

SOLUTIONS => COORDINATE GEOMETRY
REVIEW #2

1a) Point => (-5, 1)
Slope => $\frac{1}{2}$

Equation => $y - y_1 = m(x - x_1)$
 $y - 1 = \frac{1}{2}(x - 5)$
 $y - 1 = \frac{1}{2}(x + 5)$
 $y - 1 = \frac{1}{2}x + \frac{5}{2}$
 $2y - 2 = 1x + 5$
 $0 = 1x - 2y + 7$

b) Point => (-6, 2) or (5, -3)

Slope => $m = \frac{y_2 - y_1}{x_2 - x_1}$
 $= \frac{-3 - 2}{5 - (-6)}$
 $= \frac{-5}{11}$

Equation => $y - y_1 = m(x - x_1)$
 $y - 2 = \frac{-5}{11}(x - 6)$
 $y - 2 = \frac{-5x + 30}{11}$
 $11y - 22 = -5x + 30$
 $5x + 11y - 22 + 30 = 0$
 $5x + 11y + 8 = 0$

d) Point => (1, 6)

Slope => Parallel to $3x + y = 4$
 $y = -3x + 4$
 $m = -3$

Equation => $y - y_1 = m(x - x_1)$
 $y - 6 = -3(x - 1)$
 $y - 6 = -3x + 3$
 $3x + y - 6 - 3 = 0$
 $3x + y - 9 = 0$

d) Point => (-5, 0)

Slope => Perpendicular to $-2x - y + 3 = 0$
 $-2x + 3 = y$
 $m = -2$
 $m_{\perp} = \frac{1}{2}$

Equation => $y - y_1 = m(x - x_1)$
 $y - 0 = \frac{1}{2}(x - 5)$
 $y = \frac{1}{2}(x + 5)$
 $y = \frac{1}{2}x + \frac{5}{2}$
 $2y = 1x + 5$
 $0 = 1x - 2y + 5$

e) Point \Rightarrow x-int of 4 ; y-int of -3
 $\ast(4,0)$ OR $(0,-3)$

$$\begin{aligned} \text{Slope} \Rightarrow m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{-3 - 0}{0 - 4} \\ &= \frac{-3}{-4} \\ &= \frac{3}{4} \end{aligned}$$

$$\begin{aligned} \text{Equation} \Rightarrow y - y_1 &= m(x - x_1) \\ y - 0 &= \frac{3}{4}(x - 4) \\ y &= \frac{3x - 12}{4} \\ 4y &= 3x - 12 \\ 0 &= 3x - 4y - 12 \end{aligned}$$

f) Point \Rightarrow x-int of 5
 $(5,0)$

$$\text{Slope} \Rightarrow 2$$

$$\begin{aligned} \text{Equation} \Rightarrow y - y_1 &= m(x - x_1) \\ y - 0 &= 2(x - 5) \\ y &= 2x - 10 \\ 0 &= 2x - y - 10 \end{aligned}$$

g) Point \Rightarrow y-int of 2
 $(0,2)$

$$\text{Slope} \Rightarrow \frac{1}{2}$$

$$\begin{aligned} \text{Equation} \Rightarrow y - y_1 &= m(x - x_1) \\ y - 2 &= \frac{1}{2}(x - 0) \\ y - 2 &= \frac{1}{2}x \\ 2y - 4 &= 1x \\ 0 &= 1x - 2y + 4 \end{aligned}$$

2. $P(-2,-5)$ $Q(-1,6)$ $R(5,-6)$

a) Right Bisector for PQ:

① Midpoint of PQ

$$\begin{aligned} M_{PQ} &= \left(\frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2} \right) \\ &= \left(\frac{-1 + (-2)}{2}, \frac{6 + (-5)}{2} \right) \\ &= \left(-\frac{3}{2}, \frac{1}{2} \right) \leftarrow \text{POINT} \end{aligned}$$

② Perpendicular slope of PQ

$$\begin{aligned} m_{PQ} &= \frac{y_2 - y_1}{x_2 - x_1} & m_{\perp} &= -\frac{1}{11} \leftarrow \text{SLOPE} \\ &= \frac{6 - (-5)}{-1 - (-2)} \\ &= \frac{11}{-1} \\ &= -11 \end{aligned}$$

③ EQUATION

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

$$y - \frac{1}{2} = -\frac{1}{11} \left(x - -\frac{3}{2} \right)$$

$$y - \frac{1}{2} = -\frac{1}{11} \left(x + \frac{3}{2} \right)$$

$$y - \frac{1}{2} = -\frac{1}{11}x - \frac{3}{22}$$

$$22y - 11 = -2x - 3$$

$$2x + 22y - 11 + 3 = 0$$

$$2x + 22y - 8 = 0$$

b) Altitude from vertex R:

① POINT $\Rightarrow R(5, -6)$

② Perpendicular slope of PQ

$$m_{PQ} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{6 - 5}{-1 - 2}$$

$$= \frac{1}{-3}$$

$$= -\frac{1}{3}$$

$$m_{\perp} = \frac{3}{1} \leftarrow \text{SLOPE}$$

③ EQUATION

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

$$y - 6 = -\frac{1}{11}(x - 5)$$

$$y + 6 = -\frac{1}{11}x + \frac{5}{11}$$

$$11y + 66 = -1x + 5$$

$$1x + 11y + 66 - 5 = 0$$

$$1x + 11y + 61 = 0$$

c) Median from vertex Q:

① Midpoint of PR

$$M_{PR} = \left(\frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2} \right)$$

$$= \left(\frac{5 + 2}{2}, \frac{-6 + 5}{2} \right)$$

$$M = \left(\frac{7}{2}, -\frac{1}{2} \right)$$

② SLOPE of QM

$$m_{QM} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{6 - \frac{1}{2}}{-1 - \frac{7}{2}}$$

$$= \frac{\frac{12}{2} - \frac{1}{2}}{-\frac{2}{2} - \frac{7}{2}}$$

$$= \frac{\frac{11}{2}}{-\frac{9}{2}}$$

$$= \frac{11}{2} \cdot \frac{2}{-9}$$

$$= \frac{11}{-9}$$

$$= -\frac{11}{9} \leftarrow \text{SLOPE}$$

③ EQUATION [POINT $\Rightarrow (-1, 6)$ OR $\left(\frac{3}{2}, -\frac{11}{2}\right)$]

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

$$y - 6 = -\frac{23}{5}(x - -1)$$

$$y - 6 = -\frac{23}{5}(x + 1)$$

$$y - 6 = -\frac{23}{5}x - \frac{23}{5}$$

$$5y - 30 = -23x - 23$$

$$23x + 5y - 30 + 23 = 0$$

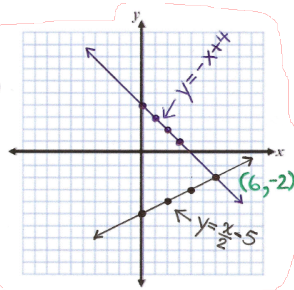
$$23x + 5y - 7 = 0$$

3. Solve by graphing:

$$\begin{aligned} x + y &= 4 \text{ ①} \\ x - 2y &= 10 \text{ ②} \end{aligned}$$

$$\begin{aligned} \text{① } x + y &= 4 \\ y &= -x + 4 \\ m &= \frac{-1}{1} \text{ (down)} \\ &\text{(over)} \\ b &= 4 \end{aligned}$$

$$\begin{aligned} \text{② } x - 2y &= 10 \\ \frac{x-10}{2} &= \frac{2y}{2} \\ \frac{x}{2} - 5 &= y \\ m &= \frac{1}{2} \text{ (up)} \\ &\text{(over)} \\ b &= -5 \end{aligned}$$



$$\begin{aligned} 4. \quad 3x + y &= 2 \text{ ①} \\ 2x + 5y &= 23 \text{ ②} \end{aligned}$$

$$\text{① } 3x + y = 2 \\ y = -3x + 2 \text{ sub in ②}$$

$$\begin{aligned} \text{② } 2x + 5y &= 23 \\ 2x + 5(-3x + 2) &= 23 \\ 2x - 15x + 10 &= 23 \\ -13x &= 23 - 10 \\ -13x &= 13 \\ x &= -1 \text{ sub in ①} \end{aligned}$$

$$\begin{aligned} \text{① } 3x + y &= 2 \\ 3(-1) + y &= 2 \\ -3 + y &= 2 \\ y &= 2 + 3 \\ y &= 5 \end{aligned}$$

SOLUTION: (-1, 5)

$$\begin{aligned} 5. \quad 2x + 5y &= 19 \text{ ①} \\ 3x - y &= 3 \text{ ②} \end{aligned}$$

$$5 \times \text{② } 15x - 5y = 15 \text{ ③}$$

$$\begin{aligned} \text{①} + \text{③ } \frac{17x}{17} &= \frac{34}{17} \\ x &= 2 \text{ sub in ②} \end{aligned}$$

$$\begin{aligned} \text{② } 3x - y &= 3 \\ 3(2) - y &= 3 \\ 6 - y &= 3 \\ 6 - 3 &= y \\ 3 &= y \end{aligned}$$

SOLUTION: (2, 3)