Georgia High School Graduation Test

MATH REVIEW

Exponents Review

5^6

Multiply terms with exponents by **adding** exponents

$4^4 \cdot 4^3 \quad 4^7$

Divide terms with exponents by **subtracting** exponents

$\frac{3^3}{3^2} \quad 3^1$

Exponents

Simplify: $p^{-2}p^{5}$

A) p^{-10}

B) p^{-3}

C) p^{3}

D) p^{7}

Simplify: $(a^3 b^2)^4$

A. $(ab)^{20}$

B. $(ab)^{24}$

C. a^7b^6

D. $a^{12}b^8$

Polynomial Operations

Adding or Subtracting = Combining like terms

$$(4x^2 - 2x + 7) - (6x^2 - x - 3) = -2x^2 + x + 10$$

Multiplying = Distribute and combine like terms

$$(3x^2 - x)(2x^2 + x - 5) = 6x^4 + 3x^3 - 15x^2 - 2x^3 - x^2 + 5x$$
$$= 6x^4 + x^3 - 16x^2 + 5x$$

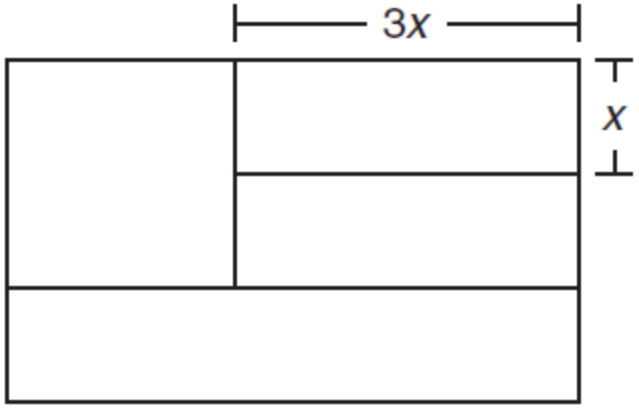
Dividing = Factor and cancel, simplify

$$\frac{x^2 - 16}{3x - 12} = \frac{(x-4)(x+4)}{3(x-4)} = \frac{x+4}{3}$$

Application Problems = Area and Volume

Polynomial Applications

The Georgia state flag consists of a square and three rectangles. Each rectangle has the same width, *x*. *The length of each of the two* smaller rectangles is equal to 3*x*, *as shown* in this diagram.

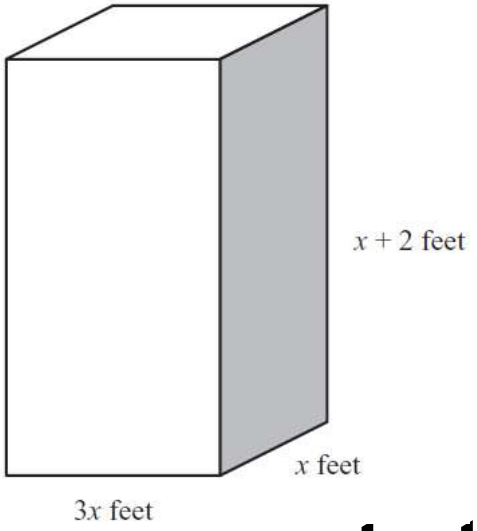


The area of this particular Georgia flag is 60 square feet. What is the length of *x*?

A) 2 ft. B) 4 ft. C) $2\sqrt{5}$ ft. D) $2\sqrt{15}$ ft

Polynomial Applications

This diagram shows the dimensions of a cardboard box.



Which expression represents the volume, in cubic feet, of the box?

A) $3x^3+2$ B) $5x^3+2$ C) $3x^3+6x^2$ D) $5x^3+6x^2$

Factoring

Two Types:

1) **GCF** $4x^3 - 2x^2 + 6x = 2x(2x^2 - x + 3)$
2) **Trial and Error** $x^2 + 4x - 32 = (x + 8)(x - 4)$

Simplifying Rationals

1) **Factor FIRST**
2) **Then, Cancel and Simplify**

$$\frac{3x^2 - 6x}{x^2 - 4} = \frac{3x(x - 2)}{(x + 2)(x - 2)} = \frac{3x}{x + 2}$$

Multiplying and Dividing Rationals

Which expression is equivalent to $\frac{y-3}{y+2} \div \frac{6-2y}{3y+6}$?

A) $-3/2$

B) $2/3$

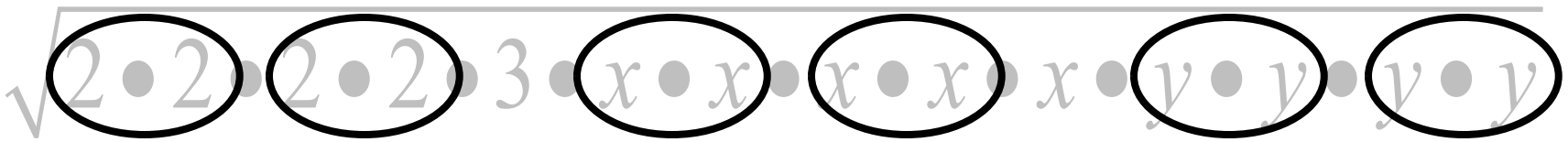
C) $\frac{-2(y-3)^2}{3(y+2)^2}$

D) $\frac{3(y-3)^2}{2(y+2)^2}$

Radicals Review

$$\sqrt{48x^5y^4}$$

1) Circle your pairs.
2) Pull out one number or letter from each pair.
3) Multiply the numbers and letters you pull out.
4) Leave numbers and letters not circled under the radical.



$$= 2 \bullet 2 \bullet x \bullet x \bullet y \bullet y\sqrt{3x}$$

$$= 4x^2y^2\sqrt{3x}$$

Radicals

Which expression is equivalent to $\sqrt{54x^{16}y^{9}}$?

A) $3x^4y^3\sqrt{6}$

B) $3x^8y^4\sqrt{6y}$

C) $6x^4y^3\sqrt{3}$

D) $6x^8y^4\sqrt{3y}$

Functions

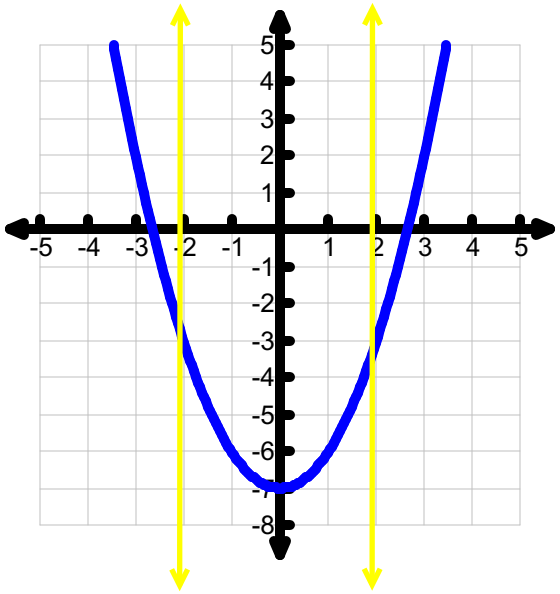
Function Notation

$$f(x) = x^2 - 7$$

$$f(2) = (2)^2 - 7 = -3$$

Identifying Functions – from points or a graph

Even or Odd



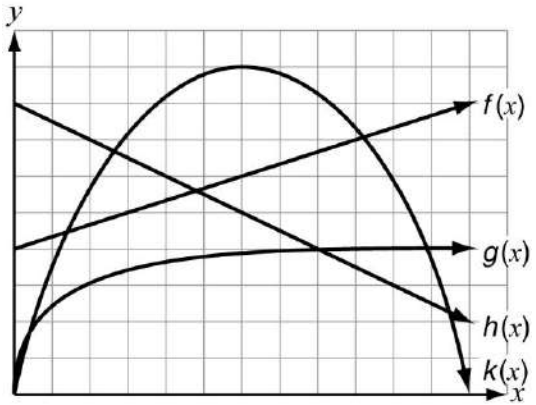
Even Function

Characteristics of functions

- ✓ Domain and Range
- ✓ Max and Min
- ✓ Zeroes
- ✓ Intervals of Increase and Decrease
- ✓ End Behavior
- ✓ Rate of Change

Functions

Four functions are plotted below.



Which function has a rate of change that approaches 0 as x increases?

A) f(x)

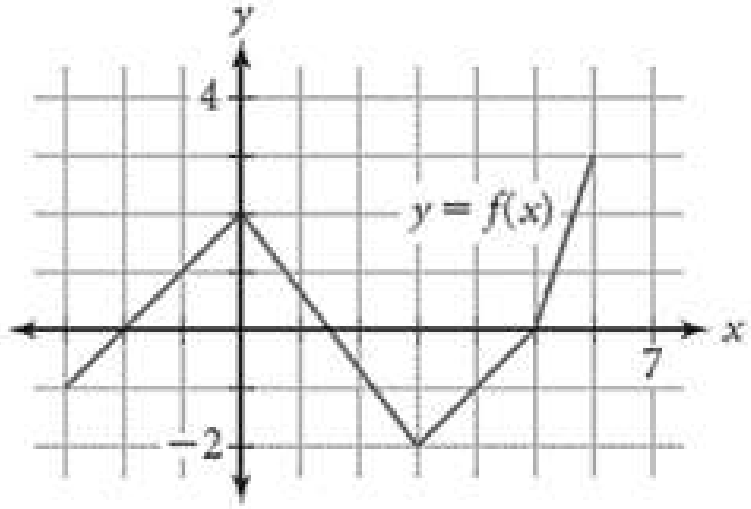
B) g(x)

C) h(x)

D) k(x)

Functions

For what x value does f(x) = 3?



