MPM 1D0

Grade 9 Academic Math
Unit 1 – Practice Test

Stupendous Work Mr. 8!

KU	APP	TIPS	COM
25 /25	11 /11	11 /11	22 /22

Name: **Mr. Solutions**

Terminology (12 COM)

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

__e__	Binomial	**a.** To raise a power to an exponent, keep the base and multiply the exponents.
__h__	Polynomial	**b.** Write a mathematical expression in a simpler form.
__b__	Simplify	**c.** A symbol, usually a letter, which represents an unknown or unspecified value.
__k__	Equation	**d.** The sum of the exponents on the variables in a term.
__g__	Like Terms	**e.** A polynomial with exactly two terms.
__i__	Distributive Law	**f.** Any mathematical calculation combining constants and/or variables using any valid mathematical operations.
__a__	$(a^x)^y = a^{xy}$	**g.** Terms that contain exactly the same variable part, that is, exactly the same literal coefficient.
__l__	Pythagorean Theorem	**h.** An algebraic expression in which each term consists of constants and/or variables combined using only multiplication (including powers).
__d__	Degree of a Term	**i.** $a(x+y) = ax + ay$
__j__	Term	**j.** Any mathematical calculation combining constants and/or variables using any operations except for addition and subtraction.
__c__	Variable	**k.** A mathematical statement asserting that two expressions are equal.
__f__	Expression	**l.** $c^2 = a^2 + b^2$

Modified True/False (3 KU)

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

2. T/F __F__ The expression "$\underline{x - 6}$" means "six reduced by a number."   Change: $6 - x$ ✓

✓ = ½ mark

3. T/F __F__ The expression "$\underline{2 + x + 5}$" means "double a number increased by 5."   Change: $2x + 5$ ✓

4. T/F __F__ The expression "$\underline{4n - 7}$" means "one-quarter of a number decreased by 7."   Change: $\frac{n}{4} - 7$ ✓

OR $\frac{1}{4}n - 7$

Multiple Choice (3 KU)

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

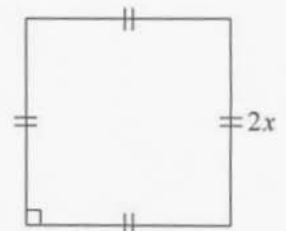5. Which expression represents the area of the square shown at the right?
   (a) $4x^2$ (b) $8x^2$ (c) $8x$ (d) $2x^2$

   [square labelled $2x$]

6. In which pair are the expressions equivalent?
   (a) $5m^2$ and $(5m)^2$ (b) $(yz)^4$ and y^4z^4 (c) $2(c^7)^3$ and $2c^{10}$ (d) $-3a^2$ and $(-3a)^2$

7. If $a = -2$ and $c = 5$, what is the value of the expression $\frac{a+c}{a^2 - c^2}$?

   $\frac{-2+5}{(-2)^2 - 5^2} = \frac{3}{4 - 25} = \frac{3}{-21} = -\frac{1}{7}$

   (a) $\frac{1}{3}$ (b) $\frac{3}{29}$ (c) $-\frac{3}{29}$ (d) $-\frac{1}{7}$

KU	APP	TIPS	COM
–	–	–	–

8. Evaluate. (8 KU)

(a) $-3\left(5^2-4^2\right)-6\left(6^2-5^2\right)$

$$= -3(25-16)-6(36-25)$$
$$= -3(9)-6(11)$$
$$= -27-66$$
$$= -93$$

(b) $2t^2-s^3$, if $t=\dfrac{1}{2}$ and $s=2$

$$= 2\left(\tfrac{1}{2}\right)^2-\left(2\right)^3$$
$$= \frac{\cancel{2}}{1}\left(\frac{1}{\cancel{4}_2}\right)-8$$
$$= \frac{1}{2}-\frac{16}{2}$$
$$= -\frac{15}{2}$$

9. Simplify. (11 KU)

(a) $\left(x^2+5x+3\right)-\left(-x^2-7x+2\right)$

$$= x^2+5x+3+(x^2+7x-2)$$
$$= x^2+5x+3+x^2+7x-2$$
$$= x^2+x^2+5x+7x+3-2$$
$$= 2x^2+12x+1$$

(b) $\dfrac{\left(t^2\right)^3\left(2t^3\right)^4}{\left(4t\right)^3}$

$$= \frac{t^6\left(2^4 t^{12}\right)}{4^3 t^3}$$
$$= \frac{2^4 t^6 t^{12}}{64\, t^3}$$
$$= \frac{16\, t^{18}}{64 t^3}$$
$$= \left(\tfrac{16}{64}\right)\left(\tfrac{t^{18}}{t^3}\right)$$
$$= \tfrac{1}{4}t^{15} \quad \left(\text{or } \tfrac{t^{15}}{4}\right)$$

