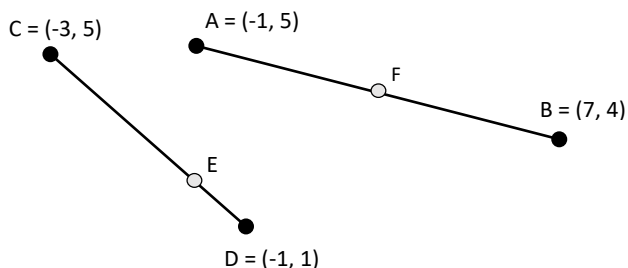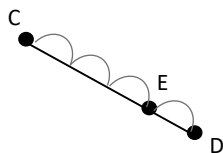**Analytical Geometry – Supplemental Questions with Solutions**

1. Consider the following diagram showing line segments $\overline{AB}$ and $\overline{CD}$. Point *F* is the midpoint of $\overline{AB}$. Point *E* divides $\overline{CD}$ in a ratio of 3 : 1. Find the distance between points *E* and *F*.

C = (-3, 5)   A = (-1, 5)

F

B = (7, 4)

E

D = (-1, 1)

Note = ratio ≠ fraction

$$\text{fraction} = \frac{3}{4}$$

C

E

D

Point E:

$$-3+\frac{3}{4}(-1+3), 5+\frac{3}{4}(1-5)$$

$$-3+\frac{3}{4}(2), 5+\frac{3}{4}(-4)$$

$$(-1.5, 2)$$

Point F:

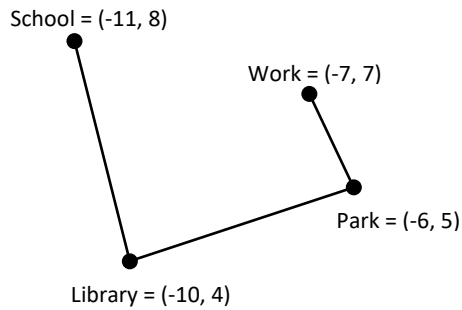$$\frac{-1+7}{2}, \frac{5+4}{2}$$

$$\frac{6}{2}, \frac{9}{2}$$

$$(3, 4.5)$$

$$d_{EF} = \sqrt{(-1.5-3)^2 + (2-4.5)^2}$$

$$= \sqrt{26.5}$$

$$\approx 5.2 \text{ units}$$

2. How long will it take Frank to get from the School to Work using the directions below if he can walk at a speed of 5.8 km/hour?

School = (-11, 8)

Work = (-7, 7)

Park = (-6, 5)

Library = (-10, 4)

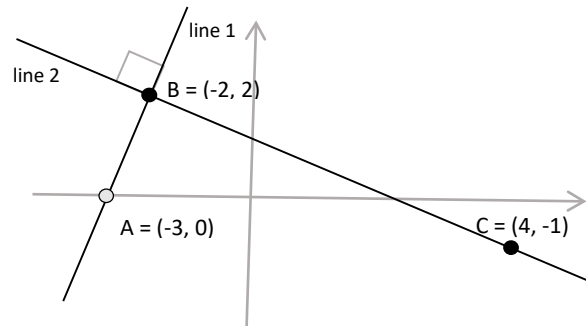$$d_{SL} = \sqrt{(-11+10)^2 + (8-4)^2} = \sqrt{1+16} = 4.123$$

$$d_{LP} = \sqrt{(-6+10)^2 + (5-4)^2} = \sqrt{16+1} = 4.123$$

$$d_{PW} = \sqrt{(-7+6)^2 + (7-5)^2} = \sqrt{1+4} = 2.236$$

Total distance travelled: $10.482\ km$

Travelling $5.8\ \dfrac{km}{h}, \therefore (10.482\ km)\left(\dfrac{h}{5.8\ km}\right) = 1.807\ hrs.$

3. Find the rule of line 2.

Parallel : Perpendicular lines

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

Slope of line 2: (negative reciprocal)
$$\frac{2}{1} \rightarrow \frac{-1}{2}$$
$$\therefore y = \frac{-1}{2}x + b$$

Sub in point C
$$-1 = \frac{-1}{2}(4) + b$$
$$-1 = -2 + b$$
$$1 = b$$
$$\therefore y = \frac{-1}{2}x + 1$$