

Grade 9 Pre-AP Math  
Unit 4 Test – Linear Relations – Practice Test

Victim: Mr. Solutions *Well done Mr. S.!*

KU	APP	TIPS	COM
22/22	21/21	15/15	14/14

**INSTRUCTIONS** – Read each question *carefully!!* For full marks, show all work where required.

**Matching**

1. Match each item with the correct statement below. (4 KU)

- |                                     |                           |                              |                                   |
|-------------------------------------|---------------------------|------------------------------|-----------------------------------|
| <del>A.</del> standard form         | <del>B.</del> reciprocals | <del>C.</del> y-intercept    | <del>D.</del> x-intercept         |
| <del>E.</del> point of intersection | <del>F.</del> slope       | <del>G.</del> parallel lines | <del>H.</del> perpendicular lines |
- Handwritten note:  $\checkmark = \frac{1}{2}$  mark*
- |   |   |
|---|---|
| <u>F</u> ✓ For a horizontal line, this is zero.                                       | <u>G</u> ✓ These lines have the same slope.                                     |
| <u>H</u> ✓ These lines meet at $90^\circ$ .   | <u>E</u> ✓ This is where two lines meet.  |
| <u>C</u> ✓ For the line $3x - 2y = 6$ , this is $-3$ .                                | <u>B</u> ✓ The numbers 10 and $1/10$ are examples.                              |
| <u>A</u> ✓ This is the name for an equation of a line in the form $Ax + By + C = 0$ . | <u>D</u> ✓ For a vertical line, the value of $x$ is constant and equal to this. |

**Modified True/False**

Indicate whether each statement is *true* or *false*.

If false, *change* the underlined part to make the statement true. (4 KU)

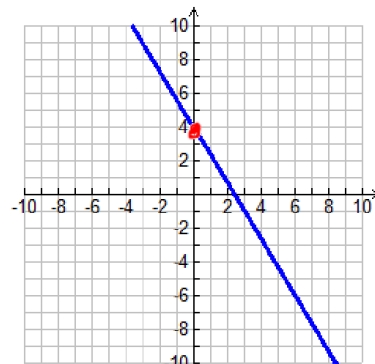
- |   |  |
|---|--|
| 2. <u>F</u> ✓ The slope of the line $x = -10$ is <u>zero</u> .  | Change: <u>undefined</u> ✓   |
| 3. <u>F</u> ✓ The y-intercept of the line $x - y = -3$ is <u>-3</u> .   | Change: <u>3</u> ✓   |
| 4. <u>F</u> ✓ <u><math>y = 4x - 1</math></u> and $4x + y + 1 = 0$ represent the same line.  | Change: <u><math>y = -4x - 1</math></u> ✓  |
| 5. <u>F</u> ✓ If the dependent variable of a linear relation decreases by 6 for every increase of 5 in the independent variable, the slope must be <u><math>-\frac{5}{6}</math></u> . | Change: <u><math>-\frac{6}{5}</math></u> ✓ <i>(<math>\Delta y</math> over <math>\Delta x</math>)</i> |

**Multiple Choice**

Identify the choice that best completes the statement or answers the question. (4 KU)

6. d ✓ For the line  $2x - 5y + 10 = 0$ , which statement is true?
- |   |  |
|---|--|
| (a) The x-intercept is $-5$ , and the y-intercept is $-2$ . | (b) The x-intercept is $5$ , and the y-intercept is $2$ .  |
| (c) The x-intercept is $5$ , and the y-intercept is $-2$ .  | (d) The x-intercept is $-5$ , and the y-intercept is $2$ . |
7. b ✓ What are the slope and y-intercept of the given line?

- |  |   |
|--|---|
| <del>(a)</del> $m = \frac{5}{3}, b = 4$  | (b) $m = -\frac{5}{3}, b = 4$             |
| <del>(c)</del> $m = \frac{3}{5}, b = -4$ | <del>(d)</del> $m = -\frac{5}{3}, b = -4$ |



K	<input type="radio"/>
A	<input type="radio"/>
T	<input type="radio"/>
C	<input type="radio"/>

8. a ✓ What is the slope of the line with an x-intercept of -10 and a y-intercept of -3?

