Dear Parents, Guardians, and Students:

During the summer, students who will be enrolled in Geometry next year are required to complete a portfolio of mathematics problems. The purpose of this experience is for the students to practice the skills and concepts covered in 8th grade math. Geometry students are required to take 8th grade Math STAAR. There is **not** a STAAR exam for geometry. The completed portfolio will be due on the first day of school.

I encourage you to work together with your child to devise a plan to meet the completion date and to closely monitor your child's progress so that the summer reinforcement work is completed in a timely fashion. I suggest using Khan Academy or similar website if there is a concept that is unfamiliar or if tutorials are needed. Please ensure that your son or daughter does all work neatly and in an organized fashion. All work should be completed neatly in pencil. Do not use pen. It will be necessary to do some of the work on separate notebook paper!

The portfolio will be checked and evaluated based on completeness on the first day of school. In order to receive full credit, all work must be shown for each problem.

All packets may be accessed on the Frank Black Middle School website to be printed out if your child loses his or her initial copy.

Things You Need to Know...

STAAR GRADE 8 MATHEMATICS REFERENCE MATERIALS

STAAR® State of Texas Assessments of Academic Readiness

LINEAR EQUATIONS			
Slope-intercept form			$y = mx + b$
Direct variation			$y = kx$
Slope of a line			$m = \frac{y_2 - y_1}{x_2 - x_1}$
CIRCUMFERENCE			
Circle	$C = 2\pi r$	or	$C = \pi d$
AREA			
Triangle			$A = \frac{1}{2}bh$
Rectangle or parallelogram			$A = bh$
Trapezoid			$A = \frac{1}{2}(b_1 + b_2)h$
Circle			$A = \pi r^2$
SURFACE AREA			
	Lateral		Total
Prism	$S = Ph$		$S = Ph + 2B$
Cylinder	$S = 2\pi rh$		$S = 2\pi rh + 2\pi r^2$
VOLUME			
Prism or cylinder			$V = Bh$
Pyramid or cone			$V = \frac{1}{3}Bh$
Sphere			$V = \frac{4}{3}\pi r^3$
ADDITIONAL INFORMATION			
Pythagorean theorem			$a^2 + b^2 = c^2$
Simple interest			$I = Prt$
Compound interest			$A = P(1 + r)^t$

Things You Need to Know…

- **Order of Operations**
  - First – Parenthesis
    - Solve anything inside grouping symbols (parentheses or brackets) first.
  - Second – Exponents
    - Simplify any exponents
  - Third – Multiply OR Divide
    - Multiply or divide from left to right, whichever comes *first*. Multiplication should not come before division unless it comes first in the expression / equation.
  - Fourth – Add OR Subtract
    - Add or subtract from left to right, whichever comes *first*. Addition should not come before subtraction unless it comes first in the expression / equation

Things You Need to Know…

- **Fraction Operations**
  - Adding & Subtracting
    1. Find a common denominator.
    2. Re-write each fraction with the common denominator.
    3. Add or subtract fractions and then whole numbers.
    4. Simplify your answer.

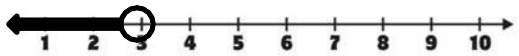
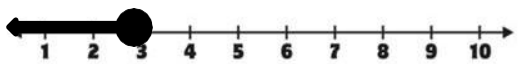
  - Multiplying
    1. Cross reduce if possible.
    2. Multiply straight across.
    3. Simplify if possible.

  - Dividing
    1. Write the second fraction as it's inverse.
    2. Follow steps for multiplication.

- **Solving Equations**
  - One Step Equations
    1. Identify the operation being performed between the variable and the coefficient or constant.
    2. Perform the inverse of that operation with the constant or coefficient on both sides of the equation to eliminate it from the same side of the equation as the variable.

  - Two Step Equations
    1. Identify the operation being performed with the constant (usually addition or subtraction).
    2. Perform the inverse of that operation with the constant on both sides to eliminate it from the side of the equation with the variable.
    3. Identify the operation being performed with the coefficient (usually multiplication or division).
    4. Perform the inverse of that operation with the coefficient on both sides to eliminate it from the side of the equation with the variable.

