MPM 1D0

Grade 9 Academic Math
Unit 3 – Analytic Geometry – Practice Test

Brilliantly insightful work Mr. S.!

KU	APP	TIPS	COM
11 /11	14/14	15/15	10/10

Name: *Mr. Solutions*

Multiple Choice (6 KU)

For questions 1 to 6, select the **best** answer. Write the letter of your choice in the provided blank space.
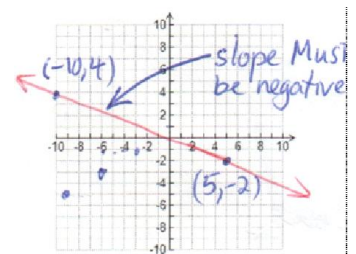
1. __b__ Three points are shown at the right. Between which two points can you draw a line with a **negative** slope?
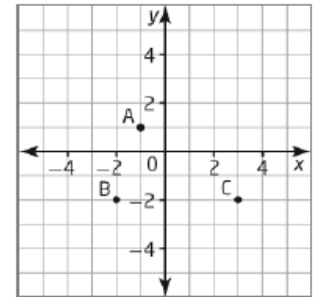
   (a) *A* and *B* — positive slope

   (b) *A* and *C*

   (c) *B* and *C* — zero slope

   (d) None of these

2. __b__ Find the slope of a line that passes through the points $(-10, 4)$ and $(5, -2)$.

   $$x_1\ y_1 \qquad x_2\ y_2$$

   (a) $\dfrac{6}{15}$

   (b) $-\dfrac{6}{15}$

   (c) $\dfrac{15}{6}$

   (d) $-\dfrac{15}{6}$

   $$m = \frac{\Delta y}{\Delta x}$$
   $$= \frac{-2-4}{5-(-10)} = \frac{-6}{15}$$

   $(-10,4)$ — slope Must be negative $(5,-2)$

3. __d__ Use first differences to determine which relation at the right is linear.

   (a) Only *A*.

   (b) Only *B*.

   (c) Both *A* and *B*.

   (d) Neither

   For both A and B, Δx is constant BUT Δy is not.

   A

x	y
−5	−15
−3	−10
−1	−5
1	−2

   B

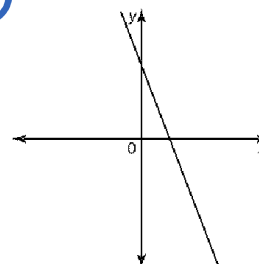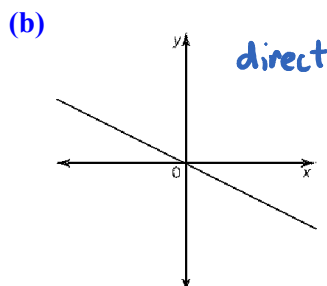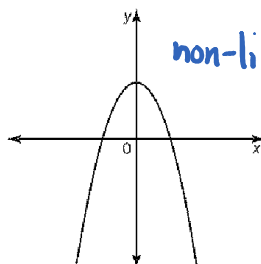 | x | y |
   |---|----|
   | 8 | 1 |
   | 6 | −3 |
   | 4 | 5 |
   | 2 | −7 |

4. __c__ Which equation represents a partial variation?

   (a) $y = -x^3 + 1$ non-linear   **(b)** $y = -3x$ direct   **(c)** $y = -3x + 1$ **(d)** none of these
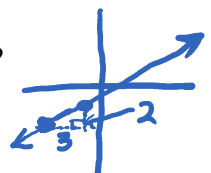
5. __c__ Which of the following graphs represents a partial variation?

   (a) non-linear   **(b)** direct   **(c)**   **(d)** none of these

6. __a__ A line passes through the point $(-6, -3)$ and has a slope of $\dfrac{2}{3}$. Which point is on the same line?

   $(-9,-5)$ $\dfrac{-3-(-5)}{-6-(-9)} = \dfrac{2}{3}$ Δy Δx

   (a) $(-9, -5)$ **(b)** $(-2, -1)$ **(c)** $(3, 4)$ **(d)** $(19, 13)$

Write complete solutions for each of the following problems.

