Review 1: Quadratic Functions

Match each of the following simplified expressions on the left with it's matching factored expression on the right.

_____1. x

a. $(3x + 7) + (4x - 9)$

_____2. $x^2 - 9$

b. $(x - 3)(x + 3)$

_____3. $7x - 2$

c. $(2x - 5)(x + 5)$

_____4. $12x^2 - 20x - 8$

d. $4(x - 2)(3x + 1)$

_____5. $2x^2 + 5x - 25$

e. $(8x - 9) - (7x - 9)$

6. If $f(x) = 3x^2 - 2x + 1$, which of the following is NOT true?

a. $f(-1) = 6$ b. $f(0) = 1$ c. $f(1) = 0$ d. $f(2) = 9$

7. If $g(x) = (x - 3)(x + 1)$, which of the following is true?

a. $g(3) = 0$ b. $g(0) = 3$ c. $g(0) = 1$ d. $g(1) = 0$

8. Which of the following would make the statement $h(4) = 0$ true?

a. $h(x) = x^2 + 3x + 2$ b. $h(x) = x^2 + 5x + 4$

c. $h(x) = x^2 - 3x - 4$ d. $h(x) = (x + 4)(x + 1)$

9. The recursive function $f(0) = 1$, $f(x) = f(x - 1) + 2n$ represents

a. a linear function   b. a geometric function

c. an exponential function   d. a quadratic function

If someone who is 5 feet tall uses a potato gun to shoot a potato in the air at 100 feet per second, we can use the function $f(x) = -16x^2 + 100x + 5$ to calculate how far the potato will be from the ground at any given second (x). Use this information to answer questions 10 – 12 below.

10a. What does $f(1)$ mean in this context?

b. Find $f(1)$

11a. What would $f(x) = 0$ mean in this context?

b. Find when $f(x) = 0$. (Your answer may not be exact, so just estimate as close as possible.

12. About how high will the potato get? When will that happen?

Review 2: Quadratic Functions #2

Match each standard form equation with it's equivalent vertex form equation in column A and it's factored form equation from column B.

Column A	Column B	Standard Form (Question)	Vertex Form (Column A)	Factored Form (Column B)
_____	_____	1. $y = x^2 + 2x - 8$	a. $(x - 1)^2 - 9$	a. $y = (x + 2)(x - 4)$
_____	_____	2. $y = x^2 - 2x - 8$	b. $(x + 3)^2 - 1$	b. $y = (x - 2)(x + 4)$
_____	_____	3. $y = x^2 + 6x + 8$	c. $(x + 1)^2 - 9$	c. $y = (x - 2)(x - 4)$
_____	_____	4. $y = x^2 - 6x + 8$	d. $(x - 3)^2 - 1$	d. $y = (x + 2)(x + 4)$

5. Which of the following is the correct factorization of the expression $2x^2 + 7x - 15$?

    a. $(2x - 3)(x + 5)$ b. $(x + 3)(x + 5)$ c. $(x - 3)(x - 5)$ d. $(2x - 5)(x + 3)$

6. Which of the following expressions is NOT equivalent to the expression $2(3x - 2)(x - 5)$

    a. $(3x - 2)(2x - 10)$ b. $(6x - 4)(x - 5)$

    c. $\left(\frac{3}{2}x - 1\right)\left(\frac{1}{2}x - \frac{5}{2}\right)$ d. $6x^2 - 34x + 20$

7. Where is the vertex of the equation $y = x^2 - 18x + 80$

    a. $(-1, 9)$ b. $(10, 8)$ c. $(10, 0)$ d. $(9, -1)$

Given some information, provide the other requested information

8. $y = (x - 2)(x + 8)$ | 9. $y = (x - 2)^2 - 9$

a. The standard form equation: | a. What form is the equation above written in?

b. The vertex: | b. The x-intercepts:

c. The y-intercept | c. The factored form equation

10. A quadratic equation that has x-intercepts of (-2 , 0) and (8 , 0), a stretch of 3, and the vertex is a minimum

    a. Factored form equation:

    b. Vertex form equation:

    c. Standard form equation:

A piece of information might be very easy to find in one form of a quadratic equation, and difficult in another. Below, decide which form is the easiest one to use to find the indicated information, say where you'd find it by using an example, and justify your answer.

    11. Vertex: _____

_____

_____

    12. Axis of symmetry: _____

_____

_____

    13. y-intercept: _____

_____

_____

    14. x-intercepts: _____

_____

_____

Review 3: Solving Equations

Match each equation on the left with it's solutions listed on the right.

_____ 1. $x^2 + 8x + 7 = 0$ a. $x = -8 \pm \sqrt{7}$

_____ 2. $x^2 - 8x + 7 = 0$ b. $x = 4 \pm \sqrt{23}$

_____ 3. $x^2 + 8x - 7 = 0$ c. $x = -4 \pm \sqrt{23}$

_____ 4. $x^2 - 8x - 7 = 0$ d. $x = -1, -7$

_____ 5. $(x + 8)^2 = 7$ e. $x = 1, 7$

Match each imaginary number on the left with its simplified version on the right.

_____ 6. i^{14} a. i

_____ 7. i^{15} b. $-i$

_____ 8. i^{16} c. 1

_____ 9. i^{17} d. -1

10. The expression $3 + \sqrt{8} - \sqrt{2} + 3\sqrt{5} - 4 - 3\sqrt{5}$ *most simplified* is:

     a. $-1 + \sqrt{2}$ b. $-1 + \sqrt{8} - \sqrt{2}$

     c. $-1 + \sqrt{2} + 6\sqrt{5}$ d. $-1\sqrt{20}$

11. The best classification for $3 + \left(\sqrt{-40}\right)^2$ is:

     a. W (Whole)   b. $\mathbb{Z}$ (Integer)   c. $\overline{\mathbb{Q}}$ (Rational)   d. $\mathbb{C}$ (Complex)

12. Which method is *fastest* for solving the following equation: $(x + 3)^2 - 4 = 0$?

     a. Graphing   b. Factoring

     c. Taking square root   d. Quadratic Equation

13. Which method is *fastest* for solving the following equation: $x^2 + 4x - 12 = 0$?

     a. Graphing   b. Factoring

     c. Completing the Square   d. Quadratic Equation

14. Which method is *fastest* for solving the following equation: $5x^2 - 2x + 4 = 0$?

    a. Graphing   b. Factoring

    c. Completing the Square   d. Quadratic Equation

15. Find the solution(s) to the equation in question 12 using any method you'd like. Answers MUST be simplified.

16. Find the solution(s) to the equation in question 13 using any method you'd like. Answers MUST be simplified

17. Find the solution(s) to the equation in question 14 using any method you'd like. Answers MUST be simplified.

Below you are given 3 different equations to solve, along with 3 different methods to solve those equations. Write each equation under ONE of the methods, then use that method to solve the equation. Solutions MUST be simplified.

Equations

18. $(x - 4)^2 = 3$ 19. $x^2 - 6x + 13 = 0$ 20. $x^2 - 16 = 0$

Methods

Factoring	Completing the Square	Quadratic Equation
Equation: _____	Equation: _____	Equation: _____
Show work:	Show work:	Show work:
Solution(s): _____	Solution(s): _____	Solution(s): _____

Review 4: Geometric Figures

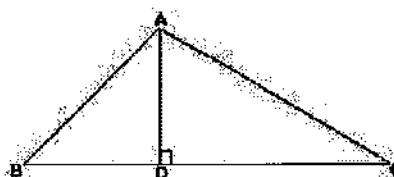Match each word/concept on the left with the picture depicting that word/concept that word/concept on the right.
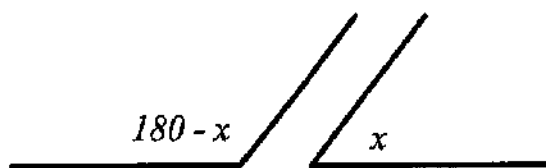
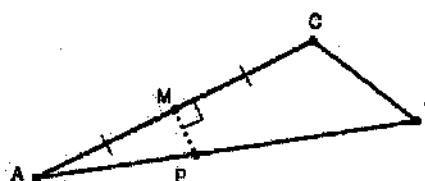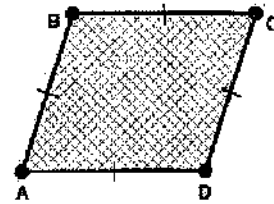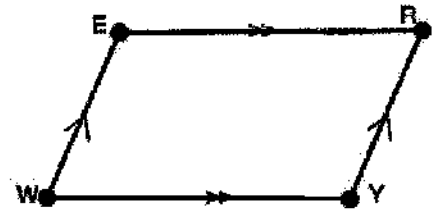|	
_____1. Linear Pair	a. $180 - x$ x
_____2. Supplementary Angles	b.
_____3. Altitude	c.
_____4. Median	d.
_____5. Perpendicular bisector of a side	e.

6. Which of the following words does NOT describe the following shape?

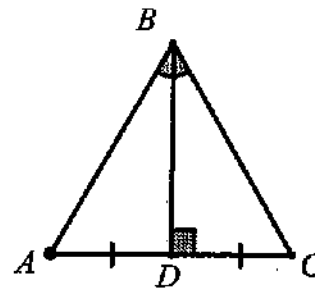   a. Parallelogram   b. Kite

    c. Rhombus   d. Trapezoid

7. Which of the following does BEST describes the following shape?

    a. Trapezoid   b. Parallelogram

    c. Rectangle   d. Square

8. When comparing $\overline{BD}$ to $\triangle ABC$, then $\overline{BD}$ is a

    a. Altitude

    b. Median

    c. Angle Bisector

    d. Perpendicular bisector of a side

    e. All of the above

9. What is true about corresponding line segments of an object that has been reflected over the x-axis?

    a. Corresponding lines are the same length

    b. Corresponding lines have the same slope

    c. Corresponding lines are parallel

    d. Corresponding lines will meet at a right angle

    e. All of the above

10. If you know that $\triangle ABC \cong \triangle XYZ$, what else do you know to be true?

    a. $\angle A \cong \angle Z$ b. $\angle B \cong \angle Y$ c. $\overline{BC} \cong \overline{XY}$ d. $\overline{AC} \cong \overline{YZ}$
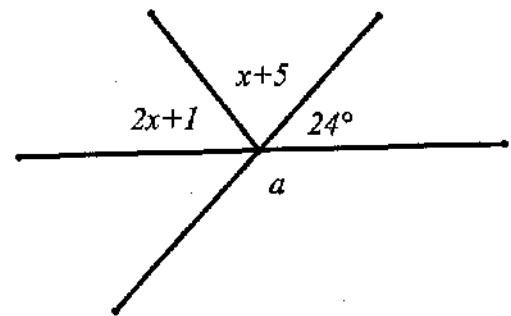
11. You know that $\angle AED = 80°$. You also know that $\overline{BE}$ bisects $\angle AED$ and that $\overline{CE}$ bisects $\angle BED$.
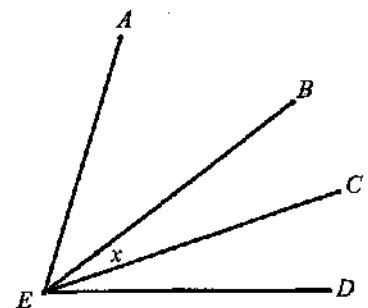
Find x.

