Algebra to the Core

Assessment Package

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Overview:

The Algebra to the Core Assessment Package consists of ten assessments for the ten lesson topics listed below. Each assessment consists of ten questions as follows.

2 Knowledge Questions
2 Understanding Questions
4 Concept / Mathematical Procedure Questions
2 Application Questions

Assessment / Lesson Topics

1) **Numerical Expressions**
2) **Algebraic Expressions**
3) **Polynomials (Combining and Evaluating)**
4) **Solving Equations (By Inspection)**
5) **Understanding Functions**
6) **Graphing Functions**
7) **Graphing Linear Equations (y = mx + b)**
8) **Polynomials (Factoring)**
9) **Solving and Graphing Inequalities (One Variable)**
10) **Irrational Numbers (Simplifying Expressions with Square Roots)**

ALGEBRA to the CORE
Assessment I.—Numeric Expressions & Order of Operations

Name _____ Date _____ Period _____

1) Which of the following is the correct order of operations? Circle the letter of the correct answer.

A) Parentheses, Exponents, Multiplication and Addition, Subtraction and Division
B) Parentheses, Multiplication and Division, Exponents, Addition and Subtraction
C) Parentheses, Exponents, Multiplication and Division, Addition and Subtraction
D) Parentheses, Exponents, Addition and Subtraction, Multiplication and Division

2) In the order of operations, do you multiply before you divide? Explain your answer.

3) Simplify $4 + 2(5 + 3)$.

4) Simplify $4(2)^2 + 8 \div 2 - 3$.

5) Simplify $4^2 + (13 - 10)^2 + 12 \div 4 \cdot 5$.

6) Simplify $3 + 6 \cdot 2 + 5(1 + 2) - 18 \div 3$.

7) Below is a problem that Suzie submitted for homework. Can you find her mistake? If so, explain what her mistake was and correct it.

$3^2 + 2(4 + 8 \div 2 - 1)^2$
$9 + 2(12 \div 2 - 1)^2$
$9 + 2(6 - 1)^2$
$9 + 2(5)^2$
$9 + 2(25)$
$9 + 50$
59

8) Explain why it is important to have the order of operations.

9) Sam went to Target. She bought a $12 scarf, a $25 pair of boots, a $10 case for her cell phone, and 3 bottles of lotion that cost $7 each. Since she had a $20 gift card, the numeric expression below represents how much she owes for her purchases.

Simplify the expression: $12 + 25 + 10 + 3 \cdot 7 - 20$.

10) The Cleveland Browns in their last game scored 4 touchdowns, 2 field goals and 1 safety. If a touch down is worth 7 points (including the extra point), a field goal is worth 3 points, and a safety is worth 2 points, the numeric expression below shows the total points scored in the game.

Simplify the expression: $4 \cdot 7 + 2 \cdot 3 + 1 \cdot 2$.

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Assessment II. – Algebraic Expressions

Name _____ Date _____ Period _____

1) Which of the following is not an algebraic expression?

A) $-x^2 + 1$ B) $4x + 5y$ C) $6x - 9$ D) $-5^2 + 6(4)$

2) Which word or phrase **does not** come into play when solving $9x + y$ for $x = 2$ and $y = 3$.

A) substitute B) evaluate

C) associative property D) order of operations

3) The algebraic expression $(F - 32) \cdot 5 \div 9$ is designed to convert a temperature reported in Fahrenheit degrees to Celsius degrees. Explain why the variable F is needed, instead of a constant number in its place.

4) Explain the key difference between the algebraic expressions $2x^2 + x + 4$ and $2x^2 + y + 4$. How does this difference affect the evaluation process for each expression?

5) Evaluate the expression $5x - 5y + 10$ for $x = 2$ and $y = -2$.

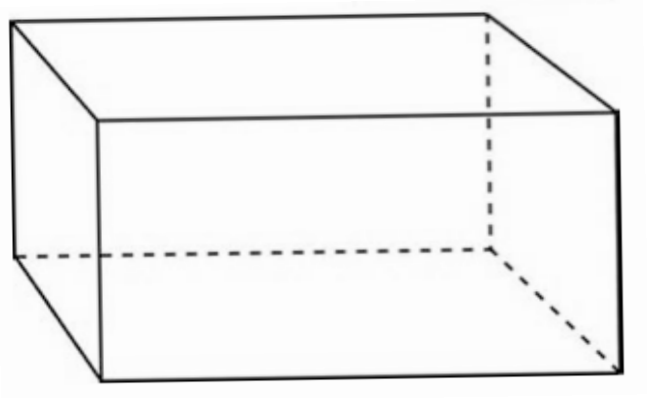
6) Evaluate the expression $2x^2 + 4x + 1$ for $x = 3$.

