Math 1 Unit 1 EOC Review

Solving Equations (including Literal Equations)

- Get the variable _____ to show what it equals to satisfy the equation or inequality

- Steps (each step only where necessary):

1. Distribute
2. Same Side Combine (like terms)
3. Opposite Sides Cancel (a variable)
4. Solve two-step equation

Concept Questions:

1. Why do we use "opposite" operations to solve an equation?

2. What does the solution to an equation represent?

3. What key words in a word problem can help determine the operations to set up an equation?

Parts of Expressions

Coefficient - _____ Variable - _____

Constant - _____ Exponent - _____

In the expression $5x^3 - 7x^2 + 4$, name the: Term(s) - _____

Coefficient(s) - _____ Variable(s) - _____ Constant(s) - _____ Exponent(s) - _____

Concept Question:

1. What is the difference between how terms are separated in expressions and how factors are separated?

Function Intro

A function is a rule in which each _____ (usually x) yields exactly one _____ (usually y).

Domain - _____ Range - _____

When we evaluate functions, we substitute the _____ variable and evaluate the expression.

Example: Evaluate h(4) for $h(t) = -4.9t^2 + 20t + 3$.

Concept Question: Write a mathematical relation that is NOT a function (has more than one y for an x) and explain.

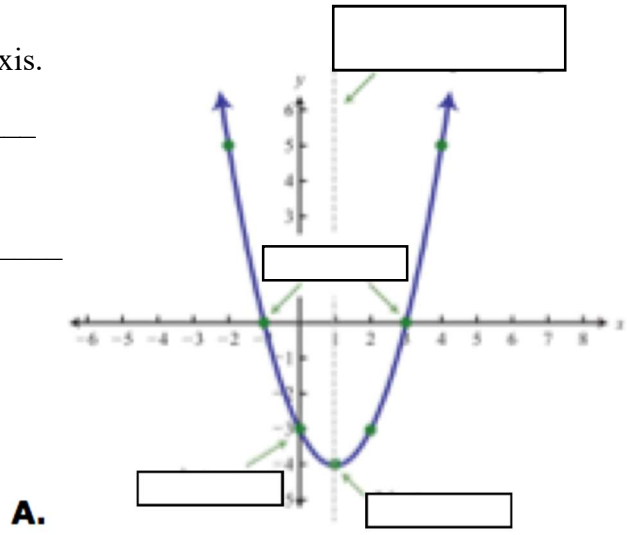
Key Features of Graphs

Intercepts: Points where a graph _____ the x or y axis.

Vertex: _____ or _____

point on a function

Axis of Symmetry: Line that cuts a function _____



A.

Concept Questions:

1. What is the x-value for every y-intercept? What is the y-value for every x-intercept? Why are these the case?

2. Does the graph of a line have a vertex? Why or why not?

Math 1 Unit 1 Sample Problems

1. The total cost, in dollars, of membership in a fitness center is given by the function $c(m) = 20m + 40$, where m is the number of months a person is a member. In dollars, how much is the cost of a membership for 1 year?

2. A company uses the formula $T = 581s + 150p$ to determine the total cost to purchase s computers and p printers. Which formula can be used to determine the number of printers purchased, given the total cost, T, and the number of computers purchased?

A $p = \frac{T}{150} - 581s$

B $p = T - \frac{581s}{150}$

C $p = \frac{T - 581s}{150}$

D $p = T - 581s - 15$

3. What is the value of x in the equation shown below?

$$2(x + 8) - 4x = 10x + 4$$

4. Two stores have movies to rent.

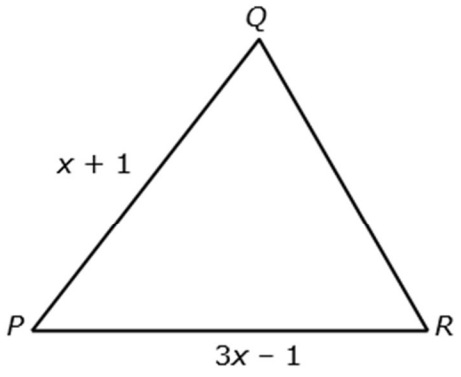
- The first store charges a \$12.50-per-month membership fee plus \$1.50 per movie rented.
- The second store has no membership fee but charges \$3.50 per movie rented.

