

ANSWERS ⇒ COORDINATE GEOMETRY REVIEW

1a) $y = 2x + 4$
 $b = 4$

b) $4x + y - 4 = 0$
 $y = -4x + 4$
 $b = 4$

$y = x + 4k$
 $b = 4k$

$2x + ky + 5 = 0$

$\frac{4}{1} = \frac{-5}{k}$

$\frac{4}{4} = \frac{4k}{4}$
 $1 = k$

$\frac{ky}{k} = \frac{-2x - 5}{k}$

$4(k) = 1(-5)$

$y = \frac{-2x - 5}{k}$

$\frac{4k}{4} = \frac{-5}{4}$

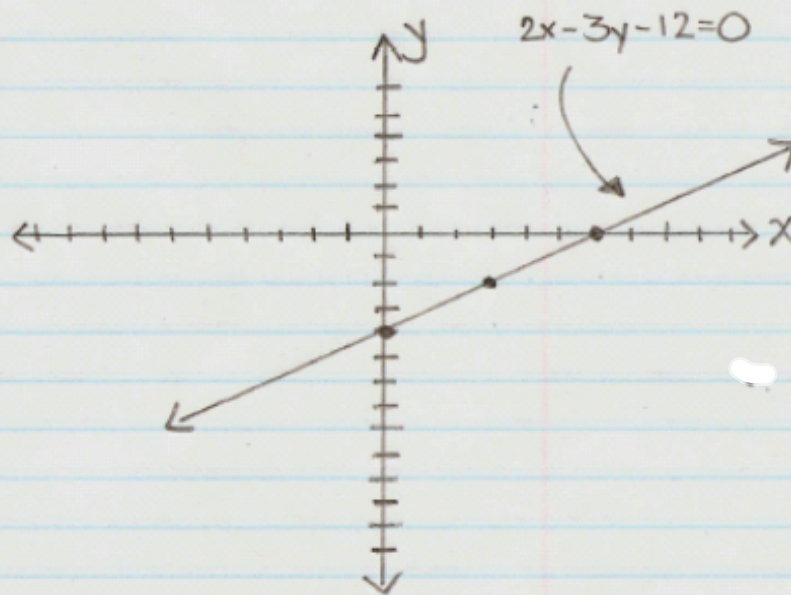
$k = \frac{-5}{4}$

$b = \frac{-5}{k}$

2a) $2x - 3y - 12 = 0$
 $\frac{2x - 12}{3} = \frac{3y}{3}$
 $\frac{2x - 12}{3} = y$

$m = \frac{2}{3}$ (up)
3 (over)

