8 Algebra CC – Quarter Test Extra Practice

ANSWER KEY

1. Categorize each numerical expression below as ***rational*** or ***irrational***. Explain your response.

a) $\sqrt{12} + \sqrt{4}$

$\sqrt{12} = \textit{irrational}$

$\sqrt{4} = 2 = \textit{rational}$

Irrational

The sum of a rational and irrational number is always irrational.

b) $-\frac{5}{7} + 9.\overline{4}$

Rational

Both numbers are rational because one number is a fraction and the other is a repeating decimal.
The sum of two rational numbers is always a rational number.

c) $\left(\sqrt{10}\right)^2$

$\sqrt{10} \bullet \sqrt{10} = \sqrt{100} = 10$

Rational

The product of two irrational numbers may be rational or irrational. In this case, it's rational because the square root of 100 is 10.

2. For which value of ***Q*** and ***R*** is ***Q + R*** a rational number?

(1) $Q = \frac{1}{\sqrt{2}}$ and $R = \frac{1}{\sqrt{3}}$

(2) $Q = \frac{1}{\sqrt{16}}$ and $R = -\frac{1}{\sqrt{9}}$

(3) $Q = -\frac{1}{\sqrt{6}}$ and $R = -\frac{1}{\sqrt{5}}$

(4) $Q = \frac{1}{\sqrt{25}}$ and $R = \frac{1}{\sqrt{3}}$

$\frac{1}{\sqrt{16}} + -\frac{1}{\sqrt{9}}$

$\frac{1}{4} + -\frac{1}{3} = -\frac{1}{12}$

$\mathbf{R} + \mathbf{R} = \mathbf{R}$

3. Ms. Gizzi asked her class "Is the product of $6.\overline{2}$ and $\sqrt{5}$ rational or irrational?" Patrick answered that the product would be irrational. State whether Patrick is correct or incorrect. Justify your reasoning.

Patrick is correct. The number $6.\overline{2}$ is a rational number because it is a repeating decimal and $\sqrt{5}$ is an irrational number because it is a non-terminating, non-repeating decimal. The product of a rational number and an irrational number is always irrational.

4. When solving the equation **3(x – 2) + 10 = 4x – 20**, Jennifer wrote **3(x – 2) = 4x – 30** as her first step. Name the property that justifies Jennifer's first step.

Subtraction Property of Equality

$$\begin{aligned} 3(x-2) + 10 &= 4x - 20 \\ -10 \quad &\quad\ \ -10 \\ 3(x-2) &= 4x - 30 \end{aligned}$$

5. To watch a varsity basketball game, spectators must buy a ticket at the door. The cost of an adult ticket is \$10.00 and the cost of a student ticket is \$3.50. If the number of adult tickets sold is represented by ***a*** and student tickets sold by ***s***, write an expression that represents the amount of money collected at the door from the ticket sales.

a: the number of adult tickets sold
s: the number of student tickets sold

10*a* + 3.50*s*

Multiply the number of tickets by the cost per ticket to calculate the total cost of tickets.

6. A moving truck rental company charges a fixed fee for renting a truck for a certain number of hours and an overage charge for each hour used beyond that amount. A person renting a truck is charged \$150 for all hours up to and including 6 hours and \$15 for each additional hour. If ***g*** represents the total number of hours, which expression could represent the total cost of renting a truck for 6 hours or more?

(1) $150 + 15g$ | **(2)** $150 + 15(g - 6)$

(3) $15 + 150(g - 6)$ | (4) $150 + 15(6 - g)$

Important Information:

Fixed Fee: \$150 (includes 6 hours)

g: total number of hours for the rental

\$15 charge for each additional hour past 6 hours

Let's test out a situation…assume the truck was rented for a total of 10 hours ($g = 10$). The first 6 hours cost \$150. The 4 additional hours cost \$60 (4 x 15). The total cost is \$210. Cost Calculation: \$150 + \$15(4)

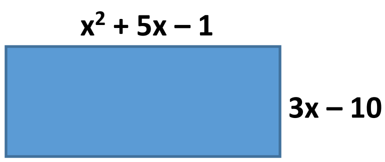
Expression (2): $\mathbf{150 + 15(g - 6)}$

$\mathbf{g = 10}$ $\quad 150 + 15(10 - 6)$

$150 + 15(4)$

\$210

7. Fred is given a rectangular piece of paper. The length of Fred's piece of paper is represented by $\mathbf{3x - 10}$ and the width is represented by $\mathbf{x^2 + 5x - 1}$. Write a simplified polynomial expression to represent the *area* of the rectangle.



