G.GPE.B.5: Parallel and Perpendicular Lines 8
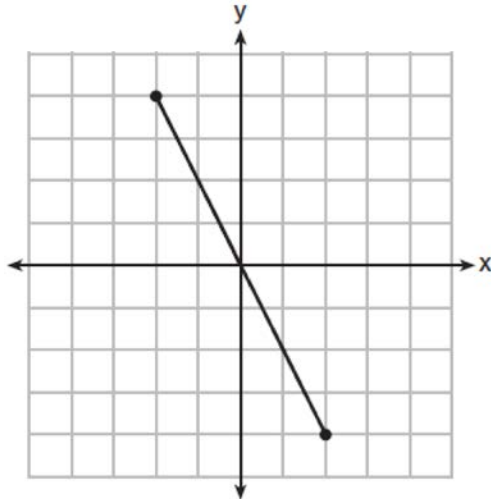
1 What is an equation of the perpendicular bisector of the line segment shown in the diagram below?

1) $y + 2x = 0$
2) $y - 2x = 0$
3) $2y + x = 0$
4) $2y - x = 0$

2 The coordinates of the endpoints of $\overline{AB}$ are $A(0,0)$ and $B(0,6)$. The equation of the perpendicular bisector of $\overline{AB}$ is
1) $x = 0$
2) $x = 3$
3) $y = 0$
4) $y = 3$

3 Which equation represents the perpendicular bisector of $\overline{AB}$ whose endpoints are $A(8,2)$ and $B(0,6)$?
1) $y = 2x - 4$
2) $y = -\frac{1}{2}x + 2$
3) $y = -\frac{1}{2}x + 6$
4) $y = 2x - 12$

4 Line segment NY has endpoints $N(-11,5)$ and $Y(5,-7)$. What is the equation of the perpendicular bisector of $\overline{NY}$?
1) $y + 1 = \frac{4}{3}(x + 3)$
2) $y + 1 = -\frac{3}{4}(x + 3)$
3) $y - 6 = \frac{4}{3}(x - 8)$
4) $y - 6 = -\frac{3}{4}(x - 8)$

5 Segment JM has endpoints $J(-5,1)$ and $M(7,-9)$. An equation of the perpendicular bisector of $\overline{JM}$ is
1) $y - 4 = \frac{5}{6}(x + 1)$
2) $y + 4 = \frac{5}{6}(x - 1)$
3) $y - 4 = \frac{6}{5}(x + 1)$
4) $y + 4 = \frac{6}{5}(x - 1)$

6 The endpoints of $\overline{AB}$ are $A(0,4)$ and $B(-4,6)$. Which equation of a line represents the perpendicular bisector of $\overline{AB}$?
1) $y = -\frac{1}{2}x + 4$
2) $y = -2x + 1$
3) $y = 2x + 8$
4) $y = 2x + 9$

7 Triangle ABC has vertices $A(0,0)$, $B(6,8)$, and $C(8,4)$. Which equation represents the perpendicular bisector of $\overline{BC}$?
1) $y = 2x - 6$
2) $y = -2x + 4$
3) $y = \frac{1}{2}x + \frac{5}{2}$
4) $y = -\frac{1}{2}x + \frac{19}{2}$

8 If $\overline{AB}$ is defined by the endpoints $A(4,2)$ and $B(8,6)$, write an equation of the line that is the perpendicular bisector of $\overline{AB}$.