What is the minimum number of movies a person would need to rent in a month for the first store to be a better deal?

5. The width of a rectangle is $\frac{3}{4}$ its length. The perimeter of the rectangle is 420 ft.

What is the length, in feet, of the rectangle?

6. The perimeter of the triangle below is $8x - 6$.



Which expression represents the length of $\overline{QR}$?

A $4x - 4$ B $4x - 6$ C $6x - 4$ D $6x - 8$

7. A function is shown below.

$g(x) = 19.60 + 1.74x$

What is the value of $g(30)$?

Math 1 Unit 2 EOC Review

Linear Equation/Function

$$y = mx + b \text{ or } f(x) = mx + b$$

(x, y) – Points on the line with x = _____ and y = _____

m – Slope (or _____) – constant rate by which dependent variable _____ or _____ as the independent variable increases

b – Y-Intercept – value of the equation when _____

Concept Questions:

1. In a linear function f(x) = mx + b, what are the terms, coefficients, variables, and constant?

Slope/Rate of Change

Rate of change - $\frac{Cha \quad in\_\_\_}{Chang \quad in\_\_\_}$ for any defined region. Give two points, use the formula _____

In a line, the rate of change (called _____) is _____.

Concept Questions:

1. Why does a line have a constant slope but a parabola does not?

2. What are some clues in word problems that would help indicate the slope?

Graphs of Linear Equations

For the graph to the right:

x-intercept = _____ y-intercept = _____

Slope = _____ Equation = _____

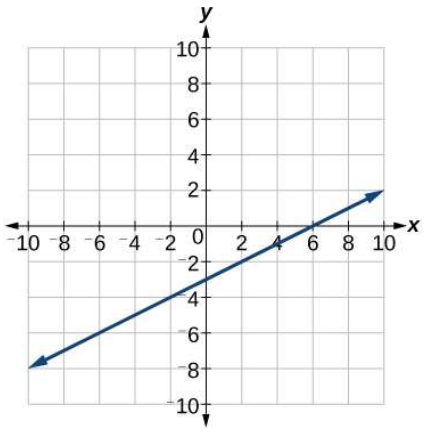


Table of values:

x	-2	-1	0	3	6	9
y			-3		0	

Concept Questions:

1. How can the x-intercept help determine the equation of the line?

2. Write a word problem that could be solved using the graph above.

Arithmetic Sequences

Arithmetic Sequence – sequence of numbers that _____ or _____ by a constant rate, called the _____.

Explicit Sequence: $a_n = a_1 + (n-1)d$ Recursive Sequence: $a_n = a_{n-1} + d$

n = _____ a_1 = _____ a_n = _____ d = _____

a_{n-1} = _____

Conceptual Questions:

1. Could the function f(x) = 3x + 2 be an arithmetic sequence? What would be a_1 and d?

2. Why are arithmetic sequences and linear functions taught in the same unit?

Scatter Plots/Correlation

Calculator Steps for Linear Regression/Plotting Scatter Plots/Getting Line of Best Fit:

1. Push STAT-EDIT-enter all (x, y) values into table (X in L_1, Y in L_2)

2. To get equation of best-fit line, STAT-CALC-LinReg (#4) _____ is the correlation coefficient

3. To graph scatterplot, 2^{nd} – STAT PLOT – Plot1…On, then choose options

Concept Questions:

1. How can a linear regression (line of best fit) help solve problems?

2. If most of the points on a scatterplot are far from the line of best fit, what will the r value be close to? How do you know?

Math 1 Unit 2 Practice Problems

1. The function $f(x) = -0.25x + 5$ models the height of a candle x seconds after it is lit. What is the meaning of the y-intercept of the function?

A the initial height of the candle

B the final height of the candle

C the rate at which the candle is burning

D the amount of time it will take the candle to burn

2. Water is being pumped into a 10-foot-tall cylindrical tank at a constant rate.

- The depth of the water is increasing linearly.
- At 1:30 p.m., the water depth was 2.4 feet.
- It is now 4:00 p.m., and the depth of the water is 3.9 feet.

What will the depth (in feet) of the water be at 5:00 p.m.?

