Solutions to Even problems for Section 1.7 - pg. 54 - 56

8. (2 + -5)/2 = -3/2

12. (13 + -6)/2, (8 + -6)/2 = (7/2 , 2/2) = (3.5, 1)

20. (1 + x)/2 = 5, (12 + y)/2 = -8 — You know the coordinates of the midpoint, but you are missing the coordinates of one of the endpoints

1 + x = 10 , 12 + y = -16 — Multiply both sides by 2

x = 9 , y = -28 *S* = (9, -28)

26. $\sqrt{(12--8)^2+(6-18)^2}=\sqrt{(20)^2+(-12)^2}=\sqrt{400+144}=\sqrt{544}=\sqrt{16*34}=4\sqrt{34}=$ 23.3

30. $\sqrt{(-3-5)^2+(-4-5)^2}=\sqrt{(-8)^2+(-9)^2}=\sqrt{64+81}=\sqrt{145}=$ 12.0

34. Everett = (-3 , 5) and Fairfield = (-8 , -3)

$\sqrt{(-3--8)^2+(5--3)^2}=\sqrt{(5)^2+(8)^2}=\sqrt{25+64}=\sqrt{89}=$ 9.4

40. a. *PQ* without the segment symbol over the top refers to the length of *PQ*

$PQ=\sqrt{(-3-5)^2+(-1--7)^2}=\sqrt{(-8)^2+(6)^2}=\sqrt{64+36}=\sqrt{100}=$ 10

b. Midpoint of *PQ* = (-3 + 5)/2 , (-1 + -7)/2 = (2/2 , -8/2) = (1 , -4)

44. a. *PQ* without the segment symbol over the top refers to the length of *PQ*

$PQ=\sqrt{(4-3)^2+(2-0)^2}=\sqrt{(1)^2+(2)^2}=\sqrt{1+4}=\sqrt{5}=$ 2.2

b. Midpoint of *PQ* = (4 + 3)/2 , (2 + 0)/2 = (7/2 , 2/2) = (3.5 , 1)

48. a. *A* = (-9, -6) *B* = (6, 6)

$AB = \sqrt{(-9-6)^2 + (-6-6)^2} = \sqrt{(-15)^2 + (-12)^2} = \sqrt{225+144} = \sqrt{369} = \sqrt{9*41} = 3\sqrt{41} =$ 19.2

b. Midpoint of *AB* = (-9 + 6)/2 , (-6 + 6)/2 = (-3/2 , 0/2) = (-1.5 , 0)

54. *Cedar* = (-3 , 1) *City Plaza* = (0 , 0)

$\sqrt{(-3-0)^2 + (1-0)^2} = \sqrt{(-3)^2 + (1)^2} = \sqrt{9+1} = \sqrt{10} =$ 3.2 miles

58. a. If R is midpoint: (-4 + 2)/2, (6 + 4)/2 = (-2/2 , 10/2) so R is (-1, 5)

If Q is midpoint: (-4 + x)/2 = 2, (6 + y)/2 = 4, (-4 + x) = 4, (6 + y) = 8 so R is (8 , 2)

If P is midpoint: (2 + x)/2 = -4, (4 + y)/2 = 6, (2 + x) = -8, (4 + y) = 12 so R is (-10 , 8)

b. If R = (-1, 5) then $RQ = \sqrt{(2--1)^2 + (4-5)^2} = \sqrt{(3)^2 + (-1)^2} = \sqrt{9+1} = \sqrt{10}$

If R = (8, 2) then $RQ = \sqrt{(2-8)^2 + (4-2)^2} = \sqrt{(-6)^2 + (2)^2} = \sqrt{36+4} = \sqrt{40}$

If R = (-10, 8) then $RQ = \sqrt{(2--10)^2 + (4-8)^2} = \sqrt{(12)^2 + (-4)^2} = \sqrt{144+16} = \sqrt{160}$

Yes, this will affect the answer to part a. The only way for the distance to be the square root of 160 is for P to be the midpoint, making it so R has to be (-10, 8)

60. The distance formula stays the same, even in 3-D: d = $\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2}$

$PQ = \sqrt{(2--2)^2 + (3-4)^2 + (4-9)^2} = \sqrt{(4)^2 + (-1)^2 + (-5)^2} = \sqrt{16+1+25} = \sqrt{42} = 6.5$