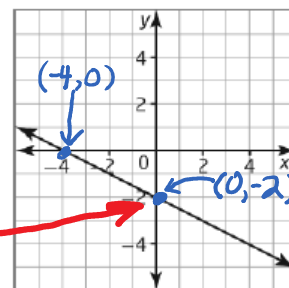7. Consider the graph given at the right. **(5 KU)**

(a) Calculate the slope

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-2 - 0}{0 - (-4)} \checkmark$$

$$= \frac{-2}{4} = \frac{-1}{2} \checkmark$$

(b) Determine the y-intercept (i.e. the vertical intercept)

$$b = -2 \quad (\text{from graph}) \checkmark$$
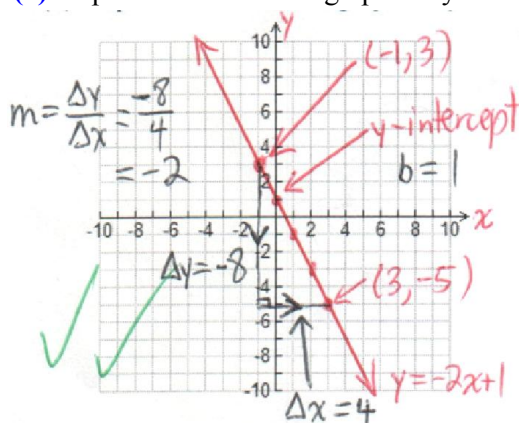
(-4,0)

(0,-2)

slope must be negative

(c) Write an equation for the relation.

$y = mx + b$ is the general form

$\therefore y = -\frac{1}{2}x - 2$ is an equation of this relation $\checkmark$

8. Consider the relation shown at the right in table form. **(6 APP)**

x	y
−1	3
0	1
1	−1
2	−3
3	−5

(a) Represent the relation graphically.

$$m = \frac{\Delta y}{\Delta x} = \frac{-8}{4}$$

(-1,3)

y-intercept

b = 1

= -2

$\Delta y = -8$

(3,-5)

$\Delta x = 4$

$y = -2x + 1$

(b) Describe the relation using an equation.

$$m = \frac{\Delta y}{\Delta x} = \frac{1 - 3}{0 - (-1)} = \frac{-2}{1} = -2, \ b = 1$$

$\therefore y = -2x + 1$ is an equation for this relation $\checkmark\checkmark$

(c) Describe the relation in words. (Translate your equation into English.)

The y-co-ordinate is one more than the x-co-ordinate multiplied by -2. $\checkmark\checkmark$

Sergeant Nolfi has instructed me to punish anyone who gets this question wrong!

9. Saaya and Naxi have two different cell phone plans. Saaya pays a base fee of $15 *plus* $0.20 per minute of airtime used. Naxi, on the other hand, pays no base fee but must pay $0.40 per minute of airtime used. **(8 APP)**

(a) Complete the following table.

Minutes of Airtime used (*t*)	Saaya's Cost (*S*)	Naxi's Cost (*N*)
0	15	0
10	17	4
20	19	8
30	21	12
40	23	16
50	25	20

(b) Use the following grid to graph the cell phone cost for both Saaya and Naxi.

Saaya: $S = 0.2t + 15$

Naxi: $N = 0.4t$

Cost (Dollars)

Airtime (minutes)
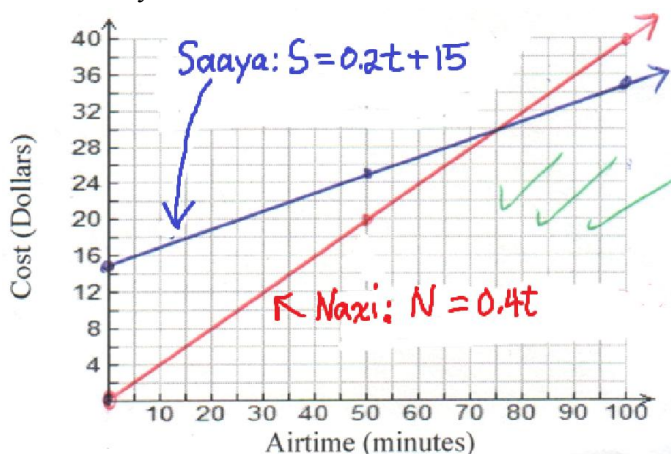
(c) Write an equation for cell phone cost for both Saaya and Naxi.
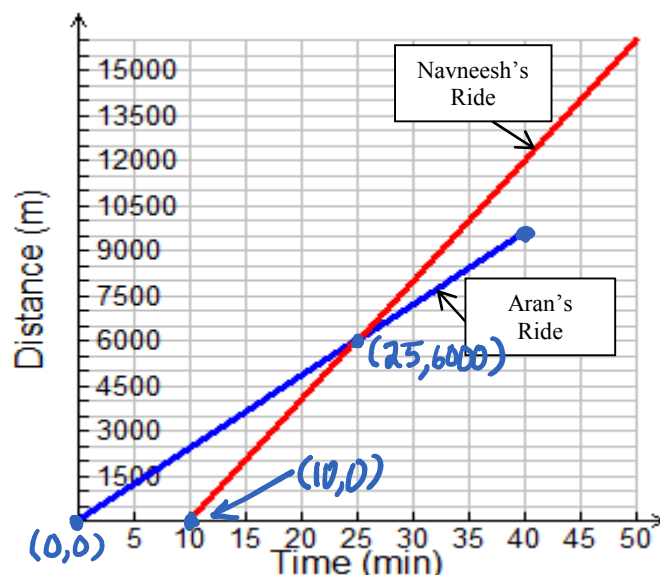
Saaya: $S = 0.2t + 15$ $\checkmark$