A) -2

B) 0

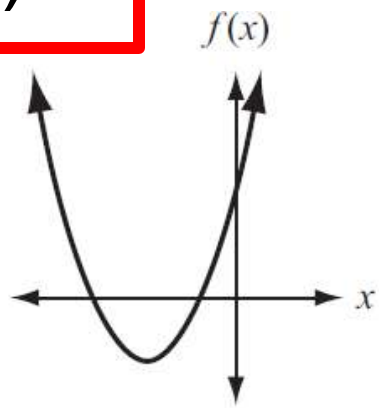
C) 2

D) 6

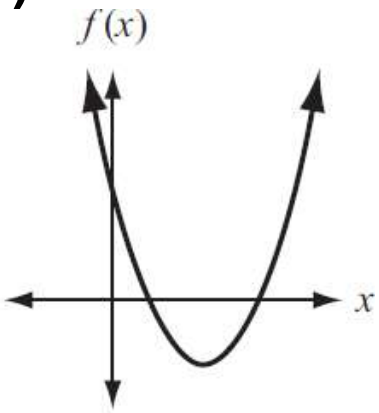
Functions

A student is studying the quadratic function, f(x). The student knows that f(0)>0. The student also determined that f(x) has 2 real roots, a and b, where a<b<0. Which graph could represent f(x)?

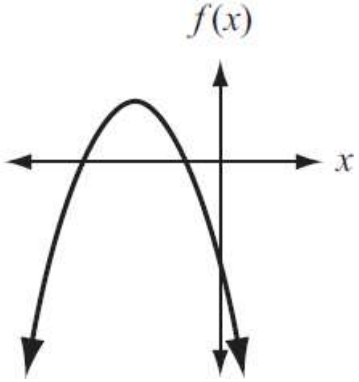
A)



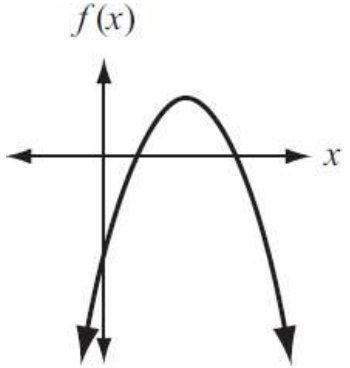
B)



C)

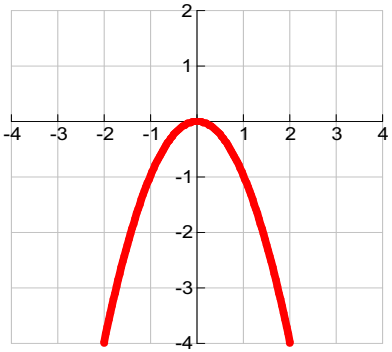


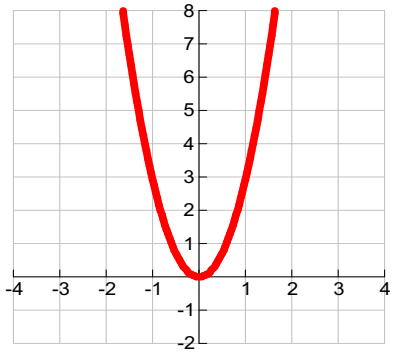
D)



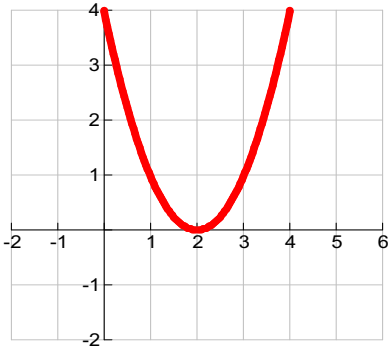
Transformations of Functions

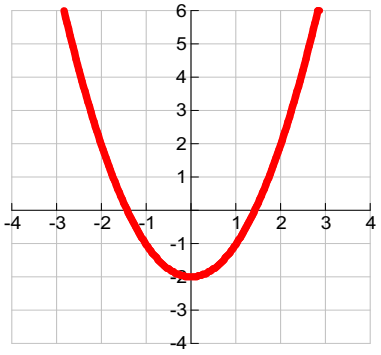
ReflectionStretch or Shrink





Horizontal Shift Vertical Shift





* Find points (x,y) if you get stuck.

Transformations

The function $g(x) = |x - 5|$ is a result of a translation to the function $f(x) = |x|$. How is the graph of g(x) different from the graph of f(x)?

A) The graph of g(x) is 5 units up.

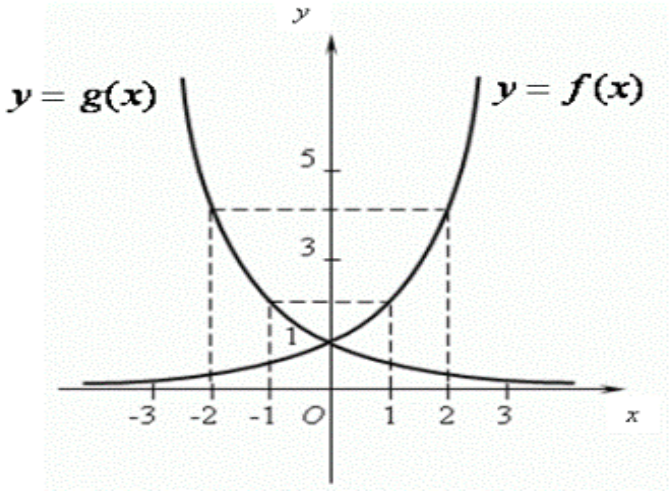
B) The graph of g(x) is 5 units down.

C) The graph of g(x) is 5 units to the left.

D) The graph of g(x) is 5 units to the right.

Transformations

Given that $f(x) = 2^x$, choose the correct formula for g(x).



A) $g(x) = -2^x$

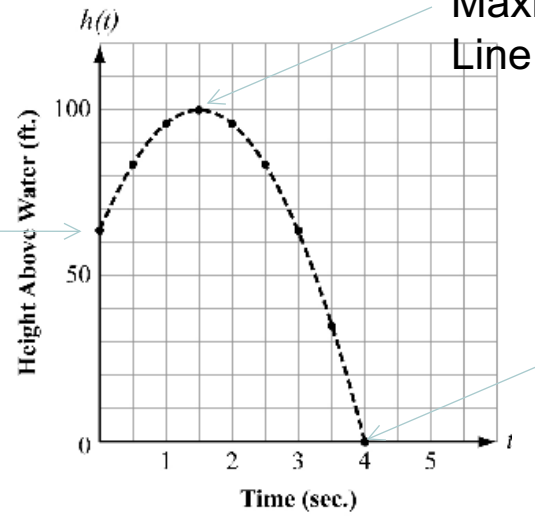
B) $g(x) = (-2)^x$

C) $g(x) = (1/2)^x$

D) $g(x) = -(1/2)^x$

Solving Quadratics

Interpreting Graphs



Maximum or Vertex point
Line of symmetry at x = -b/2a

Starting Point

Zero, where object hits the ground

Factoring

$$x^2 - 2x - 15 = 0$$
$$(x+3)(x-5) = 0$$
$$x = -3, 5$$

Square Roots

$$2x^2 - 4 = 28$$
$$2x^2 = 32$$
$$x^2 = 16$$
$$x = -4, 4$$

Quad. Formula

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

$$x^2 - 2x - 15 = 0$$
$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-15)}}{2(1)}$$
$$x = \frac{2 \pm \sqrt{4 + 64}}{2} = \frac{2 \pm \sqrt{64}}{2} = \frac{2 \pm 8}{2} = -3, 5$$

* Can get Imaginary Solutions!

Quadratics

This function models the height, f(x), in feet, of an object x seconds after it is tossed into the air.

$$f(x) = -16x^2 + 48x + 64$$

Which statement describes the object 1.5 seconds after it is tossed into the air?

A) The object is on the ground.

B) The object is moving upward.

C) The object is at its highest point.

D) The object is moving downward

Quadratics

Some rocks fell 128 feet off a cliff. The number of seconds, t, it took for each rock to reach the ground is modeled by this equation.

$$-16x^2 + 128 = 0$$

What positive value of t solves this equation?

A) 2 seconds

B) $2\sqrt{2}$ seconds

C) 4 seconds

D) $4\sqrt{2}$ seconds

Quadratics

The solution set for the equation $x^2-6x+10 = 0$ is:

A) $\{-2i, 5i\}$

B) $\{3 - i, 3 + i\}$

C) $\{3 - i\sqrt{19}, 3 + i\sqrt{19}\}$

D) $\{-2 - i\sqrt{5}, -2 + i\sqrt{5}\}$

Solving Other Equation Types

Radical Equations

$\sqrt{x-2}+4=16$ *Isolate radical*

$\sqrt{x-2}=12$ *Square both sides*

$x-2=144$

$x=146$

Rational Equations

$\frac{3}{x}+\frac{1}{2x}=6$ $LCD=2x$

$3\frac{2x}{1}+\frac{1}{2x}\frac{2x}{1}=6\frac{2x}{1}$ *Multipy by LCD*

$6+1=12x$

$5=12x$

$x=7/12$

Absolute Value Equations

$|2x-3|=7$

$2x-3=-7 \text{ or } 2x-3=7$

$2x=-4 \text{ or } 2x=10$

$x=-2 \text{ or } 5$

Exponential Equations

$2^{3x}=4^{x-3}$

$2^{3x}=(2^2)^{x-3}$ *Get a common base*

$3x=2x-6$ *Set the* exp *onents equal*

$x=-6$

Other Equations

Solve: $\frac{x-2}{3}+\frac{2x-5}{2}=\frac{5}{6}$

A) -2

B) -1

C) 3

D) 5

Other Equations

Solve: $\sqrt{3n+2}+1=0$

A) 1

B) 0

C) -1/3

D) No Solution

Other Equations (Inequalities)

This inequality can be used to find the range of possible weights in ounces, *w,* for a box of cereal.

$$|w - 13.5| \leq 0.05$$

What is the range of weights, in ounces, for the box of cereal?

