

Straight lines. Form A

1. What is the slope intercept form of $6x - 2y - 4 = 0$?

(A) $y = 6x - 2$

(B) $y = 3x + 2$

(C) $y = 3x - 2$

(D) $y = -3x + 2$

(E) $y = -6x - 4$

$$y = mx + b$$

$$6x - 2y - 4 = 0$$

$$-2y - 4 = -6x$$

$$-2y = -6x + 4$$

$$y = 3x - 2$$

$$-6x$$

$$+4$$

$$\div (-2)$$

2. Which straight line is parallel to $y = 3x + 7$?

$\rightarrow$ slopes are equal

(A) $y = \frac{1}{3}x + 7$

(B) $y = 7x$

(C) $y = 3x$

(D) $y = -3x$

(E) $y = \frac{-1}{3}x + 7$

3. Which straight line is perpendicular to $2x - y = 5$?

slope negative reciprocal

(A) $y = \frac{1}{2}x + 5$

(B) $y = -2x$

(C) $y = \frac{-1}{2}x + 13$

(D) $y = -5x$

(E) $y = \frac{-2}{5}x + 5$

$$2x - y = 5$$

$$-y = -2x + 5$$

$$y = 2x - 5$$

$$\text{slope} = 2$$

$$\text{negative reciprocal} = \frac{-1}{2}$$

$$m_1 m_2 = -1$$

$$m_2 = \frac{-1}{m_1}$$

4. For all pairs of real numbers S and T where $S = 4T - 7$,
 $T = ?$

(A) $\frac{S}{4} - 7$

(B) $\frac{S}{4} + 7$

(C) $4S + 7$

(D) $\frac{S-7}{4}$

(E) $\frac{S+7}{4}$

$$\begin{aligned} S &= 4T - 7 \\ S + 7 &= 4T & +7 \\ \frac{S+7}{4} &= T & \div 4 \end{aligned}$$

5. What is the x-coordinate of the point in the standard
^{want this} (x, y) coordinate plane at which the two lines $y = -2x + 7$
 and $y = 3x - 3$ intersect?

(A) 10

(B) 5

(C) 3

(D) 2

(E) 1

set the y's equal

$$\begin{aligned} -2x + 7 &= 3x - 3 \\ -5x + 7 &= -3 & -3x \\ -5x &= -10 & -7 \end{aligned}$$

$$x = \frac{-10}{-5} = 2$$

Extra:
 If you want the y coordinate substitute x in any of the
 y equations. $y = -2(2) + 7 = 3$ so the point is $(2, 3)$

6. For what value of n would the following system of
 equations have an infinite number of solutions?

$3a + b = 12$ ---- ①

$12a + 4b = 3n$ ---- ②

Equations are identical

Equation #1 was multiplied by 4 to get
 Equation #2

$$48 = 3n$$

$$n = \frac{48}{3} = 16$$

(A) 4

(B) 9

(C) 16

note: the 48 is 12×4

(D) 36

(E) 48

7. In the (x, y) coordinate plane, what is the y-intercept of the line $-9x - 3y = 15$?
Happens at $x=0$

(A) -9

(B) -5

(C) -3

(D) 3

(E) -15

$$\begin{aligned} -9(0) - 3y &= 15 \\ -3y &= 15 \\ y &= \frac{15}{-3} = -5 \end{aligned}$$

8. In the (x, y) coordinate plane, what is the x-intercept of the line $5x - 7y = 15$?
Happens at $y=0$

(A) $\frac{-15}{7}$

(B) 3

(C) $\frac{7}{15}$

(D) 15

(E) 7

$$\begin{aligned} 5x - 7(0) &= 15 \\ 5x &= 15 \\ x &= \frac{15}{5} = 3 \end{aligned}$$

9. In the standard (x, y) coordinate plane, what is the equation of the line that passes through the origin and the point $(3, 4)$?

(A) $y = \frac{1}{4}x + \frac{3}{4}$

(B) $y = \frac{1}{4}x - \frac{3}{4}$

$$\begin{aligned} &\text{Points: } (0, 0) \text{ and } (3, 4) \\ &\text{slope } m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - 0}{3 - 0} = \frac{4}{3} \\ &y - y_1 = m(x - x_1) \text{ point-slope formula} \\ &y - 0 = \frac{4}{3}(x - 0) \Rightarrow y = \frac{4}{3}x \end{aligned}$$



(C) $y = \frac{4}{3}x$

(D) $y = \frac{1}{2}x + \frac{3}{4}$

(E) $y = \frac{9}{4}x$

10. In the standard (x, y) coordinate plane, what is the equation of the line that passes through the origin and is parallel to the line $y - 5x + 15 = 0$ $(0, 0)$