12. Find the measure of a in the diagram below

$x+5$

$2x+1$ $\quad$ $24°$

a

13. $\triangle ABC$ has been transformed three times. You know A and B and C'''. Your job is to figure out what C was. A graph has been provided for you in case you need it, however you do not have to draw anything out to get the answer correct. Similarly, ordered pairs have been provided between steps to help you find your answer, but you do not have to use them.

To Begin: A = (-2 , 3) B = (-6 , 5) $\boxed{C = (\quad , \quad)}$

Step 1: Rotate $\triangle ABC$ 180° around the point (0 , 0)

A' = (,) B' = (,) C' = (,)

Step 2: Reflect over the x – axis

A'' = (,) B'' = (,) C'' = (,)

Step 3: Translate left 9 and up 3

A''' = (,) B''' = (,) C''' = (-8 , 2)
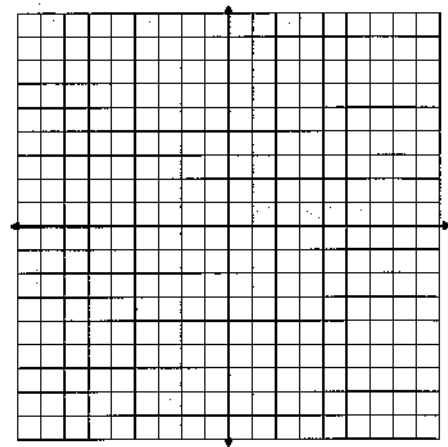
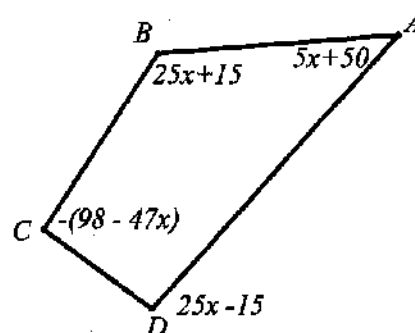# Review 5: Geometric Figures Part 2

Match each standard form equation with its equivalent vertex form equation in column A AND it's factored form equation from column B.

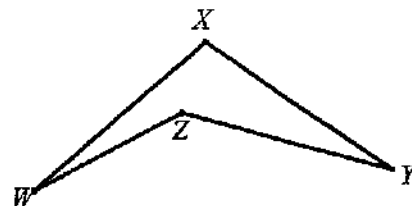| Column A	Column B	Angle Measure (Question)	Compliment (Column A)	Supplement (Column B)
_____	_____	1. 62	a. 28	a. 28
_____	_____	2. 152	b. $-2(x-43)$	b. $90 + x$
_____	_____	3. $2x + 4$	c. $180 - x$	c. 118
_____	_____	4. $90 - x$	d. None	d. $176 - 2x$
_____	_____	5. $x - 90$	e. x	e. $270 - x$

6. To the right is a regular 5-point star. The pentagon within the star is a regular pentagon, and the triangles surrounding the pentagon are isosceles triangles. Use this information to help you find $m\angle A$, $m\angle B$ and $m\angle C$.
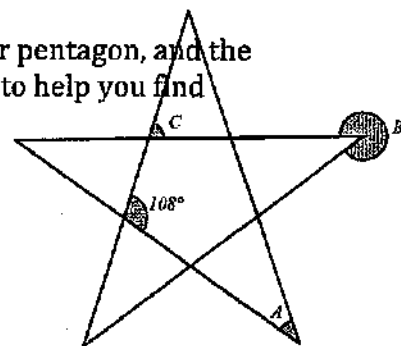
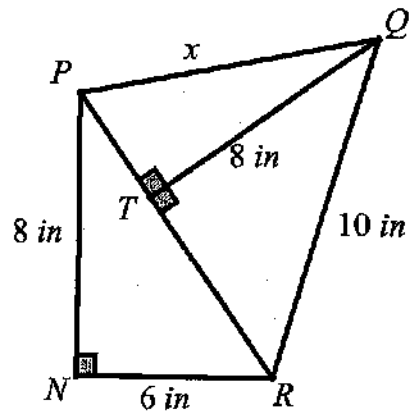7. Find the measure of all of the angles for the quadrilateral below.

8. So far we have been looking at quadrilaterals that have interior angles with angle measures less than 180°. However, the quadrilateral WXYZ has an interior angle with an angle measure that is greater than 180°. Would the sum of these interior angles still be 360°? Say why or why not.

9. Find x. Then, write a proof of your choosing in which you prove that your answer is correct. If you use any properties or theorems, make sure you say what they are. Your proof should be clear, understandable, and convince me (and yourself) that your answer is correct. If necessary, write your answer in simplified radical form.

Review 6 Right Triangle Trigonometry

The side lengths for several triangles are listed below. Use the side lengths to determine which triangles will have the same angle measures. Match the side lengths on the left with the side lengths on the right for triangles that share the exact same angle measurements.

_____1. 3, 4, 5   a. 6, 8, 12

_____2. 4, 5, 10   b. 9, 12, 15

_____3. 3, 4, 6   c. 1, 2, 3

_____4. $\sqrt{3}$, $4\sqrt{3}$, $7\sqrt{3}$ d. 2, 2.5, 5
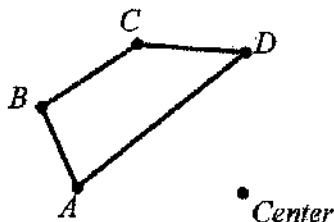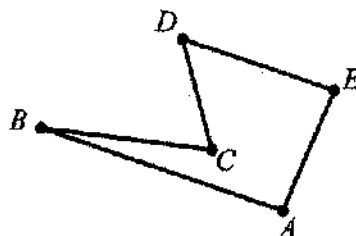
_____5. 8, 16, 24   e. 3, 12, 21

For questions 6 – 7 perform the requested dilation as well as you can using the tools you have. Of course the image won't look perfect, but use congruence markings to show that you know how a dilation should be drawn and that you have done it correctly.
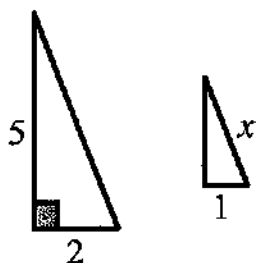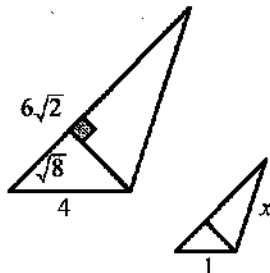
6. Ratio: 2

7. Ratio: ½

MATH II FINAL EXAM REVIEW

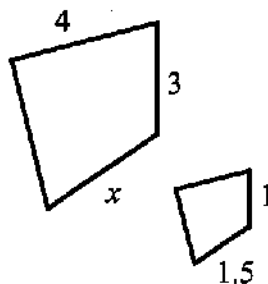*For questions 8 – 10 find the missing side for the similar shapes that are shown below.*

8.

5

2

x

1
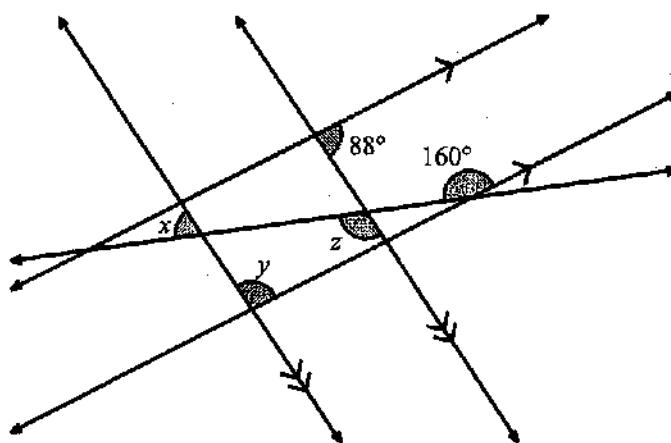
9.

$6\sqrt{2}$

$\sqrt{8}$

4

x

1

10.

4

3

x

1

1.5

11. Find the measurements of angles x, y, z.

88°

160°

x

y

z

A right triangle is shown below. Match each trigonometric function on the left with it's equivalent ratio on the right. It is possible to choose a ratio more than once. It is possible that some ratios will not be used at all.

____12. $\sin(A) =$

____13. $\cos(A) =$

____14. $\tan(A) =$

____15. $\sin(B) =$

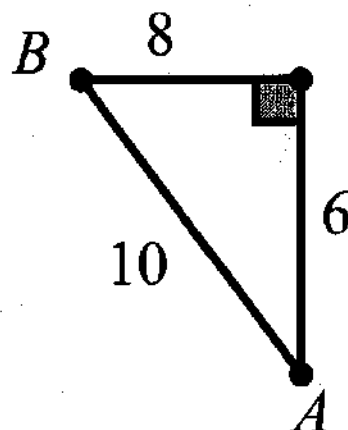____16. $\cos(B) =$

____17. $\tan(B) =$

a. $\dfrac{8}{6}$

b. $\dfrac{6}{8}$

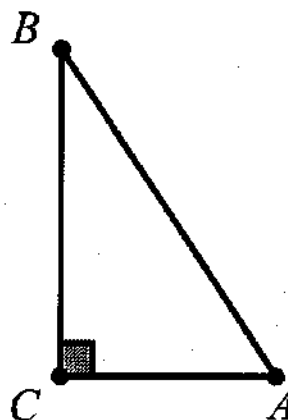c. $\dfrac{6}{10}$

d. $\dfrac{10}{6}$
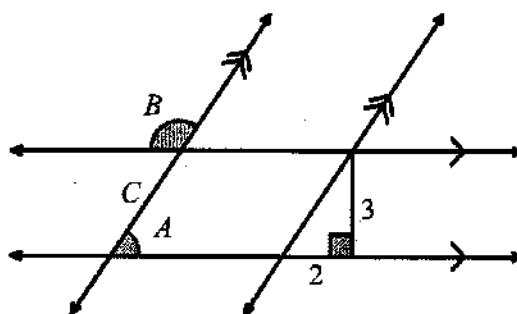
e. $\dfrac{10}{8}$

f. $\dfrac{8}{10}$

B

8

6

10

A

If you know that $\tan(A) = \frac{60}{45}$, *match each of the sides and angles with their correct measurements below. All measurements have been rounded to the nearest unit.*
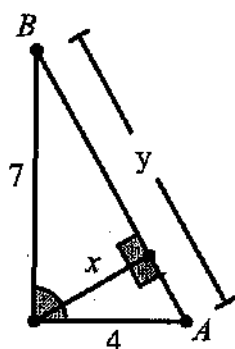
_____18. AB =   a. 60

_____19. BC =   b. 53

_____20. AC =   c. 75

_____21. $m\angle A$ =   d. 37

_____22. $m\angle B$ =   e. 45

_____23. $m\angle C$ =   f. 90

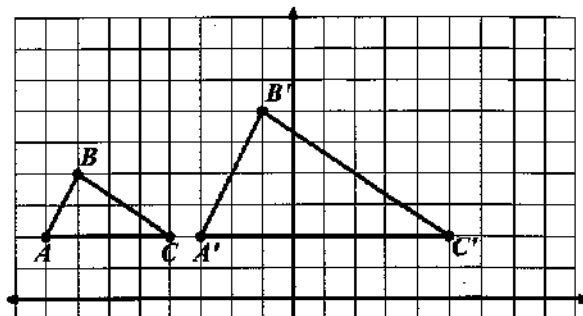24. Find the length of C as well as $m\angle A$ and $m\angle B$.

