MPM 1D9 | **Grade 9 Pre-AP Math: Unit 1 – Major Test** | **Semester 2, 2013-2014**

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Victim: Mr. Solutions — Inspiring work Mr. S.!

KU	APP	TIPS	COM
38/38	16/16	10/10	20/20

Terminology (10 COM)

1. Match each term in the left column with the ***best*** definition or description in the right column.

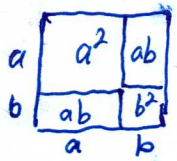
F ✓ Polynomial	**A.** A symbol, usually a letter, which represents an unknown or unspecified value.
H ✓ Equation	**B.** A number that can be exactly divided into another.
G ✓ Like Terms	**C.** A polynomial with exactly three terms.
D ✓ Expression	**D.** Any mathematical calculation combining constants and/or variables using any valid mathematical operations.
I ✓ Degree-3 Term	**E.** 125^3
J ✓ Simplify	**F.** An algebraic expression in which each term consists of constants and/or variables combined using ***only*** multiplication (including powers).
A ✓ Variable	**G.** Terms that contain exactly the same variable part.
B ✓ Factor	**H.** A mathematical statement asserting that two expressions are equal.
E ✓ Degree-0 Term	**I.** $-21x^2y$
C ✓ Trinomial	**J.** Write a mathematical expression in a simpler form.

Modified True/False (3 KU)

State whether each statement is ***true*** or ***false***. If false, ***change*** the ***underlined part*** to make the statement true.

2. T/F F ✓ $(a+b)^2 = a^2+b^2$ $(a+b)(a+b)=a^2+ab+ab+b^2$ **Change:** $a^2+2ab+b^2$ ✓

3. T/F F ✓ $5a^2+6a^2=11a^4$ **Change:** $11a^2$ ✓



4. T/F F ✓ $\frac{5a^2}{b^2}$ written without negative exponents is $\frac{b^2}{5a^2}$ **Change:** $\frac{5}{a^2b^2}$ ✓

$\left(\frac{5}{b^2}\right)\left(\frac{1}{a^2}\right)=\frac{5}{a^2b^2}$

✓ = $\frac{1}{2}$ mark

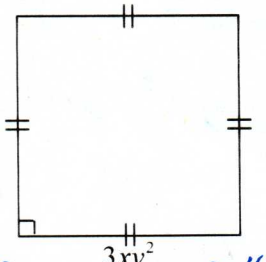
Multiple Choice (3 KU)

Identify the choice that best completes the statement or answers the question. Use the provided blank space to write the letter corresponding to your choice.

5. a ✓ Which expression represents the ***perimeter*** of the square shown at the right?

$P=4(3xy^2)=12xy^2$

(a) $12xy^2$ (b) $9xy^2$ (c) $12x^2y^4$ (d) $9x^2y^4$



6. d ✓ Which expression represents the ***area*** of the square shown at the right?

(a) $12xy^2$ (b) $9xy^2$ (c) $12x^2y^4$ (d) $9x^2y^4$

$A=(3xy^2)^2=9x^2y^4$

7. C ✓ Which of the following is equivalent to $-9ab^2(9ab)^2$?

(a) $-9(9)aabbbb$ (b) $-9ab^2+(9ab)^2$ (c) $-9(9)(9)aaabbbb$ (d) $-9+9+9+a+a+a+b+b+b+b$

KU	APP	TIPS	COM
-0	-0	-0	-0

Full Solutions **(Up to 10 COM marks can be deducted for communication errors)**

8. Evaluate. **(10 KU)**

① ② ③ ④
BEDMAS
L→R L→R

(a) $-3\left(5^2-11^2\right)-3(5-11)^2$

$=-3(25-121)-3(-6)^2$ ✓

$=-3(-96)-3(36)$ ✓

$=288-108$ ✓

$=180$ ✓

(4)

(b) $-6ab^{-2}-3a(2a-b)^2$, if $a=\frac{-1}{3}$ and $b=3$

$=\frac{-6}{1}\left(\frac{-1}{3}\right)(3)^{-2}-\frac{3}{1}\left(\frac{-1}{3}\right)\left[\frac{2}{1}\left(\frac{-1}{3}\right)-(3)\right]^2$ ✓