7) Evaluate the expression $2ab + a + b$ for $a = 1$ and $b = 6$.

8) Evaluate the expression $2(x + 2)^2 + 8 \div 4\,(x)$ for $x = 2$.

9) Use the formula $C = (F - 32) \cdot 5 \div 9$ to convert 50 degrees to Celsius.

10) The formula $S.A._{\text{rec prism}} = \mathbf{2LW + 2WH + 2LH}$ provides the total surface area of a rectangular prism with length $\mathbf{L}$, width $\mathbf{W}$, and height $\mathbf{H}$. Use the formula to calculate the total surface area of a rectangular prism with length 10 inches, width 5 inches, and height 4 inches.



ALGEBRA to the CORE
Assessment III.—Polynomials Part A

Name _____ Date _____ Period _____

For numbers 1 & 2, circle the letter of the correct answer.

1) Which of the following is the coefficient of $7x^4$?

A) 7
B) x
C) 4
D) $7x$

2) Which of the following pairs are like terms?

A) 5y, 5x
B) 3x, 3
C) 3x, 5x
D) $4x^2$, 4x

For numbers 3-7, perform the indicated operation on the given polynomials.

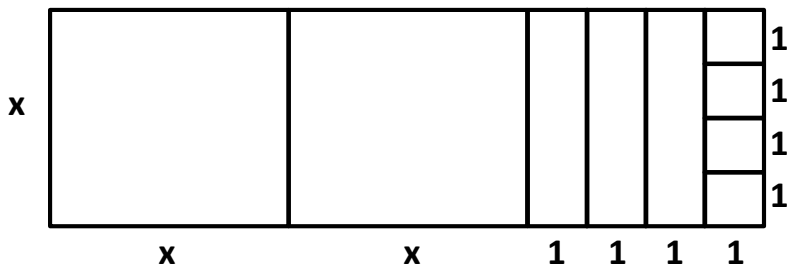
3) $(x^2 + 2x + 1) + (2x^2 + 3x + 6)$

4) $(5x^2 + 6x + 7) - (2x^2 + x + 4)$

5) $(6x^2 - 7x + 2) + (2x^2 + 3x - 6)$

6) $(2x^2 - 3x + 2) - (4x^2 - 9)$

7) Name the polynomial represented by the following diagram.



8) One of the following algebraic expressions is a polymonial and the other is not. Decide which is which, and explain why it is or why it is not a polynomial.

a) $\sqrt{3}\,x^3 + 7x^2 - .5x + 4$ b) $5x^4 - 2x^{-3} + 6x^2$

9) Add these polynomials: $(2x^2 - 4x + 5) + (x^2 + 9x - 8)$.
Next use x = 3 to verify that your answer is correct. Be sure to show your work.

10) Mike has 6 hats and 3 shirts; Bill has 4 hats and 2 shirts; and Ralph has 9 hats and no shirts. Using *h* for hats and *s* for shirts, write a simplified polynomial that represents all the hats and shirts.

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Assessment IV. – Solving Algebraic Equations

Name _____ Date _____ Period _____

1) Which number(s) make(s) the equation $4x + 20 = 2x + 30$ true?

A) 2 B) 5 C) 15 D) 20

2) Which of the following **is not** an algebraic (variable) equation?.

A) $2x + 6 = 18$ B) $5x^2 = 80$

C) $3x = 2x + 12$ D) $8x + 14 + 2x$

For problems 3 - 6, solve each equation and check your answer using substitution.

3) _____ Solve for x: $3x + 4 = 25$.