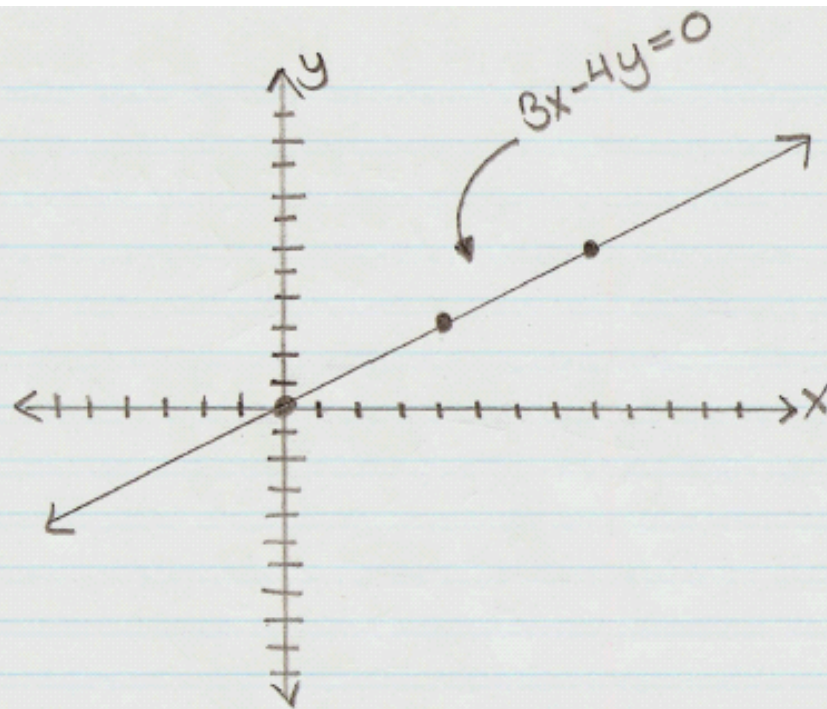
$b = -4$



$$\begin{aligned}
 \text{b) } 3x - 4y &= 0 \\
 \frac{3x}{4} &= \frac{4y}{4} \\
 \frac{3}{4}x &= y
 \end{aligned}$$

$$m = \frac{3}{4} \text{ (up)} \\ \text{4 (over)}$$

$$b = 0$$



$$3. A(-7, 3) \quad B(2, 8) \quad C(7, -1) \quad D(-2, -6)$$

$$\begin{aligned}
 \text{a) } m_{AB} &= \frac{y_2 - y_1}{x_2 - x_1} \\
 &= \frac{8 - 3}{2 - (-7)} \\
 &= \frac{5}{9}
 \end{aligned}$$

$$\begin{aligned}
 m_{CD} &= \frac{y_2 - y_1}{x_2 - x_1} \\
 &= \frac{-6 - (-1)}{-2 - 7} \\
 &= \frac{-5}{-9} \\
 &= \frac{5}{9}
 \end{aligned}$$

Since $m_{AB} = m_{CD}$,

side AB is parallel to side CD.

$$\begin{aligned} b) m_{AC} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{-1 - 3}{7 - 7} \\ &= \frac{-4}{14} \\ &= \frac{-2}{7} \end{aligned}$$

$$\begin{aligned} m_{BD} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{-6 - 8}{-2 - 2} \\ &= \frac{-14}{-4} \\ &= \frac{14}{4} \\ &= \frac{7}{2} \end{aligned}$$

Since m_{AC} is the negative reciprocal of m_{BD} , the diagonals are perpendicular.

4. ΔPQR $P(3,3)$ $Q(5,-1)$ $R(1,-3)$

SIDE PQ :

$$\begin{aligned}m_{PQ} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{-1 - 3}{5 - 3} \\ &= \frac{-4}{2} \\ &= -2\end{aligned}$$

$$\begin{aligned}m_{PQ} &= -2 \\ P(3,3)\end{aligned}$$

$$\begin{aligned}y - y_1 &= m(x - x_1) \\ y - 3 &= -2(x - 3) \\ y - 3 &= -2x + 6\end{aligned}$$

$$\begin{aligned}2x + y - 3 - 6 &= 0 \\ 2x + y - 9 &= 0\end{aligned}$$

SIDE QR :

$$\begin{aligned}m_{QR} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{-3 - -1}{1 - 5} \\ &= \frac{-2}{-4} \\ &= \frac{1}{2}\end{aligned}$$

$$\begin{aligned}m_{QR} &= \frac{1}{2} \\ Q(5,-1)\end{aligned}$$

$$\begin{aligned}y - y_1 &= m(x - x_1) \\ y - -1 &= \frac{1}{2}(x - 5)\end{aligned}$$

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

$$2y + 2 = 1x - 5$$

$$0 = 1x - 2y - 5 - 2$$

$$0 = 1x - 2y - 7$$

SIDE PR:

$$\begin{aligned} m_{PR} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{-3 - 3}{1 - 3} \\ &= \frac{-6}{-2} \\ &= 3 \end{aligned}$$

$$m_{PA} = 3$$

$$R = (1, -3)$$

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

$$y - (-3) = 3(x - 1)$$

$$y + 3 = 3x - 3$$

$$0 = 3x - y - 3 - 3$$

$$0 = 3x - y - 6$$

5. $\begin{matrix} A & B & C \\ (-6, -2) & (-1, 0) & (1, -5) \end{matrix}$

$$\begin{aligned} m_{AB} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{0 - (-2)}{-1 - (-6)} \\ &= \frac{2}{5} \end{aligned}$$