3. A statistician collected the following data to explore the relationship between two variables, x and y.

x	*y*
2.3	11.0
4.2	16.5
5.1	19.2
6.4	23.1
8.2	24.3
8.5	29.5

Which data point did the statistician exclude?

A (2.3, 11.0)

B (4.2, 16.5)

C (6.4, 23.1)

D (8.2, 24.3)

The statistician performed a linear regression and also plotted the residuals.

- Based on the residual plot, the statistician decided to exclude one data point.
- The statistician then performed linear regression on the set of remaining data points.
- The result was that the new linear model fit the remaining data more closely than the original model fit the original data.

4. Which choice could be modeled by a linear function?

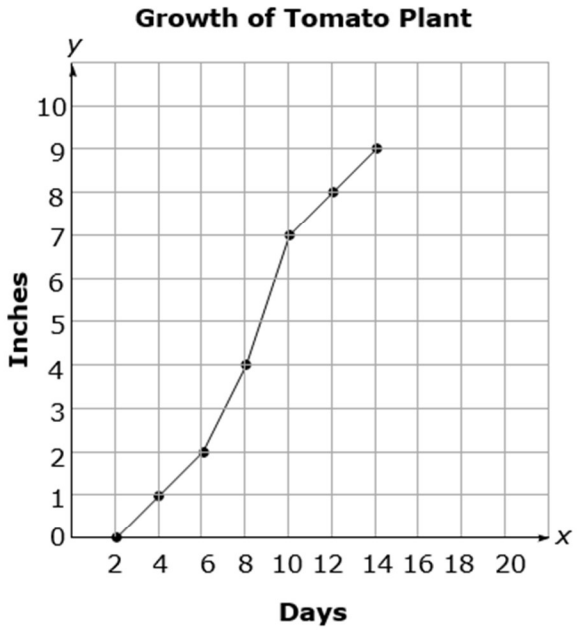
A the amount of money, y, in an account after x years earning 4% interest compounded annually

B the monthly cost, y, to use a cell phone for x minutes at a rate of 4 cents per minute

C the height, y, of a ball after bouncing x times, if each bounce reaches $\frac{2}{3}$ the previous height

D the amount, y, of radioactive material remaining after x years when decay occurs at a rate of 30% each year

5. Oscar planted a tomato seed in his garden. Each day he recorded the height of the tomato plant.



During which interval did the tomato plant grow the fastest?

A Day 4 to Day 6

B Day 6 to Day 8

C Day 8 to Day 10

D Day 10 to Day 12

6. The function $a(n) = 3n - 7$ represents the value of the nth term in a sequence. What is the sum of the 1st and 5th terms of the sequence?

7. The table below shows the U.S. average life expectancy at birth, in years, in various decades.

Years since 1930	Life Expectancy at Birth
10	62.9
20	68.2
30	69.7
40	70.8
50	73.7
60	75.4
70	77.0
80	78.7

What is the meaning of the slope of the linear best-fit equation for the data?

A The predicted average life expectancy at birth in 1930 was about 62.7 years.

B The predicted average life expectancy at birth in 1930 was about 57.6 years.

C The average life expectancy at birth increases by about 6.7 each year.

D The average life expectancy at birth increases by about 0.2 each year.

8. The table below shows the number of hours 7 students studied for a math test and the grade each student earned on the test.

Student	Hours Studied (x)	Test Grade (y)
Mary	2.00	84
Jonathan	1.75	86
Susan	2.00	88
Terry	3.00	94
Patrick	3.50	95
Amanda	3.50	93
Darius	2.25	89

How does Amanda's test score compare to the score predicted using the linear best-fit model of data for a student who studied 3.50 hours?

A Amanda scored about 5 points lower than the score predicted for a student who studied 3.50 hours.

B Amanda scored about 5 points higher than the score predicted for a student who studied 3.50 hours.

C Amanda scored about 2 points lower than the score predicted for a student who studied 3.50 hours.

D Amanda scored about 2 points higher than the score predicted for a student who studied 3.50 hours.

9. Marcus measured the height, in inches, y, of plants over the course of 3 weeks. The correlation coefficient between the number of days, x, and the height of the plants is 0.85. Which could be concluded based on the correlation coefficient of the data?