25. Find the lengths of x and y as well as the angle measures of A and B.
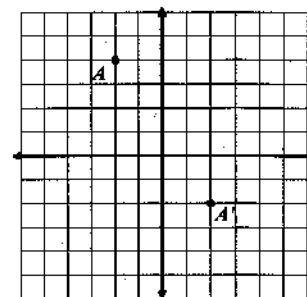
Review 7: Circles

1. For the following pre-image and image determine the **coordinates** for the center of dilation as well as the **scale factor** between the two figures.
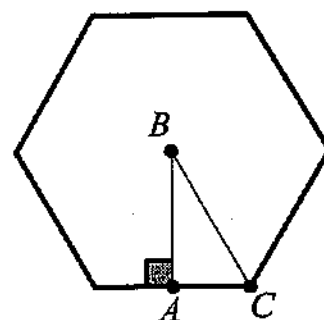
2. There is an infinite number of possible centers of rotation for the points below. Those points lie on a line. (a) **Write the equation** of the line that contains all possible centers of rotation for A and A'. (b) Using your knowledge of transformations, **explain** why any of the points of that line could be a center of rotation.

3. For the regular hexagon below find all of the following information. It is given that BC = 5.

   a. AB =

   b. Length of one side =

   c. Perimeter =

   d. Measure of one interior angle =

   e. Sum of all interior angles =

   f. Area =

On a college campus there is an interesting design outside between the entrances for four major buildings. The lines represent walking paths. Use this diagram to answer questions 4 and 5 below.

   4. There are three different paths between the points Y and Z. Find the distance for each of those paths.

   a. From Y to X then from X to Z.

   b. Around the circle from Y to Z.

   c. On straight line from Y to Z.
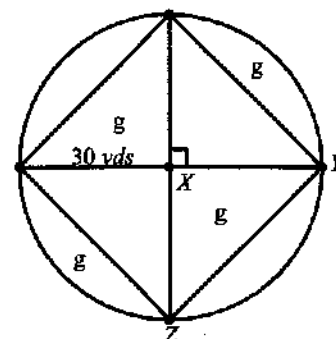
5. In the diagram above there are several "g"s marking where grass is growing. (The other areas are covered with stone.) You are the manager of the grounds crew caring for this part of campus and must order fertilizer to keep the grass healthy. To do this you must know the total area of the grass you plan to fertilize. Find that total area.

6a. As the radius of a circle grows, so does it's perimeter. Write a function the perimeter (P) in terms of the radius (r).

b. Similarly, as the radius of a circle grows, so does it's area. Write a function of the area (A) with respect to the radius (r).
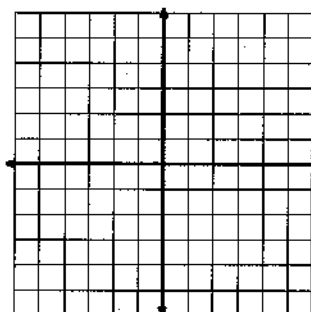
c. Find where the two functions equal each other. Do so algebraically, using a table, and by using a graph. Is there more than one place where the functions are equal?

| Algebraically	Table			Graph
	Radius	Perimeter	Area	

d. In Question 7.c you found 3 different pieces of evidence showing that there is at least one sized circle where the area and the perimeter are equal. However, most people would argue that there is no instance where an area of a circle would equal the perimeter. Why would that be?

7. Assuming you had all of the information you needed to find the total area of the shaded regions, explain what process you would need to go through to find this area. (Note: You DO NOT need to actually find the area to answer this question. Simply explain what process you could go through to find the area)
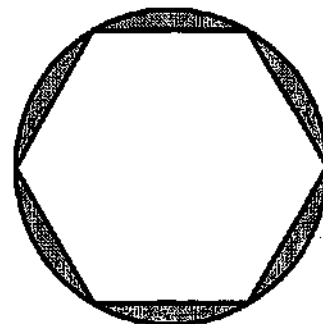
8. Write a step-by-step process you could use for finding the center of the circle below. Make sure you label items in your picture so you can clearly refer to them in your explanation.
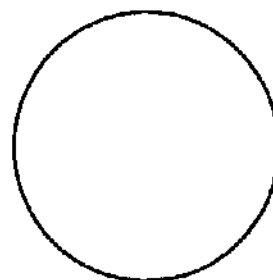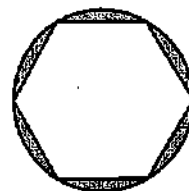
Review 8: Circles Part 2

Match each radian measurement to its matching degree measurement.

____1. $\dfrac{\pi}{2}$ a. 45°

____2. $\dfrac{2\pi}{3}$ b. 180°

____3. π c. 120°

____4. $\dfrac{3\pi}{4}$ d. 90°

____5. $\dfrac{9\pi}{4}$ e. 135°

Match each degree measurement to its matching radian measurement.

____6.   122°   a. $\dfrac{5\pi}{18}$

____7.   50°   b. $\dfrac{3\pi}{2}$

____8.   270°   c. 2π

____9.   0°   d. $\dfrac{61\pi}{90}$

____10. 1°   e. $\dfrac{\pi}{180}$

11. Find the area of the shaded region below. The radius of the circle is 5 ft.

12. Fill in the table below for the following circles. In all of them $m\angle ABC = 45°$.

Radius	Arc Length of $\overset{\frown}{AC}$ in cm	Arc Length of $\overset{\frown}{AC}$ in Radians
1 cm		
2 cm		
3 cm		
4 cm		
n cm		
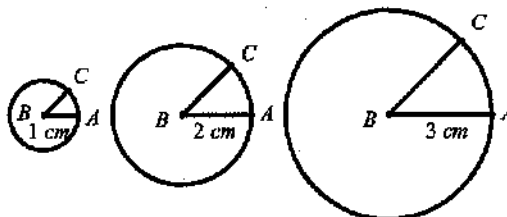
13. Complete the following table that compares various characteristic of an original shape as well as one that has been scaled by 5.

| Shape	Original Shape Characteristic	Shape Scaled by 5
Line	Length = 25 cm	Length =
Pyramid	Volume = 32 m³	Volume =
Cube	Volume =	Surface Area = 1,350 in²
Square	Perimeter = 16 miles	Area =

14. Explain in your own words what a *radian* is and how it is different from a degree.

15. Generally when speaking about an angle measure using radians, the symbol π is used. (For example, one might say an angle measure was $\frac{5\pi}{3}$ radians). The question for you to answer is this: Is $\frac{5\pi}{3}$ radians the same as $\frac{5}{3}$ radians?

Review 9: Circles as Conics

Match each graph with its matching equation.

_____1.
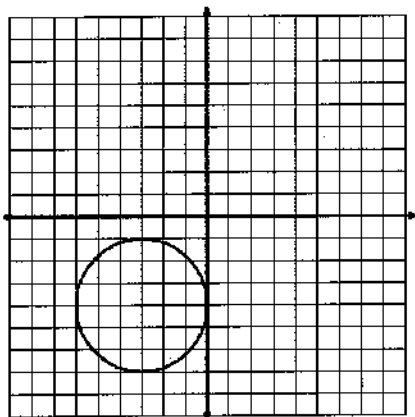
_____2.
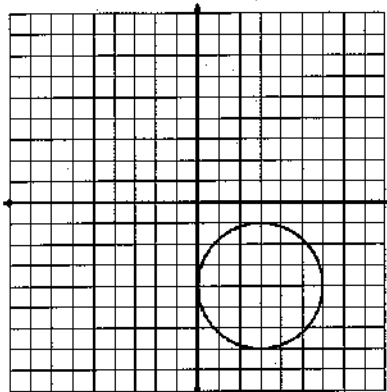
_____3.
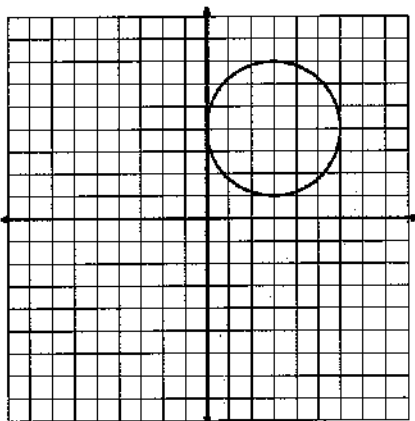
_____4.
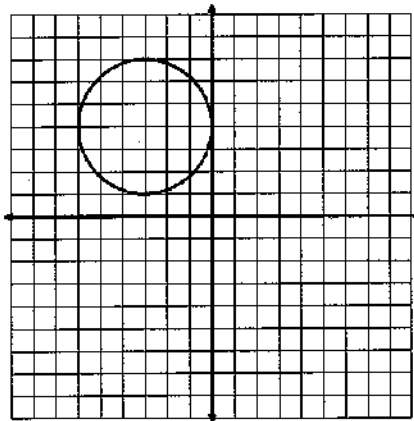
a. $(x + 3)^2 + (y + 4)^2 = 9$

b. $(x - 3)^2 + (y - 4)^2 = 9$

c. $(x + 3)^2 + (y - 4)^2 = 9$

d. $(x - 3)^2 + (y + 4)^2 = 9$

Write the equation of a circle that matches the criteria listed in the questions below. You need to provide a standard-form equation as well as an expanded form equation.

5. Center: $(2, 1)$ Radius: 7

6. Diameter of 9 and a center where $y = 3x + 12$ intersects with $y = -x + 4$.

7. Tangent to the lines $x = 3$, $x = -5$, $y = 10$, and $y = 18$.

Review 10: Mixed Review

1. **Segment PR** has an endpoint at (25, -5) and a midpoint of (18, -1). What is the value of the x-coordinate of the other endpoint?