A) w ≤ 13.55

B) w ≤ -13.55

C) 13.45 ≤ w ≤ 13.55

D) -13.45 ≤ w ≤ -13.55

Sequences

Arithmetic = adding or subtracting the same number each time

$3, 9, 15, 21, \ldots$

$a_n = a_1 + (n-1)d \quad a_1 = 1st\ number \quad d = common\ difference$

$a_n = 3 + (n-1)6$

$a_n = 3 + 6n - 6 = 6n - 3$

Geometric = multiplying by a common ratio to get to the next term in the sequence

$3, 6, 12, 24, \ldots$

$a_n = a_1 (r)^{n-1} \quad a_1 = 1st\ number \quad r = common\ ratio$

$a_n = 3(2)^{n-1}$

Sequences

Find the 200^{th} number in the sequnce:

8, 10, 12, 14, 16, ….

A) 400

B) 406

C) 408

D) 1600

Sequences

This equation can be used to find the amount of money, in dollars, that Mr. Lewis will have in his account after *t years.*

$$20,000(1.15)^t$$

How much money will Mr. Lewis have after 3 years?

A) $23,000

B) $30,417.50

C) $52,173.91

D) $69,000

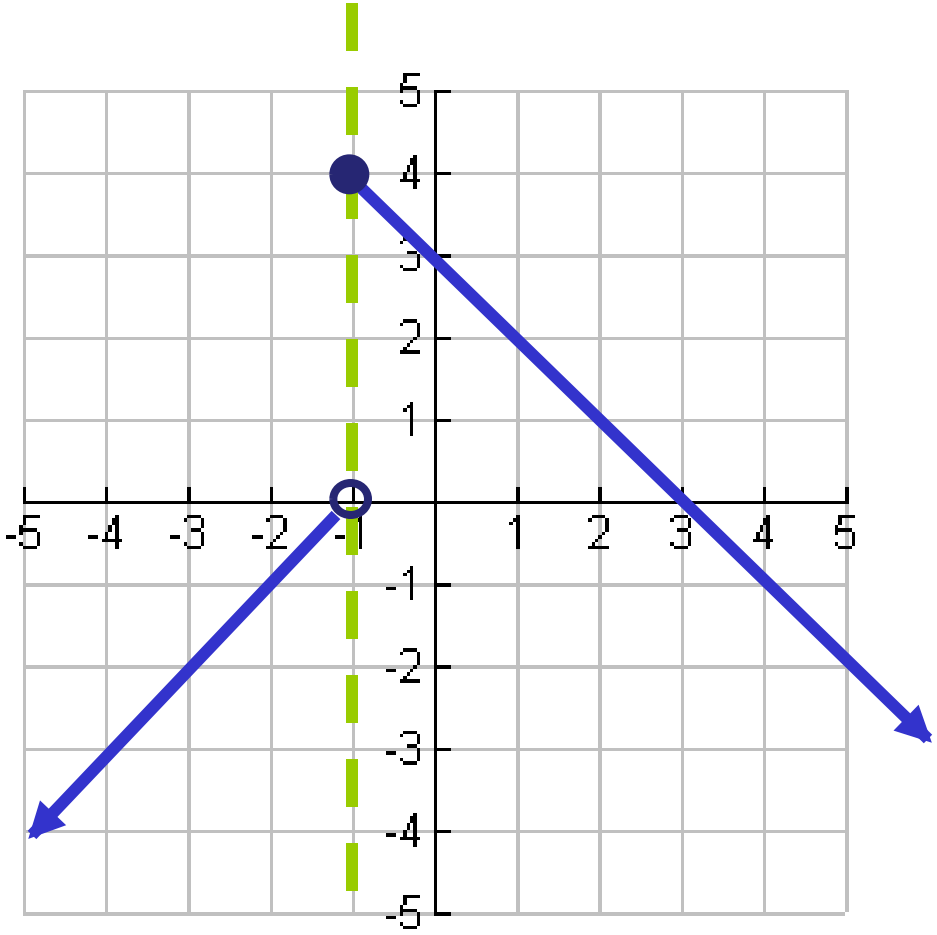
Piecewise Functions

Example: $f(x) = \begin{cases} x+1, if\ x < -1 \\ -x+3, if\ x \geq -1 \end{cases}$

x=1 is the breaking point of the graph, the point of discontinuity.

To the left is the top equation. Use if x is smaller than -1.

To the right is the bottom equation. Use if x is greater than 1.



Writing Absolute Value as Piecewise

Example:

$y = 2|x-3|$

First piece
Distribute +2

Second piece
Distribute -2

$2(x-3)$

$2x-6,\ x \geq 3$

Always the "≥" piece

Always the "<" piece

$-2(x-3)$

$-2x+6,\ x<3$

$$f(x) = \begin{cases} 2x-6, & x \geq 3 \\ -2x+6, & x<3 \end{cases}$$

Piecewise Functions

NorthStar Electric Company charges 11 cents per kilowatt-hour for the first 250 kWh. The company charges 14 cents per kilowatt-hour for all electrical usage in excess of 250 kWh. How many kilowatt-hours were used in May if the electric bill was $67.40?

$$f(x) = \begin{cases} 0.11x & x \le 250 \\ 0.14(x - 250) + 27.50 & x > 250 \end{cases}$$

A) 458 kWh

B) 497 kWh

C) 535 kWh

D) 541 kWh

Piecewise Functions

Jane has a job that pays $8.50 per hour. It pays time and a half if she works overtime (over 40 hours). Which function represents her weekly pay in terms of the number of hours she works, x?

A) $f(x) = \begin{cases} 8.5x & 0 \le x \le 40 \\ 12x + 160 & x > 40 \end{cases}$

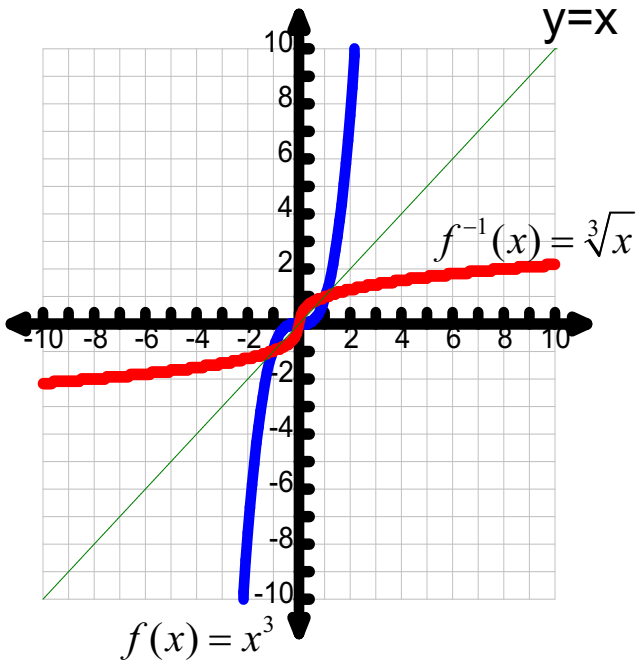
B) $f(x) = \begin{cases} 8.5x & 0 \le x \le 40 \\ 12x - 160 & x > 40 \end{cases}$

C) $f(x) = \begin{cases} 8.5x & 0 \le x \le 40 \\ 12.75(x - 40) + 340 & x > 40 \end{cases}$

D) $f(x) = \begin{cases} 8.5x & 0 \le x \le 40 \\ 12.75(x - 40) - 340 & x > 40 \end{cases}$

Inverse Functions

One to One Functions – Horizontal Line Test to determine if the inverse will be a function itself



Finding the Inverse

- ✓ Algebraically
- ✓ Graphically
- ✓ Compositions

$$f(f^{-1}(x))=x$$

$$f(x)=2x-5$$

$$y=2x-5$$

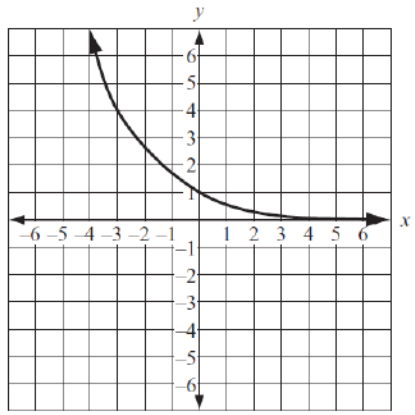
$$x=2y-5$$

$$x+5=2y$$

$$\frac{x+5}{2}=y=f^{-1}(x)$$

Inverse Functions

The function f(x) is graphed below.



What are the domain and range of the function $f^{-1}(x)$?

A) Both the domain and range are the set of all real numbers.

B) Both the domain and range are the set of all positive real numbers.

C) The domain is the set of all real numbers and the range is the set of all positive real numbers.

D) The domain is the set of all positive real numbers and the range is the set of all real numbers.

Angles of a Polygon

Sum of Interior Angles:

$$(n-2)\bullet 180^0$$

Sum of Exterior Angles:

$$360^0$$

Angles of Polygon

Sarah's flower garden is in the shape of a hexagon. What is the sum of the degree measures of the interior angles of her garden?

A. 120°
B. 180°
C. 360°
D. 720°

D) 720°

Angles of Polygon

One interior angle of a pentagon has a measure of 120°. The other four interior angles are congruent to each other.

What is the measure of one of the four congruent angles?

A. 30°
B. 60°
C. 105°
D. 195°

B) 60°

Triangle Inequalities

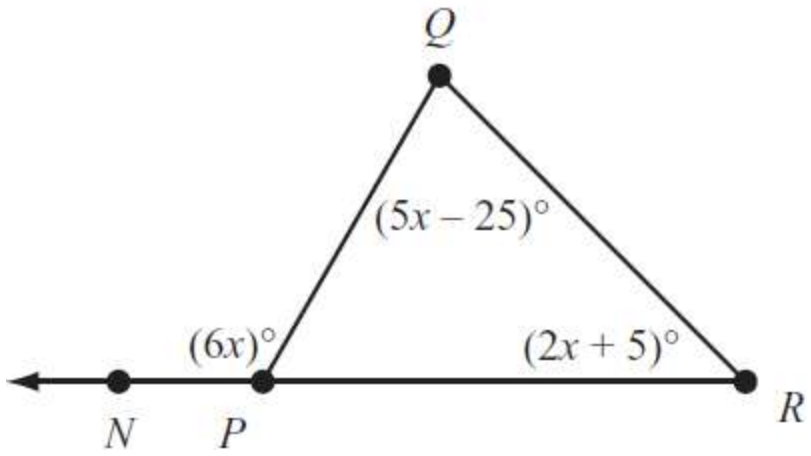
Exterior Angle Inequality:
The measure of an exterior angle of a triangle is greater than the measure of either of the nonadjacent interior angles.