$$\begin{aligned} m_{BC} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{-5 - 0}{1 - (-1)} \\ &= \frac{-5}{2} \end{aligned}$$

$$\begin{aligned} m_{AC} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{-5 - (-2)}{1 - (-6)} \\ &= \frac{-3}{7} \end{aligned}$$

m_{AB} is the negative reciprocal of m_{BC} , therefore this is a right triangle

$$6. A(k, -5) B(2, 3) \quad m = -\frac{3}{4}$$

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

$$-\frac{3}{4} = \frac{3 - (-5)}{2 - k}$$

$$-\frac{3}{4} = \frac{8}{2 - k}$$

$$(-3)(2 - k) = (4)(8)$$

$$-6 + 3k = 32$$

$$3k = 32 + 6$$

$$\frac{3k}{3} = \frac{38}{3}$$

$$k = \frac{38}{3}$$

$$7. (K, -5) (4, -4)$$

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{-4 - (-5)}{4 - K} \\ &= \frac{1}{4 - K} \end{aligned}$$

$$(K, 4) (-2, 3)$$

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{3 - 4}{-2 - K} \\ &= \frac{-1}{-2 - K} \end{aligned}$$

If parallel: $\frac{1}{4 - K} = \frac{-1}{-2 - K}$

$$(1)(-2 - K) = (4 - K)(-1)$$

$$-2 - K = -4 + K$$

$$-2 + 4 = K + K$$

$$\frac{2}{2} = \frac{2K}{2}$$

$$1 = K$$

8. A(-3,1) B(3,3)

C(-1,-6) D(1,1)

$$\begin{aligned}D_{AB} &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\&= \sqrt{(3 - (-3))^2 + (3 - 1)^2} \\&= \sqrt{(6)^2 + (2)^2} \\&= \sqrt{36 + 4} \\&= \sqrt{40} \\&= \sqrt{4 \times 10} \\&= 2\sqrt{10}\end{aligned}$$

$$\begin{aligned}D_{CD} &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\&= \sqrt{(1 - (-1))^2 + (1 - (-6))^2} \\&= \sqrt{(2)^2 + (7)^2} \\&= \sqrt{4 + 49} \\&= \sqrt{53}\end{aligned}$$

Line segment CD is longer.

9. BALL (0,0) SIDE (4,2) POCKET (0,4)

$$\begin{aligned} D_{\text{BALL TO SIDE}} &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(4 - 0)^2 + (2 - 0)^2} \\ &= \sqrt{(4)^2 + (2)^2} \\ &= \sqrt{16 + 4} \\ &= \sqrt{20} \\ &= \sqrt{4 \times 5} \\ &= 2\sqrt{5} \end{aligned}$$

$$\begin{aligned} D_{\text{SIDE TO POCKET}} &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(0 - 4)^2 + (4 - 2)^2} \\ &= \sqrt{(-4)^2 + (2)^2} \\ &= \sqrt{16 + 4} \\ &= \sqrt{20} \\ &= \sqrt{4 \times 5} \\ &= 2\sqrt{5} \end{aligned}$$

The red ball will travel $2\sqrt{5} + 2\sqrt{5} = 4\sqrt{5}$ units.

10. A(-1,-1) B(2,3)

C(-4,0) D(2,8)

$$\begin{aligned} m_{AB} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{3 - (-1)}{2 - (-1)} \\ &= \frac{4}{3} \end{aligned}$$

$$\begin{aligned} m_{CD} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{8 - 0}{2 - (-4)} \\ &= \frac{8}{6} \\ &= \frac{4}{3} \end{aligned}$$

Since $m_{AB} = m_{CD}$,
the lines
are parallel.