2. Ruthann is buying a home, and the plot of land is triangular. She would like to have a long property line along the street. The given angle, ∡M, is opposite the road side of the plot of land. The following are angle measures of ∡M for four different properties that Ruthann may choose from. Which property has the longest property line on the street?
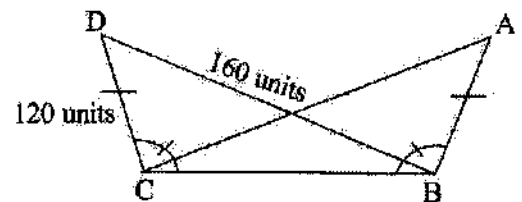
   Plot A: 65°   Plot B: 89°   Plot C: 68°   Plot D: 103°

3. The figure below shows the length of side DC equal to 120 units and the length of side DB equal to 160 units.
   What is the length of segment AC?
   A. 120 units
   B. 160 units
   C. 240 units
   D. 320 units

4. Ben has a toy light saber, and he wants to construct one proportionally smaller than his. The light on his is 33 in, and the handle is 9 in. If the light on the smaller version is 11 in, how long should the handle be?
   A. 3 in   B. 4 in   C. 4.5 in   D. 6 in
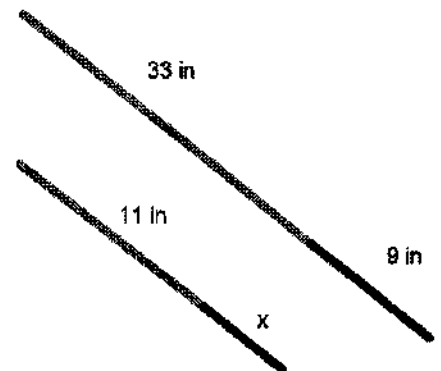
5. In the triangle below, what is the approximate value of x?
   A. 4 in   B. 4.5 in   C. 4.9 in   D. 5.1 in
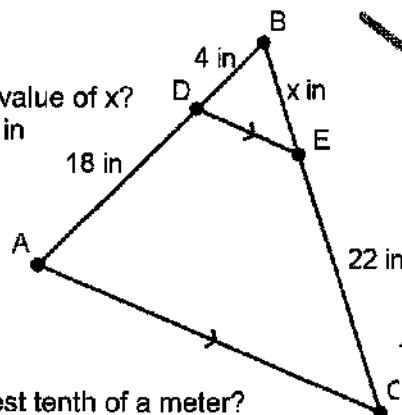
6. Look at the figure shown at the right.
   What is the length of Segment AB to the nearest tenth of a meter?
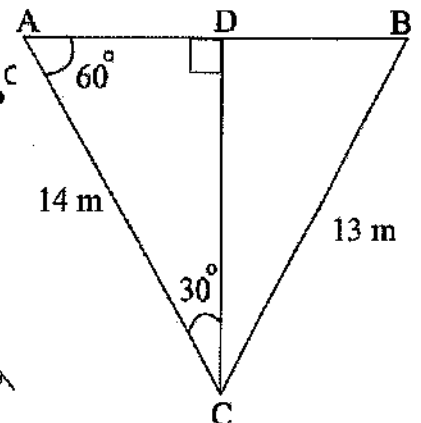
7. Look at the figure. What is the length of side AD?

   A. 6 cm   B. 8.5 cm
   C. 10.4 cm   D. 12 cm
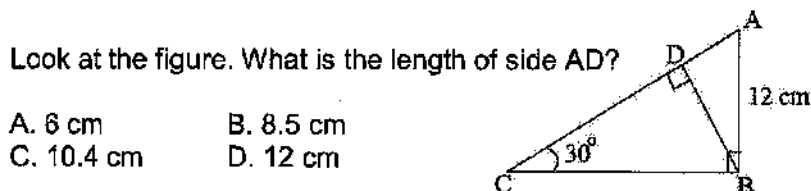
8. Look at the figure. What is the distance, in meters, between point B and point C?
   A. 200 cos 35°   B. 200 tan 35°
   C. 200/cos35°   D. 200/sin35°
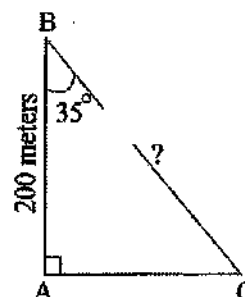
9. The vertices of pentagon LMPQR are at L(4, -2), M(5, -2), P(8, -5), Q(6, -7), R(2, -4). The coordinates of the pentagon after two translations are L_1(-5, -1), M_1(-4, -1), P_1(-1, -4), Q_1(-3, -6), R_1(-7, -3). How was LMPQR translated to create $L_1M_1P_1Q_1R_1$?

   A. To the left by 9 units and 1 unit up   B. To the right by 9 units and 1 unit up
   C. To the left by 1 unit and 9 units up   D. To the right by 1 unit and 9 units up

10.   Brennan is making a poster for the drama club's new production. It is a regular pentagon with side lengths of 12 inches. The school wants to put up a giant replica of the poster during athletic events. If the length of each side is 8 times the original, how many times larger is the area of the replica than the area of the original?

11.   The toddler section in a park is in the shape of a trapezoid. The parallel sides of the section measure 10 m and 14 m. The distance between the parallel sides is 8 m, as shown below. The section was remodeled to have an area that was 96 square units more than the original area. What change in the dimensions of the trapezoid was made to create the remodeled section?

   A. The height was doubled.
   B. The height was multiplied by four.
   C. The length of the parallel sides and the height were doubled.
   D. The length of the parallel sides and the height were multiplied by four.

12.   Gina has designed two triangular flower beds, as shown. Which statement is true for the two flower beds?
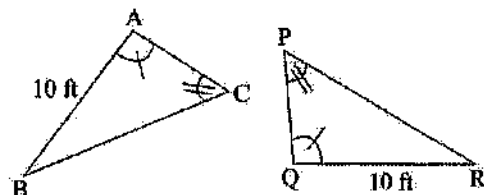
   A. They have different areas.
   B. They have the same perimeter.
   C. The length of side BC is equal to 10 feet.
   D. The length of side PQ is equal to 10 feet.

13.   Gina stores her toys in a container that has a cylindrical body and a conical lid, as shown. She wants to cover the entire exterior portion of the container with paper. How much paper, in square feet, would Gina need?

   A. 16π   B. 20π   C. 24π   D. 28π
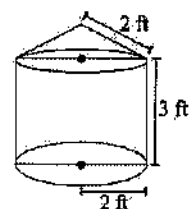
Gina's Toy Storage

14. Simplify $(5x - 1) + (10x^2 + 7x) - (2x + 4)$

   A. $10x^2 + 14x - 5$ B. $10x^2 + 7x + 3$ C. $10x^2 + 10x - 5$

15. If $(-2x^2 + 3x - 9)$ is subtracted from $(4x^2 - 6x + 9)$, the result is:

   A. $6x^2 - 3x$ B. $6x^2 - 9x + 18$ C. $2x^2 - 9x + 18$

16. Find the points of intersection of the circle with the line given their equations:

   $(x - 2)^2 + (y + 3)^2 = 4$ and $2x + 2y = -1$

17. The sum of two numbers is 17, and their difference is 7. What are the two numbers?

18. The price per person to rent a limousine varies inversely with the number of passengers. It costs $90 each for five people. How many people are renting the limousine when the cost per person is $56.25?

19. The volume, V, of a gas varies inversely as the pressure, p, in a container. If the volume of a gas is 200cc when the pressure is 1.6 liters per square centimeter, find the volume (to the *nearest tenth*) when the pressure is 2.8 liters per sq centimeter.

20. In science, one theory of life expectancy states that the lifespan of mammals varies inversely to the number of heartbeats per minute of the animal. If a gerbil's heart beats 360 times per minute and lives an average of 3.5 years, what would be the life expectancy of a human with an average of 72 beats per minute? Does this theory appear to hold for humans?

21. John makes DVDs of his friend's shows. He has realized that, because of his fixed costs, his average cost per DVD depends on the number of DVDs he produces. The cost of producing x DVDs is given by $C(x)=2500+1.25x$.

    a. John wants to figure out how much to charge his friend for the DVDs. He's not trying to make any money on the venture, but he wants to cover his costs. Suppose John made 100 DVDs. What is the cost of producing this many DVDs? How much is this *per DVD*?
    b. John is hoping to make many more than 100 DVDs for his friends. Complete the table showing his costs at different levels of production.

# of DVDs	0	10	100	1,000	10,000	100,000	1,000,000
Total Cost							
Cost per DVD							

    c. Explain why the average cost per DVD levels off.
    d. Find an equation for the average cost per DVD of producing x DVDs.
    e. Find the domain of the average cost function.
    f. Using the data points from your table above, sketch the graph of the average cost function. How does the graph reflect that the average cost levels off?

22. If $(2x - 3)$ and $(x + 5)$ are multiplied to form the trinomial ax^2+bx+c, what is the value of b?

    A 2   B 7   C 4   D -15

23. During a manufacturing process, a metal part in a machine is exposed to varying temperature conditions. The manufacturer of the machine recommends that the temperature of the machine part remain below 135° F. The temperature T in degrees Fahrenheit x minutes after the machine is put into operation is modeled by $T = -0.005x^2 + 0.45x + 125$. What is the approximate domain of minutes for which the machine is hotter than the manufacturer suggests?

24. Graph $f(x) = \sin x$ for $0 < x < 2\pi$ 25. Graph $f(x) = \cos x$ for $0 < x < 2\pi$

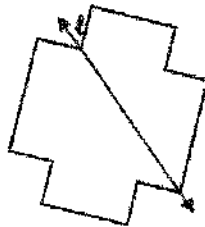26. Which of the following transformations carry this regular polygon onto itself?
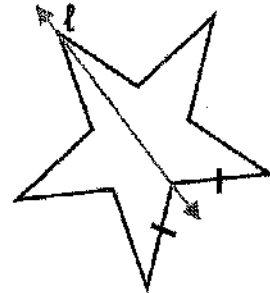
    a) Rotation of 50° clockwise
    b) Rotation of 60° counterclockwise
    c) Reflection across ℓ
    d) Rotation of 120° counterclockwise

27.

Which of the following transformations this regular polygon onto Itself?

    a) Rotation of 50° clockwise

    b) Rotation of 60° counterclockwise

    c) Rotation of 180° counterclockwise

    d) Rotation of 30° counterclockwise

28. Jodi starts a new job and is given a signing bonus of $1000. She decides to place the $1000 in a special savings account that earns 5.4% annual interest, compounded monthly on the last day of each month. She will then add $100 to the account on the first day of each month.

    a. Write a recursive formula for the amount of money Jodi will have in her account on the first day of each month.

    b. Find the balance in Jodi's account at the beginning of the first five months of her savings plan. (At the beginning of the first month, her balance is $1000.)

29. If cosx = 0.1 and x and y are complementary, what is siny?

30. The value of a car can be modeled by $V(y) = 25000(0.89)^y$ where $V(y)$ gives the value of the car y years after purchase.

    a. What was the initial value of the car?

    b. What is the annual rate of depreciation?

    c. What is the monthly rate of depreciation?

    d. Write an equivalent model to highlight the monthly rate of depreciation.

