

Mr. Nolfi

Victim:

Mr. Solutions

Well done 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  $2x - 2 = 2 - 2x$  is an **identity**.

✓ =  $\frac{1}{2}$  mark

Change: equation solved for unknown

2. F  $a^2 + b^2$  is a mathematical relationship.

Change:  $c^2 = a^2 + b^2$

3. F The algebraic expression  $3 - x^2$  is equivalent to  $3(-x^2)$ .

Change:  $-x^2 + 3$  (many other answers possible)

## 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. C Which equation models the statement "four more than a number, all tripled is equal to 8?"

(a)  $3n + 4 = 8$

(b)  $4n + 3 = 8$

(c)  $3(n + 4) = 8$

(d)  $4(n + 3) = 8$

5. C  $y = -2$  is the solution for which equation?

(a)  $y - 2 = 0$

(b)  $2y - 4 = 0$

(c)  $2 + y = 0$

(d)  $2 + 2y = 0$

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

(a)  $12t + 0.09s$

(b)  $12t + 0.9s$

(c)  $12t + 9s$

(d)  $9t + 0.12s$

7. b 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?

$t = \frac{d}{700} = \frac{1,400,000}{700} = \frac{14,000}{7} = 2,000$  minutes

(a) 2000 h

(b)  $\frac{100}{3}$  h

(c) 0.0005 minutes

(d) 9800000000 minutes

2000 minutes =  $\frac{2000}{60}$  h =  $\frac{100}{3}$  h

8. C 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) Multiply by  $2w$

(c) Subtract  $2w$

(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)  $x = \frac{y - y_1}{m} + x_1$

÷ B.S. by  $m$   $\frac{y - y_1}{m} = x - x_1$

+  $x_1$  to B.S.  $\frac{y - y_1}{m} + x_1 = x$

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

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

$$\therefore -19y - 7 + 7 = -18 + 7 \checkmark$$

$$\therefore -19y = -11$$

$$\therefore \frac{-19y}{-19} = \frac{-11}{-19} \checkmark$$

$$\therefore y = \frac{11}{19} \checkmark$$

(b)  $-7 + 9x - 3 + 8x = -x + 11$  (4 KU)

$$\therefore 17x - 10 = -x + 11$$

$$\therefore 17x - 10 + x = -x + 11 + x \checkmark$$

$$\therefore 18x - 10 + 10 = 11 + 10 \checkmark$$

$$\therefore 18x = 21$$

$$\therefore \frac{18x}{18} = \frac{21}{18} \checkmark \rightarrow \therefore x = \frac{7}{6} \checkmark$$

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

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

$$\therefore 5w - 11 + 5w = -5w + 3 + 5w \checkmark$$

$$\therefore 10w - 11 + 11 = 3 + 11 \checkmark$$

$$\therefore 10w = 14$$

$$\therefore \frac{10w}{10} = \frac{14}{10} \checkmark$$

$$\therefore w = \frac{7}{5} \checkmark$$

(d)  $\frac{-3(b-4)}{5} = -3b - 4$  (5 KU)

$$\therefore \frac{5}{1} \left[ \frac{-3(b-4)}{5} \right] = 5(-3b-4) \checkmark$$

$$\therefore \frac{5}{5} \left[ \frac{-3(b-4)}{1} \right] = -15b - 20$$

$$\therefore -3b + 12 + 15b = -15b - 20 + 15b \checkmark$$

$$\therefore 12b + 12 - 12 = -20 - 12 \checkmark$$

$$\therefore 12b = -32$$

$$\therefore \frac{12b}{12} = \frac{-32}{12} \checkmark$$

$$\therefore b = \frac{-8}{3} \checkmark$$

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

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

$$A - \pi r^2 = \pi r^2 + \pi rs - \pi r^2 \checkmark$$

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

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

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

(b) Given that  $r = 5$  and  $A = 1000$ , use the equation that you obtained in (a) to solve for  $s$ . (2 APP)

$$s = \frac{1000 - \pi(5)^2}{\pi(5)} \checkmark$$

Using a calculator

$$\approx 58.7 \checkmark$$

e.g. Expression entered on Web 2.0 calculator

$$\frac{(1000 - \pi \times 5^2)}{(\pi \times 5)}$$

$$(1000 - \pi \times 5^2) / (\pi \times 5)$$

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)

$$\frac{y}{2} - \frac{1}{3}(y+3) = \frac{1}{12} - \frac{2y-1}{4} \quad (\text{The solution is } y=2.)$$

$\therefore \frac{12}{12}(\frac{y}{2}) - \frac{12}{12}[\frac{1}{3}(y+3)] = \frac{12}{12}(\frac{1}{12}) - \frac{12}{12}(\frac{2y-1}{4})$   
 $\therefore \frac{12}{2}(\frac{y}{1}) - \frac{12}{3}(\frac{1}{1})(y+3) = \frac{12}{12} - \frac{12}{4}(\frac{2y-1}{1})$   
 $\therefore 6y - 4(y+3) = 1 - 3(2y-1)$  ✓  
 $\therefore 6y - 4y - 12 = 1 - 6y + 3$  ✓  
 $\therefore 2y - 12 + 6y = 4 - 6y + 6y$  ✓  
 $\therefore 8y - 12 + 12 = 4 + 12$  ✓  
 $\therefore 8y = 16$  ✓  
 $\therefore \frac{8y}{8} = \frac{16}{8} \rightarrow \boxed{y=2}$  ✓

| Left-hand Side                     | Right-hand Side                     |
|------------------------------------|-------------------------------------|
| $\frac{y}{2} - \frac{1}{3}(y+3)$   | $\frac{1}{12} - \frac{2y-1}{4}$     |
| $= \frac{2}{2} - \frac{1}{3}(2+3)$ | $= \frac{1}{12} - \frac{2(2)-1}{4}$ |
| $= 1 - \frac{1}{3}(\frac{5}{1})$   | $= \frac{1}{12} - \frac{3}{4}$      |
| $= 1 - \frac{5}{3}$                | $= \frac{1}{12} - \frac{9}{12}$     |
| $= \frac{3}{3} - \frac{5}{3}$      | $= \frac{-8}{12}$ ✓                 |
| $= -\frac{2}{3}$ ✓                 | $= -\frac{2}{3}$ ✓                  |

