Ch. 3 Day 1 Worksheet Solutions

1) $(-9,-7)\ (7,2) \Rightarrow \left(\frac{-9+7}{2}, \frac{-7+2}{2}\right) \Rightarrow \left(\frac{-2}{2}, \frac{-5}{2}\right) = \boxed{\left(-1, -\frac{5}{2}\right)}$

2) $(3,-2)\ (b,1)$ $\quad d = \sqrt{13}$

$$\sqrt{13} = \sqrt{(b-3)^2 + (1-(-2))^2}$$
$$13 = (b-3)^2 + (1+2)^2$$
$$13 = (b-3)^2 + 9$$
$$4 = (b-3)^2$$
$$b-3 = 2 \qquad b-3 = -2$$
$$b = 5 \qquad b = 1$$

$\boxed{b = 1 \text{ or } 5}$

3) A $(-2,0)$
B $(2,1)$
C $(1,-3)$

AB: $\sqrt{(2-(-2))^2 + (1-0)^2}$
$\sqrt{(2+2)^2 + (1)^2}$
$\sqrt{4^2+1}$
$\sqrt{17}$

BC: $\sqrt{(1-2)^2 + (-3-1)^2}$
$\sqrt{(-3)^2 + (-4)^2}$
$\sqrt{9+16}$
$\sqrt{25} = 5$

CA: $\sqrt{(1-(-2))^2 + (-3-0)^2}$
$\sqrt{(1+2)^2 + (-3)^2}$
$\sqrt{3^2 + (-3)^2}$
$\sqrt{9+9} = \sqrt{18} = \sqrt{9}\sqrt{2} = 3\sqrt{2}$

Scalene – since all sides are different

I can tell if it's a rt triangle two ways ...

1) use pythag thm

Let $c = 5$ (since it's biggest)

$(\sqrt{17})^2 + (\sqrt{18})^2 = 5^2$

$17 + 18 \neq 25$ so no! not a rt triangle

2) see if two sides are perpendicular

Slope of AB: $\frac{1-0}{2-(-2)} = \frac{1}{2+2} = \frac{1}{4}$

Slope of BC: $\frac{-3-1}{1-2} = \frac{-4}{-1} = 4$

Slope of AC: $\frac{-3-0}{1-(-2)} = \frac{-3}{1+2} = \frac{-3}{3} = -1$

none are perp ... so no!

4) @ pt $(1,-4)$ $m = 2$

$y-(-4) = 2(x-1)$

$y + 4 = 2x - 2$

$\boxed{y = 2x - 6}$

(b) $(-1,2)$ $(9,-3)$

$m = \frac{-3-2}{9-(-1)} = \frac{-5}{10} = \frac{-1}{2}$

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

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

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

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

(c) slope $(-1,3)$ $(1,-1)$

$m = \frac{-1-3}{1-(-1)} = \frac{-4}{1+1} = \frac{-4}{2} = -2$

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

pt $= (4,3)$

$\Rightarrow$

$y - 3 = \frac{1}{2}(x-4)$

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

$2y - 6 = x - 4$

$\boxed{0 = x - 2y + 2}$

5) $m = 1\frac{1}{2} = \frac{3}{2}$

pt $(1,-3)$ $(-2,t)$

parallel:

$\frac{3}{2} = \frac{t-(-3)}{-2-1}$

$\frac{3}{2} = \frac{t+3}{-3}$

$-9 = 2t + 6$

$-15 = 2t$

$t = -7.5$

perpendicular:

$-\frac{2}{3} = \frac{t+3}{-3}$

$6 = 3t + 9$

$-3 = 3t$

$t = -1$

6) $px + 4y - 2 = 0$ $\qquad$ $2x - y + p = 0$

$4y = -px + 2$ $\qquad$ $2x + p = y$

$y = -p/4\,x + 1/2$ $\qquad$ $m = 2$

$m = -p/4$ $\qquad$ $\perp m = -1/2$

$\frac{-p}{4} = \frac{-1}{2}$

$-2p = -4$

$\boxed{p = 2}$

7) @ 330 L (y-int $\Rightarrow t = 0$)

(b) largest slope (steepest segment): from B to C

(c) C (80, 2075) $\qquad \frac{2795 - 2075}{120 - 80} = \frac{720}{40} = 18$ L/min

D (120, 2795)

(d) (0, 330) $\qquad \frac{2795 - 330}{120 - 0} = \frac{2465}{120} \approx 20.5$ L/min

(120, 2795)

8) @ (8,2) (6,−2) $\Rightarrow \left(\frac{8+6}{2}, \frac{2+-2}{2}\right) = \left(\frac{14}{2}, \frac{0}{2}\right) = \boxed{(7,0)}$

(b) slope (8,2) $\Rightarrow \frac{-2-2}{6-8} = \frac{-4}{-2} = 2$ $\qquad \perp m = \frac{-1}{2}$

(6,−2)

pt (7,0) $\qquad y - 0 = -1/2(x - 7)$

$m = -1/2$ $\qquad y = -1/2\,x + 7/2$

$2y = -x + 7 \Rightarrow x + 2y - 7 = 0$

(c) pt (3,2)

line: $x + 2y - 7 = 0 \Rightarrow 3 + 2(2) - 7 = 0$

$3 + 4 - 7 = 0$ ✓ So (3,2) in on the line.

9) (a)

Slope of path:

M is midpoint of AB

$(1,5)(-1,1) \Rightarrow \left(\frac{1+-1}{2}, \frac{5+1}{2}\right) = \left(\frac{0}{2}, \frac{6}{2}\right) = (0,3)\,M$

N is midpoint of CB

$(1,5)(5,1) \Rightarrow \left(\frac{1+5}{2}, \frac{5+1}{2}\right) = (6/2, 6/2) = (3,3)\,N$

slope $(0,3)$ $(3,3)$ $\quad \frac{3-3}{3-0} = \frac{0}{3} = 0$

Slope of bottom edge of field

$A(-1,1)$ $C(5,1)$ $\quad \frac{1-1}{5-(-1)} = \frac{0}{6} = 0$

Since slopes are the same they are parallel.

(b) path length

distance

$(0,3)(3,3)$ $\quad \sqrt{(3-0)^2+(3-3)^2} = \sqrt{3^2+0^2} = \sqrt{9} = 3$

bottom edge of field length

$(-1,1)(5,1)$ $\quad \sqrt{(5-(-1))^2+(1-1)^2}$

$\sqrt{(5+1)^2+(0)^2}$

$\sqrt{6^2}$

6

$3 = \frac{1}{2}6$ ✓