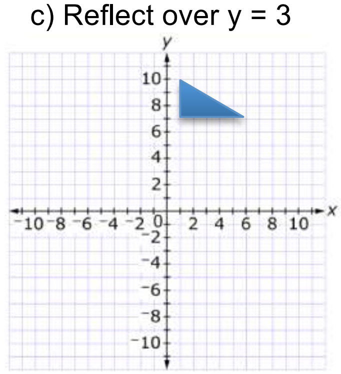
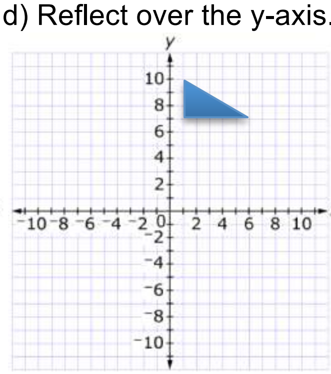
   ___________________ ___________________ ___________________







4. Perform the indicated transformation on the given pre-image with vertices (1, 10), (1, 7) & (6, 7).
   a) Reflect over y = x. b) Reflect over y = -x. c) Reflect over y = 3 d) Reflect over the y-axis.

5. Match the rule to the description of the transformation.

_____ Reflection over the y-axis	A. (x, y) → (x, -y)
_____ Reflection over the x-axis	B. (x, y) → (-y, x)
_____ Reflection over the line y = x	C. (x, y) → (y, x)
_____ Reflection over the line y = -x	D. (x, y) → (-x, y)
_____ Rotation 90° clockwise	E. (x, y) → (y, -x)
_____ Rotation 90° counterclockwise	F. (x, y) → (-y, -x)
_____ Rotation 180°	G. (x, y) → (-x, -y)

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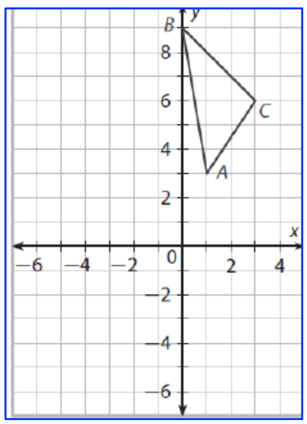
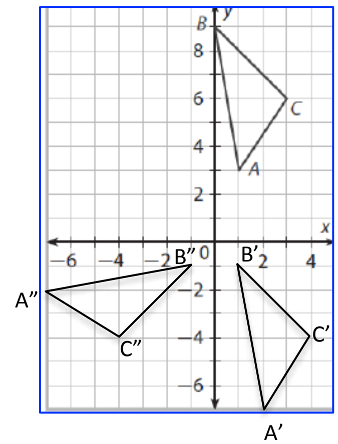
Geometry

Semester 1 Re-Engagement

6. a) Perform the indicated sequence of transformations on the given pre-image, *below left*:
Rotate 90° counterclockwise about the origin, then reflect across the x-axis.



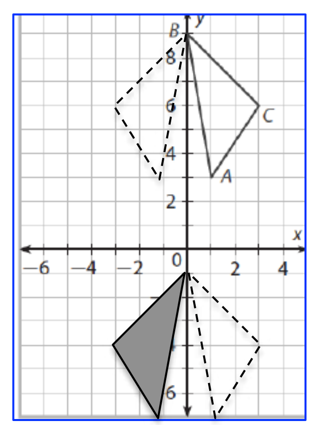


b) Describe the sequence of transformations that will result in the final image, *above right*.

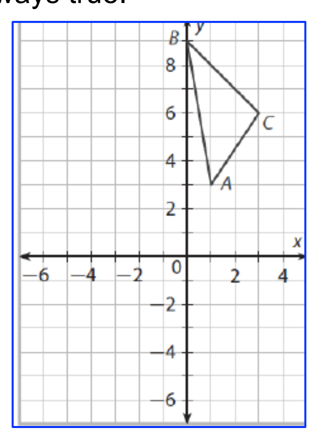
7. Lavern claims that "*any sequence of transformations involving one reflection over an axis and one translation will result in the same image*," no matter in which order the transformation are executed. (reflection, then translation vs translation first, then reflection). She supports her work as follows.

