G.GPE.B.5: Parallel and Perpendicular Lines 7

1   The graphs of the lines represented by the equations $y = \frac{1}{3}x + 7$ and $y = -\frac{1}{3}x - 2$ are
1)   parallel
2)   horizontal
3)   perpendicular
4)   intersecting, but not perpendicular

2   Which statement describes the lines whose equations are $y = \frac{1}{3}x + 12$ and $6y = 2x + 6$?
1)   They are segments.
2)   They are perpendicular to each other.
3)   They intersect each other.
4)   They are parallel to each other.

3   The lines represented by the equations $y + \frac{1}{2}x = 4$ and $3x + 6y = 12$ are
1)   the same line
2)   parallel
3)   perpendicular
4)   neither parallel nor perpendicular

4   The lines $3y + 1 = 6x + 4$ and $2y + 1 = x - 9$ are
1)   parallel
2)   perpendicular
3)   the same line
4)   neither parallel nor perpendicular

5   The equation of line k is $y = \frac{1}{3}x - 2$. The equation of line m is $-2x + 6y = 18$. Lines k and m are
1)   parallel
2)   perpendicular
3)   the same line
4)   neither parallel nor perpendicular

6   The lines represented by the equations $4x + 6y = 6$ and $y = \frac{2}{3}x - 1$ are
1)   parallel
2)   the same line
3)   perpendicular
4)   intersecting, but *not* perpendicular

7   A student wrote the following equations:
$$3y + 6 = 2x$$
$$2y - 3x = 6$$
The lines represented by these equations are
1)   parallel
2)   the same line
3)   perpendicular
4)   intersecting, but *not* perpendicular

8   The two lines represented by the equations below are graphed on a coordinate plane.
$$x + 6y = 12$$
$$3(x - 2) = -y - 4$$
Which statement best describes the two lines?
1)   The lines are parallel.
2)   The lines are the same line.
3)   The lines are perpendicular.
4)   The lines intersect at an angle other than 90°.

9 The equations of lines k, p, and m are given below:

$$k: x + 2y = 6$$

$$p: 6x + 3y = 12$$

$$m: -x + 2y = 10$$

Which statement is true?
1) $p \perp m$
2) $m \perp k$
3) $k \parallel p$
4) $m \parallel k$

10 The equations of lines k, m, and n are given below.

$$k: 3y + 6 = 2x$$

$$m: 3y + 2x + 6 = 0$$

$$n: 2y = 3x + 6$$

Which statement is true?
1) $k \parallel m$
2) $n \parallel m$
3) $m \perp k$
4) $m \perp n$

11 Determine whether the two lines represented by the equations $y = 2x + 3$ and $2y + x = 6$ are parallel, perpendicular, or neither. Justify your response.

12 Two lines are represented by the equations $x + 2y = 4$ and $4y - 2x = 12$. Determine whether these lines are parallel, perpendicular, or neither. Justify your answer.

13 State whether the lines represented by the equations $y = \frac{1}{2}x - 1$ and $y + 4 = -\frac{1}{2}(x - 2)$ are parallel, perpendicular, or neither. Explain your answer.

14 Points $A(5,3)$ and $B(7,6)$ lie on $\overleftrightarrow{AB}$. Points $C(6,4)$ and $D(9,0)$ lie on $\overleftrightarrow{CD}$. Which statement is true?
1) $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$
2) $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$
3) $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are the same line.
4) $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ intersect, but are not perpendicular.

15 Line P and line C lie on a coordinate plane and have equal slopes. Neither line crosses the second or third quadrant. Lines P and C must
1) form an angle of 45°
2) be perpendicular
3) be horizontal
4) be vertical

2

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Answer Section

1 ANS: 4   REF: 011613ge

2 ANS: 4

The slope of the line of the equation of $y = \frac{1}{3}x + 12$ is $\frac{1}{3}$. If you divide each term of the equation

$6y = 2x + 6$ by 6, the equation is transformed to $y = \frac{2}{6}x + 1$. The slope of this line is $\frac{2}{6}$, or $\frac{1}{3}$, as well.

Since the lines have equal slope, they are parallel.

REF: 060722a

3 ANS: 2

$y + \frac{1}{2}x = 4 \quad 3x + 6y = 12$

$y = -\frac{1}{2}x + 4$

$\qquad\qquad 6y = -3x + 12$

$\qquad\qquad y = -\frac{3}{6}x + 2$

$m = -\frac{1}{2}$

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

REF: 081014ge

4 ANS: 4

$3y + 1 = 6x + 4. \quad 2y + 1 = x - 9$

$\quad 3y = 6x + 3 \qquad 2y = x - 10$

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

REF: fall0822ge

5 ANS: 1   REF: 061113ge

6 ANS: 4

$m = \frac{-A}{B} = \frac{-4}{6} = -\frac{2}{3}$

REF: 011520ge

7 ANS: 4

$3y + 6 = 2x \qquad 2y - 3x = 6$

$\quad 3y = 2x - 6 \qquad 2y = 3x + 6$

$\quad\;\; y = \frac{2}{3}x - 2 \qquad y = \frac{3}{2}x + 3$

$\qquad m = \frac{2}{3} \qquad\qquad m = \frac{3}{2}$

REF: 081315ge

8 ANS: 4

$x + 6y = 12$

$6y = -x + 12$

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

$m = -\dfrac{1}{6}$

$3(x - 2) = -y - 4$

$-3(x - 2) = y + 4$

$m = -3$

REF: 011119ge

9 ANS: 1

$k: \dfrac{-A}{B} = \dfrac{-1}{2}$ $p: \dfrac{-A}{B} = \dfrac{-6}{3} = -2$ $m: \dfrac{-A}{B} = \dfrac{-(-1)}{2} = \dfrac{1}{2}$

REF: 081426ge

10 ANS: 4

$k: m = \dfrac{2}{3}$ $m: m = \dfrac{-A}{B} = \dfrac{-2}{3}$ $n: m = \dfrac{3}{2}$

REF: 061518ge

11 ANS:

The slope of $y = 2x + 3$ is 2. The slope of $2y + x = 6$ is $\dfrac{-A}{B} = \dfrac{-1}{2}$. Since the slopes are opposite reciprocals, the lines are perpendicular.

REF: 011231ge

12 ANS:

The slope of $x + 2y = 4$ is $m = \dfrac{-A}{B} = \dfrac{-1}{2}$. The slope of $4y - 2x = 12$ is $\dfrac{-A}{B} = \dfrac{2}{4} = \dfrac{1}{2}$. Since the slopes are neither equal nor opposite reciprocals, the lines are neither parallel nor perpendicular.

REF: 061231ge

13 ANS:

Neither. The slope of $y = \dfrac{1}{2}x - 1$ is $\dfrac{1}{2}$. The slope of $y + 4 = -\dfrac{1}{2}(x - 2)$ is $-\dfrac{1}{2}$. The slopes are neither the same nor opposite reciprocals.

REF: 011433ge

14 ANS: 4

$m_{\overleftrightarrow{AB}} = \dfrac{6 - 3}{7 - 5} = \dfrac{3}{2}$. $m_{\overleftrightarrow{CD}} = \dfrac{4 - 0}{6 - 9} = \dfrac{4}{-3}$

REF: 061318ge

15 ANS: 4

Since line P and line C extend through infinity, unless they are vertical, they would eventually cross the second or third quadrant.

REF: 010309a