Name: _____ Class: _____

Algebra Quarterly 1 Review Sheet 1 Answer Key

Question 1

Ron and Shawn's ages are consecutive even integers. Ron is younger than Shawn. Suppose Ron's age is represented by *x*. If twenty times Ron's age less than the square of Shawn's age is 60, create an equation that can be used to find Ron's age. Do not solve for the equation, simply create one.

Ron = x
Shawn = $x + 2$

Equation: $(x+2)^2 - 20x = 60$

Question 2

Find the value of *x* that makes the following equation true. Express your answer as a decimal if necessary.

$$\frac{2}{3}\left(\frac{1}{4}x - 2\right) = \frac{1}{5}\left(\frac{4}{3}x - 1\right)$$

One strategy is to multiply both sides by 15 since that is a common factor of 3 and 5 (the denominators):

$$\mathbf{10}\left(\frac{\mathbf{1}}{\mathbf{4}}\boldsymbol{x} - \mathbf{2}\right) = \mathbf{3}\left(\frac{\mathbf{4}}{\mathbf{3}}\boldsymbol{x} - \mathbf{1}\right)$$

$$\frac{\mathbf{10}}{\mathbf{4}}\boldsymbol{x} - \mathbf{20} = \mathbf{4}\boldsymbol{x} - \mathbf{3}$$

$$\frac{\mathbf{10}}{\mathbf{4}}\boldsymbol{x} - \mathbf{17} = \frac{\mathbf{16}}{\mathbf{4}}\boldsymbol{x}$$

$$-\mathbf{17} = \frac{\mathbf{6}}{\mathbf{4}}\boldsymbol{x}$$

$$-\frac{\mathbf{68}}{\mathbf{6}} = \boldsymbol{x}$$

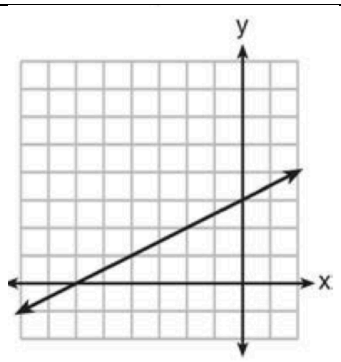
$$-\mathbf{11}\frac{\mathbf{1}}{\mathbf{3}} = \boldsymbol{x}$$

Question 3

Find the **rate of change** (aka slope) of the following:

x	y
0	-8
2	-4
3	-2
5	0

This table does not have a rate of change. From x = 0 to x = 2, the slope is 2. From x = 2 to x = 3, the slope is 2. But from x = 3 to x = 5, the slope is 1.



The rate of change is $\frac{1}{2}$. Notice (-2, 2) and (0, 3) are points on the line. If you create a table, x increases by 2 as y increases by 1. Logically, as x increases by 1, y increases by ½.

$y = 8x + x - 10$

Simplifies to $y = 9x - 10$

So the rate of change is 9 because it's the coefficient of *x* once you've fully simplified.

$3y = -12x + 21$

Divide both sides by 3:

$$y = -4x + 7$$

So the rate of change is -4

Question 4

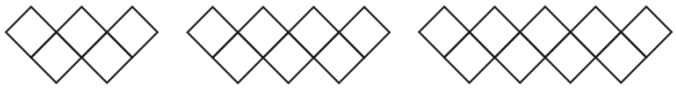
Solve the equation for *x*: $\frac{4}{5}x - 10 = \frac{4}{5}(x - 5) - 6$

Simplify the right hand side:

$$\frac{4}{5}x - 10 = \frac{4}{5}x - 10$$

Notice the left hand side and the right hand side are identical. Therefore, *any* value of *x* will make the equation true. So there are INFINITE SOLUTIONS.

Question 5



If the pattern continues, how many squares will be in the 200th design?

The expression is $5 + 2(x - 2)$. Substitute for 200 to get 401 squares.

Question 6
Consider the table below:

x	y
-5	18
-3	13.5
-1	9
1	4.5
3	0

(a) Create an equation that begins with "y = " that represents the table above.

The rate of change is $\frac{4.5-9}{1-(-1)} = -2.25$. Using term 1, the equation is $y = 4.5 - 2.25(x - 1)$

(b) Sam said that 3 represents the y-intercept since it is across from 0. Explain why he's wrong. **Sam is wrong because the y-intercept is the value of *y* when *x* is equal to zero. Sam thought it was the value of x when y is equal to zero. He mixed it up.**

(c) Frodo said that the table above represents a "linear function". Explain why he's right. **This is a linear function because the slope is always -2.25.**

Question 7
The cost of mail order fruits and vegetables is modeled by the equation $C = 8(p - 2) + 20$, where C is the total cost for p pounds of fruits and vegetables.

(a) Find the slope and explain what it means in the context of the problem.

Simplify the equation: $C = 8p - 16 + 20 = 8p + 4$. The slope is 8 because it is the coefficient of the independent variable. In this context, it represents the cost of ordering an additional pound of fruits and vegetables.

(b) Find the y-intercept and explain what it means in the context of the problem.

The y-intercept is 4 because it is the constant of the fully-simplified equation. It represents the cost of ordering NO vegetables or fruits. So it is a fixed fee, like the cost of simply being a fruit and vegetable subscriber.

Question 8

Bilbo was in the business of giving hiking tours. For the "premium route", he charges $8.00 for the first 2 hours of the hike, with each additional hour costing $2.50. For the "standard route", he charges $2.75 per hour.

(a) Create an equation "y = " for the cost of hiking *x* hours on the premium route

Make a table:

x	y
2	8
3	8 + 2.50
4	8 + 2.50(2)
5	8 + 2.50(3)
x	8 + 2.50(x – 2)

So the equation is y = 8 + 2.50(x – 2)

(b) Create an equation "y = " for the cost of hiking *x* hours on the standard route

The equation is y = 2.75x. Notice there is no (x – 2) or any y-intercept because the table would be:

x	y
1	2.75
2	2.75(2)
3	2.75(3)
4	2.75(4)
x	2.75x

In other words, the number of times you multiply by 2.75 exactly matches the term number. In contrast, in part (a), the number of times you multiply 2.50 is 2 less than the term number (hence x – 2).

(c) Gandalf couldn't choose between the premium or standard route. Help him by determining how long of a hike he would need to take so that the premium route actually cost *less* than the standard route. Do this "algebraically", meaning you cannot use any tables or graphs in your explanation.

Set the two equations equal and solve:

$$8 + 2.50(x - 2) = 2.75x$$
$$3 + 2.50x = 2.75x$$
$$3 = 0.25x$$
$$12 = x$$

So it would take a 12 hour hike, after which the premium route costs less than the standard route.

Notice before 12 hours, the premium route costs more than the standard route. We can see this by substituting a number <u>less than 12</u> for x into 2.50(x – 2) and into 2.75x and seeing that 2.75x gives a smaller answer.