

Grade 9 Academic Math
Unit 1 Test – Number Sense and Algebra

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Victim: Mr. Solutions*Well done Mr. S.!!*

KU	APP	TIPS	COM
31/31	16/16	14/14	20/20

Terminology (10 COM)1. Match each term or equation in the left column with the **best** definition or description in the right column.

- | | |
|-----------------------------|---|
| <u>I</u> ✓ Degree of a term | A A symbol that represents an unknown or unspecified value. |
| <u>E</u> ✓ $a(x+y) = ax+ay$ | B A fixed value. |
| <u>G</u> ✓ Equation | C Any mathematical calculation combining constants and/or variables using any valid mathematical operations. |
| <u>B</u> ✓ Constant | D To calculate or compute with the objective of finding the “final answer” |
| <u>H</u> ✓ Polynomial | E The property used to expand the product of a monomial and a binomial. |
| <u>C</u> ✓ Expression | F A constant multiplying the variable part of a term. |
| <u>A</u> ✓ Variable | G A mathematical statement asserting that two expressions are equal. |
| <u>F</u> ✓ Coefficient | H An algebraic expression consisting of several terms. |
| <u>D</u> ✓ Evaluate | I The sum of the exponents of the variables of a term. |
| <u>J</u> ✓ Like Terms | J Terms that contain exactly the same variable part. |

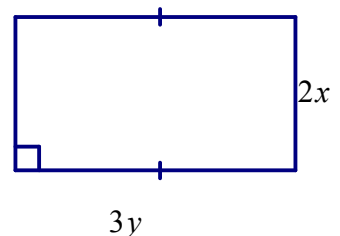
Modified True/False (3 KU)Indicate whether the statement is **true** or **false**. If false, change the **underlined part** to make the statement true.

2. T/F F ✓ The expression “3x” **means** “a number multiplied by itself 3 times.” Change: x^3 ✓
3. T/F F ✓ The expression “ $x^2 + x^2$ ” **simplifies to** “ x^4 .” ✓ = $\frac{1}{2}$ mark Change: $2x^2$ ✓
4. T/F F ✓ The expression “ $\frac{x}{5}$ ” **means** “a number reduced by 5.” Change: $x-5$ ✓

Multiple Choice (3 KU)

Identify the choice that best completes the statement or answers the question.

5. d ✓ Which expression represents the **perimeter** of the rectangle shown at the right?
 (a) $2(2x) + (3y)$ (b) $10xy$ (c) $(2x+3y)(2x+3y)$ (d) $4x+6y$
6. c ✓ Which expression represents the **area** of the rectangle shown at the right?
 (a) $(2x+3y)^2$ (b) $(2x)(3y)^2$ (c) $6xy$ (d) $6xy^2$
7. d ✓ In which pair are the expressions **equivalent**?



- (a) $-5a^2$ and $(-5a)^2$ (b) $2(5a)^2$ and $5(2a)^2$ (c) $10a^2$ and $6m^2$ (d) $25a^2$ and $(-5a)^2$

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Full Solutions (10 COM in addition to process marks)

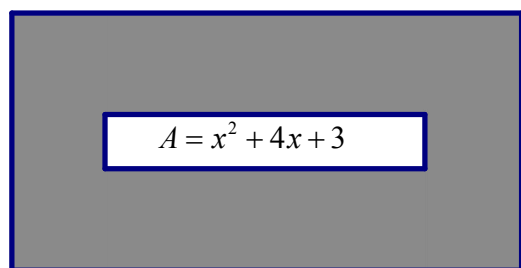
8. Evaluate. (8 KU)