4) _____ Solve for x: $(1/2)x + 10 = 16$

5) _____ Solve for x: $2(x - 1) + 12 = 20$

6) _____ Solve for x: $-4x - 5 = -25$

7) Sarah solved the equation $5x + 10 = 30$ using a method called *Solving by Inspection.* Sarah used her finger to hide the variable term 5x.

$$\boxed{5x} + 10 = 30$$

She then noticed that the number 10 needed the number 20 on its side to balance the equation. Sarah found the correct answer $x = 4$. Explain Sarah's thinking, beyond that which has been explained so far, that led her to the correct answer.

8) Is it possible for two different equations, each with one variable, to have the same answer? Explain or show by example.

9) *Five more than twice the value of a number equals 19. What is the value of the unknown number?* Write a variable equation that represents this problem. Solve your equation and the problem. Check your answer.

10) *Kristen bought two tacos, one order of fries, and a drink. The cost of the fries and drink were $1.50 and $2.50 respectively. The total cost of the meal was $10. What was the cost of each taco?* Write a variable equation that represents this problem. Solve your equation and the problem. Check your answer.

ALGEBRA to the CORE
Assessment V.—Understanding Functions

Name _____ Date _____ Period _____

For numbers 1 & 2, circle the letter of the correct answer.

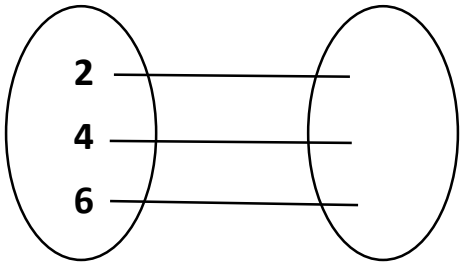
1) Which word completes the statement 'A functional relationship occurs when there is one and only one ___?___ element for each domain element.'?

A) ordered pair
B) graph
C) range

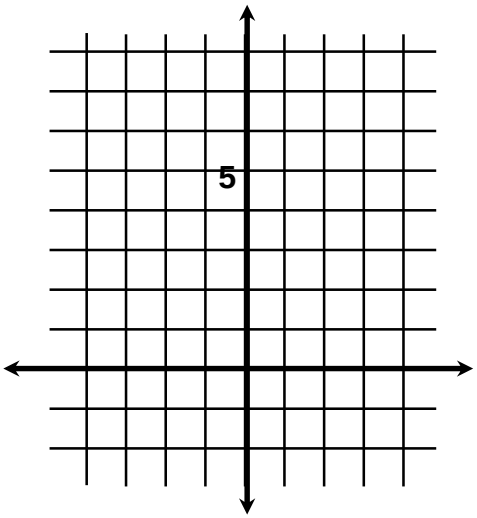
2) Which equation represents the question 'What is five more than twice the value of x?'?

A) $5 - 2x = y$
B) $x = 5y + 2$
C) $y = 2x + 5$

3) Complete the function diagram for $y = (1/2)\,x + 1$.



4) Graph the solution of the equation $y = 2x + 1$ for $x = 0$, $x = 2$, and $x = 3$. Use the coordinate plane below.



For numbers 5 & 6, circle the letter of the correct answer.

5) Which ordered pair is **not** a solution of $y = 4x + 8$?

A) (2, 16)
B) (7, 36)
C) (6, 30)

6) Which set of ordered pairs (x, y) do **not** represent a function?

A) (4, 8), (4, 12), (8, 20)
B) (2, 4), (6, 8), (10, 12)
C) (1, 0), (2, 1), (3, 1), (4, 0

7) Wind chill is a function of temperature and wind speed. The wind chill formula is $WC = t - (1/2)s$ where *WC* is wind chill, *t* is temperature, and *s* is wind speed. Compute the wind chill if the temperature is 24^{o} and the wind speed is 20 mph.

8) The best time to nap in the afternoon is 12 hours beyond the midpoint between the time you fall asleep at night and the time you wake up in the morning. When is the best nap time for a person who falls asleep at 11:00 p.m. and wakes up at 7:00 a.m.? Circle the letter of the correct answer.

A) 3:00 pm B) 1:00 pm C) 2:00 pm

9) The domain is all the students in your class. The range is each student's birth date. Does this constitute a function? Why or why not?

10) The domain is all the students in your class. The range is the name(s) of schools that each student has attended. Does this constitute a function? Why or why not?