Things You Need to Know…

- **Inequalities**
  - Greater than (>)
    - x > 3
  - Less than (<)
    -  x < 3
  - Greater than or equal to (≥)
    - Also referred to as "at least" or "no less than".
    - x ≥ 3
  - Less than or equal to (≤)
    - Also referred to as "at most" or "no more than".
    -  x ≤ 3
  - To solve an inequality, follow the same steps as solving equations.
    - If you are multiplying or dividing by a negative coefficient, you will need to reverse the direction of the inequality symbol in your answer.
      - ✓ Example: -4x < 20 = x > -5

- **Measures of Central Tendency**
  - Mean
    - The average. Take the sum of all numbers and divide by the total numbers in the data set.
  - Median
    - The middle. Order the numbers from least to greatest and find the number in the middle. If there are two numbers in the middle, find the average of the two.
  - Mode
    - The number that occurs the most in a set of data.
  - Range
    - The difference between the smallest and largest numbers in a set of data.

Simplifying Expressions

Simplify each expression.

$\lvert -15 - 4 \bullet 2$	$\lvert -5 + 2 \rvert - 3$	$\lvert -42 - 8 \rvert$	$\lvert 3 \bullet -2 \rvert + 6 - 9$
$\frac{1}{5} - \frac{2}{3} + \frac{4}{5}$	$\frac{2}{5} \bullet \frac{1}{4} + \frac{1}{2}$	$5\frac{1}{2} \div \frac{1}{4} - \frac{7}{8}$	$-\frac{5}{6} + 4\frac{1}{3} - \frac{1}{4}$
$3 - 4(8 - 6)$	$\frac{1}{2}(8 - 10) + 6$	$8 - 5 + 2 \bullet 6 \div 3$	$-3(5 \bullet 4) + 12 \div 6$
$5(x + 2y) - 2(x - 3y)$	$-4(x - 7) + x$	$\frac{1}{2}(x - 7) + 4x - 10$	$8(x + 4y) + 3(-4x + y)$
$\frac{1}{5}(x + 10) + 5x$	$-4.8(2 - 8.2x) + 6x - 3$	$\frac{1}{2}(8y + 2x) - \frac{3}{4}x$	$-18x(3 - 4.6) - 10x$

Evaluating Expressions

Evaluate each expression.

$3x - 10 + 4$ if $x = 3$	$\frac{x}{2} + 6x$ if $x = -12$	$8(x - y)$ if $x = 2, y = 6$	$x + xy$ if $x = 3, y = -2.5$
$(2x)^2 + 6$ if $x = -2$	$3x + 4y - 3x$ if $x = 2, y = 4$	$-10x + \frac{4}{x}$ if $x = -2$	$3(8x - 10) + 5x$ if $x = \frac{1}{2}$
$x + 8y - (x)^2$ if $x = -5, y = \frac{1}{4}$	$(8x)^2 + 6x + 2$ if $x = -3$	$2x^2 + 4y^2 + xy$ if $x = \frac{1}{2}, y = 2$	$8x + 2y$ if $x = 1.5, y = -2.2$
$\frac{5}{2}(x - 6) + 4$ if $x = 8$	$3x - 8x^2 + 7$ if $x = 4.5$	$-2x^2 + 8y$ if $x = 3, y = -9$	$(-5x)^2 - 3x + x$ if $x = -3.5$

Calculating Percents

Percent of a number, percent change, percent increase/decrease.