Naxi: $N = 0.4t$ $\checkmark$

10. Navneesh and Aran rode their bicycles home from school. Aran left immediately after school while Navneesh stayed for a few minutes to finish the argument she was having with Uday. The graphs at the right show how distance varies with time for each of the students. **(7 TIPS)**

(a) What is each student's speed? Show your calculations.

Aran	Navneesh
speed = slope $= \dfrac{6000-0}{25-0}$ ✓ $= 240 \text{ m/min}$ ✓	speed = slope $= \dfrac{6000-0}{25-10}$ ✓ $= 400 \text{ m/min}$ ✓

Graph: Distance (m) vs Time (min). Navneesh's Ride (red), Aran's Ride (blue). Points marked (25,6000), (10,0), (0,0).

(b) How long did Navneesh stay after school?

She stayed for 10 minutes. We know this because her graph starts at 10 on the x-axis while Aran's starts at 0. ✓

(c) Who arrived home first? Explain

Aran arrived home first because her graph ends at 40 minutes while Navneesh's continues to 50 minutes. ✓

(d) Assuming that Navneesh and Aran followed exactly the same route home, at what time did Navneesh pass Aran?

She passed Aran at 25 minutes. ✓ (This is where Navneesh's graph crosses Aran's, meaning that beyond 25 minutes Navneesh covers a greater total distance.)

11. Ayesha can run the length of the school field in 10 s. Vyshna takes twice as long to run the same distance while Loveleen takes only 7.5 s. **(8 TIPS)**

(a) No scale has been provided for the vertical axis. Include a suitable, realistic scale for this axis. (Recall that an Olympic sprinter can run 100 m in about 10 s.) Length of field should be chosen in such a way that Loveleen is slower than an Olympic sprinter.

Handwritten note on graph: Reasonable assumption: Loveleen can run 60 m in 7.5 s. For this reason, I set the length of the field to 60 m.

Graph: Distance (m) vs Time (s). Lines labeled Loveleen, Ayesha (red), Vyshna (green).

(b) Assuming that each student runs at a *constant speed*, use the grid at the right to sketch graphs of *distance* versus *time* for each of the runners. Label each graph clearly!

(c) Explain why the slope of Ayesha's graph is twice the slope of Vyshna's graph.

We know that the slope of a distance-time graph is equal to speed. Since Ayesha runs twice as fast as Vyshna, the slope of her graph must be twice that of Vyshna's. ✓
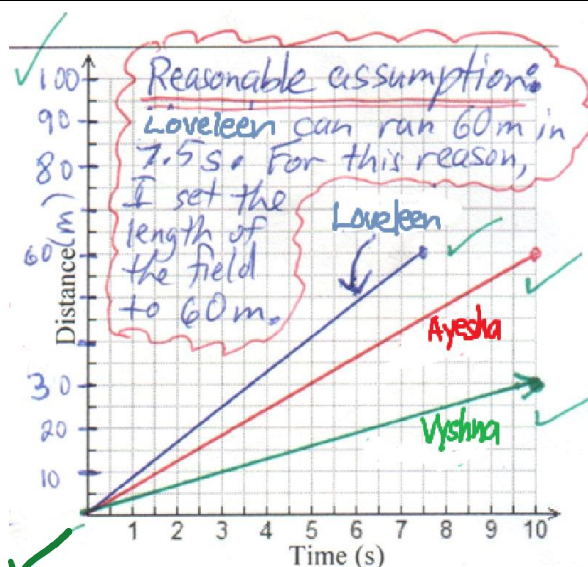
(d) How does the slope of Loveleen's graph compare to the slope of Ayesha's graph? Explain.

slope of Ayesha's graph $= \dfrac{60-0}{10-0} = 6$ (speed = 6 m/s)

slope of Loveleen's graph $= \dfrac{60-0}{7.5-0} = 8$ (speed = 8 m/s) ✓

$\dfrac{8}{6} = \dfrac{4}{3}$ Therefore, the slope of Loveleen's graph is $\dfrac{4}{3}$ times that of Ayesha. ✓