31. Simplify the following expressions:

Simplify: $\left(9\sqrt{5} - \sqrt{2}\right)\left(\sqrt{5} + 3\sqrt{2}\right)$

a. $26\sqrt{10} + 39$
b. $27\sqrt{10} + 43$
c. $9\sqrt{5} - \sqrt{2} + 26\sqrt{10}$
d. $26\sqrt{10} + 47$
e. $28\sqrt{10} + 43$

Simplify: $\sqrt{\dfrac{5x^{11}}{7y}}$

a. $\dfrac{x^5\sqrt{5x}}{7y}$
b. $\dfrac{x^5\sqrt{35xy}}{7}$
c. $\dfrac{x^5\sqrt{35xy}}{y}$
d. $\dfrac{5x^5\sqrt{xy}}{7y}$
e. $\dfrac{x^5\sqrt{35xy}}{7y}$

Simplify: $(8x^9y^{-6})^{\frac{1}{3}}$

a. $2x^3y^2$
b. $\dfrac{2x^3}{y^2}$
c. $\dfrac{8x^3}{y^2}$
d. $\dfrac{x^3}{2y^2}$
e. $2x^3y^{-6}$

32. Simplify

$$\frac{x^2 - 2x - 8}{3x - 12} \div \frac{x^2 - 4}{9x^2 - 18x} =$$

Review 1: Quadratic Functions

Match each of the following simplified expressions on the left with it's matching factored expression on the right.

__E__ 1. x

__B__ 2. $x^2 - 9$

__A__ 3. $7x - 2$

__D__ 4. $12x^2 - 20x - 8$

__C__ 5. $2x^2 + 5x - 25$

a. $(3x + 7) + (4x - 9)$

b. $(x - 3)(x + 3)$

c. $(2x - 5)(x + 5)$

d. $4(x - 2)(3x + 1)$

e. $(8x - 9) - (7x - 9)$

6. If $f(x) = 3x^2 - 2x + 1$, which of the following is NOT true? $f(1) = 2$

   a. $f(-1) = 6$ ✓   b. $f(0) = 1$ ✓   ⓒ $f(1) = 0$ d. $f(2) = 9$ ✓

7. If $g(x) = (x - 3)(x + 1)$, which of the following is true?

   ⓐ $g(3) = 0$ b. $g(0) \neq 3$ $g(0) = -3$ c. $g(0) \neq 1$ $g(0) = -3$ d. $g(1) \neq 0$ $g(1) = -4$

8. Which of the following would make the statement $h(4) = 0$ true?

   a. $h(x) = x^2 + 3x + 2$ $h(4) = 30$ b. $h(x) = x^2 + 5x + 4$ $h(4) = 40$

   ⓒ $h(x) = x^2 - 3x - 4$ d. $h(x) = (x + 4)(x + 1)$ $h(4) = 40$

9. The recursive function $f(0) = 1$, $f(x) = f(x - 1) + 2n$ represents

   a. a linear function   b. a geometric function $f_0 = 1$ +2

   c. an exponential function   linear growth   ⓓ a quadratic function $f_1 = 1 + 2(1) = 3$ +4

   $f_2 = 3 + 2(2) = 7$ +1
   $f_3 = 7 + 2(3) = 13$

If someone who is 5 feet tall uses a potato gun to shoot a potato in the air at 100 feet per second, we can use the function $f(x) = -16x^2 + 100x + 5$ to calculate how far the potato will be from the ground at any given second (x). Use this information to answer questions 10 – 12 below.

10a. What does $f(1)$ mean in this context?   height of potato after 1 second

  b. Find $f(1)$ = 89 ft

11a. What would $f(x) = 0$ mean in this context?   potato hits ground

  b. Find when $f(x) = 0$. (Your answer may not be exact, so just estimate as close as possible.   6.3 seconds

12. About how high will the potato get? When will that happen?

   Maximum/vertex: after 3.125 sec, height = 161.25 ft

   or   use $V_x = -\frac{b}{2a}$

Review 2: Quadratic Functions #2

Match each standard form equation with it's equivalent vertex form equation in column A and it's factored form equation from column B.

Column A	Column B	Standard Form (Question)	Vertex Form (Column A)	Factored Form (Column B)
c	b	1. $y = x^2 + 2x - 8$	a. $(x-1)^2 - 9$	a. $y = (x+2)(x-4)$
a	a	2. $y = x^2 - 2x - 8$	b. $(x+3)^2 - 1$	b. $y = (x-2)(x+4)$
b	d	3. $y = x^2 + 6x + 8$	c. $(x+1)^2 - 9$	c. $y = (x-2)(x-4)$
d	c	4. $y = x^2 - 6x + 8$	d. $(x-3)^2 - 1$	d. $y = (x+2)(x+4)$

ex 1. $y = x^2 + 2x - 8$
$y + 1 = x^2 + 2x + 1$
$y + 1 = (x+1)^2 - 8$
$y = (x+1)^2 - 9$

ex 3. $y = x^2 + 6x + 8$
$y + 1 = x^2 + 6x +$
$y + 9 = (x+3)^2 +$
$y = (x+3)^2 - 1$

5. Which of the following is the correct factorization of the expression $2x^2 + 7x - 15$?

   a. $(2x-3)(x+5)$ b. $(x+3)(x+5)$ c. $(x-3)(x-5)$ d. $(2x-5)(x+3)$

   $a = 1$ $a = 1$

6. Which of the following expressions is NOT equivalent to the expression $2(3x-2)(x-5)$

   a. $(3x-2)(2x-10)$ b. $(6x-4)(x-5)$

   c. $\left(\frac{3}{2}x - 1\right)\left(\frac{1}{2}x - \frac{5}{2}\right)$ d. $6x^2 - 34x + 20$

7. Where is the vertex of the equation $y = x^2 - 18x + 80$

   a. $(-1, 9)$ b. $(10, 8)$ c. $(10, 0)$ **d. $(9, -1)$**

   $V_x = \frac{-(-18)}{2(1)} = 9$

   $V_y = (9)^2 - 18(9) + 80 =$

Given some information, provide the other requested information

8. $y = (x-2)(x+8)$

   a. The standard form equation:

   $y = x^2 + 6x - 16$

   b. The vertex:

   $V_x = \frac{-6}{2(1)} = -3$

   $V_y = (-3-2)(-3+8) = -25$

   c. The y-intercept

   $(0, -16)$

9. $y = (x-2)^2 - 9$

   $\left(y = x^2 - 4x - 5\right)$

   a. What form is the equation above written in?

   Vertex/Transformation

   b. The x-intercepts:

   $(5, 0)$ & $(-1, 0)$

   c. The factored form equation

   $y = (x-5)(x+1)$

10. A quadratic equation that has x-intercepts of (-2, 0) and (8, 0), a stretch of 3, and the vertex is a minimum

   a. Factored form equation: $y = 3(x+2)(x-8)$

   b. Vertex form equation: $y = 3(x-3)^2 - 75$

   c. Standard form equation:

   multiply out (a): $y = 3x^2 - 18x - 48$

$y = 3x^2 - 18x - 48$

$V_x = \frac{-(18)}{2(3)} = 3$

$0 = 3(8-3)^2 - k$

$k = 75$

A piece of information might be very easy to find in one form of a quadratic equation, and difficult in another. Below, decide which form is the easiest one to use to find the indicated information, say where you'd find it by using an example, and justify your answer.

11. Vertex: $\boxed{y = a(x-h)^2 + k}$ (h,k) is vertex

vertex form: $y = 3(x-3)^2 - 75$ vertex $= (3, -75)$

12. Axis of symmetry: $\boxed{y = a(x-h)^2 + k}$ $x=h$ is Axis of Symmetry

(or standard, use -b/2a) $y = 3(x-3)^2 - 75$ $h=3$, $x=3$ is axis of symmetry

13. y-intercept: $\boxed{y = ax^2 + bx + c}$ $(0,c)$ is y-int

standard form: $y = 3x^2 - 18x - 48$ $c = -48$, $(0,-48) = $ y-int

14. x-intercepts: $\boxed{y = a(x-8)(x-t)}$ $(8,0)$ & $(t,0)$ are x-int (roots)

factored form: $y = 3(x+2)(x-8)$ $(-2,0)$ & $(8,0)$ are x-int (roots)

Review 3: Solving Equations

Match each equation on the left with it's solutions listed on the right.

__D__ 1. $x^2 + 8x + 7 = 0$

__E__ 2. $x^2 - 8x + 7 = 0$

__C__ 3. $x^2 + 8x - 7 = 0$

__B__ 4. $x^2 - 8x - 7 = 0$

__A__ 5. $(x + 8)^2 = 7$

a. $x = -8 \pm \sqrt{7}$

b. $x = 4 \pm \sqrt{23}$

c. $x = -4 \pm \sqrt{23}$

d. $x = -1, -7$

e. $x = 1, 7$

Quadratic Formula

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Match each imaginary number on the left with its simplified version on the right.

__d__ 6. $i^{14} = i^2 = -1$

__b__ 7. $i^{15} = i^3 = -i$

__C__ 8. $i^{16} = i^0 = 1$

__a__ 9. $i^{17} = i^1 = i$

a. i

b. $-i$

c. 1

d. -1

10. The expression $3 + \sqrt{8} - \sqrt{2} + 3\sqrt{5} - 4 - 3\sqrt{5}$ *most simplified is:*

(a. $-1 + \sqrt{2}$)

b. $-1 + \sqrt{8} - \sqrt{2}$ $\longrightarrow$

c. $-1 + \sqrt{2} + 6\sqrt{5}$

d. $-1\sqrt{20}$

$3 + \sqrt{4}\sqrt{2} + 3\sqrt{5} - 4\cdot3\sqrt{5} - \sqrt{2}$

$3 + 2\sqrt{2} + 3\sqrt{5} - 4 - 3\sqrt{5} - \sqrt{2}$

11. The best classification for $3 + \left(\sqrt{-40}\right)^2$ is:

a. $\mathbb{W}$ (Whole)   b. $\mathbb{Z}$ (Integer)   c. $\overline{\mathbb{Q}}$ (Rational)   (d. $\mathbb{C}$ (Complex))

12. Which method is *fastest* for solving the following equation: $(x + 3)^2 - 4 = 0$?

a. Graphing   b. Factoring $\sqrt{(x+3)^2} = \sqrt{4}$

(c. Taking square root)   d. Quadratic Equation

13. Which method is *fastest* for solving the following equation: $x^2 + 4x - 12 = 0$? $(x+6)(x-2) = 0$

a. Graphing   (b. Factoring)

c. Completing the Square   d. Quadratic Equation

14. Which method is *fastest* for solving the following equation: $5x^2 - 2x + 4 = 0$?

    a. Graphing   b. Factoring

    ~~c. Completing the Square~~   (d. Quadratic Equation)

        $a > 1$

15. Find the solution(s) to the equation in question 12 using any method you'd like. Answers MUST be simplified.

$$(x+3)^2 - 4 = 0 \qquad x+3 = \pm 2$$
$$\sqrt{(x+3)^2} = \sqrt{4} \qquad x = -3 \pm 2 \qquad \boxed{x = -1, -5}$$

16. Find the solution(s) to the equation in question 13 using any method you'd like. Answers MUST be simplified

$$x^2 + 4x - 12 = 0 \longrightarrow (x+6)(x-2) = 0 \longrightarrow \boxed{x = -6, 2}$$

17. Find the solution(s) to the equation in question 14 using any method you'd like. Answers MUST be simplified.

$$5x^2 - 2x + 4 = 0 \qquad x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(5)(4)}}{2(5)} \qquad x = \frac{2 \pm \sqrt{-76}}{10}$$
$$a = 5, \ b = -2, \ c = 4$$