1) What is 40% of 82?	2) What is 110% of 95?	3) What is 15.5% of 20?	4) What is 75% of 150?
5) Write two expressions that could be used to find 80% of x.		6) Write two expressions that could be used to find 105% of x.	
7) A price increases from $82 to $89.38. What is the percent change?	8) A price decreases from $254 to $213.36. What is the percent change?	9) The number of students increases from 640 to 768. What is the percent change?	10) A population decreases from 14,500 to 12,035. What is the percent change?
11) A dinner bill is $45 and an 18% tip is left. How much is the tip?	12) A dinner bill is $82 and a 15% tip is left. How much is the total cost?	13) There is a 7% sales tax on a $425 television. How much is the tax?	14) There is a 22% room tax on a $199 hotel rate. What is the total cost of a room for one night?
15) Ken makes $400 a week before a 5% raise, and then another 6% raise. What is his weekly pay now?		16) Amy bought a $750 couch. She used a 15% off coupon. There is 6% tax on the discounted price. How much does she pay?	

Using Formulas

Solve using the given formulas. Round to the nearest hundredth.

Use the formula $d = rt$ for questions 1-4.

1) Alex travels 46 miles per hour for 3.2 hours. How far has he gone?

2) Ben just drove 426 miles in 6.4 hours. What was his average rate of speed?

3) Mia is driving at a constant speed of 55 mph and drives 236.5 miles. How long was she driving?

4) Eric drives 62 mph for 5¼ hours. How far does he drive?

Use the formulas $\frac{5}{9}(F - 32) = C$ and $\frac{9}{5}C + 32 = F$ for questions 5-8.

5) Convert 80°F to Celsius.

6) Convert 42.5°F to Celsius.

7) Convert 12°C to Fahrenheit.

8) Convert 27.75°C to Fahrenheit.

Use the formula $I = Prt$ for questions 9-12.

9) You put $5,000 in the bank for 4 years with a 1.2% interest rate. How much interest is earned?

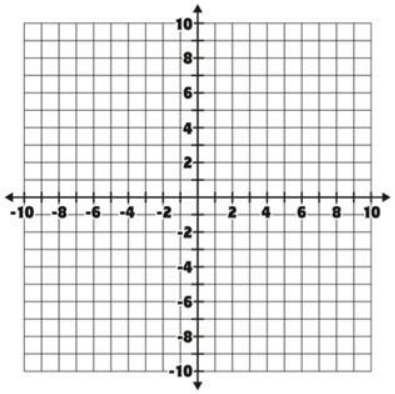
10) James earned $3,000 interest on an investment that he put in the bank for 6 years with a 5% interest rate. How much was his initial deposit?

11) Kyle puts $740 in the bank for 5.5 years with a 2½% interest rate. How much money does he have in the bank all together after 5.5 years?

Graphing on a Coordinate Plane

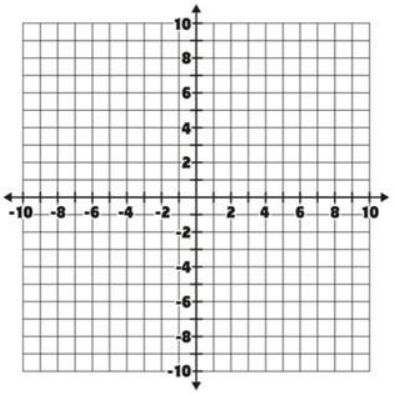
1) Graph the equation:

$$y = \frac{1}{2}x + 4$$



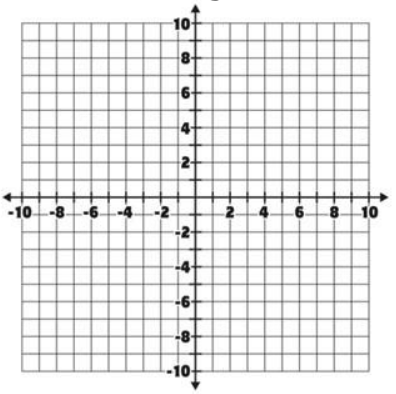
2) Graph the equation:

$$y = -4$$



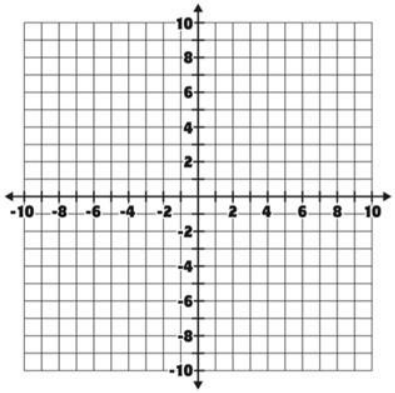
3) Graph the equation:

