# ALGEBRA ONE NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# SEMESTER ONE REVIEW

This review does NOT cover everything that will be on the midterm assessment. It does, however, give a broad sample of topics from the first semester. For a comprehensive review of the entire semester, refer to your unit tests, checkpoints, practice problems in the textbook and the objectives sheets.

# Consider the equation 70 = $\frac{x+y}{2}-3$. Solve for y.

Translate each sentence into an equation (you do NOT need to solve).

1. Ten less than the quotient of a number and five is two hundred.
2. Twenty-four is double the quantity of a number plus six.
3. Circle the step in this solution where the student made a mistake in solving. Show how to correctly solve.

25 = 11w + 8 – 14w + 5

 +14w +14w

25 = 25w + 13

-13 -13

12 = 25w

25 25

$\frac{12}{25}$ = w

Solve.

|  |  |
| --- | --- |
| 1. $\frac{3x}{5}- 18 = -3$
 | 1. $7= \frac{3x-10}{2}$
 |

1. Which of the following are true about the square on the right? Circle ALL that apply.

6b

|  |  |  |  |
| --- | --- | --- | --- |
| 1. Area = 36b2
 | 1. Perimeter = 12b2
 | 1. Perimeter = 24b
 | 1. Perimeter = 24b4
 |

# The width of a rectangle is eight inches shorter than five times the length.

# a. Label the diagram to represent this figure. Let L = length.

# b. Write a variable expression for the perimeter.

1. Solve. $\frac{x-10}{2x+6}=\frac{5}{36}$
2. Solve. $\frac{x}{2}=\frac{x+6}{8}$
3. The directions on a bottle of weed killer say to mix ¼ cup of solvent per one gallon of water to cover an area of 2500 ft2. Janelle knows her lawn is approximately 9000 ft2. Write a proportion to find the amount of weed killer solvent Janelle will need to use for her lawn.

Solve.

|  |  |
| --- | --- |
| 1. –2x + 4 = -3x + 16.
 | 1. -25 = -3 + 2(p-4)
 |

1. Graph the equation f(x) = $\left|x-2\right|$

What is the transformation from the parent function?

Domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_Range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Line of symmetry: \_\_\_\_\_\_\_\_\_\_\_\_\_

y-intercept: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

What is the vertex: \_\_\_\_\_\_\_\_\_ Is it a maximum or minimum?

1. Graph the equation f(x) = $(2)^{x}$+ 3

What is the transformation from the parent function?

Is the function increasing or decreasing?

Domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_Range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Asymptote: \_\_\_\_\_\_\_\_\_\_\_\_\_

y-intercept: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Use the table to answer the following:

|  |  |
| --- | --- |
| x | y |
| -4 | -1 |
| -3 | 0 |
| 0 | 1 |
| 5 | 2 |
| 12 | 3 |

Transformation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_Range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

y-intercept: \_\_\_\_\_\_\_\_\_\_\_\_\_\_



1. Graph the equation y = -(x + 2)2 - 3

Transformation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What is the vertex? \_\_\_\_\_\_\_ Is this a maximum or minimum?

 Domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_Range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

y-intercept: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Write and sketch** an absolute value function with a range of y < 4.

1. **Write and sketch** a quadratic function with a minimum at (0, -3).
2. **Write and sketch** a square root function whose domain is x > 4.
3. Which families do NOT have a domain of all real numbers?
4. Which families do NOT have a range of all real numbers?
5. What is the inverse of f(x)= x2 (when the domain is restricted to x ≥ 0)?

1. Eight ounces of a hot beverage are poured into a ceramic mug. Every minute, the temperature of the liquid is measured. The experiment is repeated with five different beverages (coffee, tea, plain water, hot chocolate, hot cider). The results show a scatterplot whose line of best fit has a correlation coefficient of
-0.7. What does this mean? Draw a scatterplot that could model the scenario and circle all correct descriptions from the list below.
	1. There is a not a relationship between time and temperature.
	2. As the number of minutes increases, the temperature decreases.
	3. As the number of minutes increases, the temperature increases
	4. The line of best fit is a decreasing line.
	5. The line of best fit is an increasing line.

##  Use the tables to graph the original function and its inverse.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| f(x) = $x^{3}+ 2$

|  |  |
| --- | --- |
| x | y |
|  -2 -10123 |  |

 |  |

|  |  |
| --- | --- |
| x | y |
|  |  |

 | Write the equation of the inverse.f(x) = |

# Pete’s Plumbing charges $48 to come to your house and diagnose the problem, and eighty dollars per hour to do the repair. Christina recently hired Pete’s Plumbing to do some work on her sink. Her bill was $408.