Triangle Inequality Theorem:
The sum of the lengths of any two sides of a triangle is greater than the length of the third side.

Side-Angle Inequalities:
- ✓**If one side of a triangle is longer than another side, then the angle opposite the larger side is larger than the angle opposite the shorter side.**
- ✓**If one angle of a triangle is larger than another angle, then the side opposite the larger angle is longer than the side opposite the smaller angle.**

Triangle Inequalities

Use this diagram to find the measure of $\angle QPR$.



A. 16°
B. 60°
C. 120°
D. 175°

B) 60°

Triangle Inequalities

The lengths of two sides of a triangle are $2n$ ***and*** $n-3$ ***units, where*** $n > 3$.

Which inequality represents all possible lengths, ***x, for the third side of the*** triangle?

A. $n + 3 < x < 3n - 3$

B. $n - 3 < x < 3n + 3$

C. $n - 3 < x < 2n$

D. $2n < x < 3n - 3$

A)

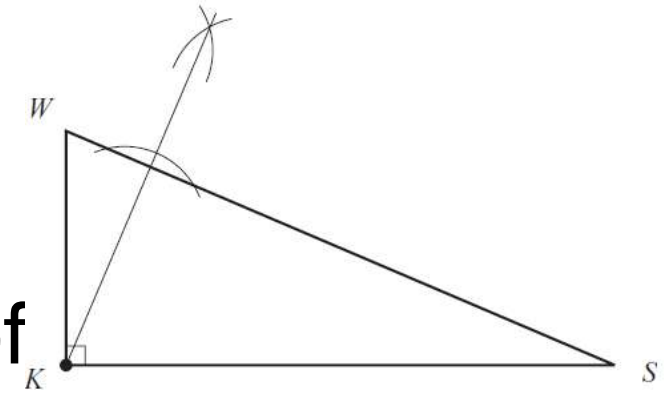
Points of Concurrency

M	An	P	A
C	I	Cr	O

Point of Concurrency	Special Segments	Special Properties
Centroid	Medians	- Center of Gravity - Longer segment of median is twice the shorter segment
Angle Bisectors	Incenter	- Equidistant to Sides of the Triangle
Perpendicular Bisectors	Circumcenter	- Equidistant to Vertices of the Triangle
Altitudes	Orthocenter	- On Euler's Line

Points of Concurrency

This diagram shows how Pam used a compass and a straightedge to construct ***K, a point of concurrency for right*** triangle ***WKS.***



What point of Pam construct?

A. centroid
B. circumcenter
C. incenter
D. orthocenter

D) orthocenter

Points of Concurrency

A cell phone company wants to build a tower that would be equidistant to each of three major cities.

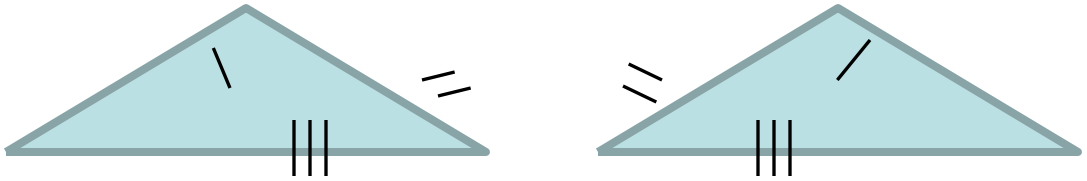
Which point of concurrency will they use in finding where to put the tower?

A. centroid
B. circumcenter
C. incenter
D. orthocenter

B) circumcenter

Triangle Congruence

SSS:



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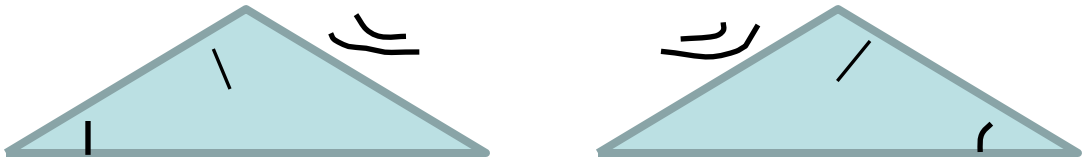

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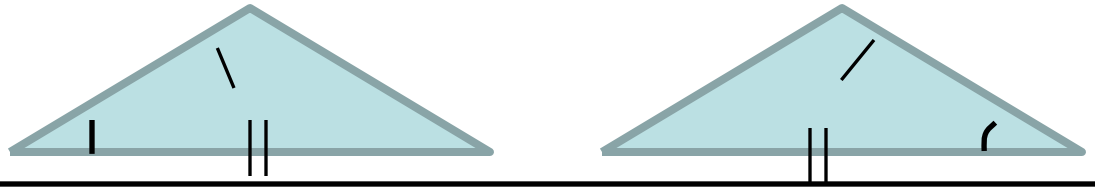
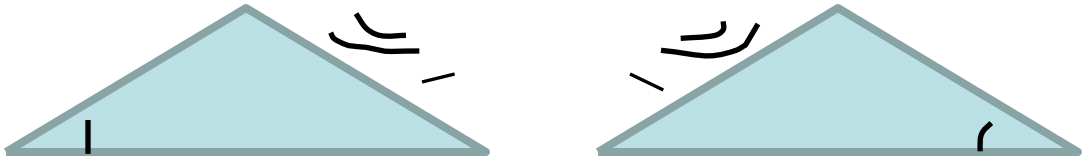


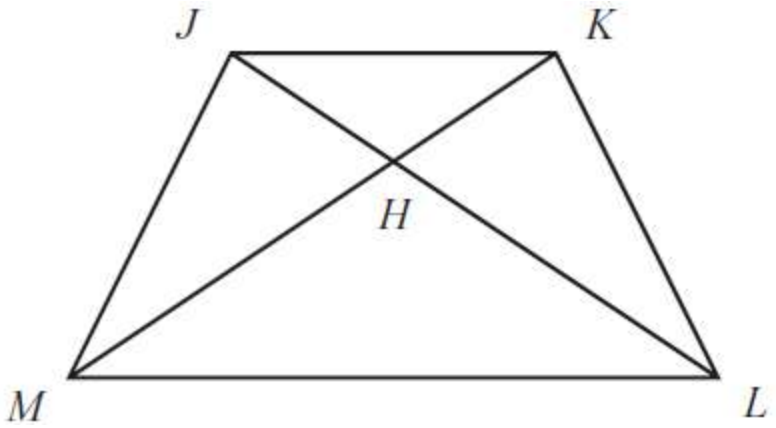
AAS:



HL:

Triangle Congruence

In this figure, Gabrielle wants to prove that $\triangle JLM \cong \triangle KML$. She knows that $\overline{JM} \cong \overline{KL}$.



What additional piece of information will allow Gabrielle to complete the proof?

A. $\overline{JL} \cong \overline{KM}$

B. $\overline{ML} \cong \overline{KM}$

C. $\overline{JH} \cong \overline{HK}$

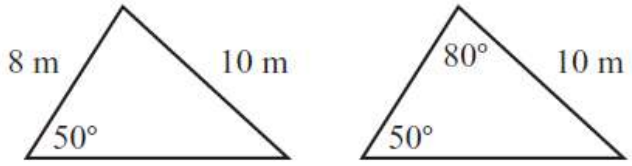
D. $\overline{MH} \cong \overline{LH}$

A)

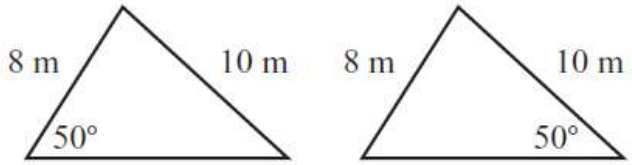
Triangle Congruence

Which pair of triangles could be proved congruent?

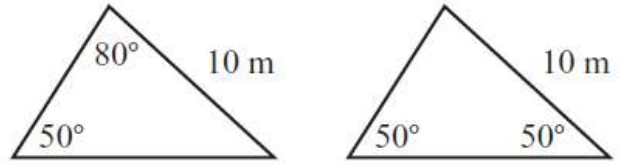
A



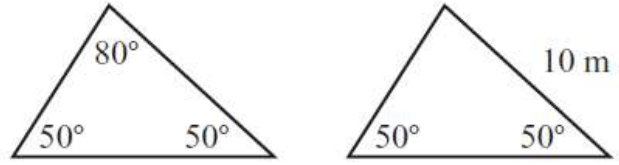
B



C

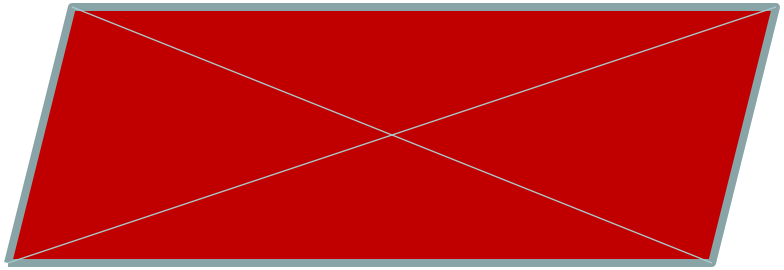


D



C)