Below you are given 3 different equations to solve, along with 3 different methods to solve those equations. Write each equation under ONE of the methods, then use that method to solve the equation. Solutions MUST be simplified.

$$x = \frac{2 \pm \sqrt{4}\sqrt{19}\sqrt{-1}}{10}$$

Equations

18. $(x-4)^2 = 3$ 19. $x^2 - 6x + 13 = 0$ 20. $x^2 - 16 = 0$

$$x = \frac{2 \pm 2i\sqrt{19}}{10}$$

Methods

$$\boxed{x = \frac{1 \pm i\sqrt{19}}{5}}$$

| Factoring	Completing the Square	Quadratic Equation
Equation: $x^2 - 16 = 0$	Equation: $x^2 - 6x + 13 = 0$	Equation: $(x-4)^2 = 3$
Show work:	Show work:	Show work:
$(x-4)(x+4) = 0$	$x^2 - 6x + 9 + 13 = 9$	$x^2 - 8x + 16 - 3 = 0$
	$(x-3)^2 + 13 = 9$	$x^2 - 8x + 13 = 0$
	$(x-3)^2 = -4$	$x = \frac{8 \pm \sqrt{64 - 4(1)(13)}}{2(1)} = \frac{8 \pm \sqrt{12}}{2}$
	$x - 3 = \pm\sqrt{-4}$	
Solution(s): $\boxed{\pm 4}$	Solution(s): $\boxed{3 \pm 2i}$	Solution(s): $\boxed{4 \pm \sqrt{3}}$ $= \frac{8 \pm 2\sqrt{3}}{2}$

Review 4: Geometric Figures

Match each word/concept on the left with the picture depicting that word/concept that word/concept on the right.
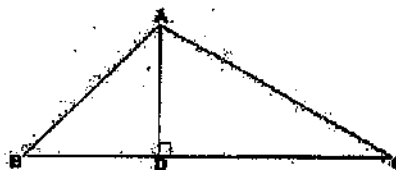
___C___ 1. Linear Pair   a.

$180 - x$ x
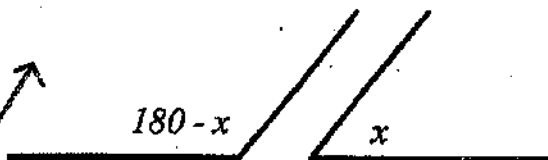
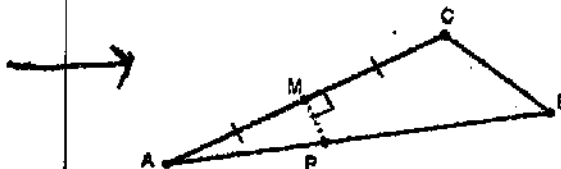___A___ 2. Supplementary Angles   b.

___B___ 3. Altitude   c.

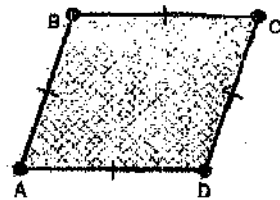___D___ 4. Median   d.

___E___ 5. Perpendicular bisector of a side   e.

6. Which of the following words does NOT describe the following shape?

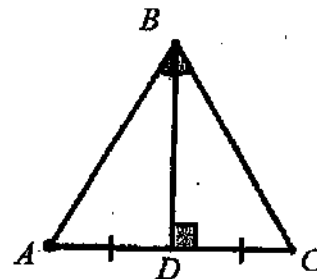   a. Parallelogram   b. Kite

    c. Rhombus   (d. Trapezoid)

7. Which of the following does BEST describes the following shape?

    a. Trapezoid   (b. Parallelogram)

    c. Rectangle   d. Square

8. When comparing $\overline{BD}$ to $\triangle ABC$, then $\overline{BD}$ is a

    a. Altitude

    b. Median

    c. Angle Bisector

    d. Perpendicular bisector of a side

    (e. All of the above)

9. What is true about corresponding line segments of an object that has been reflected over the x-axis?

    (a. Corresponding lines are the same length)

    ✗b. Corresponding lines have the same slope

    ✗c. Corresponding lines are parallel

    ✗d. Corresponding lines will meet at a right angle

    ~~e. All of the above~~
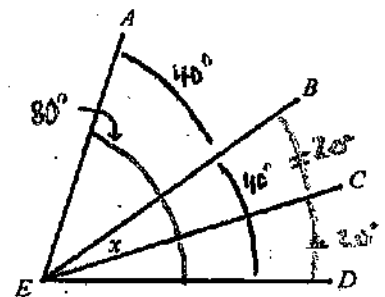
10. If you know that $\triangle ABC \cong \triangle XYZ$, what else do you know to be true?

    a. $\angle A \cong \angle \cancel{Y}$ (b. $\angle B \cong \angle Y$)   c. $\overline{BC} \cong \cancel{XY}$ d. $\overline{AC} \cong \cancel{YZ}$
    $\angle X$ $\overline{YZ}$ $\overline{XZ}$

11. You know that $\angle AED = 80°$. You also know that $\overline{BE}$ bisects $\angle AED$ and that $\overline{CE}$ bisects $\angle BED$.

Find x.

    (X = 20°)

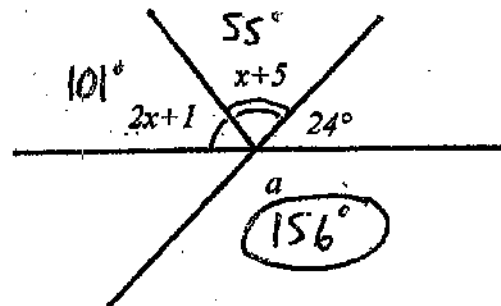12. Find the measure of a in the diagram below

$$(2x+1) + (x+5) + (24) = 180°$$

$$3x + 30 = 180$$

$$x = 50$$

[Diagram: two lines crossing a horizontal line, with angles labeled $101°$, $55°$, $x+5$, $2x+1$, $24°$, and a with $156°$ circled]

13. $\triangle ABC$ has been transformed three times. You know A and B and C′″. Your job is to figure out what C was. A graph has been provided for you in case you need it, however you do not have to draw anything out to get the answer correct. Similarly, ordered pairs have been provided between steps to help you find your answer, but you do not have to use them.

To Begin: A = (-2 , 3) B = (-6 , 5) $\boxed{C = (-1, -1)}$

Step 1: Rotate $\triangle ABC$ 180° around the point (0 , 0)

A′ = (2 , -3) B′ = (6 , -5) C′ = (1 , 1)

Step 2: Reflect over the x – axis

A″ = (2 , 3) B″ = (6 , 5) C″ = (1 , -1)

Step 3: Translate left 9 and up 3

A‴ = (-7, 6) B‴ = (-3, 8) C‴ = (-8 , 2)
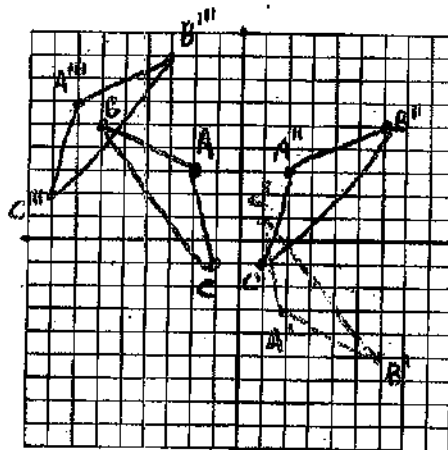
or
$$\begin{cases} (-8, 2) \text{ translate right 9 / down 3} \longrightarrow (1, -1) \\ (1, -1) \text{ reflect } x\text{-axis} \longrightarrow (1, 1) \\ (1, 1) \text{ rotate } 180° \longrightarrow (-1, -1) \end{cases}$$

Review 5: Geometric Figures Part 2

Match each standard form equation with its equivalent vertex form equation in column A AND it's factored form equation from column B.

$90 -$ _____ $180 -$ _____

Column A	Column B	Angle Measure (Question)	Compliment (Column A)	Supplement (Column B)
a	c	1. 62	a. 28	a. 28
d	a	2. 152	b. $-2(x-43)$	b. $90 + x$
b	d	3. $2x + 4$	c. $180 - x$	c. 118
e	b	4. $90 - x$	d. None	d. $176 - 2x$
c	e	5. $x - 90$	e. x	e. $270 - x$

6. To the right is a regular 5-point star. The pentagon within the star is a regular pentagon, and the triangles surrounding the pentagon are isosceles triangles. Use this information to help you find $m\angle A$, $m\angle B$ and $m\angle C$.

$$\angle C = 180 - 108 = 72°$$
$$\angle A = 180 - (72 + 72) = 36°$$
$$\angle B = 360 - 36 = 324°$$
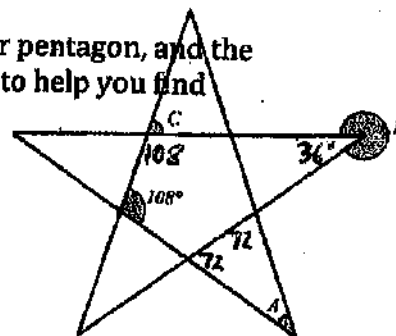
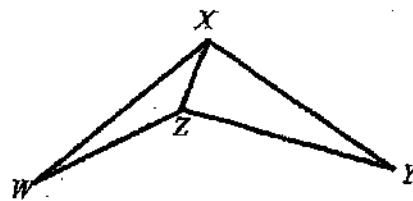7. Find the measure of all of the angles for the quadrilateral below.

$$102x - 48 = 360$$
$$x = 4$$
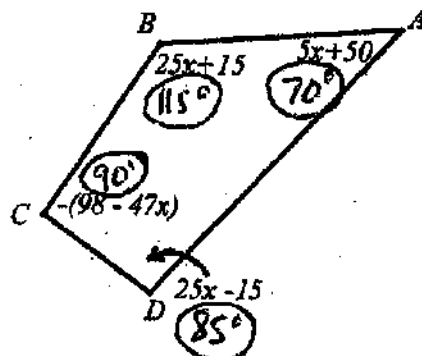
8. So far we have been looking at quadrilaterals that have interior angles with angle measures less than 180°. However, the quadrilateral WXYZ has an interior angle with an angle measure that is greater than 180°. Would the sum of these interior angles still be 360°? Say why or why not.

still equals 2 triangles and all triangles have sum of 180° for interior angles.

(figure: 5-point star with angles labeled 108, 36, 108°, 72)

(figure: quadrilateral BACD with angles $25x + 15$ (115°), $5x + 50$ (70°), (90°) $-(98 - 47x)$, $25x - 15$ (85°))

(figure: quadrilateral WXYZ)

9. Find x. Then, write a proof of your choosing in which you prove that your answer is correct. If you use any properties or theorems, make sure you say what they are. Your proof should be clear, understandable, and convince me (and yourself) that your answer is correct. If necessary, write your answer in simplified radical form.

Ⓐ Since $\triangle PNR$ is rt $\triangle$, legs are related by pythag. theorem.