#  Write an equation to model this scenario. Let H = the number of hours worked.

* 1. What is the rate of change for this scenario including units?
	2. How many hours did the plumber work?
	3. What is the y-intercept? What does the y-intercept mean in the context of this scenario?
1. Jessica is starting a business selling pencils. She spends $10 on advertising supplies and two cents per pencil. Let E = total expenses. Let p = number of pencils.

|  |  |
| --- | --- |
| p | E |
| 10 |  |
| 50 |  |
| 100 |  |

1. Fill in the table of values for Jessica’s expenses in starting her business.
2. Write an equation to model the relationship.
3. Is your equation directly proportional? Why or why not?
4. What is the range for this scenario?
5. How many pencils did Jessica purchase if her total expense was $15?
6. A hot air balloon takes off at 9:00 am. It rises according to the values shown in the table.

|  |  |
| --- | --- |
| mins | height |
| 5 | 30 |
| 10 | 60 |
| 20 | 120 |

1. Write a function to model the relationship between the minutes since
 take off and the height above the ground.
2. At what time will the balloon be 72 feet above the ground?
3. Explain why the function you wrote is an example of a directly proportional relationship.
4. The table shows the relationship between time after take-off and altitude above the runway for a plane.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| secondsafter take-off | 30 | 60 | 90 | 120 | 150 |
| feet above runway | 1680 | 3360 | 5040 | 6720 | 8400 |

1. Write a function that models the
relationship shown in the table.
Let A = altitude in feet,
let t = time in seconds.

time (s)

altitude (ft)

1. Sketch a graph to model the information in the table.

1. A second plane rises according to the equation
A = 64t. Is the second plane rising more slowly
or more quickly than the first plane in part A?
How do you know?

1. The scatter plot at the right shows the temperature in an oven over time as it preheats. The oven will stop heating when it reaches 350°.

5

70

minutes

temperature

Let m = minutes

Let T = temperature

(10 min, 350°)

1. Write the equation for the line of fit for
the increasing portion of the graph.

(2 min, 126°)

1. Identify the range for the increasing
portion of the graph
2. Write an equation for an oven whose
temperature increases more slowly while
preheating.
3. Write the equation of a line through (3, -5) with an undefined slope.
4. Write the equation of a vertical line with an x-intercept of (4, 0).
5. A certain SUV holds 20 gallons of gas when the gas tank is full. The vehicle uses 1 gallon of gas for every 22 miles driven.
	1. Write an equation to represent the relationship between number of gallons of gas in the tank and # of

 miles that can be driven. Let m = number of miles driven. Let G = number of gallons in the tank.

* 1. Is this equation directly proportional? Why or why not?
	2. How many miles can be driven when there is one-quarter tank of gas left in the car.
	3. What is the domain of this scenario?
	4. What is the range of this scenario?
1. You had to be thrifty as you were purchasing gifts for all of your friends this holiday. You spent the same amount of money on each friend. After buying gifts for 7 friends, it cost you $112.
	1. What is the rate of change for this scenario? Be sure to include units.
	2. Write an equation to represent this scenario.
	3. Is this scenario directly proportional? How do you know?
2. Your neighborhood has just been dumped on with snow! You decide to help out your closest 12 neighbors and shovel their driveways. You know that you can shovel 3 driveways every **two** hours.
	1. Write an equation to represent the relationship between number of driveways still to be shoveled and

 time. Let x = hours and y = # of driveways left to shovel.

* 1. What is the domain of this scenario?
	2. What is the range of this scenario?
	3. If you start shoveling driveways at 10am, at what time will you have all the driveways shoveled?
1. a. Write the equation of the line that passes through the points (7, -4) and (7, 1) and identify its slope.
2. Write the equation of a line parallel to the equation in part a.
3. Write the equation of a line perpendicular to the equation in part b.
4. Write the equation of a line through (2, 5) perpendicular to $y= \frac{1}{3}x-4$.
5. Write the equation of a line through (6,5) parallel to $y= \frac{1}{3}x-4$.
6. Are the equations 2y – 4x = 3 and y = -2x parallel, perpendicular or neither? Explain your reasoning.

1. Give an example of two perpendicular lines that are both directly proportional.
2. Explain why you cannot have two parallel lines that are both directly proportional.