ALGEBRA to the CORE

Assessment VI. – Graphing Functions

Name _____ Date _____ Period _____

1) A function rule is defined by the equation $f(x) = -x^2 + 1$. Assume the domain of the function is all whole numbers. Circle the quadrants that would house part of the graph. Note: the x and y axes are not considered parts of any quadrant.

I **II** **III** **IV**

2) A function rule is defined by the equation $f(x) = |x|$. Assume the domain of the function is all the integers. Which of the following best describes the range?

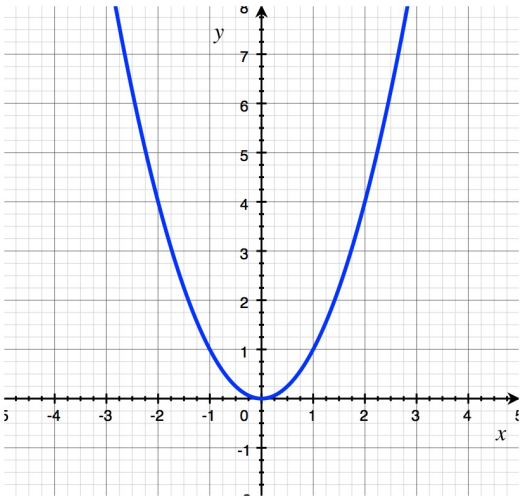
A) All real numbers

B) All the integers

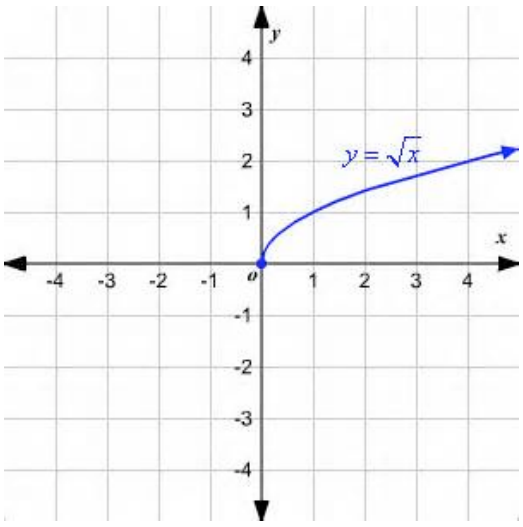
C) The whole numbers

D) All positive rational numbers

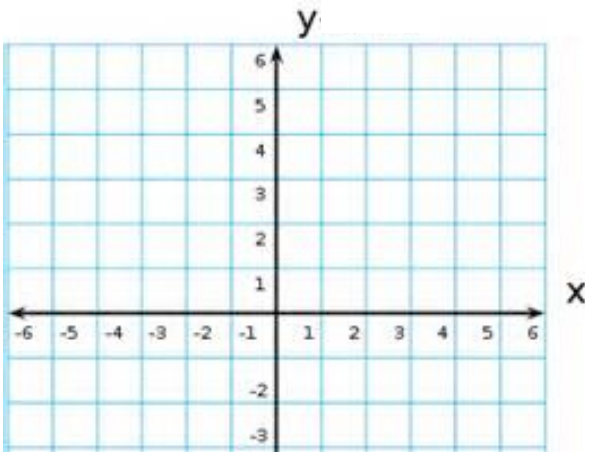
3) The graph of the function $f(x) = x^2$ is shown below. Explain how the vertical line test can be used to verify that the graph represents a function.



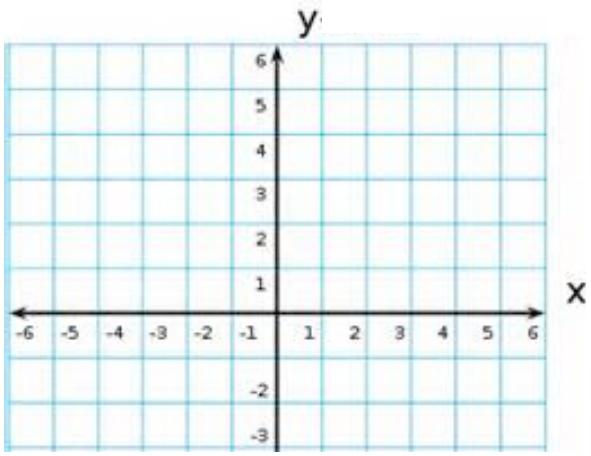
4) The graph of the function $f(x) = \sqrt{x}$ is shown below. Modify the graph so it represents the equation $y = \pm \sqrt{x}$, and explain why the new graph does not represent a function.



