MPM 1D9 | Semester 2, 2014 - 2015

Grade 9 Pre-AP Math
Unit 2 – Solving Equations (Period 1 Version)

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Victim: Mr. Solutions Brilliant display of thinking skills Mr. S. !!

KU	APP	TIPS	COM
27/27	25/25	10/10	10/10

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. F ✓ $(x+3)^2 = x^2 + 3^2$ is an **identity**. **Change:** equation solved for unknown ✓

2. F ✓ $a^2 + b^2$ is a mathematical relationship. **Change:** $c^2 = a^2 + b^2$ ✓ (other answers possible)

3. F ✓ The algebraic expression $7x - x^2$ is equivalent to $7x(-x^2)$. **Change:** $-x^2 + 7x$ ✓ (other answers possible)

✓ = ½ mark

Multiple Choice **(7 KU)**

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

4. d ✓ Which equation models the statement "three more than a number, all quadrupled is equal to 8?"

(a) $3n + 4 = 8$ **(b)** $3(n+4) = 8$ **(c)** $4n + 3 = 8$ **(d)** $4(n+3) = 8$

5. c ✓ $y = -1$ is the solution for which equation?

(a) $y - 2 = 0$ **(b)** $2y - 4 = 0$ **(c)** $2 + 2y = 0$ **(d)** $2 + y = 0$

6. d ✓ Isha sells cellphone plans. She is paid \$9/h plus 12% commission on sales. Which expression represents Isha's total earnings? (t represents hours worked, s represents amount sold in \$.)

(a) $9t + 12s$ **(b)** $9t + 0.012s$ **(c)** $0.12t + 9s$ **(d)** $9t + 0.12s$

7. c ✓ The distance, d, in kilometres, a spacecraft travels in t ***minutes*** is given by the formula $d = 700t$. How long will it take the spacecraft to travel 1,400,000 km?

(a) 2000 h **(b)** 0.0005 minutes **(c)** $\frac{100}{3}$ h **(d)** 980000000 minutes

8. b ✓ The perimeter of a rectangle can be found using the equation $P = 2l + 2w$. To isolate l, which of the following is the first step that you would perform to ***both sides***?

(a) Add $2w$ **(b)** Subtract $2w$ **(c)** Multiply by $2w$ **(d)** Divide by $2w$

9. d ✓ Which of the following is a correctly rearranged form of the equation $y - y_1 = m(x - x_1)$?

(a) $x = \frac{y - y_1 + x_1}{m}$ **(b)** $y = m(x - x_1 + y_1)$ **(c)** $x = m(y - y_1) + x_1$ **(d)** $x = \frac{y - y_1}{m} + x_1$