$\therefore \quad 8^2 + 6^2 = \overline{PR}^2$

$\overline{PR} = 10$

Ⓑ Like wise $\triangle QTR$ is right

$\therefore \quad 8^2 + \overline{TR}^2 = 10^2$

$\overline{TR} = 6$

$\overline{PR} = \overline{PT} + \overline{TR}$ by segment addition postulate

$10 = x + 6$

$x = 4$

$\overline{PT} = 4$

Ⓒ $\triangle PTQ$ is rt.

$4^2 + 8^2 = x^2$

$80 = x^2$

$\boxed{x = 4\sqrt{5}}$
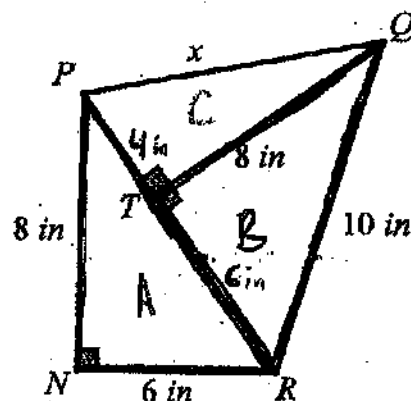
Review 6 Right Triangle Trigonometry

The side lengths for several triangles are listed below. Use the side lengths to determine which triangles will have the same angle measures. Match the side lengths on the left with the side lengths on the right for triangles that share the exact same angle measurements.

    b 1. 3, 4, 5   d = 3   a. 6, 8, 12

    d 2. 4, 5, 10   d = ½   b. 9, 12, 15

    a 3. 3, 4, 6   d = 2   c. 1, 2, 3

    e 4. $\sqrt{3}$, $4\sqrt{3}$, $7\sqrt{3}$ d = √3   d. 2, 2.5, 5

    c 5. 8, 16, 24   d = ⅛   e. 3, 12, 21

For questions 6 – 7 perform the requested dilation as well as you can using the tools you have. Of course the image won't look perfect, but use congruence markings to show that you know how a dilation should be drawn and that you have done it correctly.

6. Ratio: 2

7. Ratio: ½

For questions 8 – 10 find the missing side for the similar shapes that are shown below.

8.

$2^2 + 5^2 = y^2$
$y = \sqrt{29}$
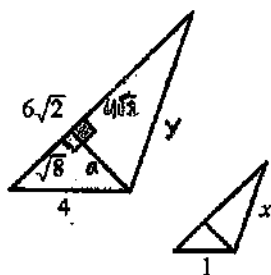
5 $y = \sqrt{29}$ x

2 1

$\frac{\sqrt{29}}{x} = \frac{2}{1} \longrightarrow \boxed{x = \frac{\sqrt{29}}{2}}$

9.

$6\sqrt{2}$ $4\sqrt{2}$ y

$\sqrt{8}$ a

4 1 x

$\sqrt{8}^2 + a^2 = 4^2$
$8 + a^2 = 16$
$a = 2\sqrt{2}$

$(4\sqrt{2})^2 + (2\sqrt{7})^2 = y^2$
$32 + 8 = y^2$
$y = 2\sqrt{10}$

$\frac{y}{1} = \frac{2\sqrt{10}}{x}$
$4x = 2\sqrt{10} \longrightarrow \boxed{x = \frac{\sqrt{10}}{2}}$

10.

4 3 x 1 1.5

$\frac{3}{1} = \frac{x}{1.5}$

$\boxed{4.5 = x}$

11. Find the measurements of angles x, y, z.

$x = 68°$
$y = 92°$
$z = 112°$

A right triangle is shown below. Match each trigonometric function on the left with it's equivalent ratio on the right. It is possible to choose a ratio more than once. It is possible that some ratios will not be used at all.

___f___ 12. $\sin(A) =$
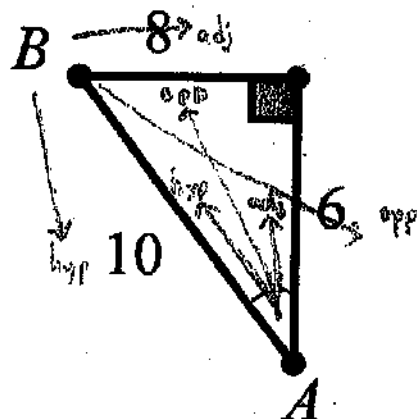
___C___ 13. $\cos(A) =$

___a___ 14. $\tan(A) =$

___C___ 15. $\sin(B) =$

___f___ 16. $\cos(B) =$

___b___ 17. $\tan(B) =$

a. $\frac{8}{6}$

b. $\frac{6}{8}$

c. $\frac{6}{10}$

d. $\frac{10}{6}$

e. $\frac{10}{8}$

f. $\frac{8}{10}$

B — 8 — adj

6 opp

10

A
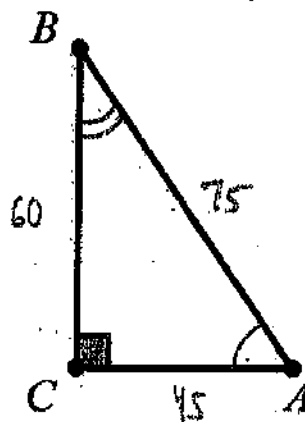
SOH CAH TOA
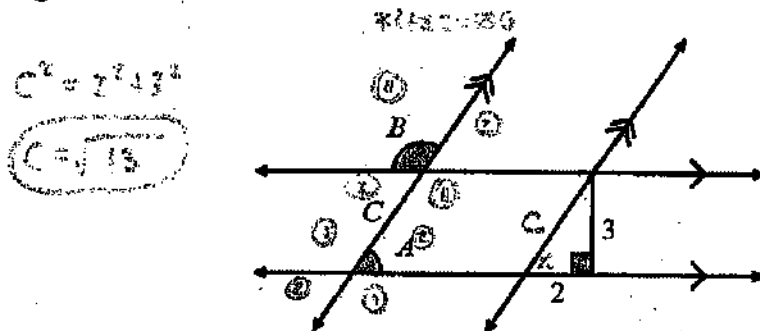
If you know that $\tan(A) = \frac{60}{45}$, *match each of the sides and angles with their correct measurements below. All measurements have been rounded to the nearest unit.*

C (75) 18. AB =

A (60) 19. BC =

E (45) 20. AC =

B (53) 21. $m\angle A = $ Tan⁻¹ $\left(\frac{60}{45}\right)$

D (37') 22. $m\angle B = $ Tan⁻¹ $\left(\frac{45}{60}\right)$

F (90) 23. $m\angle C = $ $180 - (37 + 53)$

a. 60
b. 53
c. 75
d. 37
e. 45
f. 90

24. Find the length of C as well as $m\angle A$ and $m\angle B$.

$c^2 = 2^2 + 3^2$

$C = \sqrt{13}$

$\tan A = \frac{3}{2}$

$A = 56.3°$

$\angle B = 180 - 56.3 = 73.7°$

$\angle B = 123.7°$

25. Find the lengths of x and y as well as the angle measures of A and B.

$\sin A = \frac{7}{8.06}$

$\sin^{-1}\left(\frac{7}{8.06}\right) = A$

$60.23°= A$

$\sin B = \frac{4}{8.06}$

$\sin^{-1}\left(\frac{4}{8.06}\right) = B$

$B = 29.75°$

$y^2 = 4^2 + 7^2$

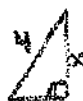$Y = \sqrt{65}$ $Y = 8.06$

$\frac{Y}{4} = \frac{4}{X}$ or $\frac{Y}{4} = \frac{7}{X}$

$Yx = 28$
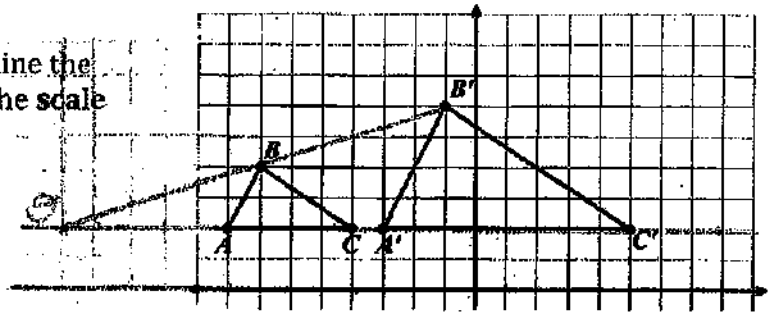
$x\sqrt{65} = 28$

$x = 28/\sqrt{65}$

$x = 3.473$

Review 7: Circles

1. For the following pre-image and image determine the **coordinates** for the center of dilation as well as the **scale factor** between the two figures.
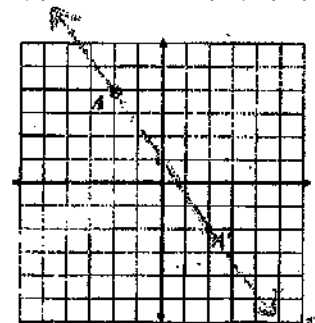
Center = (-13, 3)

K = 2

2. There is an infinite number of possible centers of rotation for the points below. Those points lie on a line. (a) **Write the equation** of the line that contains all possible centers of rotation for A and A'. (b) Using your knowledge of transformations, **explain** why any of the points of that line could be a center of rotation.

(a) $y = -\frac{3}{2}x + \frac{1}{2}$

3. For the regular hexagon below find all of the following information. It is given that BC = 5.

a. AB = *4.3*

b. Length of one side = *5*

c. Perimeter = *30*

d. Measure of one interior angle = *120*

e. Sum of all interior angles = *720*
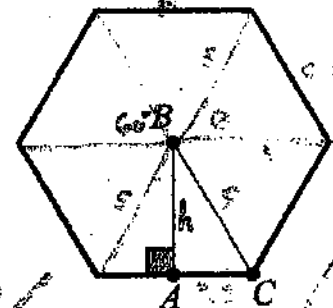
f. Area = $\frac{1}{2}(s \cdot a)$

= *64.95 sq units*

On a college campus there is an interesting design outside between the entrances for four major buildings. The lines represent walking paths. Use this diagram to answer questions 4 and 5 below.

4. There are three different paths between the points Y and Z. Find the distance for each of those paths.

a. From Y to X then from X to Z. *(60, 30)*

b. Around the circle from Y to Z.

c. On straight line from Y to Z. $30\sqrt{2}$
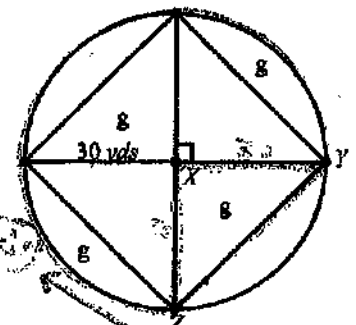
$30^2 = 30^2 + 10^2 + 180^2$

$\overline{YZ} = 30\sqrt{2}$

5. In the diagram above there are several "g"s marking where grass is growing. (The other areas are covered with stone.) You are the manager of the grounds crew caring for this part of campus and must order fertilizer to keep the grass healthy. To do this you must know the total area of the grass you plan to fertilize. Find that total area.

$A_c = 900\pi$ $A_{sq} = (30\sqrt{2})^2 = 1800 \, yd^2$

6a. As the radius of a circle grows, so does it's perimeter. Write a function the perimeter (P) in terms of the radius (r).