A = lw

	x^2	$5x$	-1
3x	$3x^3$	$15x^2$	$-3x$
-10	$-10x^2$	$-50x$	10

$\mathbf{3x^3 + 5x^2 - 53x + 10}$ **square units**

8. When $\mathbf{(x + 1)^2}$ is subtracted from $\mathbf{3x^2}$, the result is

(1) $2x^2 - 2x - 1$ | (2) $2x^2 + 2x + 1$

(3) $2x^2 + 1$ | (4) $2x^2 - 1$

$3x^2 - (x + 1)^2$ — From comes first! Write the expression starting with $3x^2$

$3x^2 - [(x + 1)(x + 1)]$ — Follow the order of operations. Square the binomial before subtracting.

$3x^2 - (x^2 + x + x + 1)$ — Keep the product in ( ).

$3x^2 - (x^2 + 2x + 1)$ — In order to subtract, you must distribute the – sign.

$3x^2 - x^2 - 2x - 1$

$\mathbf{2x^2 - 2x - 1}$

9. Solve for x in each equation below.

a) $\dfrac{x+2}{6}+\dfrac{x}{4}=\dfrac{x+16}{12}$

There are a couple of different ways to solve this problem. I decided to add the fractions on the left side and create a proportion.

$$\frac{2}{2}\left(\frac{x+2}{6}\right)+\frac{3}{3}\left(\frac{x}{4}\right)=\frac{x+16}{12}$$

$$\frac{2x+4}{12}+\frac{3x}{12}=\frac{x+16}{12}$$

$$\frac{5x+4}{12}=\frac{x+16}{12}$$

$12(x + 16) = 12(5x + 4)$
$12x + 192 = 60x + 48$
$192 = 48x + 48$
$144 = 48x$
$\mathbf{3 = x}$

Another way to solve this problem is to multiply both sides of the equation by the LCD (12).

$$\overset{2}{\cancel{12}}\left(\frac{x+2}{\cancel{6}}\right)+\overset{3}{\cancel{12}}\left(\frac{x}{\cancel{4}}\right)=\overset{1}{\cancel{12}}\left(\frac{x+16}{\cancel{12}}\right)$$

$2(x + 2) + 3x = x + 16$
$2x + 4 + 3x = x + 16$
$5x + 4 = x + 16$
$4x + 4 = 16$
$4x = 12$
$\mathbf{x = 3}$

b) $2a-bx=c$

$$\begin{array}{l} 2a - bx = c \\ \underline{-2a} \qquad \underline{-2a} \end{array}$$

$$\frac{-bx}{-b}=\frac{c-2a}{-b}$$

$$\mathbf{x} = \frac{c-2a}{-b}$$

c) $r=\dfrac{1}{4}ax^2$

$$r=\frac{1}{4}ax^2$$

$$\mathbf{4}r=\frac{\mathbf{4}}{\mathbf{1}}\bullet\frac{1}{4}ax^2$$

$$\frac{4r}{a}=\frac{ax^2}{a}$$

$$\frac{4r}{a}=x^2$$

$$\sqrt{\frac{4r}{a}}=\sqrt{x^2}$$

$$\sqrt{\frac{4r}{a}}=\mathbf{x}$$

10. Kevin wants to make a snack mix made up of almonds and raisins. He wants his mix to contain double the amount of almonds as compared to raisins. Almonds cost $12 per pound and raisins cost $8 per pound. If Kevin has $40 to spend on the mix, how many pounds of each item can he purchase?

x: # of lbs of raisins
2x: # of lbs of almonds

	$ per lb	**# of lbs**	**$ spent on each item**
raisins	$8	x	8x
almonds	$12	2x	12(2x)

8x + 12(2x) = 40

8x + 24x = 40

32x = 40

x = 1.25

Check:
1.25 lbs of raisins costing $8 per lb = $10 (1.25 x 8)

2.5 lbs of almonds costing $12 per lb = $30 (2.5 x 12)

$10 + $30 = $40

Kevin can purchase 1.25 lbs of raisins and 2.5 lbs of almonds.