5) Use the domain numbers 0, 2, and 4, and plot points representing three solutions of the equation y = .5x + 4. Draw the line that represents the graph of y = .5x + 4.



6) Use the domain numbers –4, –2, 0, 2 and 4, and plot points representing three solutions of the equation y = | x | + 1. Draw the line that represents the graph of y = | x | + 1.



7) Write the question represented by the equation y = 2x + 3.

_____

8) Write the question represented by the equation $y = x^2 - 5$.

_____

9) The rule f(x) = $5.00 + .20x is used to calculate the cost of a taxi ride where x is the number of miles from the pick-up point to the point of destination. Calculate the cost of a 10 mile taxi ride.

10. The rule $g(x) = 6x^2$ is used to calculate the number of square units on all the faces of a cube (surface area). The variable x represents the edge length of a cube (side length of one of the square faces). Calculate the surface area of a cube with edge length 3 inches.

ALGEBRA to the CORE

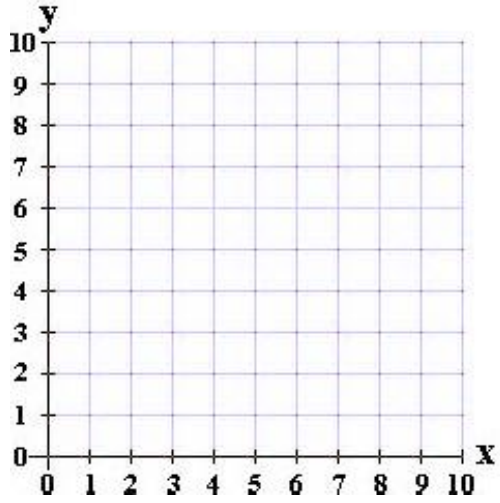
Assessment VII. – Graphing Linear Equations

Name _____ Date _____ Period _____

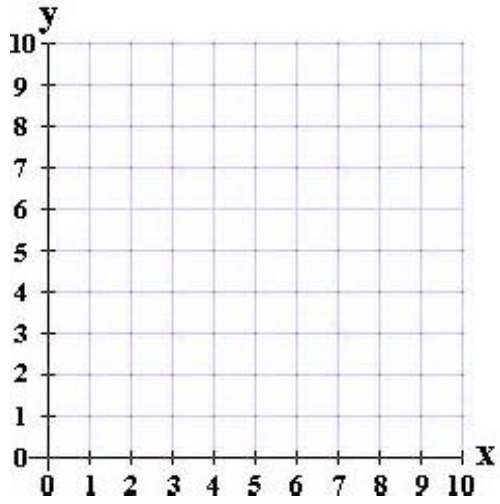
1) _____ What is the slope of the line that represents the solution of the equation y= 4x + 8?

2) _____ What is the y-intercept of the line that represents the solution of the equation y= 4x + 8?

3) Explain why the equation y= 2x + 1 is called a linear equation.



4) Explain the relationship between the slope of a linear equation and the phrase *unit rate of change*. You can use the equation y= 2x + 1 as an example.



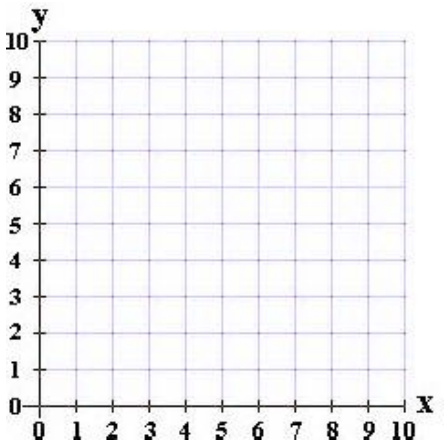
5) Complete the steps of the *intuitive method* for sketching the graph of the linear equation y= 2x – 1.

- Write the question *What is one less than* _____*?*
- Apply the question to the arbitrary numbers 0, 2, and 4.
- 2(0) – 1 = _____, 2(2) – 1 = _____, 2(4) – 1 = _____.
- Plot the points (___, –1), (2, _____), and (___, _____).
- Draw the _____ that contains the three _____ .

