Name Answers Date

8.6 – The Distance Formula

Find the distance between each pair of points. Keep your answer in simplest radical form.

1) (10, 20), (13, 16)

$d = 5$

2) (15, 37), (42, 73)

$d = 45$

3) (-19, -16), (-3, 14)

$d = 34$

4) (13, 2), (7, 10)

$d = 10$

5) Find the perimeter of ΔABC with vertices A(2, 4), B(8, 12), and C(24, 0).

52.4

6) Determine whether ΔDEF with vertices D(6, -6), E(39, -12), and F(24, 18) is scalene, isosceles, or equilateral.

Isosceles

7) Determine whether ΔGHI with vertices G(2, 6), H(18, 2), and I(12, 12) is isosceles, right, isosceles right, or equilateral.

Isosceles right

8) Describe and correct the error in finding the distance between A(6, 2) and B(1, −4).

✗

$AB = \sqrt{(6-2)^2 + [1-(-4)]^2}$
$= \sqrt{4^2 + 5^2}$
$= \sqrt{16 + 25}$
$= \sqrt{41}$
≈ 6.4

They didn't follow the formula!

$d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$

$= \sqrt{(1-6)^2 + (-4-2)^2}$

$= \sqrt{25 + 36}$

$= \sqrt{61} \approx 7.8$

For Exercises 9-11 use ΔABC with vertices A(-2, -2), B(4, 0), and C(0, 6).

9) Find midpoints M, N, and P of $\overline{AC}$, $\overline{CB}$, and $\overline{AB}$, respectively.

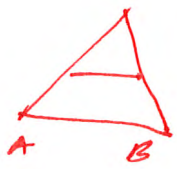
M(-1, 2), N(2, 3), P(1, -1)

10) Find the slopes of $\overline{MN}$ and $\overline{AB}$, the slopes of $\overline{MP}$ and $\overline{BC}$, and the slopes of $\overline{NP}$ and $\overline{AC}$. How do they compare?

$\text{slope}_{\overline{MN}} = \text{slope}_{\overline{AB}} = \frac{1}{3}$

$\text{slope}_{\overline{MP}} = \text{slope}_{\overline{BC}} = -\frac{3}{2}$

$\text{slope}_{\overline{NP}} = \text{slope}_{\overline{AC}} = 4$



The slope of each midsegment is the same as the third side.

11) Find the lengths of $\overline{MN}$ and $\overline{AB}$, the lengths of $\overline{MP}$ and $\overline{BC}$, and the lengths of $\overline{NP}$ and $\overline{AC}$. How do they compare?

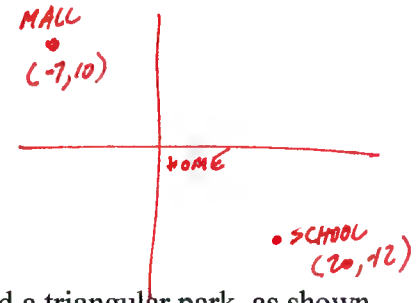
$MN = \sqrt{10}$, $AB = 2\sqrt{10}$

$MP = \sqrt{13}$, $BC = 2\sqrt{13}$

$NP = \sqrt{17}$, $AC = 2\sqrt{17}$

Each midsegment is half the third side.

12) Your school is 20 blocks east and 12 blocks south of your house. The mall is 10 blocks north and 7 blocks west of your house. You plan on going to the mall right after school. Find the distance between your school and the mall assuming there is a road directly connecting the school and the mall. One block is 0.1 mile.



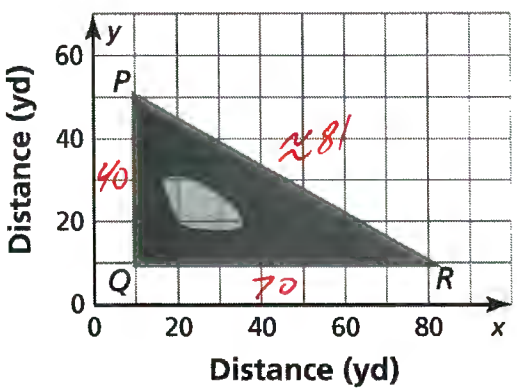
$d = \sqrt{(20-7)^2 + (-12-10)^2}$

$= \sqrt{27^2 + (-22)^2}$

$= \sqrt{1213} \approx 34.82$ blocks

$34.82 \times 0.1 \approx 3.482 \approx$ **3.5 miles**

13) A path goes around a triangular park, as shown.



a. Find the distance around the park to the nearest yard.

$P \approx 40 + 70 + 81$

≈ 191 yards

b. A new path and a bridge are constructed from point Q to the midpoint M of $\overline{PR}$. Find QM to the nearest yard.

$M(45,30)$; $Q(10,10)$

$QM = \sqrt{(10-45)^2 + (10-30)^2}$

≈ 40 yards

c. A man jogs from P to Q to M to R to Q and back to P at an average speed of 150 yards per minute. About how many minutes does it take? Explain your reasoning.

$M(45,30)$, $R(80,10)$

$MR = \sqrt{(80-45)^2 + (10-30)^2}$

≈ 40

$P \to Q \to M \to R \to Q \to P$

$40 + 40 + 40 + 70 + 40 = 230$ yds

$\frac{230 \text{ yd}}{150 \text{ yd/min}} \approx 1.5$

≈ 1.5 minutes