Since LHS = RHS,  $y=2$  is the solution ✓

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 50 kg of pistachios and sells for \$12/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)

| Quantity  | Representation | Cost (Dollars) |
|---|----------------|----------------|
| Kilograms of pistachios in the <b>mixture</b> . | 50             | $50(18) = 900$ |
| Kilograms of almonds in the <b>mixture</b> .    | $a$            | $9a$           |
| Total   | $a+50$         | $12(a+50)$     |

- (b) Translate the following sentence into an equation:

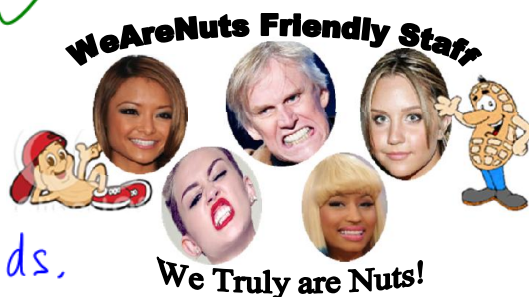
"In the mixture, the cost of the pistachios **plus** the cost of the almonds **is** the total cost of the mixture." (3 APP)

$$900 + 9a = 12(a+50)$$

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

$$\begin{aligned}
 900 + 9a &= 12a + 600 \\
 \therefore 900 + 9a - 9a &= 12a + 600 - 9a \quad \checkmark \\
 \therefore 900 - 3a - 900 &= 600 - 900 \quad \checkmark \\
 \therefore -3a &= -300 \\
 \therefore \frac{-3a}{-3} &= \frac{-300}{-3} \quad \checkmark \\
 \therefore a &= 100 \quad \checkmark
 \end{aligned}$$

The mixture should contain 100 kg of almonds. ✓



14. To reward them for *reading his online notes*, Mr. Nolfi gave a number of pennies and dimes to four of his students. He decided to distribute the money to the students in the following way:

- The first student was given 100 dimes *more than*  $\frac{1}{2}$  of the total number of *dimes*.  $\frac{1}{2}d + 100$  <sup>OR</sup>  $\left(\frac{d}{2} + 100\right)$
  - The second student was given 200 dimes *more than*  $\frac{1}{4}$  of the total number of *pennies*.  $\frac{1}{4}(d+400) + 200$
  - The third student was given 300 dimes *more than*  $\frac{1}{8}$  of the total number of *pennies*.  $\frac{1}{8}(d+400) + 300$
  - The fourth student was given 600 dimes *more than*  $\frac{1}{16}$  of the total number of *dimes*.  $\frac{1}{16}d + 600$
- total # of dimes

Given that Mr. Nolfi gave away **400 more pennies than dimes**, how much **money** did he give away altogether? (10 TIPS)

Let  $d$  represent the # of dimes Mr. Nolfi gave away. ✓

Then  $d+400$  must represent the # of pennies that he gave away. ✓

We're about to have loads of fun throwing pennies at students who don't read Mr. Nolfi's notes! (But first I need to check my Facebook messages!)



$$\left(\begin{array}{l} \text{\# dimes} \\ \text{given to} \\ \text{stud. 1} \end{array}\right) + \left(\begin{array}{l} \text{\# dimes} \\ \text{given to} \\ \text{stud. 2} \end{array}\right) + \left(\begin{array}{l} \text{\# dimes} \\ \text{given to} \\ \text{stud. 3} \end{array}\right) + \left(\begin{array}{l} \text{\# dimes} \\ \text{given to} \\ \text{stud. 4} \end{array}\right) = \text{total number of dimes}$$

$$\therefore \frac{1}{2}d + 100 + \frac{1}{4}(d+400) + 200 + \frac{1}{8}(d+400) + 300 + \frac{1}{16}d + 600 = d$$

$$\therefore \frac{1}{2}d + \frac{1}{4}(d+400) + \frac{1}{8}(d+400) + \frac{1}{16}d + 1200 = d$$

$$\therefore \frac{16}{1}\left(\frac{1}{2}d\right) + \frac{16}{1}\left[\frac{1}{4}(d+400)\right] + \frac{16}{1}\left[\frac{1}{8}(d+400)\right] + \frac{16}{1}\left(\frac{1}{16}d\right) + 16(1200) = 16d$$

$$\therefore 8d + 4(d+400) + 2(d+400) + d + 19200 = 16d$$

$$\therefore 8d + 4d + 1600 + 2d + 800 + d + 19200 = 16d$$

$$\therefore 15d + 21600 = 16d$$

$$\therefore 15d + 21600 - 15d = 16d - 15d$$

$$\therefore 21600 = d \leftarrow \text{\# of dimes}$$

$$\therefore d+400 = 22000 \leftarrow \text{\# of pennies}$$

$$\begin{aligned} \text{money given away} &= 21600(0.10) + 22000(0.01) \\ \text{(in dollars)} &= 2160 + 220 \\ &= 2380 \end{aligned}$$

Mr. Nolfi gave out a total of \$2380. (Wow! They must have been very good students.)