6) Complete the steps of the *speed method* for sketching the graph of the linear equation y= 2x – 1.

- Place a point at –1 on the ___ axis.
- Write the number 2 as a _____ .
- From the point (0, –1) move 1 space _____ and 2 spaces _____ and draw a second point at that location.
- Draw a _____ that contains the two points.

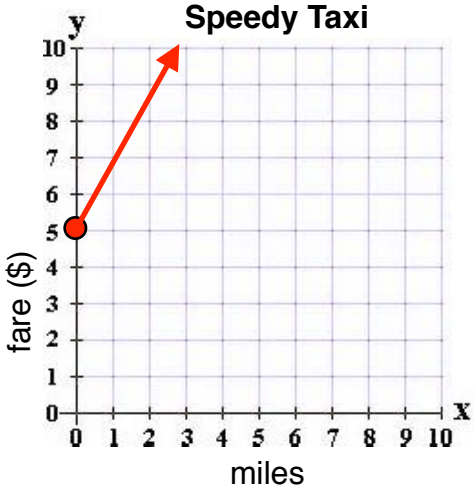
7) Sketch the graph of the solution of y = 2x + 3 on the coordinate plane.



8) Sketch the graph of the solution of y = (1/2)x + 3 on the coordinate plane.

9) Using the graph to the right, what is the pickup fee for the Speedy Taxi Company?

10) Using the graph to the right, what is the *cost per mile* for a taxi ride provided by the Speedy Taxi Company?



ALGEBRA to the CORE
Assessment VIII.—Polynomials Part B (factoring)

Name _____ Date _____ Period _____

For numbers 1 & 2, circle the letter of the correct answer.

1) Name the GCF for the polynomial $6x^3 – 15x^2 + 21x$.

A) 3x
B) 6x
C) $3x^2$

2) If a trinomial is prime then

` A) the exponents are prime
B) the coefficients are prime
C) it cannot be factored

For numbers 3-6, factor each polynomial completely.

3) $-14y – 7y^2$

4) $4x^2 – 49$

5) $x^2 + 5x – 6$

6) $2x^2 + 11x + 15$

7) Choose a value for x to verify that $6x^2 – 7x – 24$ factors into $(2x + 3)(3x – 8)$. Be sure to show your work.

8) Explain why it is possible to factor $x^2 - 25$, but it is not possible to factor $x^2 + 25$.

9) The area of a square is $x^2 - 8x + 16$. Determine the binomial that represents the measure of one side of this square.

10) Bill has 15 blocks and two crayons. Judy has 5 blocks and 3 crayons. Beth has 10 blocks and no crayons. Using "b" for blocks and "c" for crayons, write a factored polynomial representing the sum of Bill's, Judy's, and Beth's blocks and crayons.

A) 5(6b + c)
B) 5(b + 2c)
C) 5(5b + c)
D) 6(5b + c)

ALGEBRA to the CORE

Assessment IX. – Solving and Graphing Inequalities

Name _____ Date _____ Period _____

1) Match the letter of each graph with its corresponding inequality?

_____ $x > 2$ _____ $x < 2$ _____ $x \leq 2$ _____ $x \geq 2$

A) 

B) 

C) 

D) 

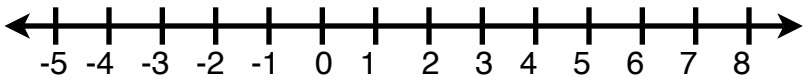
2) Match the letter of each phrase with its corresponding equation or inequality. **A) finite solutions** **B) infinite solutions**

_____ $2x + 4 > 20$ _____ $6x + 12 = 24$

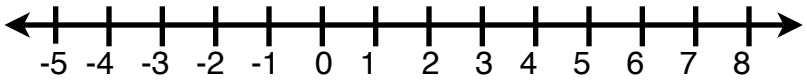
3) The solution of the inequality $ax > 4$ includes all values of x less than –1. Is the value of 'a' positive or negative? Explain your reasoning.

4) If 'a' is negative, the solution of $ax > b$ is $x < b/a$. What happened to the inequality sign? Why did this happen?