(a)  $-\frac{3}{10}$

~~(b)  $\frac{3}{10}$~~

(c)  $-\frac{10}{3}$

~~(d)  $\frac{10}{3}$~~

Slope must be negative



$$\frac{\Delta y}{\Delta x} = \frac{p-2}{10-6} = \frac{p-2}{4}$$

9. b ✓ What is the value of  $p$  so that the line passing through (6, 2) and (10,  $p$ ) has a slope of -2?

(a) -10

(b) -6

(c) 10

(d) 6

$$\frac{-6-2}{4} = \frac{-8}{4} = -2$$

### Problems

10. Determine the slope-y-intercept equation (i.e. in the form  $y = mx + b$ ) of the line passing through the points (-3, -5) and (4, 9). (5 KU)

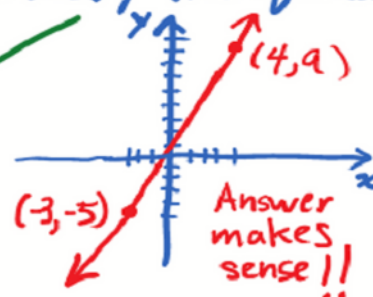
$$\begin{aligned} \textcircled{1} m &= \frac{\Delta y}{\Delta x} \\ &= \frac{9 - (-5)}{4 - (-3)} \\ &= \frac{14}{7} \\ &= 2 \end{aligned}$$

② Since (4, 9) lies on the line, its co-ordinates must satisfy the equation

$$\therefore 9 = 2(4) + b$$

$$\therefore 9 = 8 + b$$

$$\therefore b = 1$$



④ Conclusion

In slope-y-intercept form, the equation of the line is  $y = 2x + 1$

② Therefore, the equation takes the form  $y = 2x + b$

11. The following questions deal with the equation  $5x - 6y - 30 = 0$ , an equation of a line in **standard form**.

- (a) Write the equation in the form  $y = mx + b$  and state the slope and y-intercept. (4 APP)

$$5x - 6y - 30 = 0$$

$$\therefore 5x - 6y - 30 - 5x + 30 = 0 - 5x + 30$$

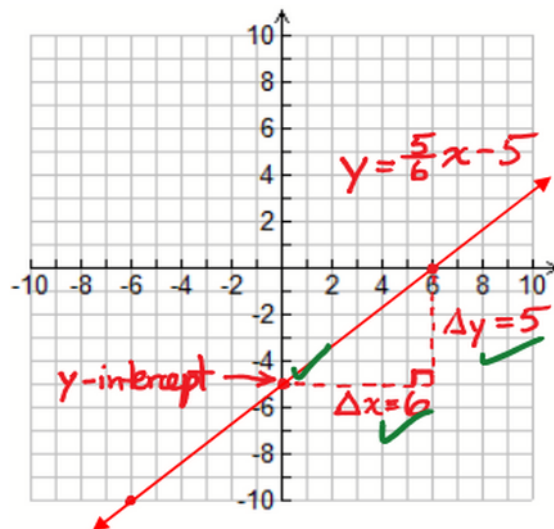
$$\therefore -6y = -5x + 30$$

$$\therefore \frac{-6y}{-6} = \frac{-5x}{-6} + \left(\frac{30}{-6}\right)$$

$$\therefore y = \frac{5}{6}x - 5$$

$$\therefore m = \frac{5}{6} \text{ and } b = -5$$

- (b) Use the slope-y-intercept form of the equation that you found in (a) to sketch a graph of the line. (3 APP)



K - 0 A - 0 T - 0 C - 0

12. Sharon and Chanelle are both electricians. Sharon charges a flat fee of \$60 plus \$40 per hour. Chanelle, on the other hand, doesn't charge a flat fee; she simply charges \$50 per hour. Let  $C$  represent the total amount charged and let  $t$  represent the time worked, in hours.