I. Reflection first: (x, y) → (-x, y) → (x, y – 10) → (-x, y – 10)

II. Translation first: (x, y) → (x, y – 10) → (-x, y) → (-x, y – 10)



Shirley claims that Lavern's conjecture is not always true. Offer a counterexample for Shirley to use in order to debunk Lavern's claim, or prove that Lavern's statement is always true.



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Semester 1 Re-Engagement
Theorems and Postulates

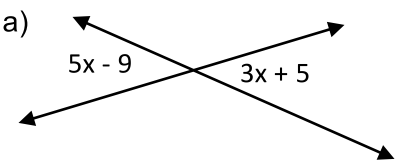
8. a) Draw a counterexample for the following statement: For all points A, B and C, *AB + BC = AC.*

   b) What condition must be true in order for AB + BC = AC?

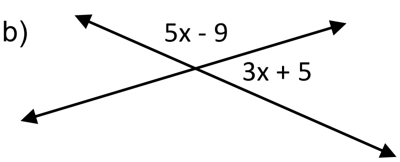
9. Hank claims that "*the square root of a number is always even*." Do you agree or disagree with Hank's conjecture. Support your position.

10. Given the the conditional statement: *If a car is a Mustang, then the car is yellow*,
    a) give an instance, b) give a counterexample, if any, c) and write the converse.

11. Solve for x: a)



b)



12. On the number line below, place *C*, to represent the complement of *x*, and *S*, to represent its supplement.

←---|--------------------------|--------------------------|---→
0° **X** 90° 180°

13. Describe the the difference between a line, a segment and a ray. Draw an example of each.

14. Draw and lable an example of each of the following:
    a) complementary angles that are not adjacent

    b) supplementary angles that are not a linear pair

    c) Two coplanar lines that are neither parallel, nor perpendicular

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Semester 1 Re-Engagement

15. Draw and/or write an example of each of the following:

a) Linear Pair Postulate

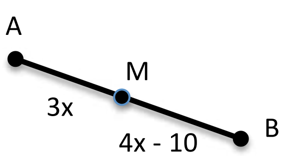
b) Vertical Angle Theorem

c) Segment Addition postulate

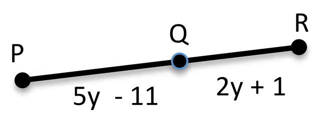
d) Angle Addition Postulate

16. Find the indicated measure

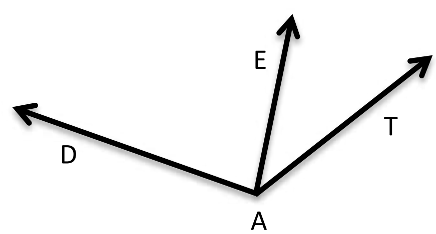
a) AB, given M is the midpoint,



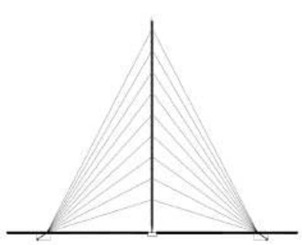
b) PQ, given PR = 32



c) m∠EAT, given m∠DAE = 85°, and m∠DAT = 115°



17. A pole is held vertical by guy wires anchored equal distance from the pole as shown in the diagram. According to the Perpendicular Bisector Theorem, what can you determine to be true?



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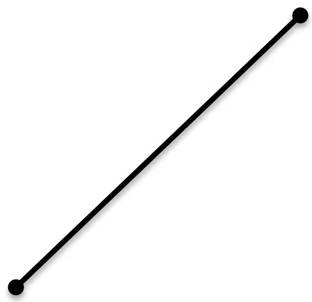
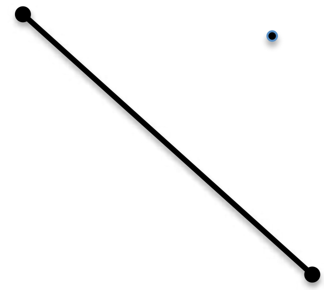
Semester 1 Re-Engagement
Constructions

18-21) Construct the following:

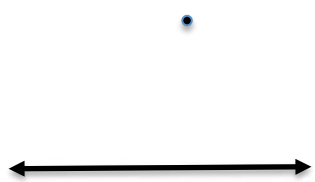
18. Perpendicular bisector



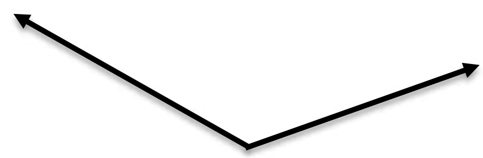
19. Perpendicular line through a point off the line



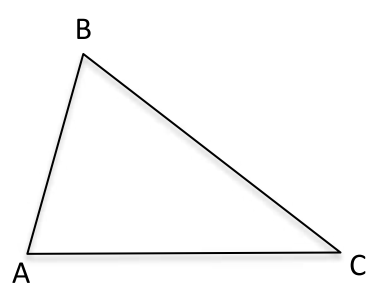
20. Parallel line through a point off the line



21. Bisect an angle



22. Construct the three medians of the triangle and show that they are concurrent.



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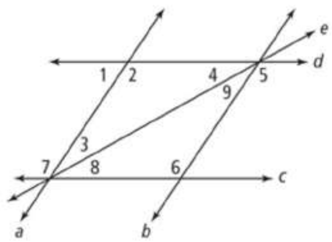
Semester 1 Re-Engagement
Parallel & Perpendicular Lines and Transversals

23. Give that d || c, a || b, m∠4 = 30° and m∠7 = 100°, Find the measure of all other designated angles.



m∠1 = _____°

m∠2 = _____°

m∠3 = _____°

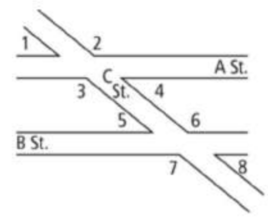
m∠5 = _____°

m∠6 = _____°

m∠8 = _____°

m∠9 = _____°

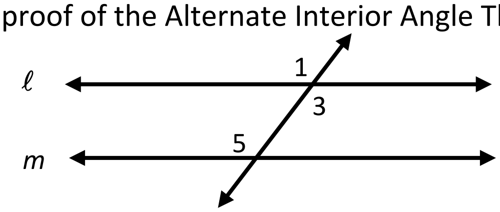
24. Streets A & B are parallel. What is the sum of ∠2, ∠3, ∠5, and ∠8? __________



25. Arrange the given statements & reasons to complete the proof of the Alternate Interior Angle Theorem.

G: ℓ // m

P: ∠3 ≅ ∠5



Statements	Reasons
1.	1.
2.	2.
3.	3.
4.	4.

Transitive Property

∠3 ≅ ∠5

Corresponding Angles Postulate

ℓ // m

Vertical Angles Theorem

Given

∠1 ≅ ∠3

∠1 ≅ ∠5

26. Draw and label a diagram that demonstrates the given types of angles.

a) vertical angles

b) linear pair

c) corresponding angles

d) alternate interior angles

e) alternate exterior angles

f) same-side interior angles (consecutive)

27. Draw and label a single diagram for which all of the following four statements are true.

i) **∠1 & ∠2 are corresponding, and congruent**

ii) **∠2 & ∠3 are corresponding, but not congruent**

iii) **∠3 & ∠4 are alternate interior, and congruent**

iv) **∠4 & ∠5 are vertical**

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Triangle Congruency

28. Draw and/or write an example of each of the following:

a) Alternate Interior Angles Theorem

b) Definition of Angle Bisector

c) Substitution Property

d) Transitive Property

e) Reflexive Property

f) Definition of Paralleogram

g) Definition of Midpoint

h) SSS Postulate

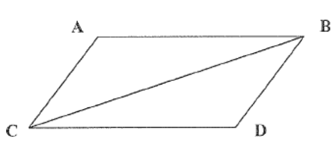
i) SAS Theorem

j) ASA Theorem

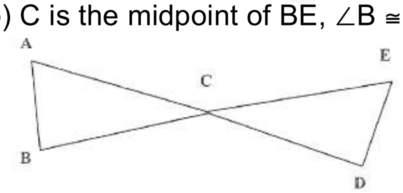
k) AAS Theorem

29. Match a Triangle Congruency Theorem/Postulate to each Diagram (Add additional markings if necessary.)

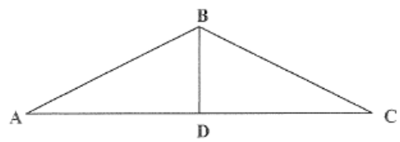
a) $\overline{AC} \parallel \overline{BD}$, $\overline{AC} \cong \overline{BD}$