A There is a strong relationship showing that as the number of days increases, the height of the plants increases.

B There is a strong relationship showing that as the number of days increases, the height of the plants decreases.

C There is a weak relationship showing that as the number of days increases, the height of the plants increases.

D There is a weak relationship showing that as the number of days increases, the height of the plants decreases.

10. The table below displays the walking heart rate and running heart rate of eight girls in beats per minute (bpm).

Walking Heart Rate	Running Heart Rate
66	128
72	136
74	134
78	138
80	142
84	146
86	148
88	152

Using the linear best-fit model for the data, what is the predicted running heart rate of a girl whose walking heart rate is 100 bpm?

A 161 bpm

B 163 bpm

C 165 bpm

D 167 bpm

Math 1 Unit 3 EOC Review

Midpoint and Distance on the Plane

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

(Or use the Pythagorean Theorem!) **(Or just average the x and y coordinates!)**

Concept Questions:

1. How is the distance formula the same as the Pythagorean Theorem?

2. Why do we divide by 2 to compute the midpoint?

Parallel and Perpendicular Slopes

Parallel lines - _____ intersect, have _____ slope

Perpendicular lines – Intersect at _____, have _____ slopes

(For a perpendicular line, flip the _____, flip the _____)

Concept Question:

1. If a triangle has two sides with opposite reciprocal slopes, what kind of triangle is it? How do you know?

Graphing Inequalities

To graph inequalities, first graph the _____ that represents the bound for the inequality.

If the inequality is < or >, use a _____ line. If the inequality is ≤ or ≥, use a _____ line.

Then, shade _____ if y > or ≥ the expression, shade _____ if y < or ≤ the expression.

Concept Question:

1. How many solutions are there for an inequality? Why?

2. To solve a system of two inequalities by graphing, how can you tell which region represents the solution?

Solving Systems of Equations

System of Equations - _____ equations with the same _____

Methods to solve:

Graphing	Substitution	Elimination
- Graph both equations - The solution to the system is the _____ of the two graphs.	- Solve one equation for a variable - _____ the expression for the variable in the other equation - Solve the equation for the first variable, then _____ again to solve for the second variable	- Multiply one or both equations if necessary to get _____ or _____ terms - Add or subtract the two equations (Same terms _____, Opposite terms _____) - Solve the "answer" equation for the first variable, then _____ to solve for the second variable

Systems that are parallel lines have _____ solutions, while systems with the same line have _____ solutions.

Examples: $y = -2x + 8$
$y = x - 1$

$7x + 6y = -9$
$y = -2x + 1$

$2x + 4y = 36$
$3x - 4y = -6$

Concept Question:

1. When is it easiest to solve a system by graphing, substitution, or elimination? Why?

Geometric Shapes Review

Quadrilateral: Polygon with _____ sides

Parallelogram: Quadrilateral with opposite sides _____ AND _____

Rectangle: Quadrilateral with four _____ opposite sides _____ and _____

Square: Quadrilateral with all sides _____, opposite sides _____, and all _____ angles

Rhombus: Quadrilateral with all sides _____ and opposite sides _____

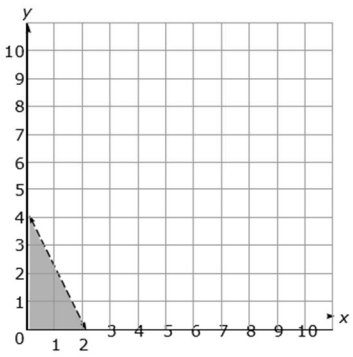
Trapezoid: Quadrilateral with one pair of _____ sides

Math 1 Unit 3 Practice Problems

1. In which graph does the shaded region represent the solution set for the inequality shown below?

$$2x - y < 4$$

A



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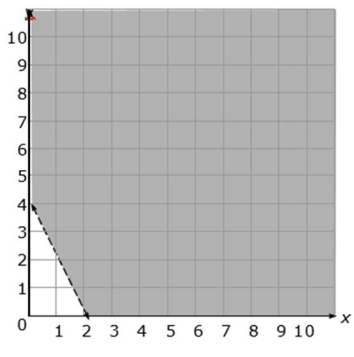

