MPM 1D0

Grade 9 Academic Math

Unit 2 – Practice Test A – Solving Equations (Not Including Problem Solving)

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Victim: Mr. Solutions Right on Mr. S.!!

KU	APP	TIPS	COM
25/25	20/20	8/8	15/15

Modified True/False **(3 KU)**

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

1. T/F F ✓ The algebraic expression $x - 7$ represents <u>seven more</u> than a number. **Change:** seven less ✓

2. T/F F ✓ <u>$x = 2$</u> is the solution to the equation $4x - 8 = 10 - 2x$. **Change:** $x = 3$ ✓
   ✓ = $\frac{1}{2}$ mark

3. T/F F ✓ "Four more than triple a number is 12" can be modelled as <u>$4n + 3 = 12$</u>. **Change:** $3n + 4 = 12$ ✓

Multiple Choice **(6 KU)**

For questions 4 to 9, select the best answer. Write the letter of your choice in the provided blank space.

4. C ✓ Which is the correct solution for $x + 7 = -4$?
   (a) $x = 3$ (b) $x = -3$ (c) $x = -11$ (d) $x = 0$

5. d ✓ $y = -2$ is the correct solution for which equation?
   (a) $3y + 1 = 5$ (b) $2y - 5 = 1$ (c) $4y + 8 = -4$ (d) $y - 3 = -5$

6. C ✓ The perimeter of a rectangle is 45 m. If the length is four times the width, what is the length?
   (a) 36 m (b) 4.5 m (c) 18 m (d) 9 m

$10w = 45$
$w = 4.5$

7. d ✓ The distance, d, in kilometres, a spaceship travels in t hours is given by the formula $d = 50000t$. How long will it take the spaceship to travel 150000 km?
   (a) 30 h (b) 300 h (c) 0.3 h (d) 3 h

$t = \frac{d}{50000} = \frac{150000}{50000}$

8. C ✓ By which number would you multiply both sides of the equation $\frac{x-1}{4} + \frac{2x+2}{6} = \frac{x+1}{12}$ to eliminate all the fractions?
   (a) 4 (b) 6 (c) 12 (d) 2

9. C ✓ Matthew and Jonathan compete on the same pizza-eating team. Matthew has eaten 10 more slices than Jonathan and together, they have eaten 50 slices. How many slices has Jonathan eaten?
   (a) 5 (b) 60 (c) 20 (d) 500

10. Solve each of the following equations. Wherever required, ***show the operation that is performed to each side.***

(a) $-6a-5=-2$ **(3 KU)**

$\therefore -6a-5+5=-2+5$ ✓

$\therefore -6a=3$

$\therefore \frac{-6a}{-6}=\frac{3}{-6}$ ✓

$\therefore a=-\frac{1}{2}$ ✓

(b) $-4-5s-3-2s=-s+18$ **(4 KU)**

$\therefore -7s-7=-s+18$

$\therefore -7s-7+s=-s+18+s$ ✓

$\therefore -6s-7=18$

$\therefore -6s-7+7=18+7$ ✓

$\therefore -6s=25$

$\therefore \frac{-6s}{-6}=\frac{25}{-6}$ ✓

$\therefore s=-\frac{25}{6}$ ✓

(c) $-6(y-3)+11=-(12-2y)$ **(5 KU)**

$\therefore -6y+18+11=-12+2y$ ✓

$\therefore -6y+29-2y=-12+2y-2y$ ✓

$\therefore -8y+29=-12$

$\therefore -8y+29-29=-12-29$ ✓

$\therefore -8y=-41$

$\therefore \frac{-8y}{-8}=\frac{-41}{-8}$ ✓

$\therefore y=\frac{41}{8}$ ✓

(d) $\frac{4(x-1)}{5}=-7$ **(4 KU)**

$\therefore \frac{5}{1}\left(\frac{4(x-1)}{5}\right)=5(-7)$ ✓

$\therefore 4(x-1)=-35$

$\therefore 4x-4=-35$

$\therefore 4x-4+4=-35+4$

$\therefore 4x=-31$

$\therefore \frac{4x}{4}=\frac{-31}{4}$ ✓

$\therefore x=-\frac{31}{4}$ ✓

11. Solve the following equation showing all steps. Then check your solution to verify that it is correct. **(10 APP)**

$\frac{3q}{2}-\frac{q+2}{4}=12-\frac{2q+3}{3}$

$\therefore \frac{12}{1}\left(\frac{3q}{2}\right)-\frac{12}{1}\left(\frac{q+2}{4}\right)=12(12)-\frac{12}{1}\left(\frac{2q+3}{3}\right)$

$\therefore 18q-3(q+2)=144-4(2q+3)$

$\therefore 18q-3q-6=144-8q-12$

$\therefore 15q-6=132-8q$

$\therefore 15q-6+8q=132-8q+8q$

$\therefore 23q-6=132$

$\therefore 23q-6+6=132+6$

$\therefore 23q=138$

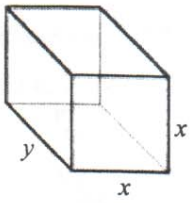
$\therefore \frac{23q}{23}=\frac{138}{23}$

$q=6$

Left-hand Side	Right-hand Side
$\frac{3q}{2}-\frac{q+2}{4}$	$12-\frac{2q+3}{3}$
$=\frac{3(6)}{2}-\frac{6+2}{4}$	$=12-\frac{2(6)+3}{3}$
$=\frac{18}{2}-\frac{8}{4}$	$=12-\frac{12+3}{3}$
$=9-2$	$=12-\frac{15}{3}$
$=7$	$=12-5$
	$=7$

Since L.H.S. = R.H.S., $q=6$ is the solution.