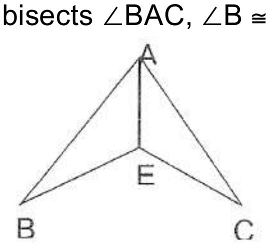
b) C is the midpoint of $\overline{BE}$, $\angle B \cong \angle E$



c) D is the midpoint of $\overline{AC}$, $\overline{AB} \cong \overline{CE}$



d) $\overrightarrow{AE}$ bisects $\angle BAC$, $\angle B \cong \angle C$



SSS

SAS

AAS

ASA

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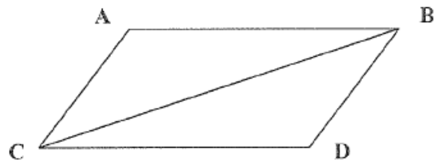
30. a) G: ABCD is a parallelogram
P: ∠A ≅ ∠D

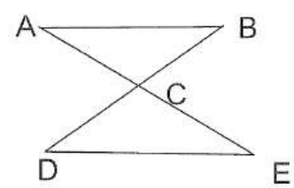


Statements	Reasons
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.

b) What did you prove above?

31. Regarding the following diagram, match each set of givens to the triangle congruency theorems and postulates that will be used to prove the two triangles are congruent. The theorems and postulates may be chosen more than once or not at all.

SSS SAS AAS ASA



a) AB || ED
C is the midpoint of DB

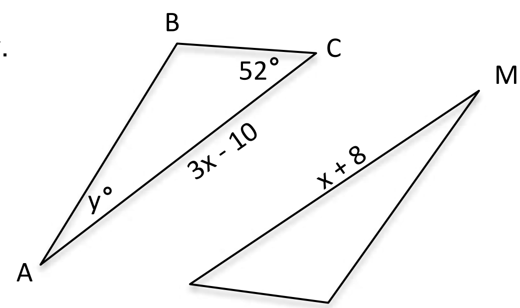
b) C is the midpoint of AE
DC ≅ CB

c) AC ≅ EC
∠D ≅ ∠B

d) AB || ED
AB ≅ ED

__________ __________ __________ __________

32. ΔABC ≅ ΔMNP. Solve for x & y.



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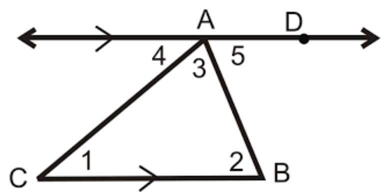
P 100° N

Triangle Properties

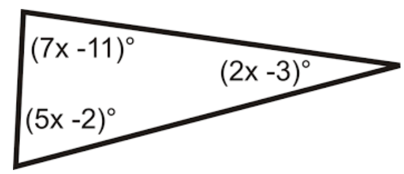
33 a) Prove the Triangle Sum Theorem.

G: $\overline{AD} \parallel \overline{CB}$

P: $m\angle 1 + m\angle 2 + m\angle 3 = 180$



b) Find the measure of each angle.

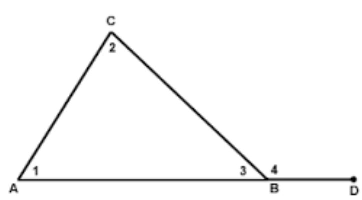


Statements	Reasons
1.	1.
2. $m\angle 4 + m\angle 3 + m\angle 5 = 180$	2. Angle Addition postulate
3. $m\angle 1 = m\angle 4$	3.
4.	4. Alternate Interior Angle Th.
5.	5. Substitution