(c) $2y(y-4)-3y(y-4)$

$$= 2y^2-8y-3y^2+12y$$
$$= 2y^2-3y^2-8y+12y$$
$$= -y^2+4y$$

10. Write an algebraic expression, in *simplest form*, for the *perimeter* of the figure at the right. (5 APP)

$$P = 2(4x+3) + 2(3x^2-x-2)$$
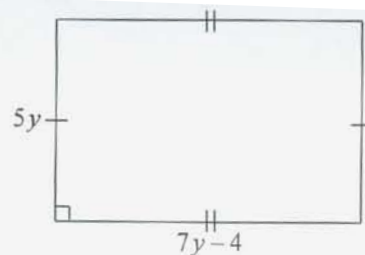$$= 8x+6 + 6x^2-2x-4$$
$$= 6x^2+8x-2x+6-4$$
$$= 6x^2+6x+2$$

$4x+3$

$3x^2-x-2$
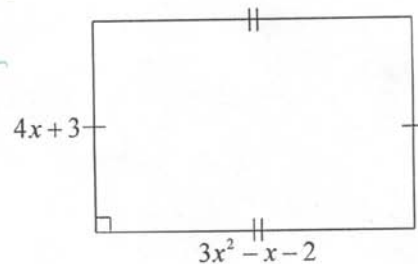
11. Write an algebraic expression, in *simplest form*, for the *area* of the figure at the right. **(3 APP)**

$$A = 5y(7y - 4)$$
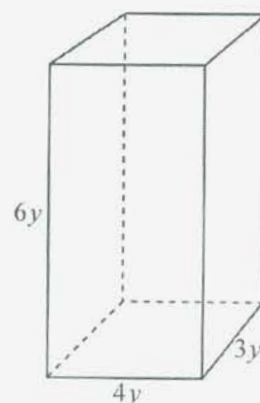$$= 35y^2 - 20y$$

$5y$

$7y - 4$

12. Write an algebraic expression, in *simplest form*, for the *volume* of the prism shown at the right. (Note that for a prism, $V = l \times w \times h$.) **(3 APP)**

$$V = 4y(3y)(6y)$$
$$= 4(3)(6)yyy$$
$$= 72y^3$$

$6y$

$3y$

$4y$

13. Two friends, Elliot and Dang, are travelling to the airport in two different taxis. The taxi company used by Elliot charges a \$5.00 flat fee plus \$0.50 for every kilometre. In Dang's case, the taxi company charges a \$3.00 flat fee plus \$0.70 for every kilometre. **(6 TIPS)**

(a) Write two expressions, one that represents Elliot's cost of travelling by taxi and another that represents Dang's cost of travelling by taxi.

$e \rightarrow$ distance Elliot travelled $d \rightarrow$ distance Dang travelled

Elliot: $5 + 0.5e$ Dang: $3 + 0.7d$

(b) Write an expression that represents Dang's and Elliot's *total cost* of travelling by taxi.

$$\text{Total cost} = 5 + 0.5e + 3 + 0.7d$$
$$= 5 + 3 + 0.5e + 0.7d$$
$$= 8 + 0.5e + 0.7d$$

(c) If Elliot travelled 35 km and Dang travelled 75 km, how much money did each friend spend?

Elliot's cost
$= 5 + 0.5e$
$= 5 + 0.5(35)$
$= 5 + 17.5 = 22.5$

Dang's cost
$= 3 + 0.7d$
$= 3 + 0.7(75)$
$= 3 + 52.5$
$= 55.5$

The taxi ride cost Elliot \$22.50 and Dang \$55.50

KU	APP	TIPS	COM
–	–	–	–

14. The table below summarizes the results of an experiment studying bacterial growth. At the beginning of the experiment, there are ten bacteria in a dish. Every 12 hours, the number of bacteria doubles. **(5 TIPS)**

Time Elapsed (h)	Number of Bacteria
0	10
12	$10 \times 2 = 20$
24	$(10 \times 2) \times 2 = 10 \times 2^2$ $= 40$
36	$(10 \times 2^2) \times 2 = 10 \times 2^3$ $= 80$
48	$(10 \times 2^3) \times 2 = 10 \times 2^4$ $= 160$
60	$(10 \times 2^4) \times 2 = 10 \times 2^5$ $= 320$
72	$(10 \times 2^5) \times 2 = 10 \times 2^6$ $= 640$
84	$(10 \times 2^6) \times 2 = 10 \times 2^7$ $= 1280$ ✓✓
96	$(10 \times 2^7) \times 2 = 10 \times 2^8$ $= 2560$

(a) Extend the values in the table for the next two days.

(b) Assuming that the growth rate remains constant, use the pattern in the table to calculate the number of bacteria you would expect to find after 7 days.

Pattern! Number of bacteria $= 10 \times 2^{\frac{t}{12}}$, where $t = $ # hours

After seven days, $t = 7(24) = 168$

∴ number of bacteria $= 10 \times 2^{\frac{168}{12}}$

$= 10 \times 2^{14}$

$= 10 \times 16384$

$= 163840$ ✓

KU	APP	TIPS	COM
–	–	–	–