Stations Activity - Unit 1 Solutions

- **Formula Fortress Phase 1**

① $M = \left(\frac{-4+9}{2}, \frac{7+3}{2}\right) = \left(\frac{5}{2}, \frac{10}{2}\right) = \boxed{(2.5, 5)}$

② $AB = \sqrt{(9--4)^2+(3-7)^2}$

$= \sqrt{(9+4)^2+(-4)^2}$

$= \sqrt{(13)^2+(-4)^2}$

$= \sqrt{169+16}$

$= \sqrt{185}$

$\boxed{AB \approx 13.6}$

- **Formula Fortress Phase 2**

① $AB = \sqrt{(0-2)^2+(3-6)^2}$

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

$= \sqrt{4+9}$

$= \sqrt{13}$

$\boxed{AB \approx 3.6}$

$CD = \sqrt{(1--1)^2+(3-0)^2}$

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

$= \sqrt{(2)^2+(3)^2}$

$= \sqrt{4+9}$

$= \sqrt{13}$

$\boxed{CD \approx 3.6}$

$\overline{AB} \cong \overline{CD}$ because they are the same length

② x-values: $1 = \frac{-4+x_2}{2}$

$2 = -4+x_2$

$x_2 = 6$

y-values: $-2 = \frac{6+y_2}{2}$

$-4 = 6+y_2$

$y_2 = -10$

$\boxed{S(6, -10)}$

Formula Fortress Phase 3

① Midpoint $= \left(\frac{-2+7}{2}, \frac{5+-1}{2}\right) = \left(\frac{5}{2}, \frac{4}{2}\right) = \boxed{(2.5, 2)}$

Distance from endpoint $(-2,5)$ to midpoint $(2.5, 2)$

$= \sqrt{(2.5--2)^2+(2-5)^2}$

$= \sqrt{(2.5+2)^2+(2-5)^2}$

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

$= \sqrt{20.25+9}$

$= \sqrt{29.25}$

≈ 5.4

Distance from endpoint $(7,-1)$ to midpoint $(2.5, 2)$

$= \sqrt{(2.5-7)^2+(2--1)^2}$

$= \sqrt{(-4.5)^2+(2+1)^2}$

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

$= \sqrt{20.25+9}$

$= \sqrt{29.25}$

≈ 5.4

Since the distance from each endpoint to the midpoint is the same, the midpoint $(2.5, 2)$ is correct

② $(1,-2)$ $(2.5,-1.5)$ $(4,-1)$

A N M L B

$(1.75,-1.75)$ $(3.25,-1.25)$

$\overline{AN} \cong \overline{NM} \cong \overline{ML} \cong \overline{LB}$

To find midpoint M:

$\left(\frac{4+1}{2}, \frac{-1+-2}{2}\right) = \left(\frac{5}{2}, \frac{-3}{2}\right) = (2.5, -1.5)$

To find midpoint N:

$\left(\frac{2.5+1}{2}, \frac{-1.5+-2}{2}\right) = \left(\frac{3.5}{2}, \frac{-3.5}{2}\right) = (1.75, -1.75)$

To find midpoint L:

$\left(\frac{4+2.5}{2}, \frac{-1+-1.5}{2}\right) = \left(\frac{6.5}{2}, \frac{-2.5}{2}\right) = (3.25, -1.25)$

Skills Hills Phase 1

① Points: G, H, I (many possibilities)

Lines: $\overleftrightarrow{GK}$, $\overleftrightarrow{LH}$, $\overleftrightarrow{HK}$, $\overleftrightarrow{LI}$, line m, line n

Rays: $\overrightarrow{HI}$, $\overrightarrow{HP}$, $\overrightarrow{HJ}$, $\overrightarrow{HK}$, $\overrightarrow{HG}$, $\overrightarrow{HL}$

Segments: $\overline{GH}$, $\overline{HP}$, $\overline{PI}$, $\overline{HJ}$, $\overline{KH}$, $\overline{HL}$

