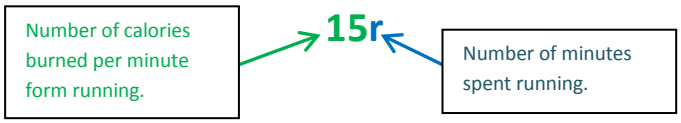
8 Algebra CC – Unit 2 PIPS (Persevere in Problem Solving) ANSWER KEY

Interpreting Expressions

1) Marina burns calories at a rate of 15 calories per minute when running and 6 calories per minute when walking. Suppose she exercises for 60 minutes by running for ***r*** minutes and walking for the remaining time. The expression **15*r* + 6(60 – *r*)** represents the calories burned during the 60-minute session.

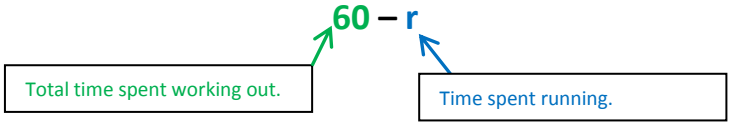
A. What does **15*r*** represent?

The number of calories burned from running.



B. What does **60 – *r*** represent?

The amount of time Marina spent walking.



C. Kara says that **360 + 9*r*** is an equivalent expression. Do you agree or disagree? Justify your response.

Yes

Justification #1:

15r + 6(60 – r)	*original expression*
15r + 360 – 6r	*distributive property*
360 + 15r – 6r	*commutative property of +*
360 + 9r	*combine like terms*

Justification #2: Let r = 2

15r + 6(60 – r)	360 + 9r
15(2) + 6(60 – 2)	360 + 9(2)
30 + 6(58)	360 + 18
30 + 348	**378**
378	

Writing Expressions

2) A. Using an algebraic expression, represent the cost of a dozen balloons plus a 5% tax. Let ***b*** represent the cost of a dozen balloons.

b + .05b

The .05b represents the tax on the dozen balloons. It's added to the cost (b) of the dozen balloons to represent the total cost of a dozen

B. How would you change your expression to find the cost of **one** balloon?

$$\frac{b + .05b}{12}$$

Divide the denominator by 12 because the numerator represents the total cost, including tax, of 12 balloons.

C. Find the cost of one balloon including tax if the cost of a dozen balloons is $10. *Show all work.*

$$\frac{10 + .05(10)}{12}$$

$$\frac{10 + 0.5}{12}$$

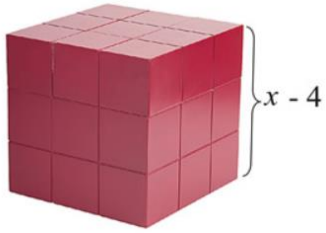
$$\frac{10.5}{12} = 0.875$$

Each balloon cost 87.5 cents.
≈88 ¢

Operations with Polynomial Expressions

3) The side of a game cube is represented by **x – 4**, as shown at the right. Express the volume of the cube as a simplified polynomial expression in standard form.

Helpful Hint: To find the volume of a cube, use the formula **V = s^3**



V = s^3

$(x-4)^3$

$(x-4)(x-4)(x-4)$

Multiply the first two binomials

$(x$ $4)(x$ $4)$

x^2

x^2

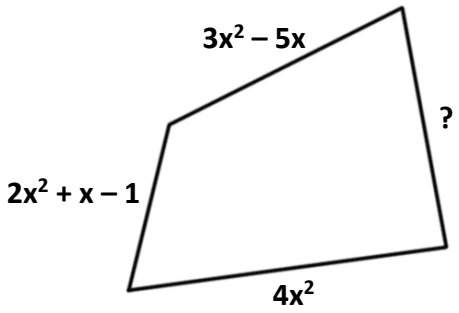
$(x$: by the third binomial, $x-4$

	x	-4
x^2	x^3	$-4x^2$
-8x	$-8x^2$	32x
16	16x	-64

$x^3 - 4x^2 - 8x^2 + 32x + 16x - 64$

volume = $x^3 - 12x^2 + 48x - 64$ cubic units

4) Represent the length of the missing side of the quadrilateral shown below as a simplified polynomial expression in standard form if the perimeter is **$5x^2 + 2x + 1$**.



Perimeter: $5x^2 + 2x + 1$

To find the missing side, subtract the sum of the three sides from the perimeter.

$(5x^2 + 2x + 1) - ((3x^2 - 5x) + (2x^2 + x - 1) + (4x^2))$

$(5x^2 + 2x + 1) - (9x^2 - 4x - 1)$

$5x^2 + 2x + 1 - 9x^2 + 4x + 1$ *distributed the - sign*

$5x^2 - 9x^2 + 2x + 4x + 1 + 1$ *combine like terms*

$-4x^2 + 6x + 2$ units

Check

$-4x^2 + 6x + 2$
$3x^2 - 5x$
$2x^2 + x - 1$
$+ \quad 4x^2$
$5x^2 + 2x + 1$

All four sides sum $5x^2 + 2x + 1$