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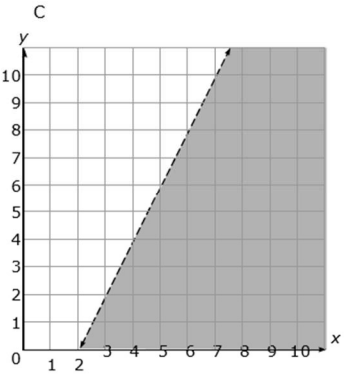

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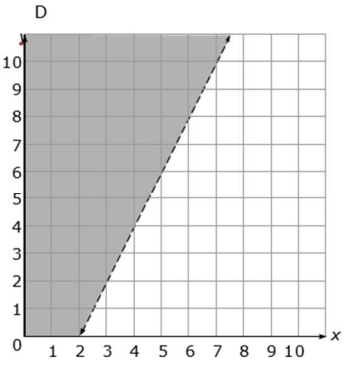


2. A line, $y = mx + b$, passes through the point (1, 6) and is parallel to $y = 4x + 6$. What is the value of b?

3. Joanna has a total of 50 coins in her purse.

- The coins are either nickels or quarters.
- The total value of the coins is $7.10.

Which system of equations can be used to determine the number of nickels, n, and quarters, q, that Joanna has in her purse?

A $n + q = 50$
$0.05n + 0.25q = 7.10$

B $n + q = 7.10$
$50n + 50q = 7.10$

C $0.05n + 0.25q = 50$
$n + q = 7.10$

D $0.05n + 0.25q = 7.10$
$50n + 50q = 7.10$

4. What is the value of x in the system of equations shown below?

$$5x + 4y = 1$$

$$y = 1 - x$$

5. Three systems of equations are shown in the table below.

Place (click and drag) the choice that describes the number of solutions of each system into the appropriate column in the table below.

$2x + 2y = 16$ $4x + 3y = 27$	$2x + 2y = 8$ $4x + 4y = 16$	$2x + 3y = 12$ $2x + 3y = 18$

one solution	no solution	infinitely many solutions

6. Which equation represents the line that is perpendicular to the graph of $4x + 3y = 9$ and passes through $(-2, 3)$?

A $3x - 4y = -18$ B $3x + 4y = 18$ C $3x - 4y = -6$ D $3x + 4y = 6$

7. Karen has two dogs. The larger dog weighs 1.4 pounds more than the smaller dog. The combined weight of the two dogs is 12.6 pounds. What is the weight, in pounds, of the smaller dog?

8. Place (click and drag) one option from each of the lists below into its corresponding box to create an equation of the line that passes through the point $(1, -10)$ and is perpendicular to $y = -\frac{1}{3}x + 5$.

$y =$ [1] [2] [3]

1	2	3
$-\frac{1}{5}x$	+	1
$-\frac{1}{3}x$	−	5
$3x$		10
$5x$		13

9. Two functions are shown below.

$$f(x) = 3x + 7$$

$$g(x) = 2x + 12$$

What is the value of x where the graphs of $f(x)$ and $g(x)$ intersect?

A -22 B -5 C 5 D 22

10. The vertices of a rectangle are located at $(1, 2)$, $(5, 0)$, $(2, -6)$, and $(-2, -4)$. What is the area of the rectangle in square units?

A 20 B 30 C 35 D 45

11. What is the midpoint of the longest side of the triangle with vertices $(1, 4)$, $(3, 4)$, and $(3, 6)$?

A $(1, 1)$ B $(2, 4)$

C $(2, 5)$ D $(3, 5)$

Math 1 Unit 4 EOC Review

Exponential Function Form

$y = ab^x$ (Growth or Decay)

y = _____ a = _____

b = _____ x = _____

When the rate is given as a percent, convert it to a decimal and write as _____ for growth and _____ for decay.

Concept questions:

1. Why do we use 1 ± r for the b value when r is given as a percent?

2. Why is the rate of change for an exponential function NOT constant as it is for a linear function?

3. Which increases faster – exponential functions or linear functions? Why?

Rewriting Exponents

Exponent Rules: $x^a \cdot x^b$ = _____ $\frac{x^a}{x^b}$ = _____ $(x^a)^b$ = _____

x^{-a} = _____ $\sqrt{x^a}$ = _____

Concept Questions:

1. Why does the power rule $(x^a)^b = x^{ab}$ apply for exponents with common bases?

2. Why does taking the square root of an exponent divide the exponent by 2?

Geometric Sequences

Geometric Sequence – sequence of numbers that _____ by the same number to compute the next term. The number multiplied is called the _____.