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



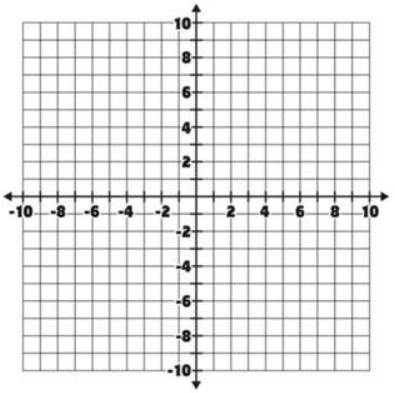
4) Graph the equation:

$$y = -\frac{5}{4}x + 5$$



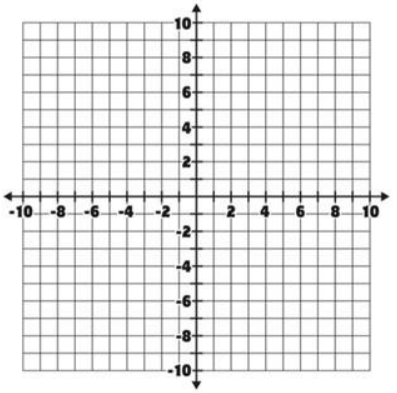
5) Graph the equation:

$$x = 6$$



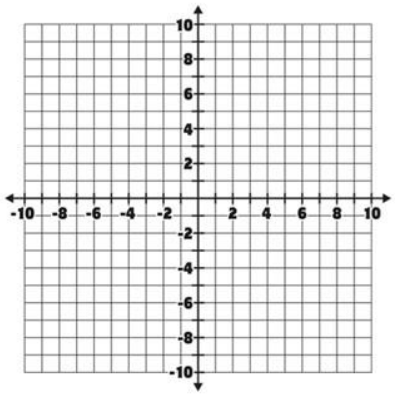
6) Graph the equation:

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



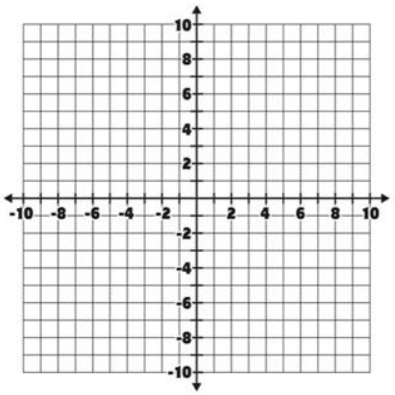
7) Graph the equation:

$$y = 6x - 5$$



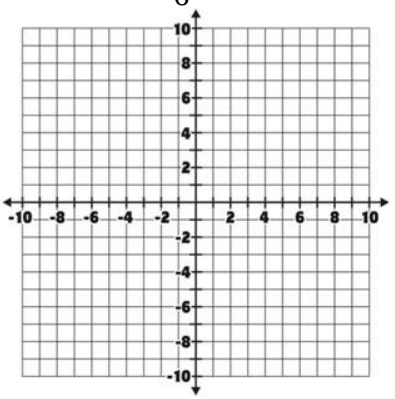
8) Graph the equation:

$$y = -4x - 4$$



9) Graph the equation:

$$y = \frac{5}{6}x - 6$$



Round to the nearest tenth.

1) Find the missing value.

$$\frac{3}{5} = \frac{15}{x}$$

2) Find the missing value.

$$\frac{x}{6} = \frac{15}{20}$$

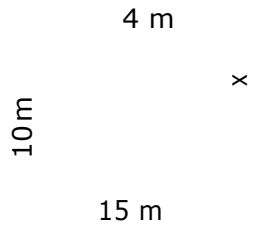
3) Find the missing value.

$$\frac{2}{8} = \frac{x}{7}$$

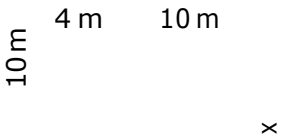
4) Find the missing value.

$$\frac{12}{x} = \frac{5}{1}$$

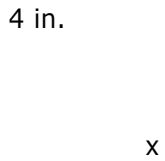
5) Determine the missing side length.