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x

y

1. Explain and demonstrate how to graph 4y + 3x = 24

x-intercept: y-intercept:

1. Write the equation of the line through the points (-2, 7) and (1, -5) in point-slope form.
2. Write the equation of a line through the point (3,5) that is parallel to x = -1.
3. Write the equation of a line through the point (-4,-2) that is perpendicular to y = 5.
4. The equation 25x + 50y < 200 represents a budget for back to school clothes shopping. Let x = # of shirts purchased and y = # of pairs of jeans purchased.

	1. How much money do you have to spend? How much do shirts cost? How much do jeans cost?
	2. If this scenario were graphed, what is the x-intercept?
	 What does this mean in terms of the scenario?
	3. How many shirts could you purchase if you buy 3 pairs of jeans?
	4. Identify the domain and range of this scenario.
	5. Sketch a graph of this scenario. Label the axes.

1. Graph the equation. y – 3 = -2(x + 5)
2. Graph the equation. y – 3 = 0(x + 4)

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x

y

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x

y

1. Solve the following system by **elimination**. 2m + n = 15, 3m + 3n = 15

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x

y

1. Solve the following system of equations by **graphing**. x + y = 3, y = 2x + 6
2. Solve the following system of equations by **substitution**. -x + y = 4, 4x – 3y = -10
3. Given the equations 2y + 2 = 4x and 3y – 6x = -3, explain how you determine how many solutions this system will have.
4. Solve the following system of equations using the method of your choice. 4x + 2y = 8, y = -2x + 4
5. Find the value of y for which the two functions will be equivalent. f(x) = 2x + 6, f(x) = -4x - 12
6. Given the following system of equations, circle **ALL** answers that apply. y = x – 2, 2y – 6 = 2x

|  |  |  |
| --- | --- | --- |
| 1. parallel lines
 | 1. lines intersect once
 | 1. lines never intersect
 |
| 1. same line
 | 1. lines intersect more than once
 | 1. lines have the same slope
 |

1. Your parents want to help you start saving for college. They are willing to open a college savings account for you and deposit money every time you mow the lawn. Your mom would like to open the account with $200 and deposit $20 every time you mow the lawn. Your dad disagrees. He wants to open an account with only $75 but deposit $25 for each time you mow the lawn.
	1. Write a system of equations that models this scenario. Let x = # of times you mow the lawn and let

 y = $ in the account.

* 1. Which option is a better choice? Give reasons for your choice.
1. a. Graph -5 > x.

b. Create a real world scenario to model this graph.

1. Model the scenario “Water must be at least 212° F to be a vapor” as an inequality and a graph.

Let t = temperature of the water.

55

70

1. Write a scenario that could be modeled with the graph shown at right.
2. Kevin is buying new clothes. The inequality 75x + 35y $\leq $ 300 models his shopping budget, where x = # of pairs of pants and y = # of shirts.

 Which of the following are true? Circle all correct choices.

1. Kevin buys 110 items.
2. Kevin can purchase 15 t-shirts.
3. Kevin will spend at least $300.
4. Kevin will spend no more than $300.
5. Kevin could buy two pairs of pants and three t-shirts.
6. Tricia is hiring a landscaping contractor to install flower beds at her home. The company charges $500 to build the flower beds and $5 per plant for installation. Tricia will spend no more than $800 on her landscaping. Write an inequality to represent how much Tricia can spend on her landscaping. Let p = # of plants.

Solve and graph the solution on a number line. Show your work.

|  |  |
| --- | --- |
| 1. 28n + 6 ≥ - 12n + 10
 | 1. 14 > 65 - x
 |
|  |  |

Graph each inequality or system of inequalities for the next three questions. Tell whether the point (0, 0) is part of the solution region **and EXPLAIN how you know.**

|  |  |  |
| --- | --- | --- |
| 1. 2y + 4x ≤ 8

yx55-5-5 | 1. 2 < y

yx55-5-5 | 1. y > $-\frac{1}{3}$ x + 2

 -5 < x < 3yx55-5-5 |

1.  Mrs. Warfield’s children plan on selling lemonade and brownies at their garage sale this summer. They will sell lemonade for $1 per cup and brownies for $2 each. Since Mrs. Warfield is a math teacher, she made a graph to represent their earnings.
2. Based on the graph, how much do the children want to earn?
3. In previous years they have never sold more than 7 brownies.

If this is true again, how many cups of lemonade do they

need to sell to meet or exceed their goal?