MPM 1D9 **Semester 2, 2016 - 2017**

Grade 9 Pre-AP Math
Unit 3 – Analytic Geometry – Major Test

Mr. Nolfi
Victim: Mr. Solutions

Another fine piece of work Mr. S.!

KU	APP	TIPS	COM
15/15	16/16	12/12	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 ✓ Mukti starts 10 m away from a motion sensor and walks toward it at a speed of 2 m/s. The slope of her distance-time graph is 10.
Change: −2 ✓

2. F ✓ If the run (Δx) is zero when the rise (Δy) is not zero, the slope must be zero.
Change: undefined ✓

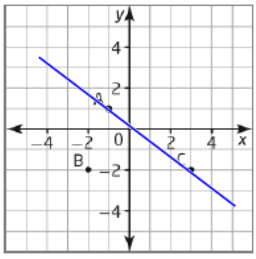
3. F ✓ If a distance-time graph is a straight line that goes upward to the right, the speed must be increasing.
Change: constant ✓

(✓ = ½ mark)

Multiple Choice (5 KU)

For questions 4 to 8, select the ***best*** answer. Write the letter of your choice in the provided blank space.

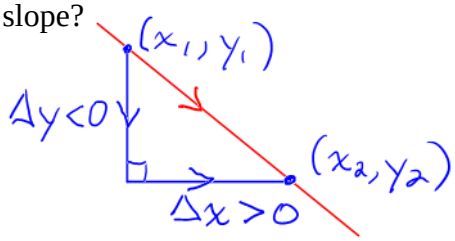
4. b ✓ Three points are shown at the right. Between which two points can you draw a line with a ***negative*** slope?



(a) *A* and *B* **(b)** *A* and *C* **(c)** *B* and *C* **(d)** None of these

5. C ✓ ***Why*** does a line that goes downward to the right have a ***negative*** slope?

(a) Lines that have a negative slope go downward to the right.
(b) A line that decreases must have a negative slope.
(c) The rise (Δy) and the run (Δx) must have opposite signs.
(d) This is an inviolable law of nature.



6. b ✓ Which of the relations at the right is linear?

(a) Only *A* **(b)** Only *B* **(c)** Both *A* and *B* **(d)** Neither

A

x	*y*
0	7
2	2
4	−3
5	−8

B

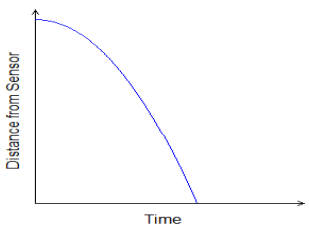
x	*y*
10	−3
20	0
30	3
40	6

7. b ✓ Which of the following equations represents a ***partial*** variation?

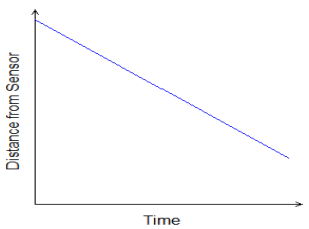
(a) $y = -5x + 0$ **(b)** $y = -5x + 8$ **(c)** $y = \sqrt{x} + 8$ **(d)** (a), (b) and (c)

8. C ✓ Which of the following represents motion toward a sensor with a decreasing speed?

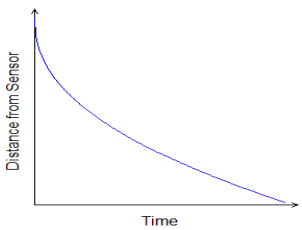
(a)



(b)



(c)



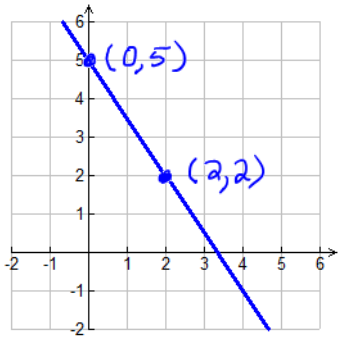
(d) (a), (b) and (c)

KU	APP
− 0	− 0
TIPS	COM
− 0	− 0

Full Solutions

Write complete solutions for each of the following problems.