② $\angle JHK$: acute

$\angle PHK$: Right

$\angle GHI$: obtuse

$\angle IHL$: straight

③ $DE + EF = DF$

$x + 50 = 63$

$x = 13 \Rightarrow \boxed{DE = 13}$

④ $m\angle TQR = 65°$

$m\angle SQR = 65 + 65 = 130°$

Skills Hills Phase 2

① $8x = 40$ $\quad \boxed{m\angle ABD = 8(5) = 40°}$

$\boxed{x = 5}$

② $PQ = 18 \div 2 = 9$

$QR = 18 \div 2 = 9$

$RS = 46 - 9 - 9 = 28$

• Skills Hills Phase 3

① $9x+3+13x-25=77$

$22x-22=77$

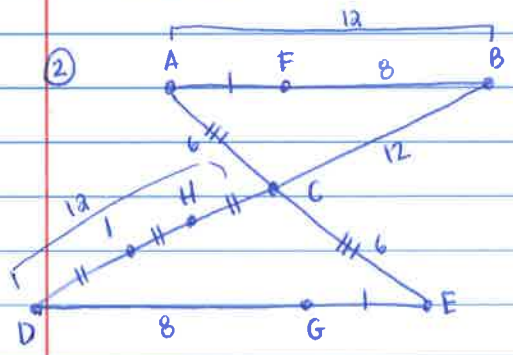
$22x=99$

$\boxed{x=4.5}$

$m\angle FHG = 13(4.5)-25$

$\boxed{m\angle FHG = 33.5°}$

②



$CH = 12 \div 3 = 4$

$HI = 4$

$ID = 4$

$AF = 12-8 = 4$

$GE = 4$

• Application Nation Phase 1

① Home → School

$(-2,3) \rightarrow (1,2)$

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

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

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

$= \sqrt{9+1}$

$= \sqrt{10}$

Starbucks → Home

$(-1,0) \rightarrow (-2,3)$

$D = \sqrt{(-2--1)^2+(3-0)^2}$

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

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

$= \sqrt{1+9}$

$= \sqrt{10}$

Since the distances are the same, Home → School is the same as Starbucks → Home

② $m\angle HBS \approx 63°$, acute

Vertex: Point B

Sides: $\overrightarrow{BH}$ and $\overrightarrow{BS}$

• Application Nation Phase 2

① Home → school

$(-2,3) \to (1,2)$

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

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

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

$= \sqrt{9+1}$

$= \sqrt{10}$

≈ 3.2 mi.

School → Starbucks

$(1,2) \to (-1,0)$

$D = \sqrt{(-1-1)^2+(0-2)^2}$

$= \sqrt{(-2)^2+(-2)^2}$

$= \sqrt{4+4}$

$= \sqrt{8}$

≈ 2.8 mi

Starbucks → Home

$(-1,0) \to (-2,3)$

$D = \sqrt{(-2--1)^2+(3-0)^2}$

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

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

$= \sqrt{1+9}$

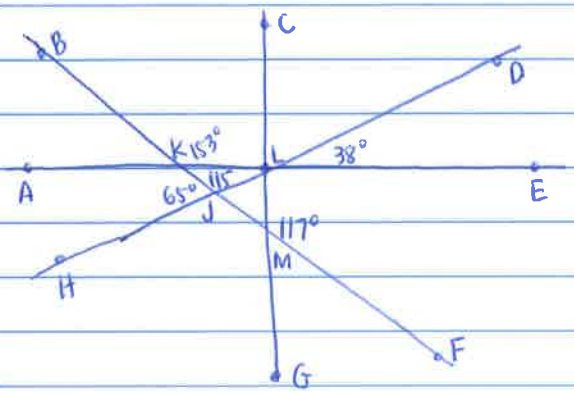
$= \sqrt{10}$

≈ 3.2 mi

Total walking distance $= 3.2 + 2.8 + 3.2$

$= \boxed{9.2 \text{ miles}}$

②



$m\angle CLD = 90-38 = 52°$

$m\angle EKF = 180-153 = 27°$

$m\angle FJH = 115°$

$m\angle FMG = 180-117 = 63°$

$m\angle DJF = 180-115 = 65°$

$m\angle DLG = 90+38 = 128°$

Application Nation Phase 3

Home → School	Home → Starbucks	School → Starbucks
$(-2,3) \to (1,2)$	$(-2,3) \to (-1,0)$	$(1,2) \to (-1,0)$
$M = \left(\frac{-2+1}{2}, \frac{3+2}{2}\right)$	$M = \left(\frac{-2-1}{2}, \frac{3+0}{2}\right)$	$M = \left(\frac{1-1}{2}, \frac{2+0}{2}\right)$
$= \left(\frac{-1}{2}, \frac{5}{2}\right)$	$= \left(\frac{-3}{2}, \frac{3}{2}\right)$	$= \left(\frac{0}{2}, \frac{2}{2}\right)$
$= (-0.5, 2.5)$	$= (-1.5, 1.5)$	$= (0,1)$