(A) $y = 5x$ $\rightarrow$ slopes are equal $\rightarrow m_1 = m_2$

(B) $y = -5x$

(C) $y = 5x + 15$

(D) $y = 3x$

(E) $y = \frac{1}{3}x$

$y - 5x + 15 = 0$
write in slope intercept form ($y = mx + b$)

$y + 15 = 5x$

$y = 5x - 15$

$\downarrow$
slope m_1

so $m_2 = 5$

$(0, 0)$ 5
Point-slope

$y - y_1 = m(x - x_1) \Rightarrow y - 0 = 5(x - 0) \Rightarrow y = 5x$

11. In the standard (x, y) coordinate plane, what is the equation of the line that passes through $(3, 4)$ and is parallel to the line $y = 2x + 2$ $\rightarrow$ slopes are equal

(A) $y = \frac{1}{2}x + 2$

(B) $y = 2x - 2$

(C) $y = 2x + 4$

(D) $y = 2x + 10$

(E) $y = 3x + 2$

For $y = 2x + 2$ $m_1 = 2$ so $m_2 = 2$
 $\downarrow$
 m_1

Point-slope formula
 $(3, 4)$ 2
 x_1, y_1

$y - y_1 = m(x - x_1)$
 $y - 4 = 2(x - 3)$

$y = 2x - 6 + 4$

$y = 2x - 2$

12. What is the slope of any line parallel to the line $2x - 3y = 7$?

A) $\frac{-2}{3}$

(B) -3

(C) $\frac{2}{3}$

(D) 2

(E) 3

slopes are equal for parallel lines
write $2x - 3y = 7$ in standard slope intercept form $y = mx + b$

$$-3y = -2x + 7$$

$$y = \frac{2}{3}x - \frac{7}{3} \quad \div -3$$

slope. Any line with slope of $\frac{2}{3}$ is parallel

13. If a system of 2 linear equations in variables has NO solution, and 1 of the equations is $3y - 2x - 9 = 0$, which of the following could be the equation of the other line?

(A) $y = \frac{2}{3}x + 2$

(B) $y = 2x + 9$

(C) $y = \frac{-3}{2}x + 2$

(D) $y = 2$

(E) $y = \frac{-2}{3}x + 2$

NO solution = Don't intersect
Don't intersect = slopes are parallel

$$3y - 2x - 9 = 0$$

$$3y = 2x + 9$$

$$y = \frac{2}{3}x + 3$$

$$\rightarrow \text{slope} = \frac{2}{3}$$

→ Only equation with slope = $\frac{2}{3}$

14. In the standard (x, y) coordinate plane, what is the distance between the line $x = -2$ and the y -axis?

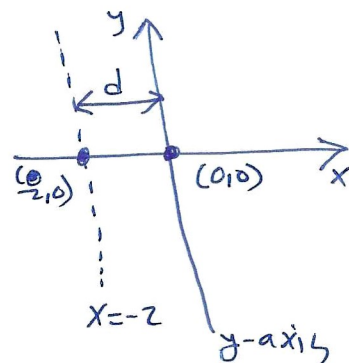
(A) -2

(B) $\sqrt{2}$

(C) 2

(D) 4

vertical line at $x = -2$
visually distance = 2
or use distance formula
 $(0, 0)$ and $(-2, 0)$
 $d = \sqrt{(-2-0)^2 + (0-0)^2}$
 $d = \sqrt{4} = 2$



→ Trap: Distance is positive



(E) -4

15. In the standard (x, y) coordinate plane, what is the distance between the line $y = 8$ and the x -axis?

(A) 8

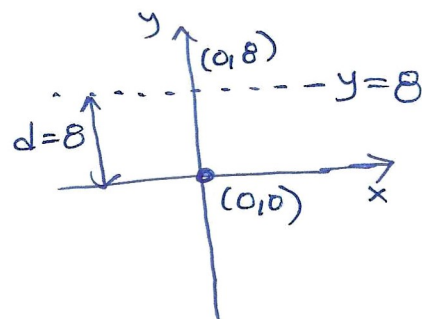
(B) $\sqrt{8}$

(C) 4

(D) -8

(E) -4

Horizontal line
at $y = 8$
visually distance = 8
or use distance formula
 $(0, 0) + (0, 8)$
 $d = \sqrt{(0-0)^2 + (8-0)^2}$
 $d = \sqrt{64} = 8$



16. If the point with coordinates $(-2, b)$ lies on the graph of $y = -4x + 5$. What is the value of b ?

(A) 13

(B) 8

(C) 3

(D) 1

(E) -3

$(-2, b) \rightarrow x = -2$ and $y = b$

$$y = -4x + 5$$

$$b = -4(-2) + 5$$

$$b = 8 + 5 = 13$$

17. The graph of the line with equation $-2x - 3y = -15$ does NOT have points in what quadrant(s) of the standard (x, y) coordinate plane below?