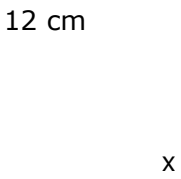
6) Determine the missing side length.



7) Determine the missing side length.

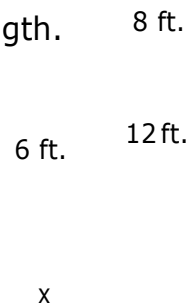


8) Determine the missing side length.

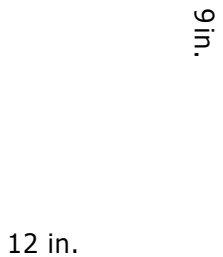


9) Determine the missing side length.

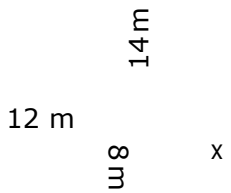
10) Determine the missing side length.



11) Determine the missing side length.



12) Determine the missing side length.



13) Find the missing value.

$$\frac{3.5}{} = \frac{10}{}$$

14) Find the missing value.

$$\frac{x}{} = \frac{13}{}$$

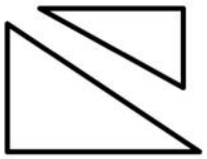
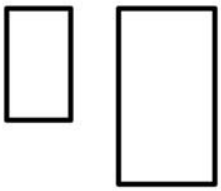
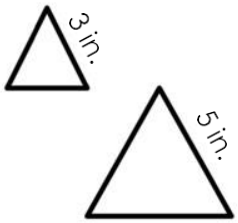
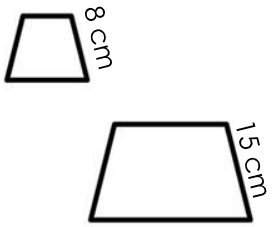
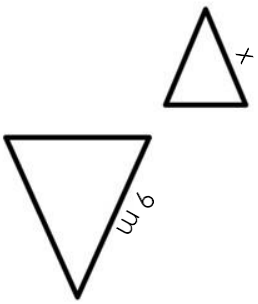
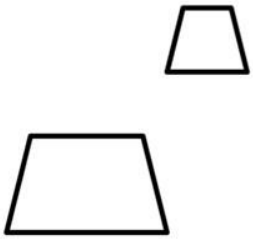
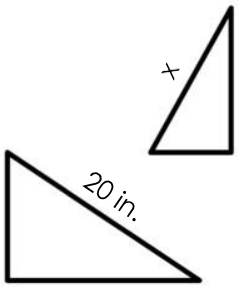
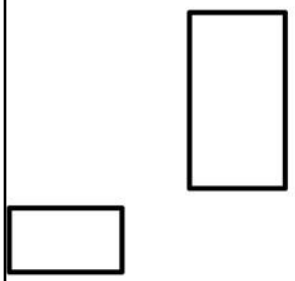
15) Find the missing value.

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

16) Find the missing value.

$$\frac{5}{} = \frac{2}{}$$

Scale and Proportions

Solving Equations

Solve each equation. Round to the nearest tenth.

$-2x+1-7x=-53$	$-\frac{x}{2}+2=5$	$7(x+5)=28$	$6-3x=-2x$
$4x+2=122-6x$	$-3+2x=-x-12$	$6(\frac{2}{3}+4x)=-260$	$4(-2x+8)=-40$
$3(6x-2)=192$	$2(7-3x)=14$	$5x+4+3x=74$	$\frac{2}{3}x+\frac{5}{7}+2x=-\frac{13}{21}$
$3(-\frac{3}{5}x+3)=14.4$	$-\frac{1}{3}(-4+2x)=4$	$-5(-2+2x)=13\frac{1}{3}$	$-\frac{1}{2}(-4-2x)=-12$
$\frac{1}{5}(x+10)=5x+25$	$-\frac{1}{2}(2-8x)=30$	$9x-3=4x+22$	$6x+4-3x=2x+10$

Measures of Center

Find each measure of center. Round to the nearest tenth.