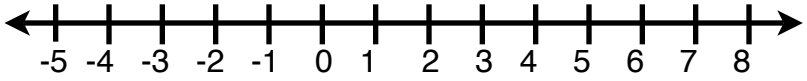
5) Sketch the graph of the solution of $x + 10 > 14$.



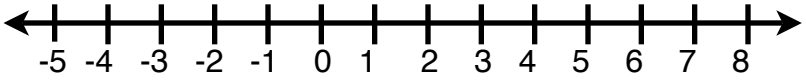
6) Sketch the graph of the solution of $x + 6 < 8$.



7) Sketch the graph of the solution of $7x + 4 \geq 18$.



8) Sketch the graph of $-3x + 4 < 10$.



9) At the Sandwich Shack the number 1 combo meal costs $6.50. Andrew only has $4.75 in his wallet, but has some extra cash in the ash tray of his car. Write an inequality that represents the problem *'What amounts of money can Andrew have in his car's ash tray that would allow him to purchase the number 1 combo meal?'*. Solve your inequality.

10) The formula $A._{rec} = \boldsymbol{LW}$ provides the area of a rectangle with length $\boldsymbol{L}$ and width $\boldsymbol{W}$. Assume the length of a rectangle is 12 inches. Write an inequality that represents the problem '*What measures of the width* $\boldsymbol{W}$ *make the area greater than 36 square inches'*. Solve your inequality.

ALGEBRA to the CORE

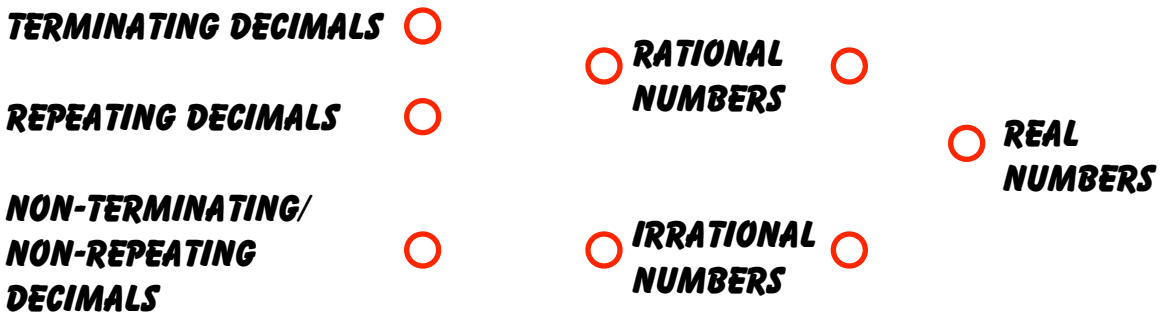
Assessment X. – Irrational Expressions

Name _____ Date _____ Period _____

1) Write the square root of each number.

$\sqrt{16}$ = _____ $\sqrt{49}$ = _____ $\sqrt{144}$ = _____ $\sqrt{0}$ = _____ $\sqrt{1/4}$ = _____

2) Draw connecting line segments that show the relationship between terminating decimals, repeating decimals, non-terminating and non-repeating decimals, rational numbers, irrational numbers, and real numbers.



3) Use the concept of decimal to explain the difference between a rational number and an irrational number.

4) Three of the following statements are **true**, and one is **false**. Which statement is false?

A) Together, the rational numbers and irrational numbers form the real numbers.
B) Rational numbers cannot be square roots of real numbers.
C) The rational numbers and irrational numbers are disjoint.
D) The square root of a prime number is an irrational number.

For problems 5 - 8, simplify each expression. Use radicals to report your final answers, not decimal approximations.

5) $\sqrt{20} + \sqrt{45}$

6) $\sqrt{8} - \sqrt{50}$

7) $\sqrt{75} + \sqrt{300}$

8) $\sqrt{24} + \sqrt{54} - \sqrt{6}$

9) The formula $s = \sqrt{A}$ provides the side length of a square when the area of the square is A square units. Use this formula to calculate the side length of a square with area = 63 square inches. Write your answer as an irrational number in simplest form.

10. The length of the hypotenuse of a right triangle with leg lengths 'a' and 'b' is given by the formula $h = \sqrt{a^2 + b^2}$. Use the formula to calculate the length of the hypotenuse of a right triangle with leg lengths 8 cm. and 4 cm. . Write your answer as an irrational number in simplest form.