$=\frac{2}{1}\left(\frac{1}{3^2}\right)-(-1)\left(-\frac{2}{3}-\frac{9}{3}\right)^2$ ✓

$=\frac{2}{9}-(-1)\left(\frac{-11}{3}\right)^2$ ✓

$=\frac{2}{9}-(-1)\left(\frac{121}{9}\right)$ ✓

$=\frac{2}{9}-\left(\frac{-121}{9}\right)=\frac{123}{9}=\frac{41}{3}$ ✓

(6)

9. Simplify. **(22 KU)**

(a) $-x^2y-6xy^2+2x^2y-9xy^2$

$=-x^2y+2x^2y-6xy^2-9xy^2$

$=x^2y-15xy^2$ ✓ ✓

(2)

Add/Subtract → LIKE TERMS

(b) $-1x^2y\left(-6xy^2\right)\left(+2x^2y\right)\left(-9xy^2\right)$

$=(-1)(-6)(2)(-9)x^2x^1x^2x^1y^1y^2y^1y^2$

$=-108x^6y^6$ ✓ ✓ ✓

(3)

Multiply → rearrange the factors

(c) $-x^2y-6xy^2\left(+2x^2y-9xy^2\right)$

$=-x^2y-12x^3y^3+54x^2y^4$ ✓ ✓ ✓

(3)

First term → already simplified

Second term → distributive prop.

(d) $-\frac{1}{1}\left(-6s^2+5s\right)-\frac{1}{1}\left(7s^2-5s\right)$

$=6s^2-5s-7s^2+5s$ ✓ ✓ ✓

$=6s^2-7s^2-5s+5s$

$=-s^2$ ✓

(3)

(e) $(5d-3)(2d-3)-7\left(d^2-3d-1\right)$

$=10d^2-15d-6d+9-7d^2+21d+7$ ✓ ✓ ✓

$=10d^2-7d^2-15d-6d+21d+9+7$

$=3d^2+16$ ✓ ✓

(5)

(f) $\frac{32b^9d^2\left(+bd^4\right)^3}{-2^3\left(2b^3d\right)^2}$

(6)

$=\frac{32b^9d^2(-1)^3b^3(d^4)^3}{-8(2)^2(b^3)^2d^2}$ ✓ ✓

$=\frac{32(-1)b^9b^3d^2d^{12}}{-8(4)b^6d^2}$

$=\frac{-32b^{12}d^{14}}{-32b^6d^2}$ ✓

$=\left(\frac{-32}{-32}\right)\left(\frac{b^{12}}{b^6}\right)\left(\frac{d^{14}}{d^2}\right)$

$=b^6d^{12}$ ✓ ✓

KU	APP	TIPS	COM
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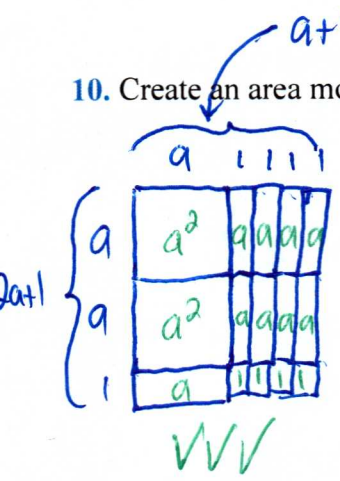
10. Create an area model that demonstrates why $(2a+1)(a+4) = 2a^2 + 9a + 4$ **(6 APP)**



$A = lw = (2a+1)(a+4)$ ✓

But

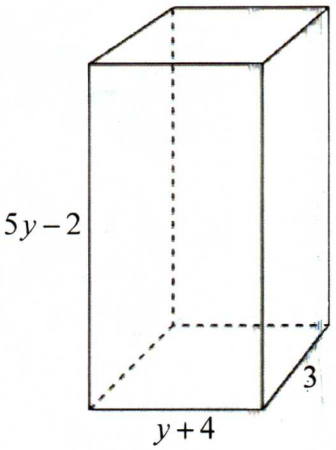
$A = a^2 + a^2 + a + a + a + a + a + a + a + a + a + 1 + 1 + 1 + 1$