Use the test scores to answer questions 1 – 4.

62	80	65	75	99	80	100	98	65	57
46	87	80	90	72	98	82	65	66	84

1) What is the average test score?	2) What is the mode of the test scores?	3) What is the range of the test scores?	4) What is the median test score?

Use the newborn weights (in pounds) to answer questions 5 – 8.

4.2	6.8	10.2	9.8	9.3	8.6	7.4	5	6.2	8.7	9.2
9	7.3	5.2	6	6.8	8.4	7	7.5	8	8.3	11

5) What is the average newborn weight?	6) What is the mode of the newborn weights?	7) What is the range of the newborn weights?	8) What is the median newborn weight?

Use the salaries (in dollars) to answer questions 9 – 12.

30,450	60,300	112,080	80,500	72,600	42,000
54,000	67,500	23,750	52,000	64,800	70,700

9) What is the average salary?	10) What is the mode of the salaries?	11) What is the range of the salaries?	12) What is the median salary?

Area, Circumference & Perimeter

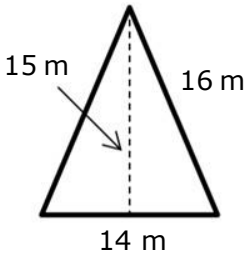
Round to the nearest hundredth. Use 3.14 for π.

1) Farmer Johnson is fencing in an area for his horses. The field measures 150 feet by 165.5 feet. How much fencing will he need?

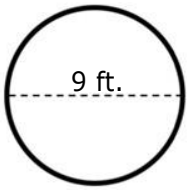
If fencing costs $1.50 per foot. How much will he spend on fencing?

2) A circular pool needs a cover. If the pool has a radius of 6.75 feet, what will the area of pool cover be?

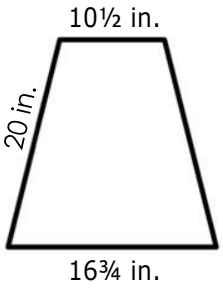
3) Determine the area.



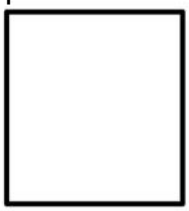
4) Determine the area.



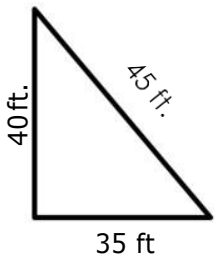
5) Determine the perimeter.



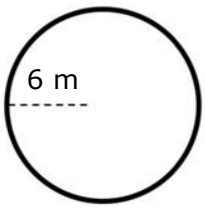
6) Determine the perimeter of the square.



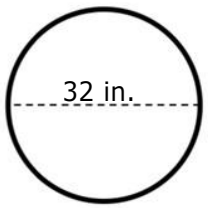
7) Determine the area.



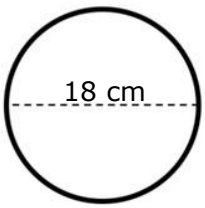
8) Determine the circumference.



9) Determine the area.



10) Determine the circumference.



11) A square park needs grass. Sod is sold by the square foot. If the park has a side length of 32.5 feet, how much sod is needed?

12) Anna is putting a ribbon around a circular picture frame. The frame has a diameter of 12.7 inches. How long does the ribbon need to be?

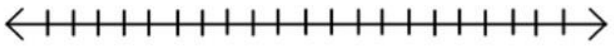
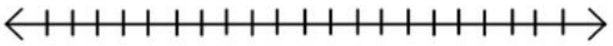
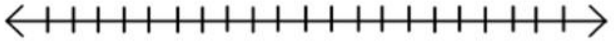
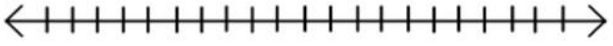
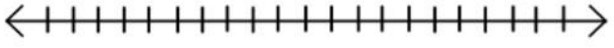
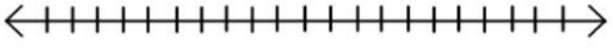
Writing Equations for Lines

Write the equation represented by each situation.