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



(a) Calculate the slope. Write your answer in ***fraction*** form!

$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2-5}{2-0} = \frac{-3}{2}$ ✓

(b) State the ***co-ordinates*** of the *y*-intercept:

$(0, 5)$ ✓

(c) Write an ***equation*** for the relation:

$y = -\frac{3}{2}x + 5$ ✓

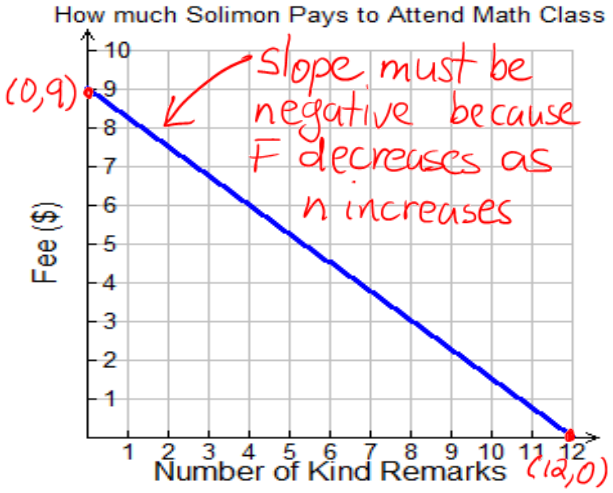
(d) Use your equation to ***calculate*** the *y*-co-ordinate for an *x*-co-ordinate of −2.

$y = -\frac{3}{2}\left(\frac{-2}{1}\right) + 5$

$= 3 + 5$ ✓

$= 8$ ✓

10. Solimon is well known for making inappropriate remarks. To discourage this behaviour, Mr. Nolfi charged Solimon a fee for every class attended. To decrease the amount of money Solimon had to pay, Mr. Nolfi agreed to ***reduce*** the fee by a constant amount for every ***kind remark*** that Solimon made.

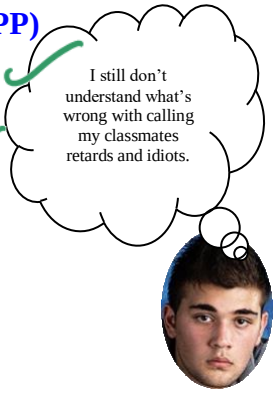


(a) Let *F* represent the fee that Solimon pays (in $) and let *n* represent the number of kind remarks that Solimon makes. Use the graph at the left to write an equation that relates *F* to *n*. **(4 APP)**

$m = \text{slope} = \frac{0-9}{12-0} = \frac{-9}{12} = \frac{-3}{4}$ ✓

$b = y\text{-intercept} = 9$ ✓

$\therefore F = \frac{-3}{4}n + 9$ ✓



(b) In part (a), you found both the slope and the *y*-intercept of Solimon's graph. State the ***meaning*** of each in the ***context of this problem***. **(2 APP)**

Meaning of the Slope:

negative slope

Solimon's fee is reduced by $\$\frac{3}{4}$ ($0.75) for every kind remark ✓

Meaning of the *y*-intercept:

Solimon must pay $9 if he doesn't make any kind remarks. ✓

(c) How many kind remarks would Solimon need to make to reduce his fee to $0.00? Arrive at an answer to this question by ***solving an equation***. Does your answer agree with the graph? Explain. **(4 APP)**