10. Solve each of the following equations. You ***must*** show the operation that is performed to each side.

(a) $-18y-7=-19$ **(3 KU)**

$\therefore -18y-7+7=-19+7$ ✓

$\therefore -18y=-12$

$\therefore \frac{-18y}{-18}=\frac{-12\div(-6)}{-18\div(-6)}$ ✓

$\therefore y=\frac{2}{3}$ ✓

(b) $-5+7x-3+8x=-x+11$ **(4 KU)**

$\therefore 15x-8=-x+11$ ✓

$\therefore 15x-8+x=-x+11+x$

$\therefore 16x-8=11$ ✓

$\therefore 16x-8+8=11+8$

$\therefore 16x=19$

$\therefore \frac{16x}{16}=\frac{19}{16}$ ✓

$\therefore x=\frac{19}{16}$ ✓

(c) $5(w-2)+1=-(5w-2)-1$ **(5 KU)**

$\therefore 5w-10+1=-5w+2-1$

$\therefore 5w-9=-5w+1$ ✓

$\therefore 5w-9+5w=-5w+1+5w$ ✓

$\therefore 10w-9=1$

$\therefore 10w-9+9=1+9$ ✓

$\therefore 10w=10$

$\therefore \frac{10w}{10}=\frac{10}{10}$ ✓

$\therefore w=1$ ✓

(d) $\frac{-5(b-1)}{6}=-5b-1$ **(5 KU)**

$\therefore \frac{6}{1}\left(\frac{-5(b-1)}{6}\right)=6(-5b)-6(1)$ ✓

$\therefore -5(b-1)=-30b-6$

$\therefore -5b+5=-30b-6$ ✓

$\therefore -5b+5+30b=-30b-6+30b$

$\therefore 25b+5=-6$

$\therefore 25b+5-5=-6-5$ ✓

$\therefore 25b=-11$ ✓

$\therefore \frac{25b}{25}=\frac{-11}{25}$

$\therefore b=\frac{-11}{25}$ ✓

11. The surface area of a cylinder is given by the equation $A=2\pi r^2+2\pi rh$.

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

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

$\therefore A-2\pi r^2=2\pi r^2+2\pi rh-2\pi r^2$ ✓

$\therefore A-2\pi r^2=2\pi rh$

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

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

(b) Given that $r=5$ and $A=1000$, use the equation that you obtained in **(a)** to find the value of h. **(2 APP)**

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

$=\frac{1000-2\pi(5^2)}{2\pi(5)}$ ✓

$\doteq 26.8$ ✓

use scientific calculator

12. ***Solve*** the following equation. Then check to ***verify*** that your answer is correct. (Note that you are given the solution. This allows you to verify the solution even if you are not able to solve the equation.) **(10 APP)**

$\frac{12}{1}\left(\frac{y-3}{2}\right)-\frac{4}{1}\left(\frac{1}{3}y\right)=\frac{1}{12}\left(\frac{2y-7}{4}\right)\frac{12}{1}$ (The solution is $y = 5$.)

$\therefore 6(y-3)-4y = 1-3(2y-7)$

$\therefore 6y-18-4y = 1-6y+21$

$\therefore 2y-18 = -6y+22$

$\therefore 2y-18+6y = -6y+22+6y$

$\therefore 8y-18 = 22$

$\therefore 8y-18+18 = 22+18$

$\therefore 8y = 40$

$\frac{8y}{8} = \frac{40}{8}$

$\therefore y = 5$

Left-hand Side	Right-hand Side
$\frac{y-3}{2}-\frac{1}{3}y$	$\frac{1}{12}-\frac{2y-7}{4}$
$=\frac{5-3}{2}-\frac{1}{3}\left(\frac{5}{1}\right)$	$=\frac{1}{12}-\frac{2(5)-7}{4}$
$=1-\frac{5}{3}$	$=\frac{1}{12}-\frac{3}{4}$
$=\frac{3}{3}-\frac{5}{3}$	$=\frac{1}{12}-\frac{9}{12}$
$=\frac{-2}{3}$	$=\frac{-8}{12}=-\frac{2}{3}$

Since LHS = RHS, $y = 5$ satisfies the equation.

13. The WeAreNuts bulk food store sells pistachios at \$18/kg and almonds at \$9/kg. A mixture of pistachios and almonds is made in such a way that it contains 100 kg of pistachios and sells for \$14/kg. How many kilograms of almonds must there be in the mixture?

(a) Complete the following table. All quantities must be expressed in terms of ***one variable***. If you use more than one, you will fail to solve this problem **AND** you will receive a mark of **ZERO**! **(2 APP)**

Type of Nut	*Mass of Nuts (kg)*	*Cost (Dollars)*
Pistachios	100	$18(100) = 1800$
Almonds	a	$9a$
Mixture	$a+100$	$14(a+100)$

(b) Translate the following sentence into an equation:

"In the mixture, the cost of the pistachios ***plus*** the cost of the almonds ***is*** the total cost of the mixture." **(3 APP)**

