

Practice Test

Functions and Lines

1

x	-4	0	6
$f(x)$	-4	-1	k

In the table above, if $f(x)$ is a linear function, what is the value of k ?

- A) 2.5
- B) 3
- C) 3.5
- D) 4

2

The graph of a line in the xy -plane has slope $\frac{1}{3}$ and contains the point $(9,1)$. The graph of a second line passes through the points $(-2,4)$ and $(5,-3)$. If the two lines intersect at (a,b) , what is the value of $a+b$?

- A) -2
- B) 2
- C) 4
- D) 6

3

Which of the following expressions is equal to 0 for some value of x ?

- A) $5 + |x+5|$
- B) $5 + |x-5|$
- C) $-5 + |x+5|$
- D) $-5 - |x-5|$

4

Line ℓ in the xy -plane contains points from each of the Quadrants I, III, and IV, but no points from Quadrant II. Which of the following must be true?

- A) The slope of line ℓ is zero.
- B) The slope of line ℓ is undefined.
- C) The slope of line ℓ is positive.
- D) The slope of line ℓ is negative.

5

x	-3	-1	1	5
$f(x)$	9	5	1	-7

The table above shows some values of the linear function f . Which of the following defines f ?

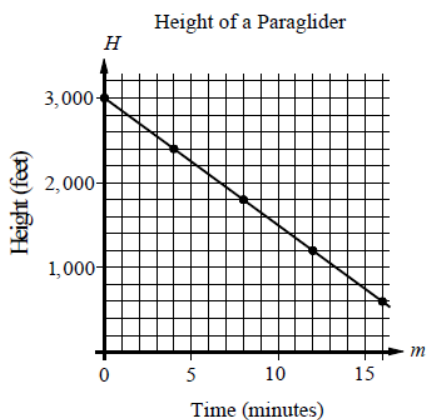
- A) $f(x) = 2x - 3$
- B) $f(x) = -2x + 3$
- C) $f(x) = 2x - 1$
- D) $f(x) = -2x + 1$

6

If $f(x) = -6x + 1$, what is $f(\frac{1}{2}x - 1)$ equal to?

- A) $-3x + 7$
- B) $-3x - 5$
- C) $-3x + 1$
- D) $-3x - 1$

Questions 7 and 8 refer to the following information.



The graph above shows the relationship between the height of paraglider H , in feet, and time m , in minutes.

7

Which of the following represents the relationship between H and m ?

- A) $H = -100m + 3000$
- B) $H = -150m + 3000$
- C) $H = -175m + 3000$
- D) $H = -225m + 3000$

8

If the height of the paraglider is 1,350 feet, which of the following best approximates the time the paraglider has been flying?

- A) 10 minutes
- B) 10 minutes and 30 seconds
- C) 11 minutes
- D) 11 minutes and 30 seconds

9

A line in the xy -plane passes through the point $(1, -2)$ and has a slope of $\frac{1}{3}$. Which of the following points lies on the line?

- A) $(3, -2)$
- B) $(2, -\frac{4}{3})$
- C) $(0, -2)$
- D) $(-1, -\frac{8}{3})$

10

$$f(x) = ax + 2$$

In the function above, a is a constant. If

$f(-1) = 4$, what is the value of $f(-\frac{1}{2})$?

11

If the slope of the line in the xy -plane that passes through the points $(2, -4)$ and $(6, k)$ is $\frac{3}{2}$, what is the value of k ?

12

$$\frac{1}{3}x - \frac{3}{4}y = -11$$

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

If (x, y) is the solution to the system of equations above, what is the value of $x + y$?

Answers Functions and Lines

Chapter 3 Practice Test

1. C

Use the slope formula to find the slope of the function. Since $f(x)$ is a linear function, the slope between $(-4, -4)$ and $(0, -1)$ equals the slope between $(0, -1)$ and $(6, k)$.

$$\text{Therefore, } \frac{-1 - (-4)}{0 - (-4)} = \frac{k - (-1)}{6 - 0}.$$

$$\frac{3}{4} = \frac{k+1}{6} \quad \text{Simplify.}$$

$$4(k+1) = 18 \quad \text{Cross Multiplication}$$

$$4k + 4 = 18 \quad \text{Distributive Property}$$

$$4k = 14 \quad \text{Subtract 4 from each side.}$$

$$k = \frac{7}{2} \text{ or } 3.5 \quad \text{Divide each side by 4.}$$

2. B

The equation of the line with slope $\frac{1}{3}$ and point

$$(9, 1) \text{ is } y - 1 = \frac{1}{3}(x - 9) \text{ or } y = \frac{1}{3}x - 2.$$

The slope of the second line is $\frac{-3 - 4}{5 - (-2)}$ or -1 .

The equation of the second line is $y - 4 = -1(x + 2)$ or $y = -x + 2$. To find the point of intersection,

substitute $\frac{1}{3}x - 2$ for y in the second equation and solve for x .

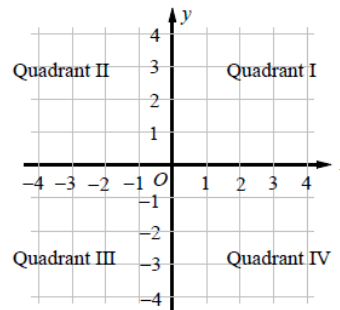
$$\frac{1}{3}x - 2 = -x + 2$$

Solving for x yields $x = 3$. Substituting 3 for x in the equation of the second line yields $y = -1$. Therefore, $(a, b) = (3, -1)$ and $a + b = 3 - 1 = 2$.