9 Write an equation of the line that is the perpendicular bisector of the line segment having endpoints $(3,-1)$ and $(3,5)$. [The use of the grid below is optional]
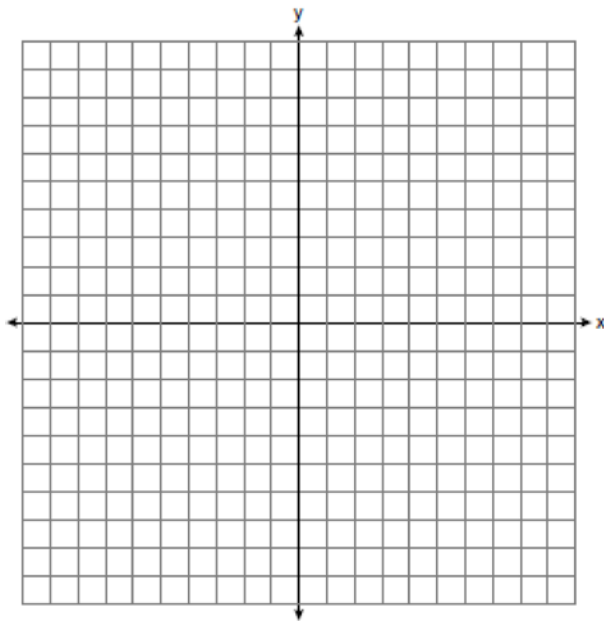
10 Write an equation of the perpendicular bisector of the line segment whose endpoints are $(-1,1)$ and $(7,-5)$. [The use of the grid below is optional]
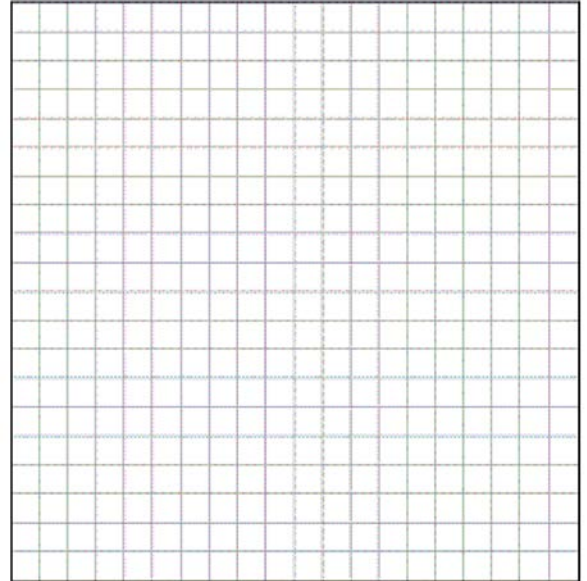
11 Determine the distance between point $A(-1,-3)$ and point $B(5,5)$. Write an equation of the perpendicular bisector of $\overline{AB}$. [The use of the accompanying grid is optional.]
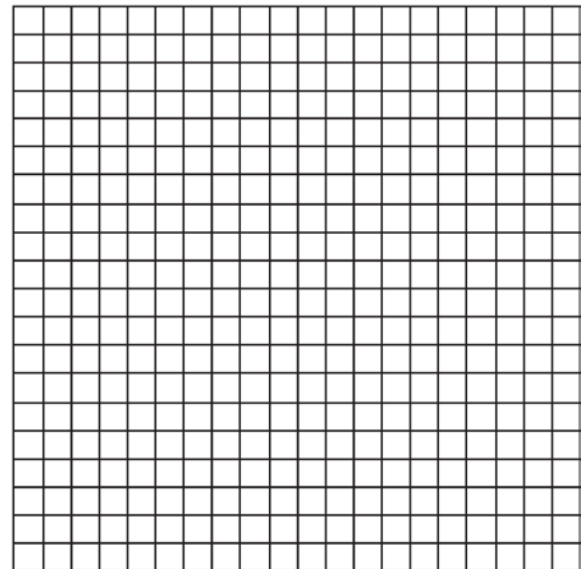
G.GPE.B.5: Parallel and Perpendicular Lines 8
Answer Section

1 ANS: 4

The segment's midpoint is the origin and slope is −2. The slope of a perpendicular line is $\frac{1}{2}$. $y = \frac{1}{2}x + 0$

$$2y = x$$
$$2y - x = 0$$

REF: 081724geo

2 ANS: 4

$\overline{AB}$ is a vertical line, so its perpendicular bisector is a horizontal line through the midpoint of $\overline{AB}$, which is $(0,3)$.