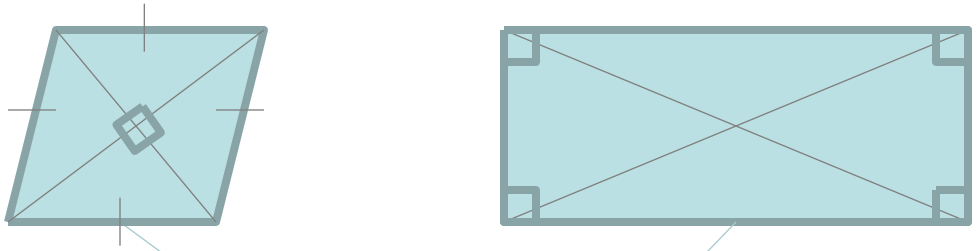
Properties of a Parallelogram



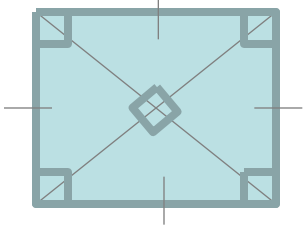
1) Opposite sides are parallel
2) Opposite angles are congruent
3) Opposite sides are congruent
4) Consecutive angles are supplementary.
5) Diagonals bisect each other

Special Quadrilaterals

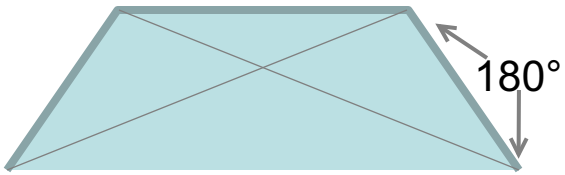
Rhombus Rectangle



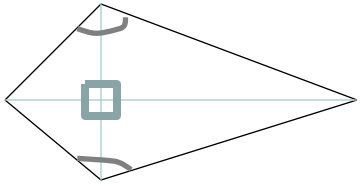
Square



Trapezoid

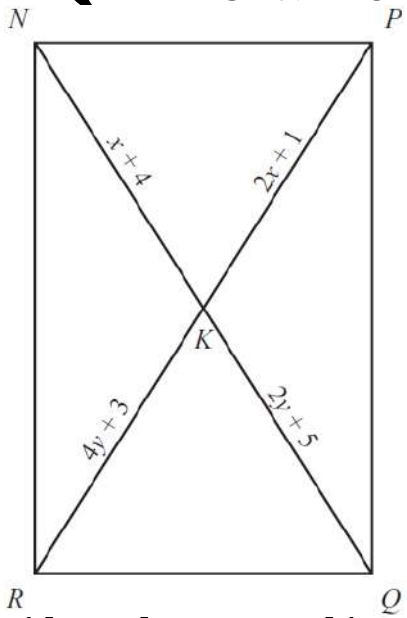


Kite



Quadrilaterals

In this diagram NPQR is a rectangle.



What is the length, in units, of $\overline{NQ}$?

A. 1

B. 3

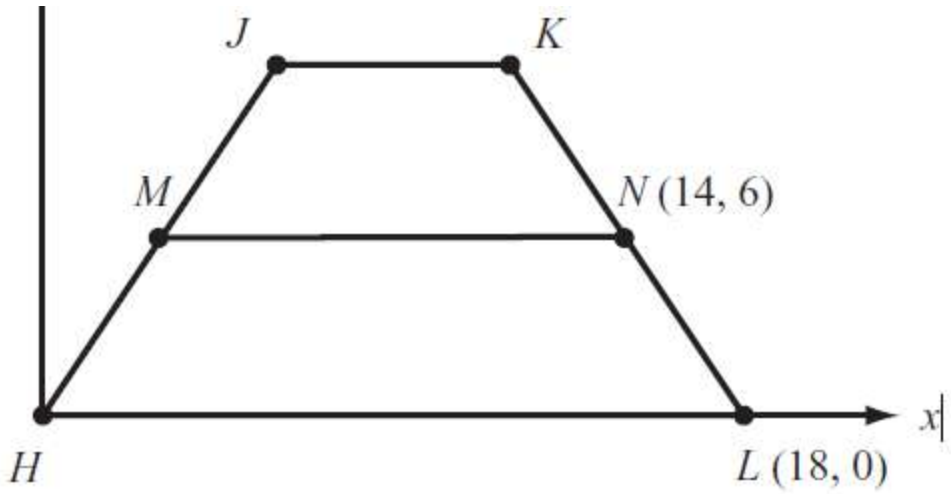
C. 7

D. 14

D) 14

Quadrilaterals

Trapezoid *HJKL is shown on this* coordinate grid. $\overline{MN}$ *connects the* midpoints of $\overline{JH}$ and $\overline{KL}$. What are the coordinates of point K?



A. (8,9)

B. (9,8)

C. (10,12)

D. (12,10)

C) (10,12)

Distance and Midpoint

Distance Formula:

$$d = \sqrt{(x_x - x_1)^2 + (y_2 - y_1)^2}$$

Midpoint Formula:

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

Distance Formula

A street map is placed on a coordinate grid. The length of each square on the grid is 100 yards. Main Street is represented by the line *y* = −2 *on the* grid.

- **The coordinates of Chad's business are (−5, 2).**
- **The coordinates of Dwayne's business are (−2,−6).**

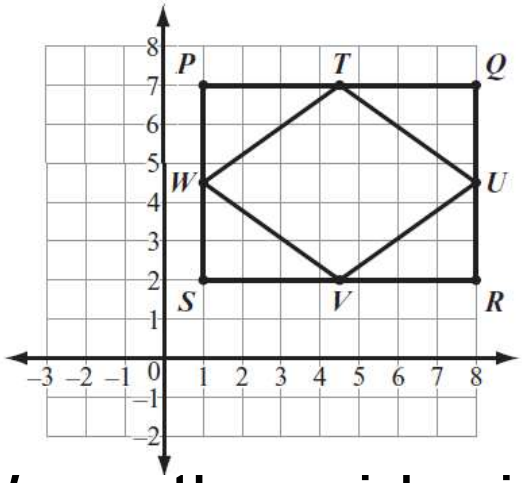
Chad walks the SHORTEST distance from his business to Main Street. Then he walks the SHORTEST distance from where he is on Main Street to Dwayne's business. How many yards does Chad walk?

A. 800
B. 900
C. 1,000
D. 1,100

B) 900

Distance Formula

The coordinate grid shows a flag pattern.



Points T, U, V, and W are the midpoints of the sides of quadrilateral PQRS. Each unit represents one inch.

What is the perimeter of quadrilateral TUVW?

A. 14 inches
B. 14.1 inches
C. 17.2 inches
D. 24 inches

C) 17.2

Logic Statements

"If I go to school, then I see my friends."

Truth Value

Converse:
-Switch the hypothesis and conclusion
-"If I see my friends, then I go to school."

Inverse:
-Negate or add "not" to the hypothesis and conclusion
-"If I do not go to school, then I do not see my friends."

Contrapositive:
-Switch the hypothesis and conclusion, and negate the hypothesis can conclusion.
-"If I do not see my friends, then I do not go to school."

Conditional Statements

Which of these true statements also has a true inverse?

A. If the product of integers *a and b is* odd, then both *a and b are odd.*

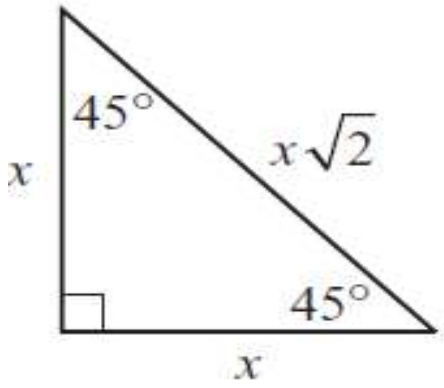
B. If x is a multiple of 6, then x is an even number.

C. If a and b are consecutive integers, then the sum of a and b is odd.

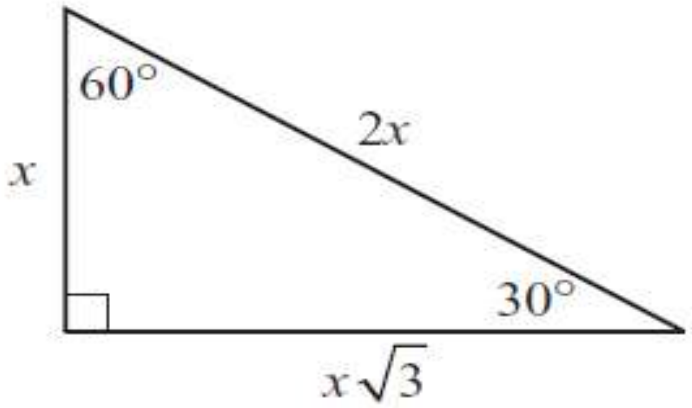
D. If p is negative, then $|-p|$ is positive.

A)

Special Right Triangles



$45^0 - 45^0 - 90^0$ *Triangle*

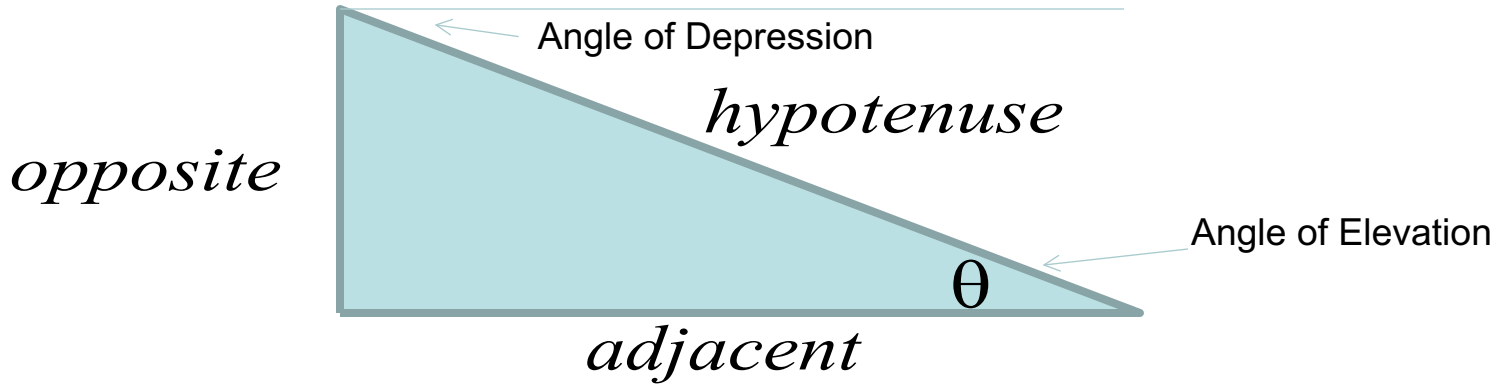


$30^0 - 60^0 - 90^0$ *Triangle*

The formula are given to you!