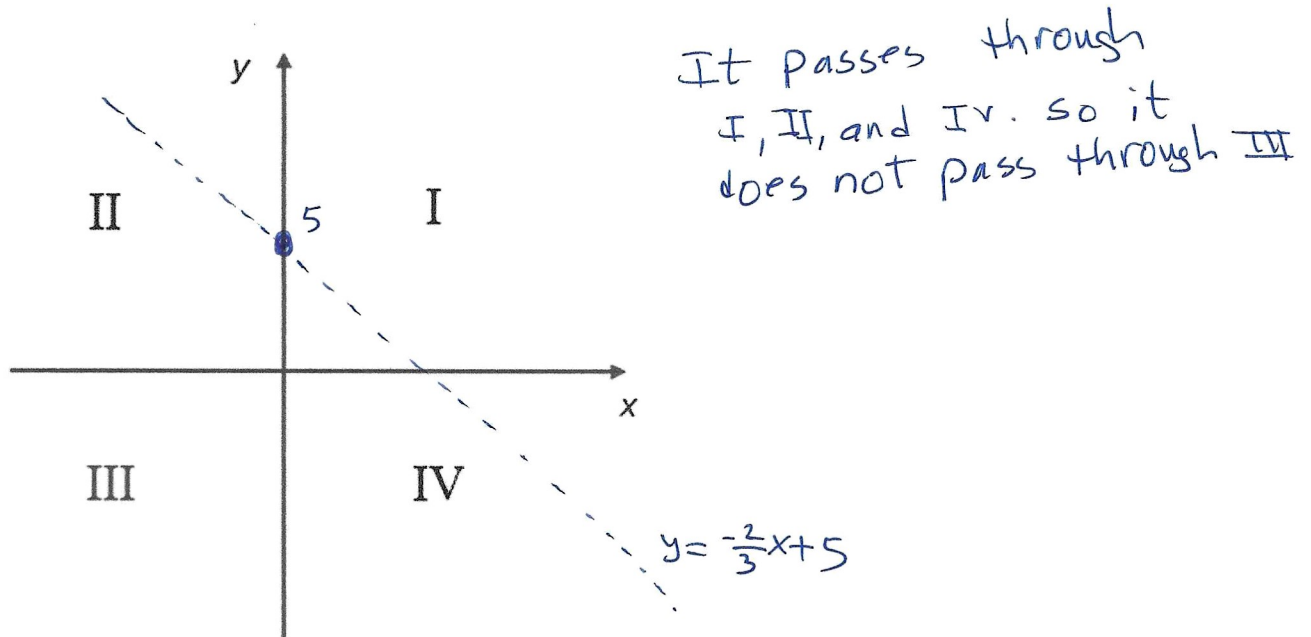
Need to sketch line $-2x - 3y = -15$
write line in slope-intercept form

$$-2x - 3y = -15$$

$$-3y = 2x - 15$$

$$y = \frac{2}{3}x + 5$$

↓ slope ↓ y-intercept



- (A) Quadrant I only
- (B) Quadrant II only
- (C) Quadrant III only
- (D) Quadrant IV only
- (E) Quadrant II and IV only

18. Which of the following is an equation of the line that passes through the point $(-4, 5)$ and $(-8, -15)$ in the standard (x, y) coordinate plane?

- (A) $5x - y = -25$
- (B) $5x - 4y = 15$
- (C) $x + y = 5$
- (D) $\frac{5}{6}x = y + 5$

slope $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-15 - 5}{-8 - (-4)} = \frac{-20}{-4} = 5$