$= 2a^2 + 9a + 4$ ✓

$\therefore (2a+1)(a+4) = 2a^2 + 9a + 4$ ✓

Logic used here: If $a=b$ and $a=c$ then $b=c$

11. Consider the rectangular prism shown at the right.



(a) Write a ***fully simplified*** algebraic expression for the ***volume*** of the rectangular prism shown at the right. (For a rectangular prism, $V = lwh$.) **(6 APP)**

$V = lwh$

$= 3(y+4)(5y-2)$ ✓ (*)

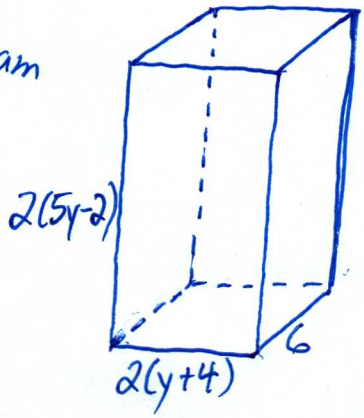
$= (3y+12)(5y-2)$ ✓

$= 15y^2 - 6y + 60y - 24$ ✓

$= 15y^2 + 54y - 24$ ✓

(b) Suppose that each of the dimensions of the above rectangular prism is doubled. What happens to the volume of the prism? Does it also double or does something else happen? Justify your answer. **(4 APP)**

The new dimensions would be as shown in the diagram at the right.



$\therefore V = 6[2(y+4)][2(5y-2)]$ ✓

$= 6(2)(2)(y+4)(5y-2)$ ✓

$= 24(y+4)(5y-2)$ ✓ (*)

By comparing to the expression in 11(a), we see that the volume is 8 times greater when the side lengths are doubled.

KU	APP	TIPS	COM
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12. Lady Gaga has released a new CD featuring the famous rappers Shronn Doggie and Sleepy Prabhnoor Fury. As shown in the table below, each negotiated a different contract with the recording company. **(10 TIPS)**

Songwriter	Fixed Rate	Amount Paid to "Artist" for each CD Sold
Lady Gaga	$50,000.00	$2.00
Shronn Doggie	$5000.00	$3.00
Sleepy Prabhnoor Fury	$3000.00	$4.00

(a) Let n represent the total number of CDs sold. Write a ***fully simplified*** algebraic expression for the ***total amount*** the recording company will pay the three "artists" for selling n CDs.

Total paid in $ = amount paid to Gaga + amount paid to Doggie + amount paid to Sleepy

$= 2n + 50000 + 3n + 5000 + 4n + 3000$ ✓✓

(4) $= 2n + 3n + 4n + 50000 + 5000 + 3000$

$= 9n + 58000$ ✓ ✓

(b) What is the ***total amount*** the recording company will pay if 1,000,000 CDs are sold?

$n = 1000000$

(2) ∴ Total Paid in $

$= 9(1000000) + 58000$ ✓

$= 9058000$ ✓

The recording company must pay $9,058,000 if 1,000,000 CDs are sold.

(c) Suppose that Sleepy Prabhnoor Fury is paid $483,000 altogether. How many CDs must have been sold?

(2) Number of CDs sold

$= \frac{\text{total paid} - \text{fixed rate}}{\text{amount paid per CD}}$

$= \frac{483000 - 3000}{4} = 120000$ ✓ ✓

120000 CDs must have been sold if Sleepy received a payment of $483,000

(d) Is it possible for either of Sleepy or Doggie to earn more than Gaga? Justify your answer.

(2) If a very large number of CDs is sold, then Sleepy and Doggie can earn more than Gaga because they each receive more per CD. ✓ For example, if $n = 100000$,

Gaga earns $2(100000) + 50000 = 250000$

Doggie earns $3(100000) + 5000 = 305000$ ✓

Sleepy earns $4(100000) + 3000 = 403000$

KU	APP	TIPS	COM
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