A B C
11a) (-1,3) (1,8) (-3,-2)

$$\begin{aligned} m_{AB} &= \frac{y_2 - y_1}{x_2 - x_1} & m_{BC} &= \frac{y_2 - y_1}{x_2 - x_1} & m_{AC} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{8 - 3}{1 - (-1)} & &= \frac{-2 - 8}{-3 - 1} & &= \frac{-2 - 3}{-3 - 1} \\ &= \frac{5}{2} & &= \frac{-10}{-4} & &= \frac{-5}{-2} \\ & & &= \frac{5}{2} & &= \frac{5}{2} \end{aligned}$$

These points are
collinear.

$$\begin{array}{ccc} D & E & F \\ b) & (-2, -3) & (4, 0) & (10, 5) \end{array}$$

$$\begin{aligned} m_{DE} &= \frac{y_2 - y_1}{x_2 - x_1} & m_{EF} &= \frac{y_2 - y_1}{x_2 - x_1} & m_{DF} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{0 - (-3)}{4 - (-2)} & &= \frac{5 - 0}{10 - 4} & &= \frac{5 - (-3)}{10 - (-2)} \\ &= \frac{3}{6} & &= \frac{5}{6} & &= \frac{8}{12} \\ &= \frac{1}{2} & & & &= \frac{2}{3} \end{aligned}$$

These points are not collinear.

$$\begin{array}{ccc} G & H & I \\ c) & (1, 12) & (4, -3) & (5, -8) \end{array}$$

$$\begin{aligned} m_{GH} &= \frac{y_2 - y_1}{x_2 - x_1} & m_{HI} &= \frac{y_2 - y_1}{x_2 - x_1} & m_{GI} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{-3 - 12}{4 - 1} & &= \frac{-8 - (-3)}{5 - 4} & &= \frac{-8 - 12}{5 - 1} \\ &= \frac{-15}{3} & &= \frac{-5}{1} & &= \frac{-20}{4} \\ &= -5 & &= -5 & &= -5 \end{aligned}$$

These points are collinear.

$$12. (5, k) (-4, -2)$$

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{-2 - k}{-4 - 5} \\ &= \frac{-2 - k}{-9} \end{aligned}$$

$$(3, -k) (1, 2)$$

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{2 - k}{1 - 3} \\ &= \frac{2 + k}{-2} \end{aligned}$$

$$-\frac{2 - k}{-9} = \frac{2 + k}{-2}$$

$$(-2)(-2 - k) = (-9)(2 + k)$$

$$4 + 2k = -18 - 9k$$

$$2k + 9k = -18 - 4$$

$$\frac{11k}{11} = \frac{-22}{11}$$

$$k = -2.$$

13. $A(-2, 2)$ $B(7, 5)$ $C(9, -3)$ $D(-4, -2)$

$$\begin{aligned}D_{AC} &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(9 - (-2))^2 + (-3 - 2)^2} \\ &= \sqrt{(11)^2 + (-5)^2} \\ &= \sqrt{121 + 25} \\ &= \sqrt{146}\end{aligned}$$

$$\begin{aligned}D_{BD} &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \quad \text{Diagonal} \\ &= \sqrt{(-4 - 7)^2 + (-2 - 5)^2} \quad \text{BD is} \\ &= \sqrt{(-11)^2 + (-7)^2} \quad \text{longer.} \\ &= \sqrt{121 + 49} \\ &= \sqrt{170}\end{aligned}$$

14. $P(-1, 2)$

$A(6, -1)$ $U(-8, 5)$

$$\begin{aligned} \text{Midpoint}_{AU} &= \left(\frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2} \right) \text{ Therefore } \\ &= \left(\frac{-8 + 6}{2}, \frac{5 + (-1)}{2} \right) \text{ } P(-1, 2) \text{ is } \\ &= \left(\frac{-2}{2}, \frac{4}{2} \right) \text{ the midpoint } \\ &= (-1, 2) \text{ of } AU. \end{aligned}$$

15. Midpoint_{EF} = (5, 1) E(-1, 0) F(x, y)

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

$$(5)(2) = (1)(-1+x)$$

$$10 = -1+x$$

$$10+1 = x$$

$$11 = x$$

$$\frac{1}{1} = \frac{0+y}{2}$$

$$(1)(2) = (1)(y)$$

$$2 = y$$

The missing
point F is
(11, 2).