Point-slope formula

$$y - y_1 = m(x - x_1)$$

$$y - 5 = 5(x + 4)$$

$$y = 5x + 20 + 5$$

$$y = 5x + 25 \text{ or } 5x - y = -25$$

(B) $(-5, -5)$

(C) $(-5, 0)$

(D) $(0, -5)$

(E) $(0, 0)$

or just simply substitute the value of x into y

$$x = -5 \Rightarrow y = -5 - 5 = -10$$

$$(-5, -10)$$

22. Which one of the following lines has the smallest slope?

(A) $y = x + 6$ $m = 1$

(B) $y = 2x + 10$ $m = 2$

(C) $y = \frac{1}{2}x - 1$ $m = \frac{1}{2}$

(D) $5y = 15x + 4$ $m = \frac{15}{5} = 3$

(E) $7y = 3x - 7$ $m = \frac{3}{7}$

$$y = mx + b$$

↓
slope

23. Given that $y - 5 = \frac{1}{2}x + 1$ is the equation of a line, at what point does the line cross the x-axis?

$$y = 0$$

(A) -15

(B) -12

(C) 1

(D) 4

(E) 6

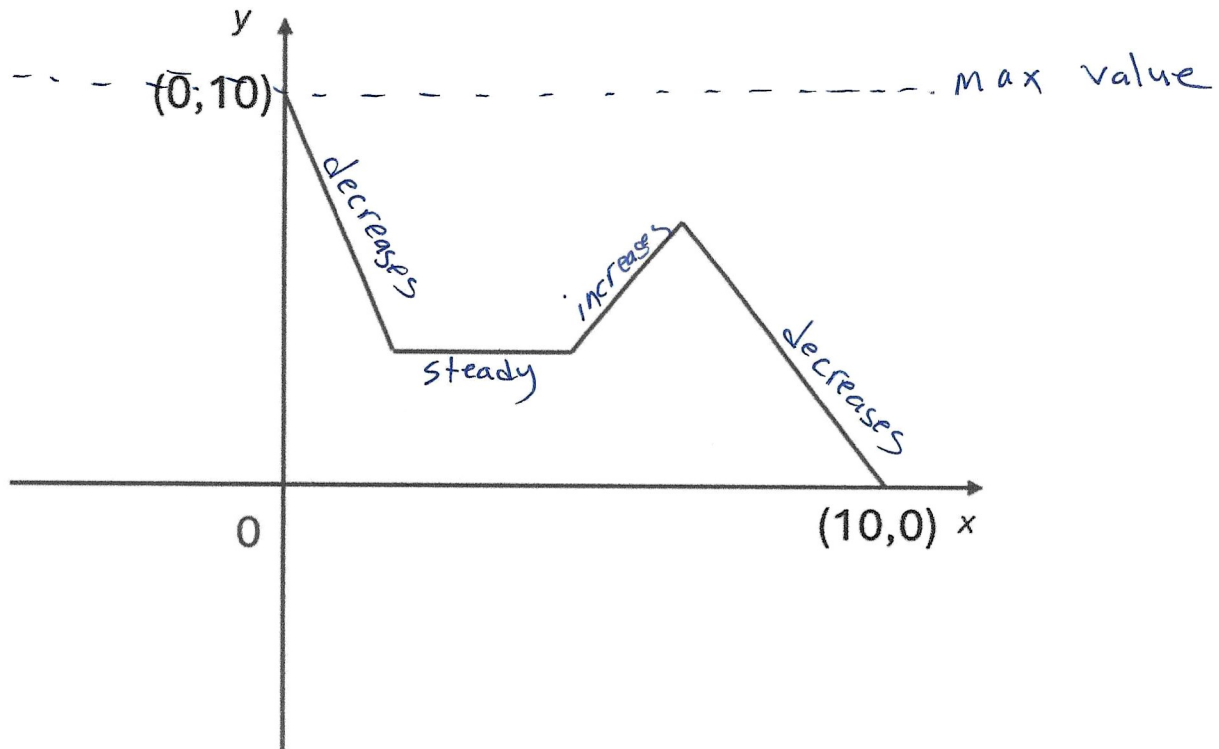
$$y - 5 = \frac{1}{2}x + 1$$

$$0 - 5 = \frac{1}{2}x + 1$$

$$\frac{1}{2}x = -6$$

$$x = -12$$

24. The graph below shows how the variable y varies with x in the standard (x, y) coordinate plane. What statement is true about how y varies with x ?



(A) Starts at $y = 0$, decreases, remains steady, increases, decreases

(B) Starts at a maximum point, decreases, remains steady, increases, decreases

(C) Starts at a minimum point, increases, decreases, remains steady, increases.

(D) Starts at $y = 0$, decreases, reaches its lowest value, increases, decreases

(E) Starts at a maximum point, decreases, reaches its lowest value, increases, decreases

Answers

- | | | |
|-------|-------|-------|
| 1. C | 11. B | 21. A |
| 2. C | 12. C | 22. E |
| 3. C | 13. A | 23. B |
| 4. E | 14. C | 24. B |
| 5. D | 15. A | |
| 6. C | 16. A | |
| 7. B | 17. C | |
| 8. B | 18. A | |
| 9. C | 19. E | |
| 10. A | 20. A | |