$1800+9a = 14(a+100)$

(c) Now solve the equation and state a conclusion. **(5 APP)**

$1800+9a = 14(a+100)$

$\therefore 1800+9a = 14a+1400$

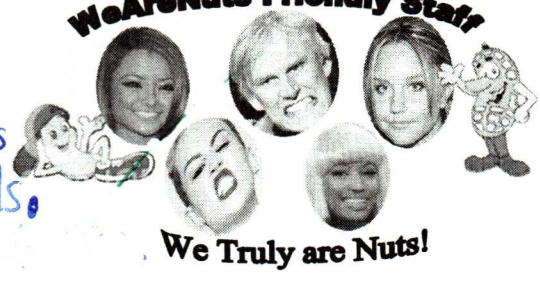
$\therefore 1800+9a-1800-14a = 14a+1400-1800-14a$

$\therefore -5a = -400$

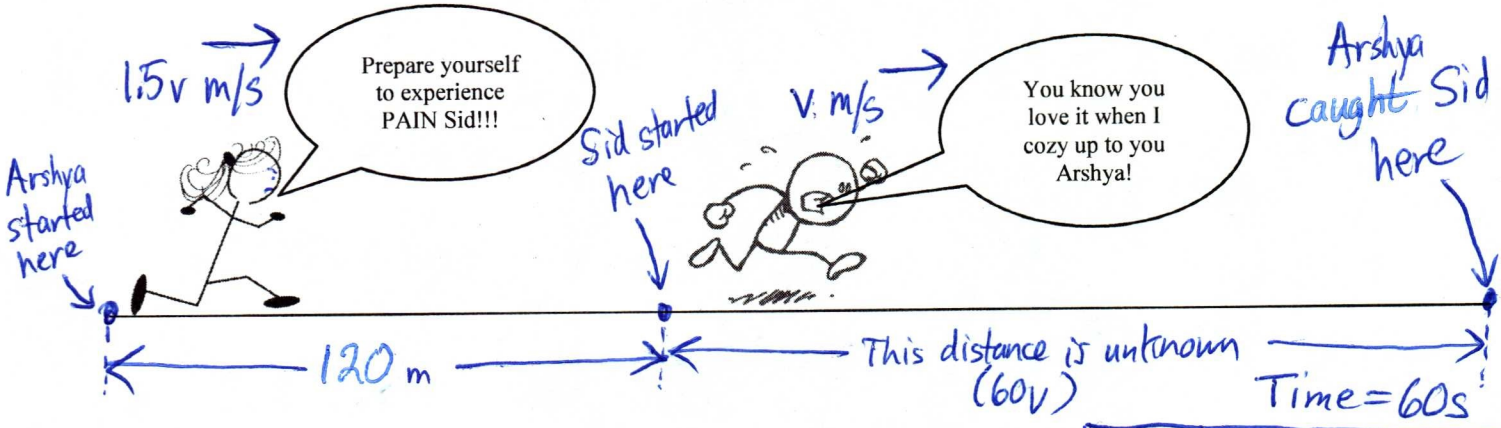
$\therefore \frac{-5a}{-5} = \frac{-400}{-5}$

$\therefore a = 80$

The mixture contains 80 kg of almonds.



14. Mr. Sid Srivastava has gone too far! He cozied up to Arshya in class too many times, making her so angry that she decided to chase Sid and tackle him to the ground. Arshya and Sid started 120 m apart and started running in the ***same direction*** at exactly the same time. If Arshya ran 1.5 times faster than Sid and it took her exactly one minute to catch up to him, how fast were each of them running? **(10 TIPS)**



(Distance Arshya ran) is 120 m more than (Distance Sid ran)

Assuming time is measured in seconds, we have

$60(1.5v) = 60v + 120$

	speed	Distance
Sid	v	60v
Arshya	1.5v	60(1.5v)

$v = \frac{d}{t}$

$\therefore d = vt$

$\therefore 90v = 60v + 120$

$\therefore 90v - 60v = 60v + 120 - 60v$

$\therefore 30v = 120$

$\therefore v = 4 \rightarrow 1.5v = 1.5(4) = 6$

Sid ran at 4 m/s while Arshya ran at 6 m/s.

(OR 240 m/min) (OR 360 m/min)

(If time is measured in minutes then the equation would be $1(1.5v) = 1v + 120$)