1) Carl makes $10.25 per hour, *h*, plus a daily bonus of $25. Write an equation that represents his total earnings, *t*, each day.	2) It costs $10 to enter a theme park and $2 for each ticket, *t*. Write an equation that represents the total cost, *c*, of going to the theme park.	3) James has $150 in savings and earns an additional $50 per week, *w*, cutting grass. Write an equation that represents the total, *t*, in his account.
4) A shipping company charges a $5.50 flat rate, plus $0.20 per pound, *p*. Write an equation that represents the total cost, *c*, of shipping.	5) Adam has $60 on a gift card. He buys *h* hats for $4.00 each. Write an equation that represents the amount left, *a*, on his gift card.	6) A car rental company charges $120 plus $0.37 per mile, *m.* Write an equation that represents the total cost, *c*, of renting a car.
7) Cora bought *g* bags of candy for $1.45 each and a gallon of milk for $3.49. Write an equation to represent the total amount, *a*, spent at the store.	8) Mya bought *x* shirts for $14.50 each and used a $20 coupon. Write an equation that represents the total amount, *a*, she spent.	9) Ken can run *m* miles at a pace of 6.30 minutes per mile. He ran slower for 10 minutes to warm up. Write an equation that represents the total time, *t,* Ken spent running.
10) Henry raised $X for the fundraiser. Darla raised $5 less than twice as much as Henry. Write an equation that represents the total, *t*, amount raised by both Henry and Darla.	11) A scuba company charges $20 for equipment rental plus $5 per hour, *h*, for use. Write an equation that represents the total cost, *c,* of renting scuba equipment.	12) Melissa earned $1,200 last week. She is donating an equal amount, *a*, to three different charities. Write an equation that represents how much money Melissa has left, *m.*

Solving Inequalities

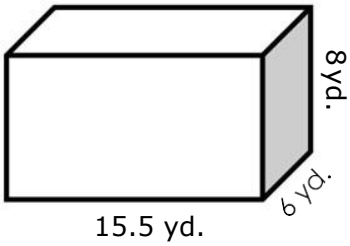
Solve each inequality. Round to the nearest tenth. Graph #1 – 6 on the number line.

$-7x + 6 \leq 20$ 		$-3x + 6 > 5$ 	
$2x - 7 > -21$ 		$3 + 3x - 6x \leq -12$ 	
$3x - \frac{1}{2}(8x - 6) < 10$ 		$-5 - 2x \geq -21$ 	
$12x - 2 - 7x > -22$	$-20 - 2x > 5x - 8$	$\frac{1}{2}(-6x + 2) + 4x \geq 10$	$2(2x - 4) - 5(-4x) \leq -20$
$2(x + 1) + 5x \geq -19$	$4(2 - 1x) < 30$	$5 + 3x \leq 15 + x$	$6x + 4 < 30$

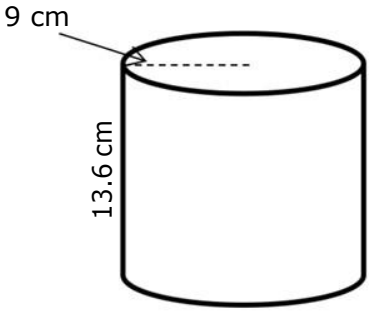
Surface Area & Volume

Round to the nearest hundredth. Use 3.14 for π.

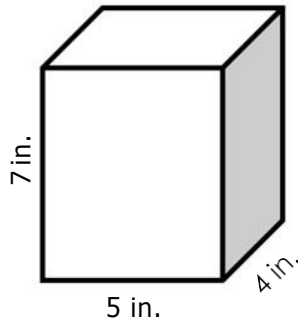
1) Find the surface area.