Label the triangle and then, answer the questions!

Right Triangle Trig Ratios



$$\sin(\theta) = \frac{opposite}{hypotenuse}$$

$$\cos(\theta) = \frac{adjacent}{hypotenuse}$$

$$\tan(\theta) = \frac{opposite}{adjacent}$$

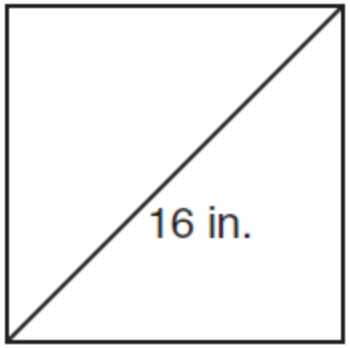
The formula are given to you!

Label the triangle, and then answer the questions!

Make sure you are in DEGREE mode!

Right Triangles

This diagram shows a square with a diagonal length of 16 inches.



What is the approximate area of the tile?

A. 64 square inches

B. 128 square inches

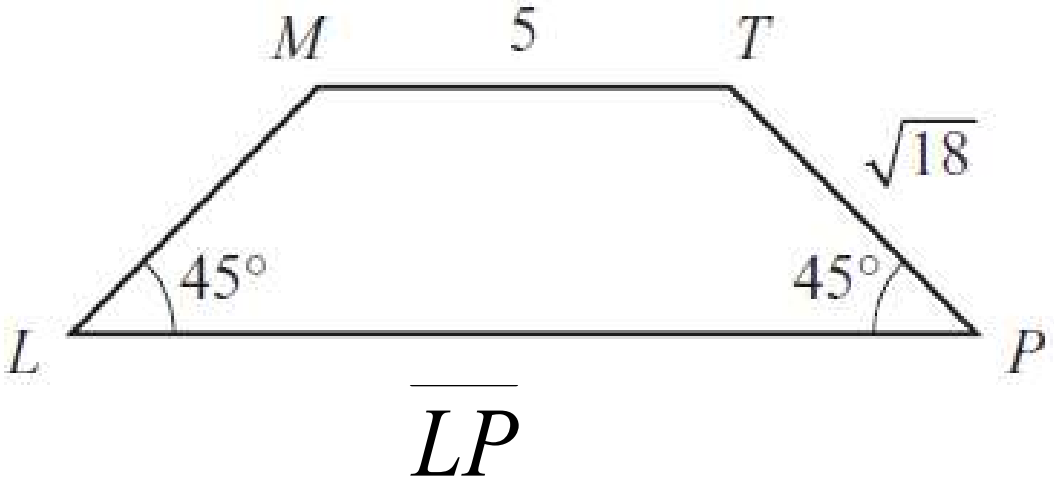
C. 181 square inches

D. 256 square inches

B) 128 sq. in.

Right Triangles

Quadrilateral LMTP is an isosceles trapezoid.



What is the length of $\overline{LP}$?

A. 10

B. 11

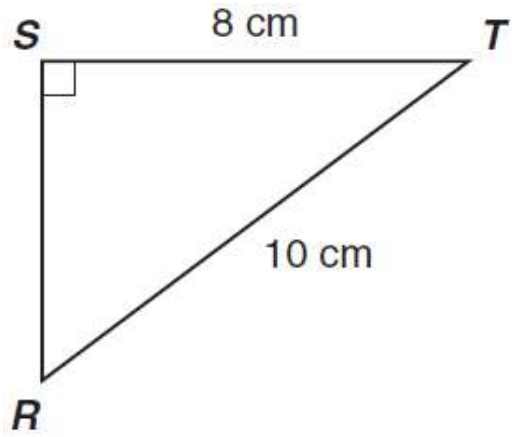
C. $5+2\sqrt{18}$

D. $5+6\sqrt{2}$

B) 11

Right Triangles

A student drew this diagram of a right triangle.



What is the value of the tangent of $\angle R$?

A. 4/5

B. 5/4

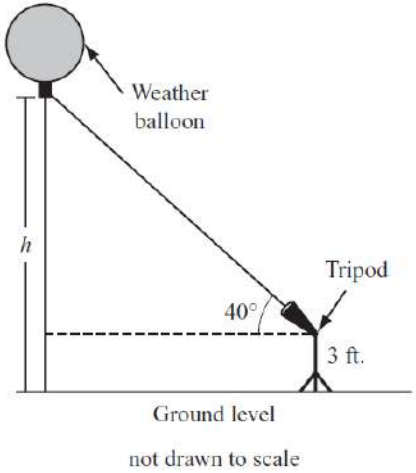
C. 3/4

D. 4/3

D) 4/3

Right Triangles

Bianca uses an angle-measuring device on a 3-foot tripod to find the height, h, of a weather balloon above ground level, as shown in this diagram.



The balloon is at a 40° angle of elevation. A radio signal from the balloon tells Bianca that the distance between the tripod and the balloon is 25,000 feet.

Which expression represents the height, h, of the balloon above ground level?

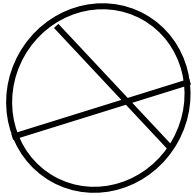
B)

A. $25{,}000 \sin(40^0)$ -3B. $25{,}000 \sin(40^0)$ +3

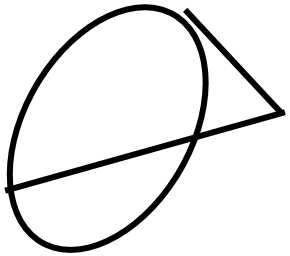
C. $25{,}000 / \sin(40^0)$ -3D. $25{,}000 / \sin(40^0)$ +3

Circles – Segment Lengths

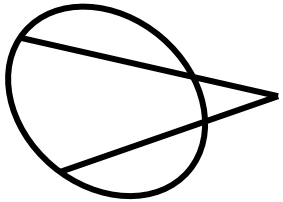
Finding Segment Lengths:



$A \bullet B = C \bullet D$

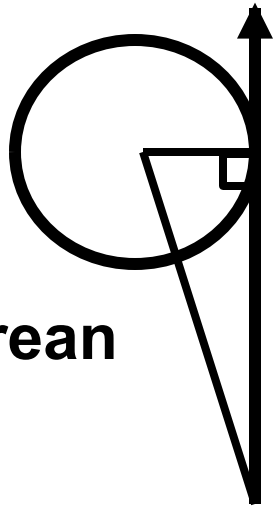


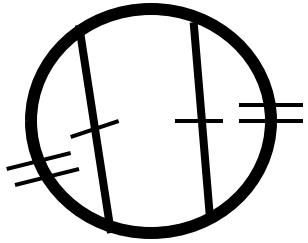
$outside \bullet whole = outside \bullet whole$



Tangent Problems: Chord Problems:

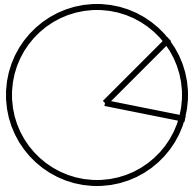
Use Pythagorean Theorem





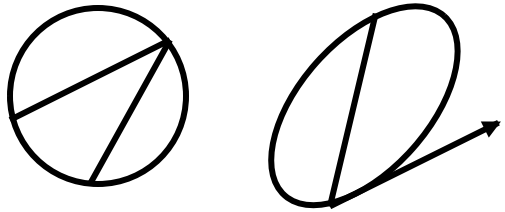
Circles – Missing Angles

Central Angle:



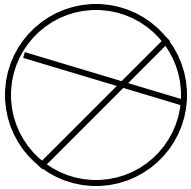
$$Central\ Angle = Intercepted\ Arc$$

Vertex On the Circle:



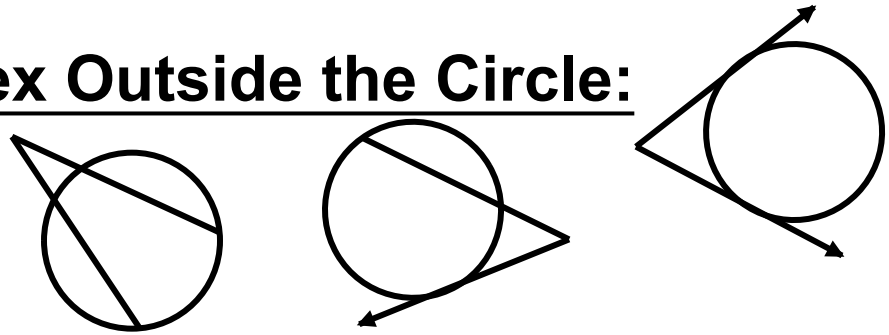
$$Angle = \frac{Intercepted\ Arc}{2}$$

Vertex Inside the Circle:



$$Angle = \frac{Arc + Arc}{2}$$

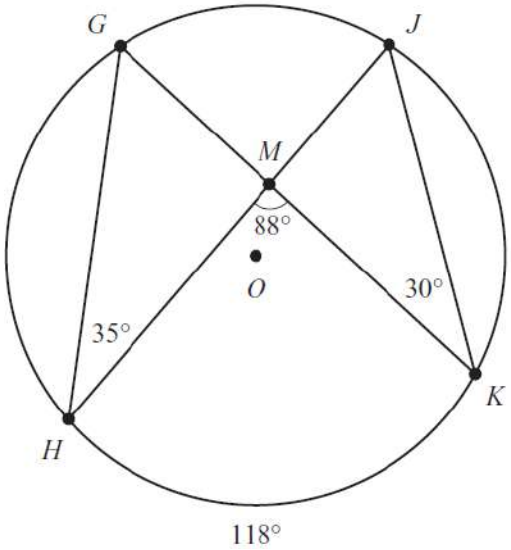
Vertex Outside the Circle:



$$Angle = \frac{Large\ Arc - Small\ Arc}{2}$$

Circles

Use the diagram to answer the question.