$P(r) = 2\pi r$

b. Similarly, as the radius of a circle grows, so does it's area. Write a function of the area (A) with respect to the radius (r).

$A(r) = \pi r^2$

c. Find where the two functions equal each other. Do so algebraically, using a table, and by using a graph. Is there more than one place where the functions are equal?

Algebraically	Table			Graph
	Radius	Perimeter	Area	

Algebraically:
$2\pi r = \pi r^2$

$\pi r^2 = 2\pi r$

$\pi r (r - 2) = 0$
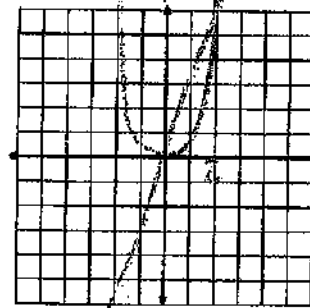
d. In Question 6.c you found 3 different pieces of evidence showing that there is at least one sized circle where the area and the perimeter are equal. However, most people would argue that there is no instance where an area of a circle would equal the perimeter. Why would that be?

the units ≠ the sq. units

7. Assuming you had all of the information you needed to find the total area of the shaded regions, explain what process you would need to go through to find this area. (Note: You DO NOT need to actually find the area to answer this question. Simply explain what process you could go through to find the area)

$A_{\bigcirc} - A_{hex} = \pi r^2 - \frac{3\sqrt{3}}{2} r^2$

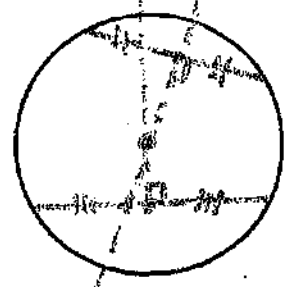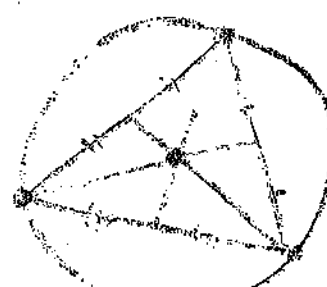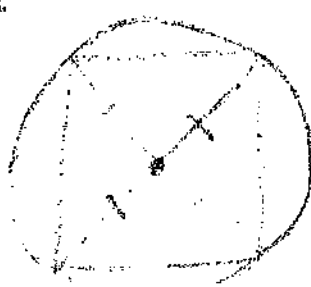8. Write a step-by-step process you could use for finding the center of the circle below. Make sure you label items in your picture so you can clearly refer to them in your explanation.

Review 8: Circles Part 2

Match each radian measurement to its matching degree measurement.

d 1.　　　　$\dfrac{\pi}{2} \cdot \dfrac{180}{\pi} = 90°$　　a. 45°

c 2.　　　　$\dfrac{2\pi}{3} \cdot \dfrac{180}{\pi} = 120°$　　b. 180°

b 3.　　　　$\pi \cdot \dfrac{180}{\pi} = 180°$　　c. 120°

e 4.　　　　$\dfrac{3\pi}{4} \cdot \dfrac{180}{\pi} = 135°$　　d. 90°

a 5.　　　　$\dfrac{9\pi}{4} \cdot \dfrac{180}{\pi} = 405°$　　e. 135°

Match each degree measurement to its matching radian measurement.

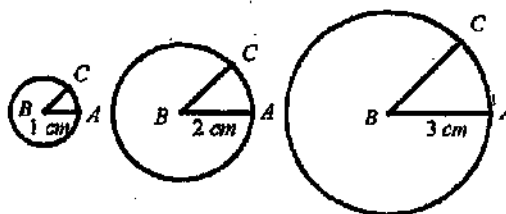**d** 6.　　$122° \cdot \dfrac{\pi}{180} =$　　　a. $\dfrac{5\pi}{18}$

a 7.　　$50° \cdot \dfrac{\pi}{180} = \dfrac{5\pi}{18}$　　b. $\dfrac{3\pi}{2}$

b 8.　　$270° \cdot \dfrac{\pi}{180} = \dfrac{3\pi}{2}$　　c. 2π

c 9.　　$0° \cdot \dfrac{\pi}{180} = 0$　　d. $\dfrac{61\pi}{90}$

e 10.　$1° \cdot \dfrac{\pi}{180} = \dfrac{\pi}{180}$　　e. $\dfrac{\pi}{180}$

11. Find the area of the shaded region below. The radius of the circle is 5 ft.

$A = \pi r^2$

$A_a = 2r^2 w$

$A_{shaded} = A_s - A_{hex} = 25\pi - 64.95 = \boxed{13.59 \text{ ft}^2}$

64.95 ft^2

12. Fill in the table below for the following circles. In all of them $m\angle ABC = 45°$.

$C = \pi d$

$C = 2\pi r$
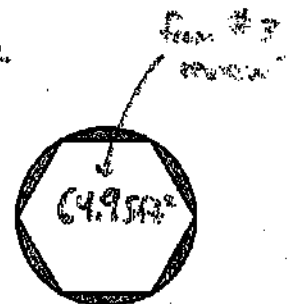
$C = 4\pi$

$C = 6\pi$

$C = 8\pi$

$C = 2\pi r$

Radius	Arc Length of $\overset{\frown}{AC}$ in cm	Arc Length of $\overset{\frown}{AC}$ in Radians
1 cm	0.785	$\pi/4$
2 cm	1.571	$\pi/2$
3 cm	2.356	$3\pi/4$
4 cm	3.142	π
n cm	0.785n	$n\pi/4$

• Area for a 45° = $\frac{1}{8} \pi r^2$

• $\overset{\frown}{AC}$ Radians = $\theta \cdot \pi r$

$45° = \pi/4$

13. Complete the following table that compares various characteristic of an original shape as well as one that has been scaled by 5.

Shape	Original Shape Characteristic	Shape Scaled by 5
Line	Length = 25 cm	Length = (125 cm)
Pyramid	$\frac{l \cdot w \cdot h}{3}$ Volume = 32 m³	Volume = $\frac{5l \cdot 5w \cdot 5h}{3}$ = $5^3 \cdot 32$ = (4000 m³)
Cube	old side = 3 Volume = 3^3 = (27 in³)	Surface Area = 1,350 in² 1350 = 6s² new side = 15
Square	all sides = 4 Perimeter = 16 miles	Area = new side = 20 $A = 20^2$ = (400 mi²)

14. Explain in your own words what a *radian* is and how it is different from a degree.
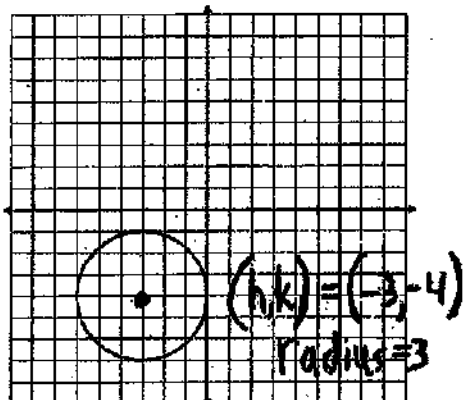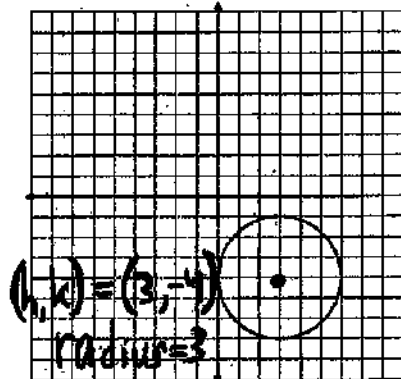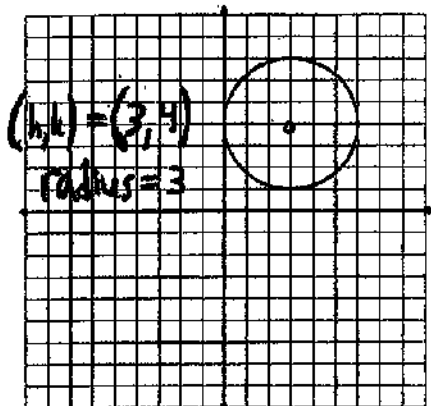
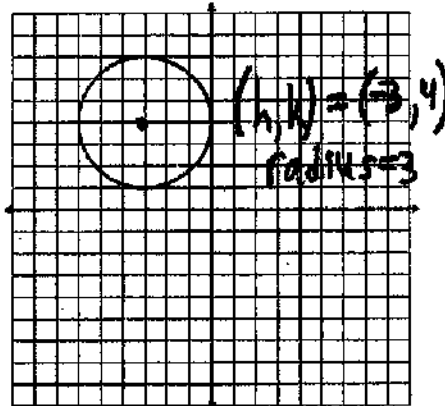- radians correspond to the arc length of a unit circle, they are actual numbers
- degrees get used for direction, and for area etc, we use radians for calculus

15. Generally when speaking about an angle measure using radians, the symbol π is used. (For example, one might say an angle measure was $\frac{5\pi}{3}$ radians). The question for you to answer is this: Is $\frac{5\pi}{3}$ radians the same as $\frac{5}{3}$ radians?

No. $\frac{5\pi}{3}$ radians is 300° & $\frac{5}{3}$ radians = $\left(\frac{5}{3} \cdot \frac{180}{\pi}\right)$ degrees ≈ 96.4°

Review 9: Circles as Conics

Match each graph with its matching equation.

a 1.

$(h,k) = (-3,-4)$
radius=3

d 2.

$(h,k) = (3,-4)$
radius=3

b 3.

$(h,k) = (3,4)$
radius=3

c 4.

$(h,k) = (-3,4)$
radius=3

a. $(x + 3)^2 + (y + 4)^2 = 9$

$(h,k) = (-3,-4)$

c. $(x + 3)^2 + (y - 4)^2 = 9$

$(h,k) = (-3,4)$

b. $(x - 3)^2 + (y - 4)^2 = 9$

$(h,k) = (3,4)$

d. $(x - 3)^2 + (y + 4)^2 = 9$

$(h,k) = (3,-4)$

Write the equation of a circle that matches the criteria listed in the questions below. You need to provide a standard-form equation as well as an expanded form equation.

5. Center: $(2,1)$ Radius: 7 $(x-2)^2 + (y-1)^2 = 49$ $x^2 + y^2 - 4x - 2y - 44 = 0$

6. Diameter of 9 and a center where $y = 3x + 12$ intersects with $y = -x + 4$.

7. Tangent to the lines $x = 3$, $x = -5$, $y = 10$, and $y = 18$.

$x = \frac{3+3}{2} = -1,\ Y = \frac{10+18}{2} = 14,\ r = 4$ $(x+2)^2 + (x-8)^2 = 20.25$

$x^2 + 4x + y^2 + 25 - 19.75 = 0$

$\begin{cases} y = 3x+12 \\ y = -x+4 \end{cases}$

$a = -4.8$

$x = -2 \rightarrow y = 6$

$(x+1)^2 + (y-14)^2 = 16$

$x^2 + \dots$