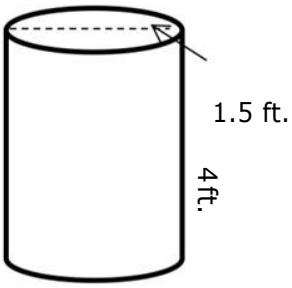
2) Find the volume.



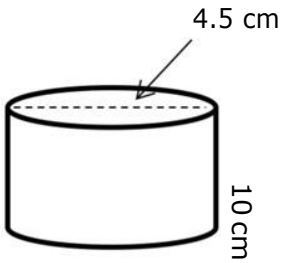
3) Find the volume.



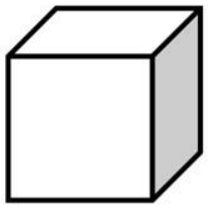
4) Find the surface area.



5) Find the volume when filled halfway.



6) Find the volume of the cube when filled 75%.



7) Nina is painting a bird house. The bird house is in the shape of a cube and has an edge length of 6.5 inches. How much paint will Nina need?

8) Ryan has a pool in his backyard. The pool measures 52 feet long, 25 feet wide, and 8.5 feet deep. How much water will fit in the pool?

9) How much gift wrap is needed to cover a box measuring 18 inches by 12 inches by 4 inches?

10) A cylindrical lava lamp is 18 inches tall. The radius of the lamp is 5.25 inches. How much liquid is in the lamp?

11) What is the surface area of a box in the shape of a rectangular prism with a length of 8 inches, width of 9 inches, and height of 4 inches?

12) A soda can has a diameter of 2.3 inches and a height of 9.5 inches. What is the volume?

Pythagorean Theorem

Round to the nearest hundredth.

1) In a right triangle, find c if a = 4.5 inches and b = 6 inches.	2) In a right triangle, find b if a = 3 centimeters and c = 8 centimeters.	3) In a right triangle, find c if a = 3.4 meters and b = 7.2 meters.
4) In a right triangle, find c if a = 8 inches and b = 9.5 inches.	5) In a right triangle, find a if b = 14.5 feet and c = 16.2 feet.	6) In a right triangle, find a if b = 11 inches and c = 18 inches.
7) The store is 3.2 miles north of the pool. The school is to the east of the pool. The distance between the store and the school is 6 miles. What is the distance between the pool and the school?		8) In a right triangle, find b if a = 14 centimeters and c = 24 centimeters.
9) A house is 16.5 feet tall. It casts a shadow that is 20.2 feet long. What is the distance from the top of the house to the end of the shadow?		10) In a right triangle, find c if a = 25.5 meters and b = 30 meters.
11) In a right triangle, find a if b = 40 inches and c = 46 inches.	12) A television is 42 inches tall. The distance from the top left corner to the bottom right corner is 60 inches. How wide is the television?	

Order of Operations

Simplify each expression. Round to the nearest hundredth.

1) $4^2 + 2(6) - 8$	2) $9 \div 3 + 6 \bullet 2 \div 2^2$	3) $20 - 4(4) - 2 + 6$
4) $9 - 6 + 2(3^2 + 4)$	5) $-10 + 4(3 - 8) + 2^2$	6) $5^2 + 6(2 \bullet 6 \div 3) - 4^2$
7) $12 - 3^2(8 - 4 \bullet 5)$	8) $-10 + 3(12 \div 6 \bullet -2)^2$	9) $2.2 \bullet 9 + 8 \div 0.4 - 6$
10) $1.5 + 2.3 - 0.75(4 \bullet 2.6)$	11) $5 - \frac{1}{2}(6\frac{1}{2} + 14 - 12\frac{2}{3})$	12) $10\frac{3}{4} + \frac{2}{5} \bullet \frac{6}{8}^1 - \frac{3}{5}^4$
13) $5^2 - 12(\frac{3}{2}^1 \bullet 3.4 - 8)$	14) $-5\frac{1}{2} + \frac{1}{4}((-4)^2 + 8)$	15) $6(3.5 \bullet 2)^2 - 18 \div 2\frac{1}{2}$