<p>(a) $-6(3^2 - 5^2) - 4(7 - 15)^2$ (BEDMAS <i>not</i> distributive property!)</p> $= -6(9 - 25) - 4(-8)^2$ $= -6(-16) - 4(64)$ $= 96 - 256$ $= -160$	<p>(b) $-8a^2 - 4ab^2$, if $a = \frac{1}{6}$ and $b = -5$</p> $= -8\left(\frac{1}{6}\right)^2 - 4\left(\frac{1}{6}\right)(-5)^2$ $= -\frac{8}{1}\left(\frac{1}{36}\right) - \frac{4}{1}\left(\frac{1}{6}\right)\left(\frac{25}{1}\right)$ $= -\frac{8}{36} - \frac{100}{6 \times 6}$ $= -\frac{8}{36} - \frac{600}{36} = -\frac{608 \div 4}{36 \div 4} = -\frac{152}{9}$
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9. Simplify. (17 KU)

<p>(a) $2x^5 + 7y - 12 + 8y + 5 - 6x^5$</p> $= 2x^5 - 6x^5 + 7y + 8y - 12 + 5$ $= -4x^5 + 15y - 7$	<p>(b) $(2x^5)(7y)(8y)(-6x^5)$</p> $= 2(7)(8)(-6)(x^5)(x^5)(y)(y)$ $= -672x^{5+5}y^{1+1}$ $= -672x^{10}y^2$
<p>(c) $\frac{72n^{15}}{(3n^3)^2} - (15n^4)(2n^5)$</p> $= \frac{72n^{15}}{3^2(n^3)^2} - 15(2)(n^4)(n^5)$ $= \frac{72n^{15}}{9n^6} - 30n^{4+5}$ $= \frac{72}{9}\left(\frac{n^{15}}{n^6}\right) - 30n^9$ $= 8n^9 - 30n^9 = -22n^9$	<p>(d) $4(3x^2 - 2x) - 3x(x - 5)$</p> $= 12x^2 - 8x - 3x^2 + 15x$ $= 12x^2 - 3x^2 - 8x + 15x$ $= 9x^2 + 7x$

10. The area of the large rectangle is $4x^2 + 9x + 2$. Write a *fully simplified* algebraic expression for the area of the shaded region. (5 APP)



$$A_{\text{shaded}} = A_{\text{large rect.}} - A_{\text{small rect.}}$$

$$= 4x^2 + 9x + 2 - (x^2 + 4x + 3)$$

$$= 4x^2 + 9x + 2 + (-x^2 - 4x - 3)$$

$$= 4x^2 - x^2 + 9x - 4x + 2 - 3$$

$$= 3x^2 + 5x - 1$$

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11. A box with a **volume** of $60xy^2$ has dimensions as shown below. If the height of the box is $4x$ and the length of the box is $5y$, what is the width, w of the box? (2 TIPS)

$$V = 4x(5y)(w)$$

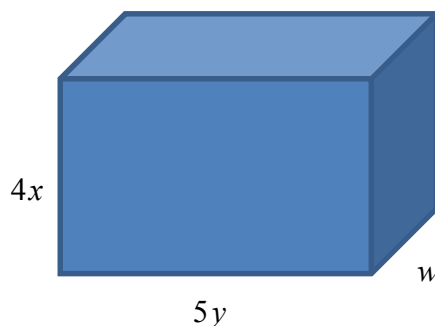
$$\therefore V = 20xyw$$

$$\therefore 20xyw = 60xy^2$$

$$\therefore w = \frac{60xy^2}{20xy} = 3y \checkmark$$

Check:

$$\begin{aligned} 4x(5y)(3y) \\ = 4(5)(3)xyy \\ = 60xy^2 \end{aligned}$$



12. Homeforms collected money for Central Peel's Terry Fox Fundraiser. Ms.K's class collection envelope had only nickels, dimes, and quarters. The **number of quarters was twice the number of dimes** and **the number of dimes was triple the number of nickels**.