Explicit Sequence: $a_n = a_1(r)^{n-1}$ Recursive Sequence: $a_n = ra_{n-1}$

n = _____ a_1 = _____ a_n = _____ r = _____

a_{n-1} = _____

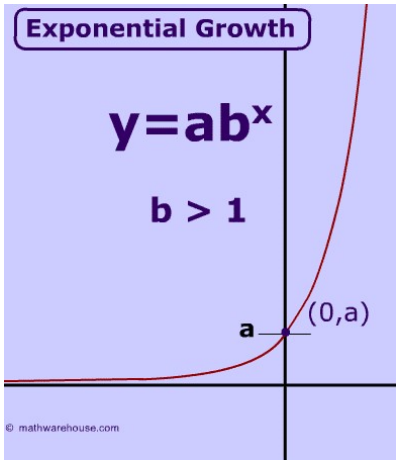
Conceptual Questions:

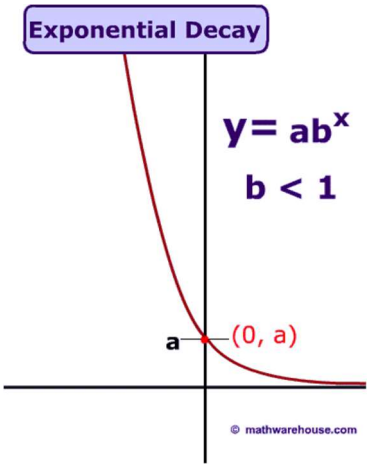
1. Could the function $f(x) = 3(2)^x$ be an arithmetic sequence? What would be a_1 and r?

2. Why are geometric sequences and exponential functions taught in the same unit?

Exponential Graphs

Exponential functions are _____, with the parent function either increasing _____ or decreasing to the _____.





Concept Questions:

1. Why is the *a* value the y-intercept of the parent function for exponential functions?

2. Why does a *b* value between 0 and 1 decrease?

3. Why does an exponential parent function not have negative values?

Math 1 Unit 4 Practice Problems

1. Two functions are shown below.

$$f(x) = \frac{1}{2} \cdot 2^x$$

$$g(x) = 5x + 2$$

What is the largest integer value of x such that $f(x) \leq g(x)$?

2. A club began with 3 members. Each month, each member brought one new member. Which function can be used to determine the number of members x months after the club began?

A $f(x) = 2x + 3$ B $f(x) = 3x + 1$

C $f(x) = 1.5(2)^x$ D $f(x) = 3(2)^x$

3. Every ten years, the Census counts how many people are living in every town in the United States.

- The 2010 Census showed that 1,000 people were living in Appleville, and 4,000 people were living in Bridgetown.
- The population of Appleville is predicted to double every ten years.
- The population of Bridgetown is predicted to increase by 1,000 every ten years.

If the predictions come true, what will be the first census year that will show Appleville with a larger population than Bridgetown?

4. Select (click) each situation that can be modeled with a linear function.

A taxi charges an initial fee of \$2.00, and \$1.50 for each additional mile.

The population in a town decreases by 15% each year.

An airplane flying at an altitude of 33,000 feet descends at a rate 20 feet per minute.

A pizza restaurant charges \$5.50 per pizza, and \$0.50 for each additional topping.

Math 1 Unit 5 EOC Review

Polynomial Operations

Multiplying: _____ terms times EVERY other term

To distribute _____, write the polynomial in parentheses and _____.

Adding or subtracting: _____.

Remember, you can NOT operate with _____ in the calculator!