$F = 0, n = ?$

$0 = -\frac{3}{4}n + 9$ ✓

$\therefore 4(0) = \frac{4}{1}\left(\frac{-3}{4}n\right) + 4(9)$

$\therefore 0 = -3n + 36$ ✓

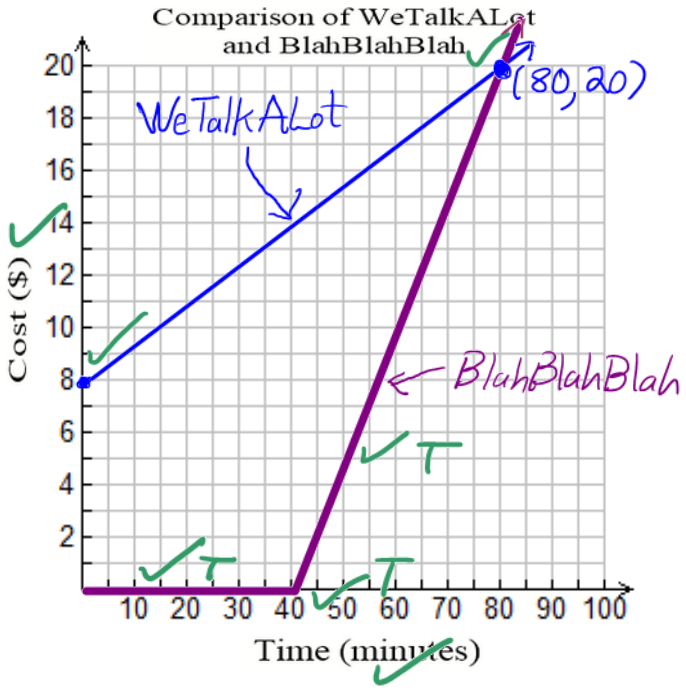
$\therefore 3n = 36$

$\therefore n = 12$ ✓

Solimon must make 12 kind remarks to reduce his fee to zero. This agrees with the graph because (12,0) lies on the graph. ✓

KU	APP	TIPS	COM
−0	−0	−0	−0

11. For long distance calls, the *WeTalkALot* telephone company charges $8.00 plus $0.15 per minute. The *BlahBlahBlah* telephone company charges nothing for the first 40 minutes, and $0.50 for each minute ***beyond*** the first 40 minutes.



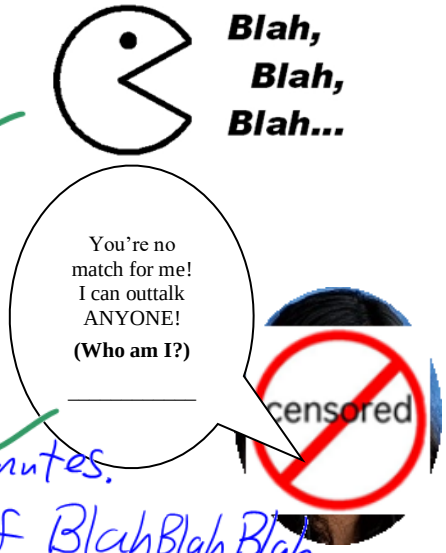
(a) Let t represent time in minutes and let C represent cost in dollars. Write an equation that relates C to t for *WeTalkALot*. **(2 APP)**

WeTalkALot Equation: $C = 0.15t + 8$

(b) Use the given grid to sketch a graph of C versus t for *WeTalkALot*. Do not forget to ***label*** the axes! **(4 APP)**

(c) Use the ***same*** grid to sketch a graph of C versus t for *BlahBlahBlah*. **(3 TIPS)**

(d) Use your graphs to ***estimate*** the following: **(6 TIPS)**



(i) For what number of minutes do *WeTalkALot* and *BlahBlahBlah* charge the same amount? Explain.

Since the graphs intersect at (80, 20), both companies charge $20 for 80 minutes of long distance usage.

(ii) Under what circumstances is *BlahBlahBlah* a better deal? Explain.

Since BlahBlahBlah's graph is below that of WeTalkALot for up to 80 minutes, it has a lower cost when usage is below 80 minutes.

(iii) Under what circumstances is *WeTalkALot* a better deal? Explain.

Since WeTalkALot's graph is below that of BlahBlahBlah for more than 80 minutes of usage, it has a lower cost when long distance usage is over 80 minutes.

(e) The graph of C versus t for *BlahBlahBlah* consists of two parts. Write an equation that relates C to t for each part. **(3 TIPS)**

Equation for *BlahBlahBlah* for 0 to 40 minutes: $C = 0$

Equation for *BlahBlahBlah* beyond 40 minutes: $C = 0.5t - 20$ or $C = 0.5(t - 40)$

KU	APP	TIPS	COM
–0	–0	–0	–0