(a) Using one variable, write an algebraic expression that represents the number of coins. Where n represents the number of nickels. (3TIPS)

$n \rightarrow \# \text{ of nickels}, 3n \rightarrow \# \text{ of dimes}, 2(3n) = 6n \rightarrow \# \text{ quarters}$

$$\text{total \# of coins} = n + 3n + 6n = 10n$$

(b) Write an algebraic expression that represents the value of these coins. (3TIPS)

$$\begin{aligned} 0.05n + 0.10(3n) + 0.25(6n) \\ = 0.05n + 0.3n + 1.5n = 1.85n \end{aligned}$$

(c) How much money did Ms. K's class raise if the envelope had four nickels? (2 TIPS)

$$\begin{aligned} n &= 4 \\ 1.85n &= 1.85(4) \checkmark \\ &= 7.4 \checkmark \end{aligned}$$

Ms. K's class raised \$7.40.

13. Lucie does babysitting for two families. She earns **\$15 for the evening, plus \$5 for every hour** she is there, when she babysits for her neighbour. When she babysits for her Aunt, **Lucie gets paid \$10 an hour**.

(a) Write an expression that represents Lucie's earnings when she babysits for each family. (3 APP)

Neighbour: $15 + 5t$ or $5t + 15$ Aunt: $10t$ $t \rightarrow \# \text{ of hours worked}$

(b) Over the weekend, Lucie does **2.5 hours of babysitting for her Aunt** on Saturday and **1 hour for her neighbour on Sunday**. Use your expressions above to determine how much Lucie earned in total over the weekend. (2 APP)

$$\begin{aligned} \text{Total amount earned} \\ = 10(2.5) + 15 + 5(1) \checkmark \\ = 25 + 15 + 5 \\ = 45 \checkmark \\ \text{Lucie earned \$45 altogether.} \end{aligned}$$

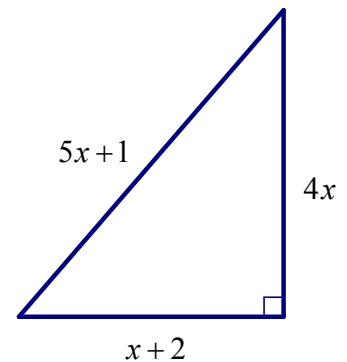
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14. The dimensions of a triangle are given in the diagram to the right.

(a) Find a simplified expression for the perimeter of the triangle. (2 APP)

$$P = 5x + 1 + x + 2 + 4x$$

$$= 10x + 3$$



(b) Find a simplified expression for the area of the triangle. (2 APP)

$$A = \frac{bh}{2}$$

$$= \frac{4x(x+2)}{2}$$

$$= 2x(x+2) = 2x^2 + 4x$$

(c) Repeat parts a) and b) if the dimensions of the triangle are quadrupled. (2 APP)

Perimeter	Area
$P = 4(5x+1) + 4(x+2) + 4(4x)$ $= 20x + 4 + 4x + 8 + 16x$ $= 40x + 12$	$A = \frac{bh}{2}$ $= \frac{4(x+2)[4(4x)]}{2}$ $= \frac{16(4x)(x+2)}{2}$ $= 8(4x)(x+2)$ $= 32x(x+2) = 32x^2 + 64x$

(d) Does this quadruple the perimeter? Justify your answer. (2 TIPS)

$$4(10x + 3)$$

perimeter obtained in 14(a)

$$= 40x + 12$$

perimeter obtained in 14(c)

By quadrupling the perimeter found in 14(a), we obtain the perimeter calculated in 14(c). Therefore, quadrupling the side length ALSO quadruples the perimeter.

(e) Does this quadruple the area? Justify your answer. (2 TIPS)

$$4(2x^2 + 4x)$$

area obtained in 14(b)

$$= 8x^2 + 16x$$

$$\neq 32x^2 + 64x$$

area obtained in 14(c) is 16 times greater than the area calculated in 14(b)

Quadrupling the area calculated in 14(b) is NOT equal to the area found in 14(c). Therefore, quadrupling the side length Does NOT quadruple the area.

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