C)

What is wrong with the information given in the diagram?

A. $\overline{HJ}$ should pass through the center of the circle.

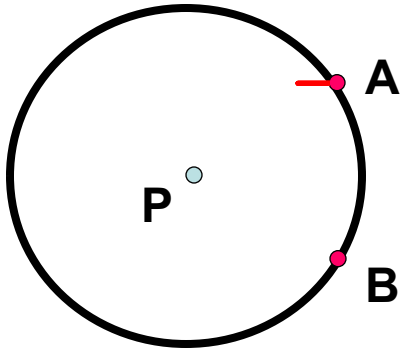
B. Length of $\overline{GH}$ should be equal to that of $\overline{JK}$

C. Measure of $\angle GHM$ should be equal to that of $\angle JKM$

D. Measure of $\angle HMK$ should be equal to half the measure of $\overline{HK}$.

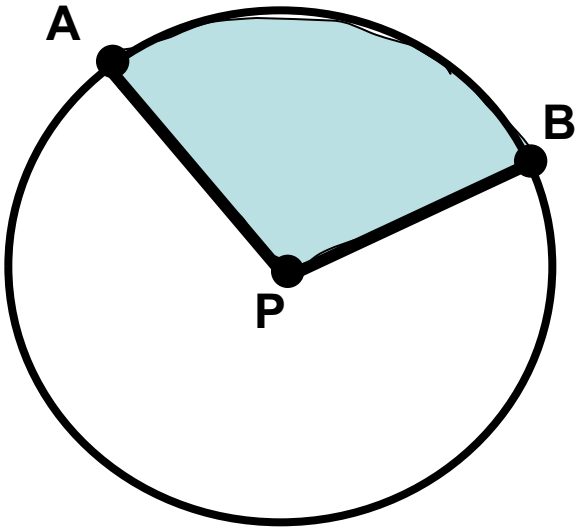
Circles: Arc Length, Area of Sector

Arc Length:



$$Length\ \widetilde{AB} = \frac{measure\ \widetilde{AB}}{360^0} \bullet 2\pi r$$

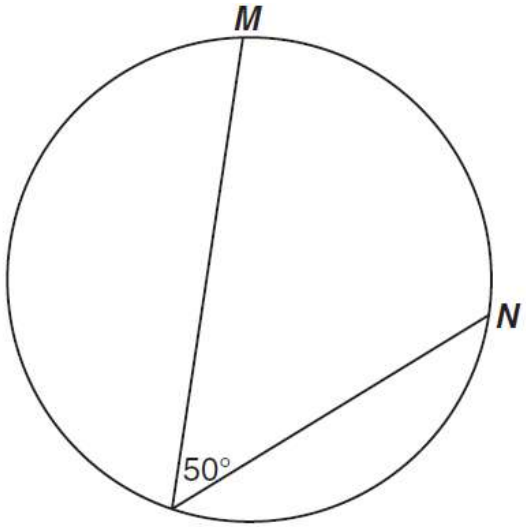
Area of Sector:



$$Area\ of\ Sector\ AB = \frac{measure\ \widetilde{AB}}{360^0} \bullet \pi r^2$$

Circles

The circle has a radius of 9 inches.



What is the approximate length of arc MN?

A. 8 inches

B. 16 inches

C. 23 inches

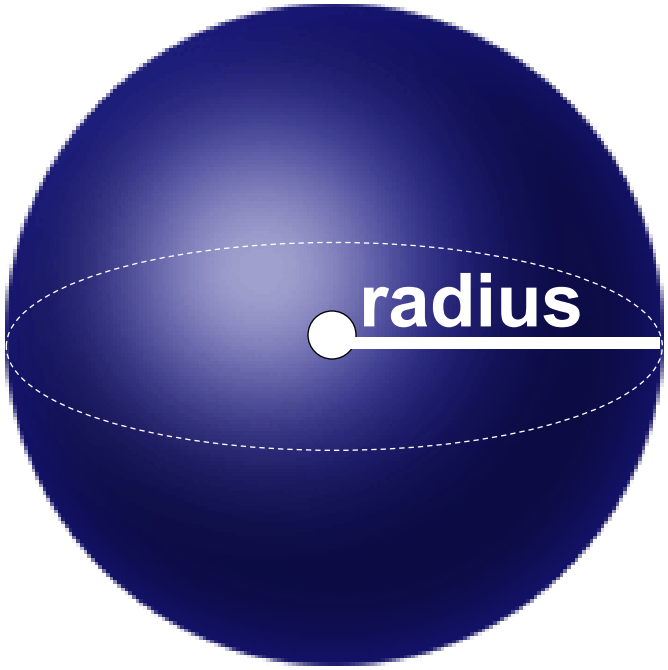
D. 35 inches

B) 16 inches

Spheres: Surface Area and Volume

Surface Area: $SA = 4\pi r^2$

Volume: $V = \frac{4}{3}\pi r^3$



These formulas are given.

You need to know what effect doubling, tripling, etc. has on the Surface and Area Volume.

Example: If you double the radius, the SA is 4 times as big as it was, and the Volume is 8 times as big as it was.

Spheres

The ratio of the surface area of Pluto to the surface area of Mercury is approximately 1 to 4. Assuming the planets are roughly spherical, what is the ratio of the volume of Pluto to the volume of Mercury?

A. 1 to 4

B. 1 to 8

C. 1 to 16

D. 1 to 64

D) 1 to 64

Spheres

The radius of a blue marble is 3/4 the radius of a red marble. The volume of the red marble is 32π cubic centimeters. Assuming both marbles are spherical, what is the volume, in cubic centimeters, of the blue marble?

A. $\frac{27}{2}\pi$

B. $\frac{32}{3}\pi$

C. 18π

D. 24π

C) 18Π

Georgia High School Graduation Test
PROBABILITY

Calculating Probabilities

Simple Probability is $\frac{\text{\# of successes}}{\text{total \# of outcomes}}$

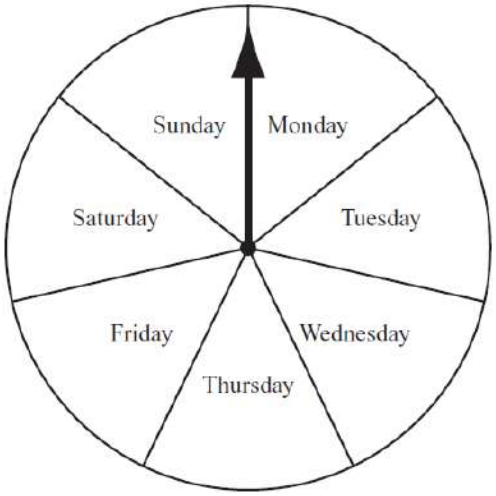
P(A and B) means P(A) times P(B).

- **Be careful of problems with no replacement.**

P(A or B) means P(A) + P(B)

Compound Probabilities

Beth has this spinner which is divided into seven congruent sections. Each section is labeled with a day of the week.



Beth will spin the arrow 2 times.
What is the probability that the arrow will land on either Saturday or Sunday both times?

A) 3/49 B) 4/49 C) 2/7 D) 4/7

Compound Probabilities

Greg wrote the numbers 1 through 9 on pieces of paper and placed them in a hat. He will randomly select one piece of paper from the hat. He will not replace it. Greg will then randomly select a second piece of paper from the hat.

What is the probability that Greg will select a piece of paper with an odd number on it and then select one with an even number on it?

A) 20/81

B) 5/18

C) 9/17

D) 19/18

Permutations vs. Combinations

Permutations: Order Matters

Example: Picking president, vice president, secretary, treasurer from 12 people

$$ {}_nP_r = \frac{n!}{(n-r)!} $$

$$ {}_{12}P_4 = \frac{12!}{(12-4)!} = \frac{12!}{8!} = 12 \bullet 11 \bullet 10 \bullet 9 = 11,880 $$

Combinations: Order Doesn't Matter

Example: Picking 3 captains from a team of 15 players

$$ {}_nC_r = \frac{n!}{r!(n-r)!} $$

$$ {}_{15}P_3 = \frac{15!}{3!(15-3)!} = \frac{15!}{3!12!} = \frac{15 \bullet 14 \bullet 13}{3 \bullet 2 \bullet 1} = 455 $$

Permutations vs. Combinations

There are 10 students who applied for internships. Only 3 positions are available.

How many different groups of 3 can be selected from the 10 students?

A) 30

B) 120

C) 720

D) 1000

Predicting the Number of Outcomes

Your friend is visiting and only brought one suitcase.
In her suitcase is 4 different t-shirts, 3 pairs of pants, and 2 pairs of shoes. How many different outfits can she wear?

A) 12

B) 24

C) 48

D) 15

Conditional Probabilities

Seth places 7 red cards, 9 blue cards, and 4 yellow cards in a bag. All the cards are the same size and shape. He randomly selects a card. It is yellow. He does not replace it.

Seth will randomly select a second card from the bag. What is the probability that he will select a blue card?

A) 9/19

B) 9/20

C) 1/5

D) 1/9

Permutations vs. Combinations

Our state wants to use 2 letters followed by 3 digits to make license plates. How many different license plates are possible?