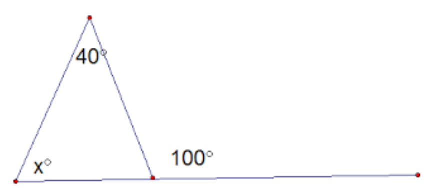
34. a) Prove the Remote Exterior Angle Theorem

G: ΔABC

P: $m\angle 1 + m\angle 2 = m\angle 4$



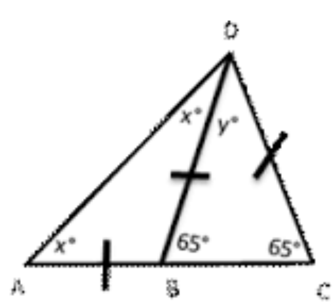
b) Solve for x.



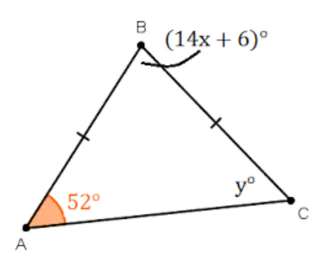
Statements	Reasons
1.	1.
2. $m\angle 1 + m\angle 2 \ m\angle 3 = 180$	2. Triangle Sum Theorem
3.	3.
4.	4.
5.	5.

35. a) Draw an example of the Isosceles Triangle Theorem. Include the measurements of all 6 parts.

b) Solve for x & y.



c) Solve for x & y.



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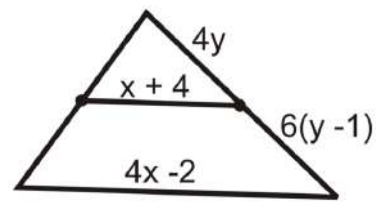
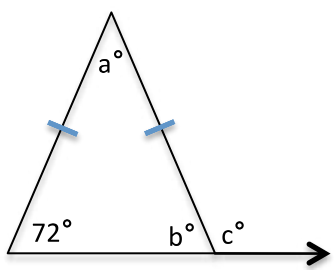
36. a) Draw an example of the Midsegment Theorem. Include all pertinent measurements.

b) Shown is an example of a midsegment of a triangle. Solve for x & y.



37. Find a, b & c.



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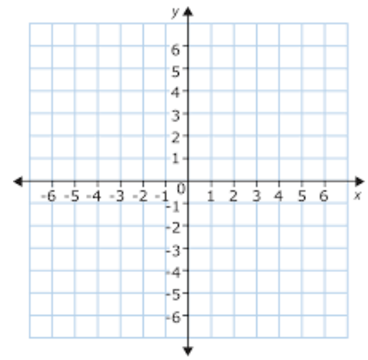
Coordinate Geometry

38. Given A(-2, 1) B(2, 3) and C(4, -2), write the equation of the line that is

a) parallel to $\overleftrightarrow{AB}$, through C

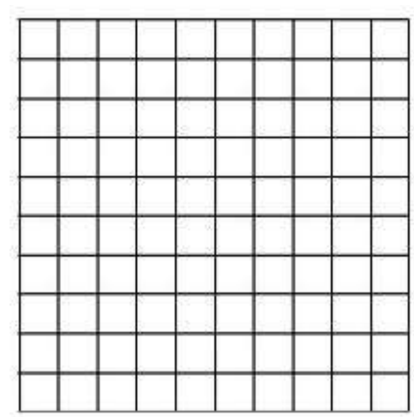
b) perpendicular to $\overleftrightarrow{AB}$, through C.



c) Check your answers by graphing.

39-41) Given QUAD *Q(0, 1), U(0, 5), A(4, 7), D(4, 3).*

39. Find the perimeter of QUAD.



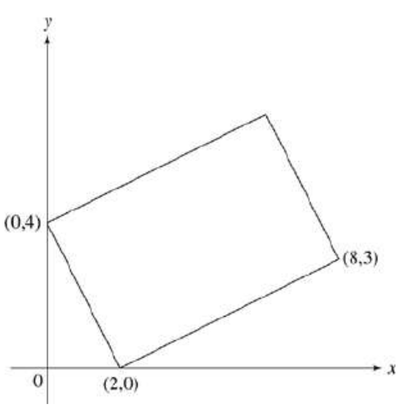
40. Prove that QUAD is a parallelogram.