(a) For each electrician, write an equation relating  $C$  to  $t$ . (3 APP)

Sharon:  $C = 40t + 60$

Chanelle:  $C = 50t$

(b) Using the grid at the right, sketch the graphs of both equations from part (a). Be sure to label the graph and axes appropriately. Use an appropriate scale on both axes. (6 APP)

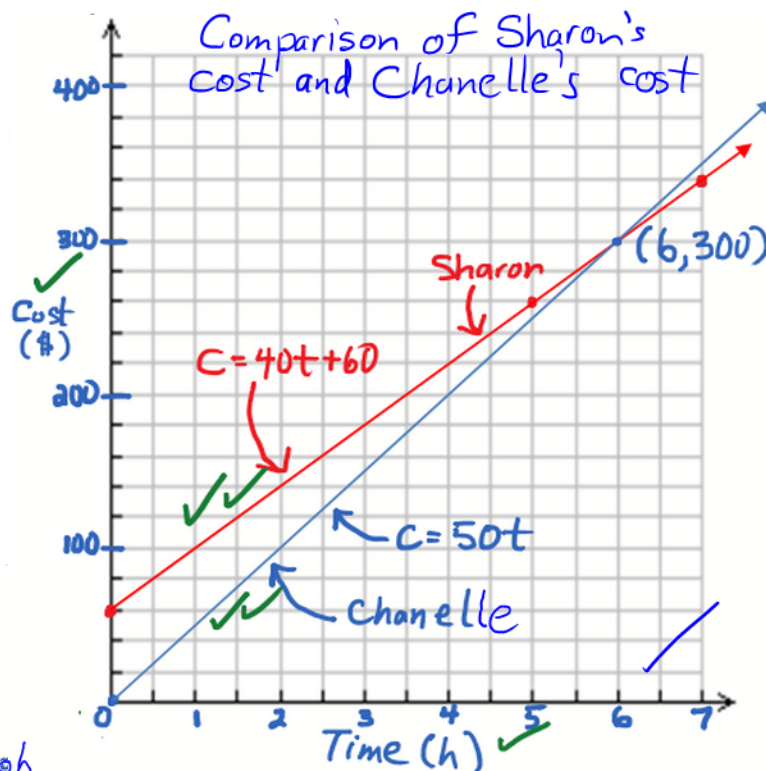
(c) State the point of intersection and explain what it represents in this situation. (2 APP)

Point of Intersection: (6, 300)

Meaning: For 6 hours of work, both electricians charge \$300.

(d) How would you decide which electrician to hire? Explain. (3 APP)

For fewer than 6 hours of work, Chanelle charges less than Sharon (graph is lower). For more than 6 hours of work, Sharon charges less. I would base my decision on the number of hours required to complete the job.



13. A line is perpendicular to the line  $y = -\frac{7}{2}x + 9$  and also passes through the point of intersection of  $x + y = 10$  and  $3x - 4y + 12 = 0$ . Determine the equation of the line in standard form. (5 KU, 3 TIPS)

Required Line:

- ① Perpendicular to  $y = -\frac{7}{2}x + 9 \rightarrow m = \frac{2}{7}$
- ② Passes through the point of intersection of  $x + y = 10$  and  $3x - 4y + 12 = 0$   
 $\therefore$  passes through (4, 6) (see graph)

Therefore, the equation of the line takes the form  $y = \frac{2}{7}x + b$ . Since (4, 6) lies on the line, its co-ordinates satisfy the equation

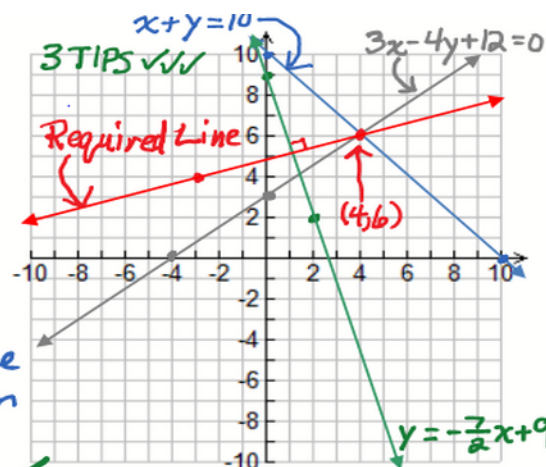
$$\therefore 6 = \frac{2}{7}(\frac{4}{1}) + b \quad \therefore 7y = 2x + 34$$

$$\therefore b = \frac{42}{7} - \frac{8}{7} = \frac{34}{7}$$

$$\therefore y = \frac{2}{7}x + \frac{34}{7}$$

$$\therefore 2x - 7y + 34 = 0$$

is the equation of the line in standard form.