Example 1: $(2x - 3)^2$

Concept Questions:

1. What is the difference between $2x + 2x$ and $2x(2x)$?

2. Write two polynomials that you can NOT multiply using the "FOIL" trick, and explain why not.

Factoring

GCF	$x^2 + bx + c$	$ax^2 + bx + c$	Perfect Squares	
$10x^2 - 5x$	$x^2 - 9x - 22$	$3x^2 - 13x - 10$	$x^2 - 49$	$5x^3 + 500x$

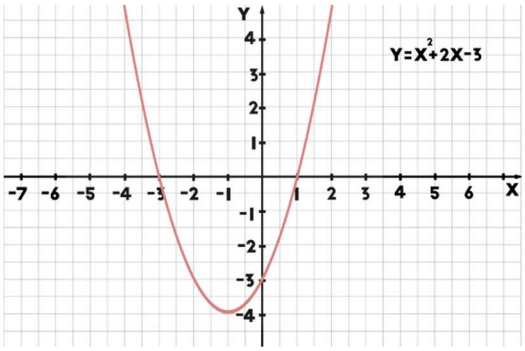
Concept Questions:

1. Why is $a^2 - b^2$ NOT the same as $(a - b)^2$?

2. Why can we NOT just find two numbers that add to *b* and multiply to *c* to factor a trinomial with $a > 1$?

Quadratic Graphs

The shape of the graph of a quadratic function (with degree, or _____, of 2) is a _____.



$f(x) = ax^2 + bx + c$

$f(x) = x^2 + 2x - 3$

X-Intercepts	Y-Intercept	Open Up or Down	Vertex	Axis of Symmetry
_____	_____	$a > 0$ - _____	_____	_____
		$a < 0$ - _____		

Concept Questions:

1. Why is the y-intercept equal to the *c* value?

2. Why are the x-intercepts the same as the solutions equal to 0?

Solving by Factoring

To solve a quadratic by factoring, set the expression equal to 0, factor, and _____.

You will get _____ solutions when solving a quadratic equation.

If both solutions are the same, the solution is a _____, and the _____ is on the x-axis.

Example: $x^2 - 5x = 14$

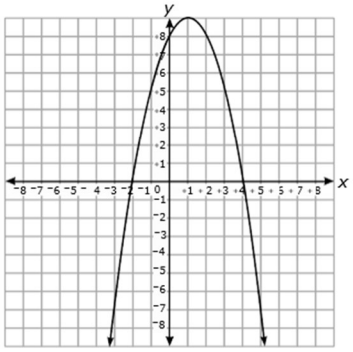
Concept Questions:

1. Why is it necessary to set the quadratic equal to 0 before solving?

Math 1 Unit 5 Practice Problems

1. Which choice is the graph of $y = (4 - x)(x + 2)$?

A



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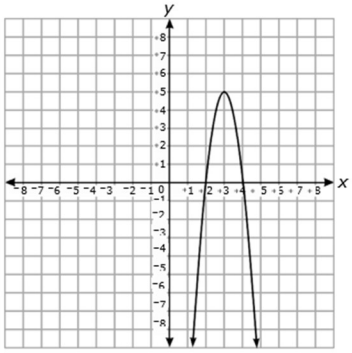

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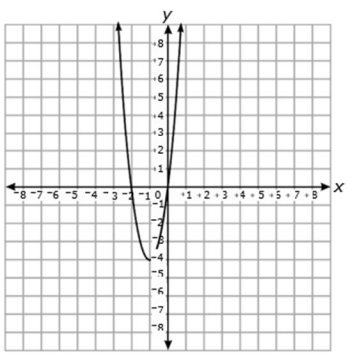

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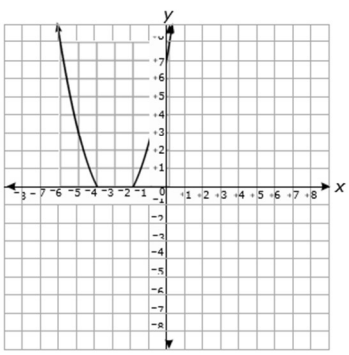

2. Which expression is equivalent to $(x + 2)(3x - 3)$?

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

3. A company models its net income, in thousands of dollars, with the function $f(x) = 9x^2 - 54x - 144$, where x is the number of units of its product sold. How many units of its product does the company need to sell in order for the net income to equal \$0?