$(-0.5, 2.5)$

$D = \sqrt{(-1.5--0.5)^2 + (1.5-2.5)^2}$
$= \sqrt{(-1.5+0.5)^2 + (-1)^2}$
$= \sqrt{(-1)^2 + (-1)^2}$
$= \sqrt{1+1}$
$= \sqrt{2}$
≈ 1.4

$D = \sqrt{(0--1.5)^2 + (1-1.5)^2}$
$= \sqrt{(0+1.5)^2 + (-0.5)^2}$
$= \sqrt{(1.5)^2 + (-0.5)^2}$
$= \sqrt{2.25 + 0.25}$
$= \sqrt{2.5}$
≈ 1.6

$D = \sqrt{(-0.5-0)^2 + (2.5-1)^2}$
$= \sqrt{(-0.5)^2 + (1.5)^2}$
$= \sqrt{0.25 + 2.25}$
$= \sqrt{2.5}$
≈ 1.6

distance $= 1.4 + 1.6 + 1.6 =$ **4.6 mi**

② a. $RS + ST + TR = 16.4 + 1.5(16.4) + 1.5(16.4) + 16.4$
$=$ **82 mi**

b. $82 \div 56 =$ **1.5 hours**

c. Town R (1.75 hrs) + Town S (1.75 hrs) + Town T (1.75 hrs) + driving (1.5 hrs)
$= 6.75$ hours
Yes, 6.75 hours is less than an 8 hour work day

• Angle Pair - adise Phase 1

① $m\angle A + m\angle B = 90$ $\quad m\angle A + m\angle C = 180$

$m\angle A + 53 = 90$ $\quad 37 + m\angle C = 180$

$\boxed{m\angle A = 37°}$ $\quad \boxed{m\angle C = 143°}$

② $\angle 1 \& \angle 5$: Linear Pair

$\angle 2 \& \angle 5$: Vertical

$\angle 1 \& \angle 3$: Neither

$\angle 1 \& \angle 2$: Linear Pair

$\angle 2, \angle 3 \& \angle 4$: Neither

③ $2x + 9 + 10x + 15 = 180$ $\quad m\angle ABC = 2(13) + 9$ $\quad m\angle DBC = 10(13) + 15$

$12x + 24 = 180$ $\quad \boxed{= 35°}$ $\quad \boxed{= 145°}$

$12x = 156$

$\boxed{x = 13}$

• Angle Pair - adise Phase 2

① $3x + 20 = 5x - 50$ $\quad 3x + 20 + y = 180$

$20 = 2x - 50$ $\quad 3(35) + 20 + y = 180$

$70 = 2x$ $\quad 105 + 20 + y = 180$

$\boxed{x = 35}$ $\quad 125 + y = 180$

$\boxed{y = 55}$

② $m\angle 1 + m\angle 2 = 90$ $\quad m\angle 1 = 4(17) - 7$ $\quad m\angle 2 = 17 + 12$

$4x - 7 + x + 12 = 90$ $\quad \boxed{= 61°}$ $\quad \boxed{= 29°}$

$5x + 5 = 90$

$5x = 85$

$\boxed{x = 17}$

• Angle Pair-adise Phase 3

① $m\angle A = x$, $m\angle B = y$ ⟩ $x = 42 + y$, $x + y = 180$ ⟩ substitute in

$42 + y + y = 180$

$42 + 2y = 180$

$2y = 138$

$y = 69 \Rightarrow \boxed{m\angle B = 69^\circ}$ $\boxed{m\angle A = 180 - 69 = 111^\circ}$

② $8x + 38 + 8x - 2 = 180$

$16x + 36 = 180$

$16x = 144$

$\boxed{x = 9}$

$11y + 4 + 12y + 38 = 180$

$23y + 42 = 180$

$23y = 138$

$\boxed{y = 6}$

Angles: $8(9) + 38 = 110^\circ$

$8(9) - 2 = 70^\circ$

$12(6) + 38 = 110^\circ$

$11(6) + 4 = 70^\circ$