14. By tutoring classmates, Ranbir earned some money, all of which he deposited into his bank account. Once summer arrived, he stopped tutoring and began spending his money on go-cart racing. (4 TIPS, 4 COM)

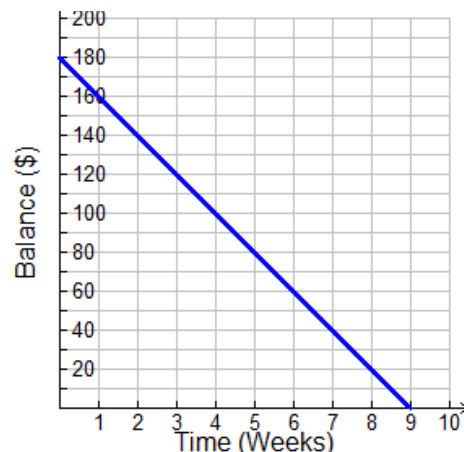
(a) How much money did Ranbir save altogether? Explain.

Ranbir saved \$180. ✓  
This can be seen from the vertical intercept, which gives the amount of money Ranbir has at time 0 weeks.

(b) How long will it take Ranbir to spend all his money? Explain.

Since the point (9,0) lies on the graph, ✓  
Ranbir's bank account balance will be \$0 at 9 weeks. It will take him 9 weeks to spend all his money. ✓

Ranbir's Bank Account



(c) How much money will he have after 3 weeks? Explain.

The point (3, 120) lies on the graph. ✓  
Therefore, Ranbir will have \$120 left after 3 weeks. ✓

(d) Calculate the *slope* and explain what it means in this situation.

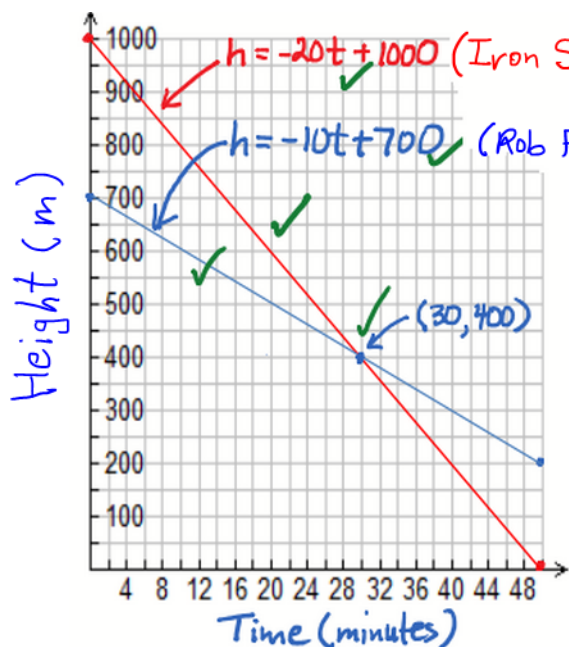
$$m = \frac{0 - 180}{9 - 0} = \frac{-180}{9} = -20 \quad \checkmark$$

This means that he spends \$20/week. ✓

15. The Iron Sheik and Rob Ford are flying in separate hot-air balloons. The Iron Sheik's balloon is 300 m *directly above* Rob Ford's balloon and *falling* at a speed of 20 m per minute. Rob Ford's balloon is 700 m above the ground and *falling* at a speed of 10 m per minute.

Assuming that the balloons are both moving vertically, will they collide before reaching the ground?

If the balloons do collide, at what time does the collision take place? How high above the ground are the balloons when they collide? (8 TIPS)



Rob Ford

Initial height = 700m →  $b = 700$   
Speed = 10 m/s →  $m = -10$  (height decreasing)

Iron Sheik

Initial Height = 700 + 300 →  $b = 1000$   
Speed = 20 m/s →  $m = -20$

✓ The graphs intersect at the point (30, 400).  
This means that the balloons collide after 30 minutes, 400 m above the ground.

Rob Ford! When I catch up with you, I will humble you with my famous, unbreakable finishing move, the mighty camel clutch!



K	-	D	A	-	O	T	-	O	C	-	O
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