4. What is the value of the positive zero of the function, f, defined by $f(x) = x^2 - 121$?

5. What is the value of the smaller zero of the function $f(x) = 2x^2 - 8x - 24$?

6. What is the distance, in units, between the y-intercept of $f(x) = x^2 + 7x - 18$ and the y-intercept of the linear function that passes through the points shown in the table below?

x	$g(x)$
$^-5$	2
10	11
25	20
60	41

7. Two functions are shown below.

$$f(x) = 3x^2 + 14x - 5$$

$$g(x) = 11x + 13$$

Select (click) the points at which the graphs of the two functions intersect.

$(^-5, 0)$ $(^-3, ^-20)$ $(2, 35)$ $(6, 79)$

8. What are the solutions to the equation $4x^2 - 52x + 169 = 121$?

A $\{1, -12\}$ B $\{-1, 12\}$ C $\{-1, -12\}$ D $\{1, 12\}$

9. David has a rectangle and a right triangle.

- The length of the rectangle is 5 more than its width, w.
- The length of the shorter leg of the triangle is equal to the rectangle's width.
- The length of the longer leg of the triangle is twice the length of the rectangle.

Which function, $f(w)$, represents the combined area of the rectangle and the triangle?

A $f(w) = 2w^2 + 10w$

B $f(w) = 3w^2 + 15w$

C $f(w) = w^2 + 10w + 25$

D $f(w) = w^2 + 15w + 50$

10. What is the distance between the y-intercept of the function $f(x) = 2x^2 - 6x + 3$ and the y-intercept of the linear function g represented by the table below?

x	$g(x)$
-5	15
-2	3
2	-13
5	-25

A 2 units B 3 units C 8 units D 9 units

11. A rectangle has a perimeter of 64.

- Let x equal the width of the rectangle.
- Let y equal the area of the rectangle.

Which equation can be used to find the area of the rectangle?

A $y = x^2 - 64x$ B $y = -x^2 + 64x$

C $y = x^2 - 32x$ D $y = -x^2 + 32x$

Math 1 Unit 6 EOC Review

Representations of Data

Very large quantities of data can be seen much easier using a _____ or _____ than a _____.

We can create these using our calculators to easily interpret the data.

_____ are preferable for showing actual values within the data.

_____ are preferable for showing the spread of the data.

Concept question:

1. Why are dot plots not preferable for a survey of an entire high school with 2000 students?

Measures of Central Tendency (Mean, Median, IQ Range, SD)

Mean - _____

Median - _____

Interquartile Range - _____

Standard Deviation - _____

Concept Question:

1. Explain the potential relationship between the IQR and standard deviation for a box plot with very short whiskers and long boxes.

Outlier Effects

Outlier - _____

An outlier generally has a larger effect on the _____ and _____ of a data set than the _____ and _____.

Concept Question:

1. Why does an outlier not greatly affect a median, but it can have a great effect on a mean?

Math 1 Unit 6 Practice Problems

1. A set of nine data points is shown below.

8, 11, 12, 10, 9, 7, 5, 3, 9

Which statement is true if a tenth data point of 45 is added to the data set?

A The mean and median will both increase.

B The mean will increase and the median will decrease.

C The mean will increase and the median will remain the same.

D The mean and median will both decrease.

2. The choices below are data sets. In the choices, w is a constant. Each choice has the same mean. Which choice has the greatest standard deviation?

A $w - 2, w - 1, w, w + 1, w + 2$

B $w - 2, w - 2, w, w + 2, w + 2$

C $w - 3, w - 1, w, w + 1, w + 3$

D $w - 3, w, w, w, w + 3$

3. Abby scored 87, 93, 96, and 89 on her first four history quizzes. What score does Abby need to get on her fifth quiz to have an average of exactly 91 on her history quizzes?

A 90 B 94 C 98 D 100

4. The table below shows the weights of 8 different bears at a zoo.

Type of Bear	**Weight** (pounds)
Asiatic Black Bear	225
Black Bear	300
Brown Bear	550
Panda Bear	200
Polar Bear	1,000
Sloth Bear	300
Spectacled Bear	280
Sun Bear	100

If the weight of the polar bear is removed, which statement is true?

A The mean decreases more than the median because the polar bear is a high outlier.

B The mean decreases less than the median because the polar bear is a high outlier.

C The mean decreases more than the median because the high value balances the low value.

D The mean decreases less than the median because the high value balances the low value.