REF: 011225ge

3 ANS: 1

$m = \left(\frac{8+0}{2}, \frac{2+6}{2}\right) = (4,4)$ $m = \frac{6-2}{0-8} = \frac{4}{-8} = -\frac{1}{2}$ $m_\perp = 2$ $y = mx + b$

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

REF: 081126ge

4 ANS: 1

$m = \left(\frac{-11+5}{2}, \frac{5+-7}{2}\right) = (-3,-1)$ $m = \frac{5--7}{-11-5} = \frac{12}{-16} = -\frac{3}{4}$ $m_\perp = \frac{4}{3}$

REF: 061612geo

5 ANS: 4

$\left(\frac{-5+7}{2}, \frac{1-9}{2}\right) = (1,-4)$ $m = \frac{1--9}{-5-7} = \frac{10}{-12} = -\frac{5}{6}$ $m_\perp = \frac{6}{5}$

REF: 062220geo

6 ANS: 4

$\left(\frac{-4+0}{2}, \frac{6+4}{2}\right) \rightarrow (-2,5)$; $\frac{6-4}{-4-0} = \frac{2}{-4} = -\frac{1}{2}$; $m_\perp = 2$; $y - 5 = 2(x + 2)$

$$y = 2x + 4 + 5$$
$$y = 2x + 9$$

REF: 062324geo

7 ANS: 3

midpoint: $\left(\dfrac{6+8}{2},\dfrac{8+4}{2}\right) = (7,6).$ slope: $\dfrac{8-4}{6-8} = \dfrac{4}{-2} = -2;$ $m_\perp = \dfrac{1}{2}.$ $\quad 6 = \dfrac{1}{2}(7) + b$

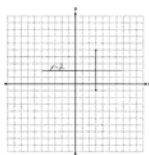$$\dfrac{12}{2} = \dfrac{7}{2} + b$$

$$\dfrac{5}{12} = b$$

REF: 081327ge

8 ANS:

$M = \left(\dfrac{4+8}{2},\dfrac{2+6}{2}\right) = (6,4)$ $m = \dfrac{6-2}{8-4} = \dfrac{4}{4} = 1$ $m_\perp = -1$ $y-4 = -(x-6)$

REF: 081536ge

9 ANS:

$M = \left(\dfrac{3+3}{2},\dfrac{-1+5}{2}\right) = (3,2).$ $y = 2.$

REF: 011334ge
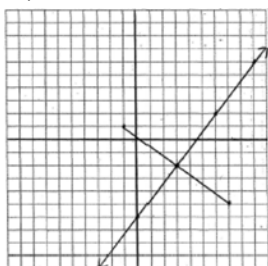
10 ANS:

$y = \dfrac{4}{3}x - 6.$ $M_x = \dfrac{-1+7}{2} = 3$ The perpendicular bisector goes through $(3,-2)$ and has a slope of $\dfrac{4}{3}.$

$$M_y = \dfrac{1+(-5)}{2} = -2$$

$$m = \dfrac{1-(-5)}{-1-7} = -\dfrac{3}{4}$$

$y - y_M = m(x - x_M).$

$y + 2 = \dfrac{4}{3}(x-3)$

REF: 080935ge

2

11 ANS:

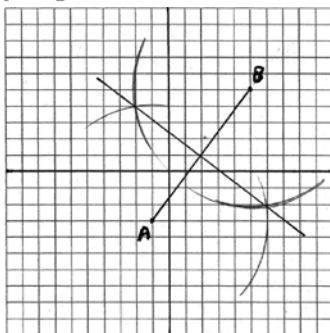$$d = \sqrt{(-1-5)^2 + (-3-5)^2}$$

10, $y - 1 = -\frac{3}{4}(x-2)$. $= \sqrt{100}$. To find the equation of the perpendicular bisector, calculate

$$= 10$$

$$M_x = \frac{-1+5}{2} = 2$$

midpoint and slope. $M_y = \frac{-3+5}{2} = 1$. The perpendicular bisector of $\overline{AB}$ goes through (2,1) and has a

$$m = \frac{-3-5}{-1-5} = \frac{-8}{-6} = \frac{4}{3}$$

slope of $-\frac{3}{4}$.
$$y - y_M = m(x - x_M)$$
$$y - 1 = -\frac{3}{4}(x-2)$$

REF: 080235a