3. C

The expressions $|x + 5|$ or $|x - 5|$ can never be a negative number. Thus $5 + |x + 5|$ or $5 + |x - 5|$ can not equal zero. The expression $-|x - 5|$ can never be a positive number. Thus $-5 - |x - 5|$ can not equal zero. If $-5 + |x + 5| = 0$, then $|x + 5| = 5$, when $x = 0$.

4. C



If the slope of a line is positive, it is possible that the line contains no points from Quadrant II or from Quadrant IV. If the slope of a line is negative, it is possible that the line contains no points from Quadrant I or from Quadrant III. Since the line ℓ contains points from each of the Quadrants I, III, and IV, but no points from Quadrant II, the slope of line ℓ must be positive.

5. B

x	-3	-1	1	5
$f(x)$	9	5	1	-7

First, find the slope of the linear function f .

We can choose any two points from the table. Let's use $(1, 1)$ and $(-1, 5)$ to find the slope m

of f . $m = \frac{5 - 1}{-1 - 1} = \frac{4}{-2} = -2$. Thus the slope

intercept form of f can be written as

$f(x) = -2x + b$. From the table we know $f(1) = 1$.

$f(1) = -2(1) + b = 1$ implies $b = 3$. Thus f is defined as $f(x) = -2x + 3$.

Answers Functions and Lines

6. A

$$f(x) = -6x + 1$$

$$\begin{aligned} f\left(\frac{1}{2}x - 1\right) &= -6\left(\frac{1}{2}x - 1\right) + 1 && \text{Substitute } \frac{1}{2}x - 1 \text{ for } x. \\ &= -3x + 6 + 1 && \text{Distributive Property} \\ &= -3x + 7 && \text{Simplify.} \end{aligned}$$

7. B

Since the points (0, 3000) and (4, 2400) lie on the line, the slope of the line is $\frac{2400 - 3000}{4 - 0} = -150$.

The H -intercept of the line is 3,000. Therefore the relationship between H and m can be represented by $H = -150m + 3000$, the slope-intercept form of the line.

8. C

$$\begin{aligned} H &= -150m + 3000 && \text{Equation of the line} \\ 1350 &= -150m + 3000 && \text{Substitute 1350 for } H. \end{aligned}$$

Solving for m yields $m = 11$.

9. D

The point-slope form of the line that passes through the point (1, -2) and has a slope of $\frac{1}{3}$

is $y + 2 = \frac{1}{3}(x - 1)$. The slope-intercept form of

the line is $y = \frac{1}{3}x - \frac{7}{3}$. We can replace $f(x)$ for

y to get the function form. Thus, $f(x) = \frac{1}{3}x - \frac{7}{3}$.

Now check each answer choice.

$$\text{A) } (3, -2) \quad f(3) = \frac{1}{3}(3) - \frac{7}{3} = -\frac{4}{3} \neq -2$$

$$\text{B) } (2, -\frac{4}{3}) \quad f(2) = \frac{1}{3}(2) - \frac{7}{3} = -\frac{5}{3} \neq -\frac{4}{3}$$

$$\text{C) } (0, -2) \quad f(0) = \frac{1}{3}(0) - \frac{7}{3} = -\frac{7}{3} \neq -2$$

$$\text{D) } (-1, -\frac{8}{3}) \quad f(-1) = \frac{1}{3}(-1) - \frac{7}{3} = -\frac{8}{3}$$

Choice D is correct.

10. 3

$$f(x) = ax + 2$$

If $f(-1) = 4$, then $f(-1) = a(-1) + 2 = 4$.

Solving for a yields $a = -2$.

Thus $f(x) = -2x + 2$ and

$$f\left(-\frac{1}{2}\right) = -2\left(-\frac{1}{2}\right) + 2 = 3.$$

11. 2

Use the slope formula.

$$\text{Slope} = \frac{k - (-4)}{6 - 2} = \frac{3}{2}.$$

$$\frac{k + 4}{4} = \frac{3}{2} \quad \text{Simplify.}$$

$$2(k + 4) = 3 \cdot 4 \quad \text{Cross Product}$$

$$2k + 8 = 12 \quad \text{Distributive Property}$$

Solving for k yields $k = 2$.

12. 6

$$\frac{1}{3}x - \frac{3}{4}y = -11 \quad \xrightarrow{\text{Multiply by 3}} \quad x - \frac{9}{4}y = -33$$

$$\frac{1}{2}x + \frac{1}{6}y = -1 \quad \xrightarrow{\text{Multiply by } -2} \quad -x - \frac{1}{3}y = 2$$

Add the equations and we get $-\frac{9}{4}y - \frac{1}{3}y = -31$.

$$12\left(-\frac{9}{4}y - \frac{1}{3}y\right) = 12(-31) \quad \text{Multiply each side by 12.}$$

$$-27y - 4y = -372 \quad \text{Distributive Property}$$

$$-31y = -372 \quad \text{Simplify.}$$

$$\frac{-31y}{-31} = \frac{-372}{-31} \quad \text{Divide each side by } -31.$$

$$y = 12 \quad \text{Simplify.}$$

$$\frac{1}{3}x - \frac{3}{4}y = -11 \quad \text{First equation}$$

$$\frac{1}{3}x - \frac{3}{4}(12) = -11 \quad y = 12$$

$$\frac{1}{3}x - 9 = -11 \quad \text{Simplify.}$$

$$\frac{1}{3}x - 9 + 9 = -11 + 9 \quad \text{Add 9 to each side.}$$

$$\frac{1}{3}x = -2 \quad \text{Simplify.}$$

$$3\left(\frac{1}{3}x\right) = 3(-2) \quad \text{Multiply each side by } -2.$$

$$x = -6 \quad \text{Simplify.}$$

Therefore, $x + y = -6 + 12 = 6$.