41. a) Show that the diagonals of QUAD bisect each other.

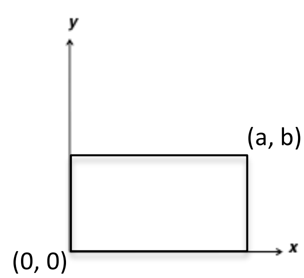
b) Determine, algebraically, whether or not the diagonals are perpendicular.

42. Find the missing coordinates.

a)



b)



43. Given the endpoint of a segment E(-2,4) and midpoint M(1,1), determine the coordinates of the other midpoint.

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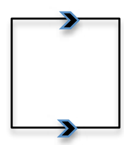
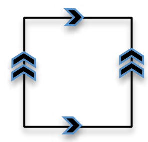
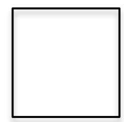
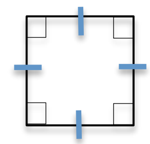
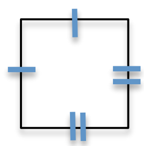
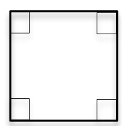
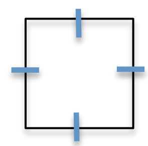
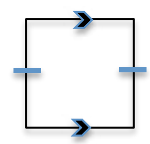
Quadrilaterals

44. Identify each quadrilateral according to it’s markings.

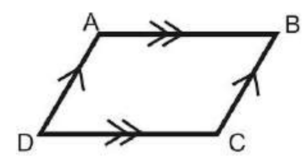
a) ________________ b) ________________ c) ________________ d) ________________

e) ________________ f) ________________ g) ________________ h) ________________

45. In the parallelogram below, given that m∠D = 65°, find the measure of the other three angles.



46. For rectangle HOME,

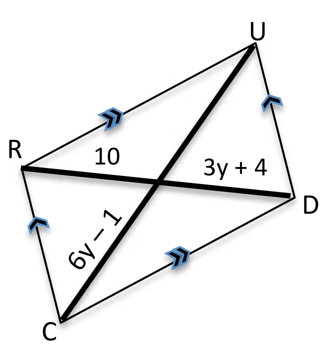
a) Draw HOME, including diagonals HM & OE.

b) Given HM = 3x + 5 & OE = 5x + 1, find HM & OE.

47. Circle all the properties below that are true of all parallelograms.

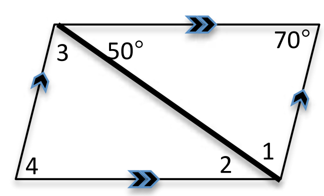
Opposite side congruent	Opposite sides parallel	Diagonals bisect each other
Opposite angels congruent	Diagonals are perpendicular	Consecutive angles are congruent
Diagonals congruent	Adjacent sides are perpendicular	Adjacent sides are congruent

48. Find the length of diagonal CU.



49. Find each designated angle.

m∠1 = _____, m∠2 = _____, m∠3 = _____, m∠4 = _____



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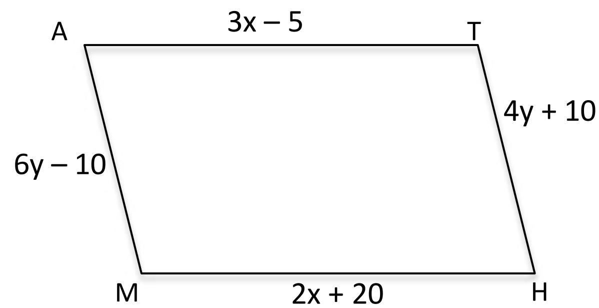
50. *Given parallelogram MATH, with m∠H = (2w + 30)° and m∠A = (6w - 50)°, find:*

a) m∠MAT =

b) m∠AMH =

c) the perimeter of MATH = ____________



51. Draw and name a quadrilateral for which the given conditions are true.

a) Diagonals are congruent, but not always perpendicular.

____

c) Diagonals bisect each other, and are congruet as well as perpendicular.

____

b) Diagonals are perpendicular, but not always congruent.

____

d) Diagonals bisect each other, but are not always congruent.

____