A) 676,000

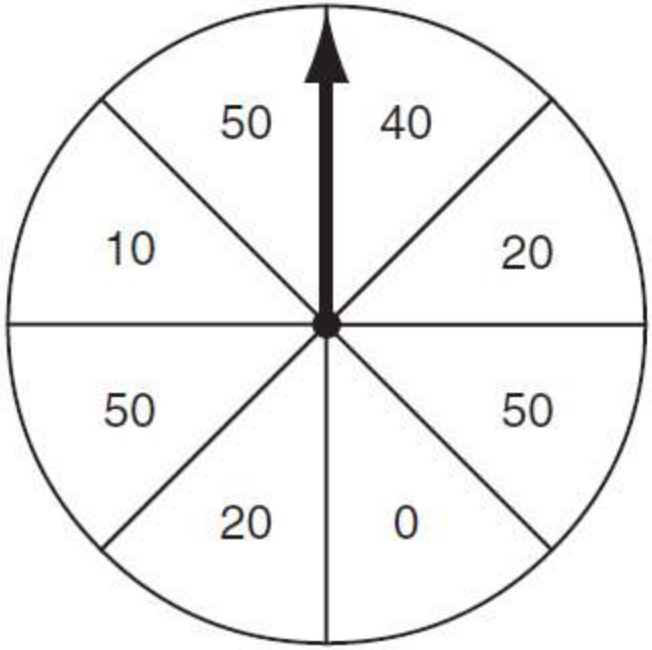
B) 6084

C) 492,804

D) 4,000

Expected Value

Jerry will spin the arrow on the spinner once. What is the expected value of his spin?



A) 20

B) 25

C) 30

D) 50

Statistics

Measures of Central Tendency:

- Mean- Average
- Median- Middle
- **Mode- occurs the MOST**

Measures of Spread:

- **Range- Highest minus Lowest**
- **IQR – Interquartile Range = Q3-Q1**
- **MAD – Mean Absolute Deviation**

Statistics Calculations

Expected Value:

$$\sum_{i=1}^{n} x_i p(x_i)$$

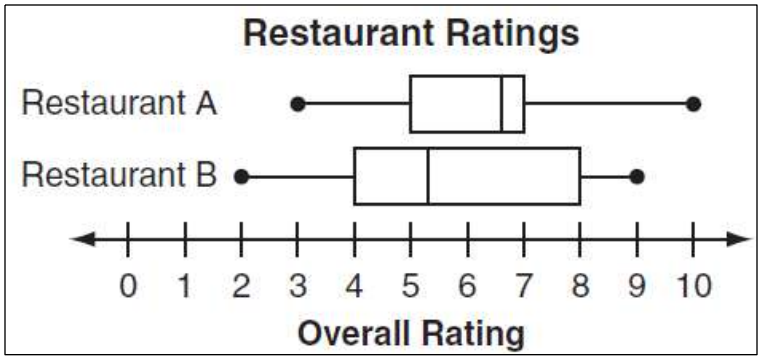
Example: Money from my parents for a lost tooth

Amount of Money	Probability
$2	¼
$5	½
$10	¼

Expected Value = $2(1/4) + $5(1/2) + $10(1/4) = $5.50

Statistics

A group of 100 people were asked to rate two restaurants on a scale from 0 to 10. The results are represented by this double box-and-whisker plot.



Which statement is correct?

A) The range is greater for Restaurant A than Restaurant B.

B) The range is greater for Restaurant B than Restaurant A.

C) The interquartile range is greater for Restaurant A than B.

D) The interquartile range is greater for Restaurant B than A.

Statistics Calculations

MAD:

$$\frac{\sum_{i=1}^{N}|x_i - \bar{x}|}{N}$$

Example: Test Scores = 76, 78, 80, 82, 84

$$\bar{x} = 80$$

$$\frac{|76-80|+|78-80|+|80-80|+|82-80|+|84-80|}{5} = \frac{4+2+0+2+4}{5} = 2.4$$

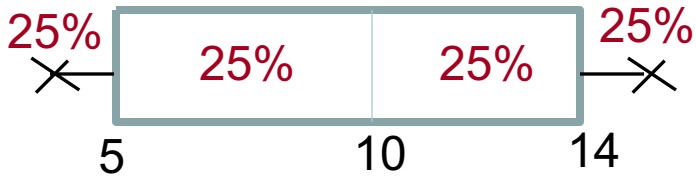
Interquartile Range:

Example: Points Scored: 4, 5, 8, 10, 12, 14, 15

Q3 = Upper Quartile = 14

Q1 = Lower Quartile = 5

IQR = Q3 – Q1 = 9



MAD

What is the Mean Absolute Deviation of the following data set?

{12, 10, 14, 4, 5}

A) 18

B) 9

C) 3.6

D) 1.8

MAD

When the mean deviation is small, it means that the data is _____?

A) More spread out

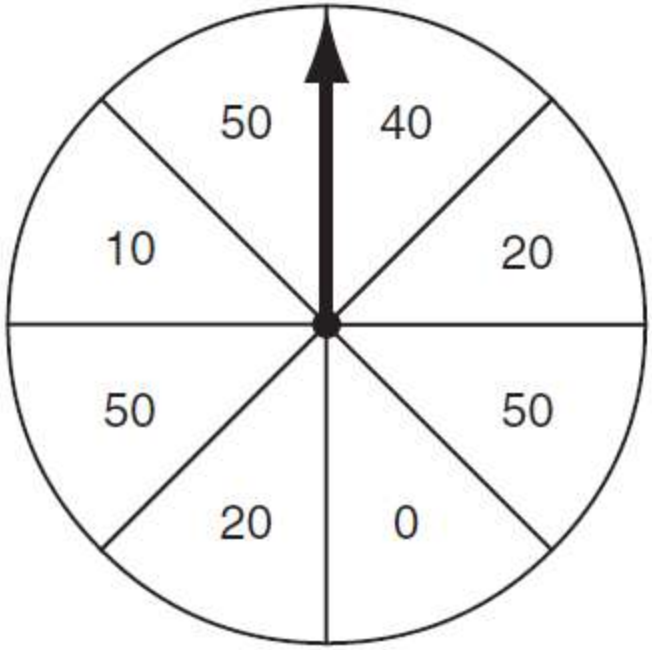
B) Bunched closely together

C) Large

D) Small

Expected Value

Jerry will spin the arrow on the spinner once. What is the expected value of his spin?



A) 20

B) 25

C) 30

D) 50

Georgia High School Graduation Test

MATH II PROBABILITY

Statistics

Use the calculator!

Measure of Spread or Dispersion:

- Sample Standard Deviation

$$S = \sqrt{\frac{\sum_{i=1}^{N} (x_i - \bar{x})^2}{N - 1}}$$

- **The bigger the number, the more spread out the data is.**
- **Can also tell by looking at the shape of the distribution.**

Standard Deviation

A marketing researcher asked a random selection of adults to rate two different brands of toothpaste on a scale from 1 through 10.

- Brand X had a mean rating of 7.5 with a standard deviation of 1.1.
- Brand Y had a mean rating of 6.8 with a standard deviation of 2.0.

Based on the data, which statement **must** be true?

A. The data is more dispersed for Brand X.

B. The data is more dispersed for Brand Y.

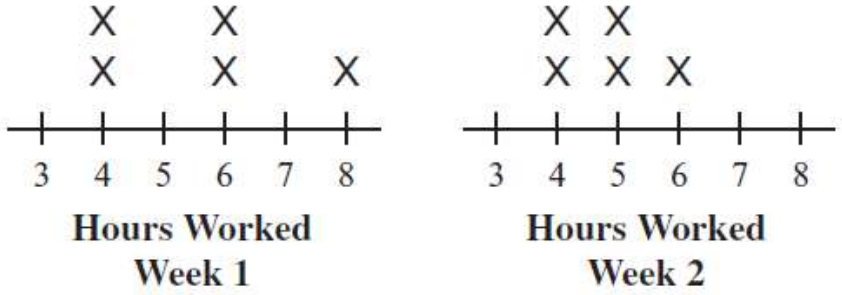
C. The range of the data is greater for Brand X.

D. The range of the data is greater for Brand Y.

B)

Standard Deviation

These line plots show the number of hours Theodore worked each day for the past two weeks.



Which conclusion can be made from the line plots?

A. Both the mean and the standard deviation for Week 1 are greater than for Week 2.

B. Both the mean and the standard deviation for Week 2 are greater than for Week 1.

C. The mean for Week 1 is greater, but the standard deviation for Week 2 is greater.

D. The mean for Week 2 is greater, but the standard deviation for Week 1 is greater.

A)

Regression Analysis

An English teacher determined that there is a positive linear relationship between students' scores on an essay test and the length of time students take to complete the test. Based on this information, which conclusion is valid?

A. The student with the highest score on the essay test took the longest to complete the test.

B. A student who takes more time to complete the essay test will have a higher score than a student who takes less time to complete the test.

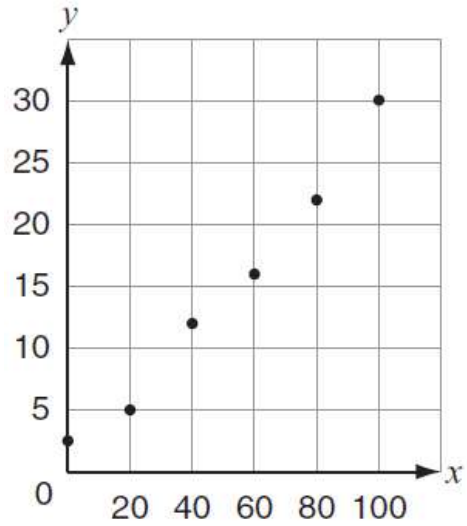
C. Students with lower scores on the essay test tend to have taken shorter times to complete the test.

D. Students with higher scores on the essay test tend to have taken shorter times to complete the test.

C)

Regression Analysis

A student drew this scatter plot.



Which equation best models the data?

A. y = 0.1x + 3

B. y = 0.3x + 1

C. y = x + 0.3

D. y = 3x + 0.1

B) y = 0.3x+1

Regression Analysis

Positive Correlation – As x goes up, y goes up.

Ex. As I study more, my grade goes up.

Negative Correlation – As x goes up, y goes down.

Ex. As I sleep in class more, my grade goes down.

Linear Regression – Estimate the slope and y-intercept; Substitute into y = mx + b

Med-Median Line

Divide the data into 3 symmetrical groups

Find the median points (x,y) of each group

Find the equation of the line between the 1^{st} and 3^{rd} medians.

Use the middle point to make an adjustment to the line.