12. Shown at the right is a shape known as a *square prism*. Its volume can be found using the formula $V = x^2 h$.



(a) Rearrange the formula to isolate x. (That is, solve for x in terms of h and V.) (3 APP)

$V = x^2 h$

$\therefore \frac{V}{h} = \frac{x^2 h}{h}$ ✓

$\therefore \frac{V}{h} = x^2$

$\therefore \sqrt{\frac{V}{h}} = \sqrt{x^2}$ ✓

$\therefore x = \sqrt{\frac{V}{h}}$ ✓

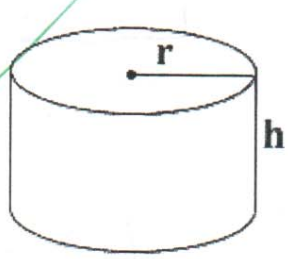
(b) Given that $h = 5$ and $V = 200$, use the equation that you obtained in (a) to solve for x. (2 APP)

$x = \sqrt{\frac{V}{h}}$

$= \sqrt{\frac{200}{5}}$ ✓

$= \sqrt{40} \doteq 6.3$ ✓

13. The surface area of a cylinder with radius r and height h is found using the formula $A = 2\pi r^2 + 2\pi r h$.



(a) *Solve* for h in terms of r. (3 APP)

$A = 2\pi r^2 + 2\pi r h$

$\therefore A - 2\pi r^2 = 2\pi r^2 + 2\pi r h - 2\pi r^2$

$A - 2\pi r^2 = 2\pi r h$

$\therefore \frac{A - 2\pi r^2}{2\pi r} = \frac{2\pi r h}{2\pi r}$

$\therefore h = \frac{A - 2\pi r^2}{2\pi r}$ ✓

(b) A cylinder has a surface area of 200 m^2 and a radius of 5 m. Use the formula that you developed in (a) to calculate the height of the cylinder. (2 APP)

$h = \frac{A - 2\pi r^2}{2\pi r}$

$= \frac{200 - 2\pi(5)^2}{2\pi(5)}$ ✓

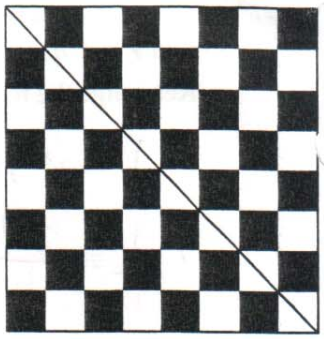
$= \frac{200 - 2\pi(25)}{10\pi}$

$= \frac{200 - 50\pi}{10\pi}$

$\doteq \frac{200 - 50(3.14)}{10(3.14)}$

$\doteq 1.37$ ✓

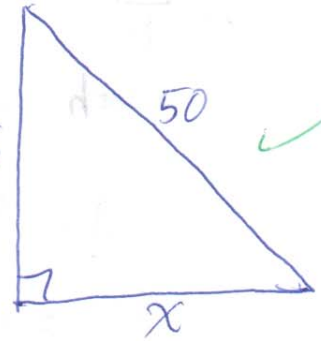
14. The chessboard shown at the right has a diagonal length of 50 cm.



(a) Find the *area* of each small square on the chessboard. (**Hint:** The Pythagorean Theorem) **(5 TIPS)**

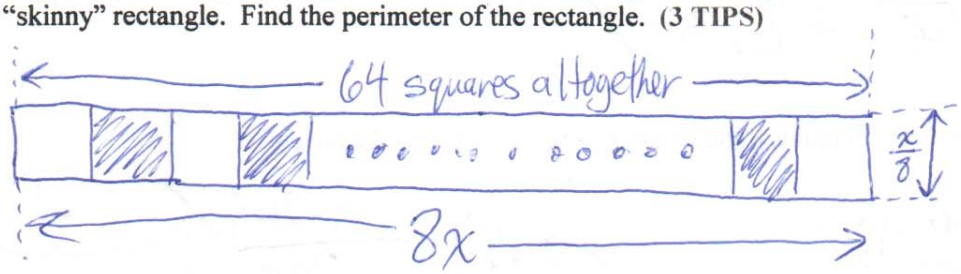
Let x represent the length of one side of the chessboard. Then, by the Pythagorean Theorem,

$$x^2 + x^2 = 50^2$$
$$\therefore\ 2x^2 = 2500$$
$$\therefore\ x^2 = 1250$$



Now x^2 is the area of the entire chessboard, which means that the area of the chessboard must be $1250\ cm^2$. Since there are 64 squares in all, the area of a single square must be $\frac{1250}{64} = 19.53125\ cm^2$.

(b) Suppose that the squares on the chessboard were arranged in a single row. This would form a very long and "skinny" rectangle. Find the perimeter of the rectangle. **(3 TIPS)**



$$P = 2(8x) + 2\left(\frac{x}{8}\right) \qquad \frac{2}{1}\left(\frac{x}{8}\right) = \frac{2x}{8_4} = \frac{x}{4}$$
$$= 16x + \frac{x}{4}$$

From 14a) we know that $x^2 = 1250$.

Therefore, $x = \sqrt{1250}$.

$$\therefore\ P = 16\left(\sqrt{1250}\right) + \frac{\sqrt{1250}}{4}$$
$$\doteq 574.5\ cm$$

The perimeter of the rectangle is about 574.5 cm.