

PART III

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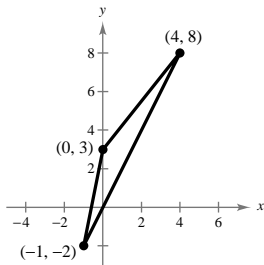
CHAPTER P

Prerequisites

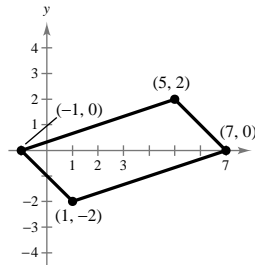
Section P.1 Graphical Representation of Data

Solutions to Even-Numbered Exercises

2.



4.



6. $A: (\frac{3}{2}, -4)$; $B: (0, -2)$;
 $C: (-3, \frac{5}{2})$; $D: (-6, 0)$

8. $A: (-4, 0)$; $B: (-5, -5)$;
 $C: (3.5, -2.5)$; $D: (2, 0)$

10. $(4, -8)$

12. $(-12, 0)$

14. If $x < 0$ and $y < 0$ then $(x, 4)$ is in Quadrant III.

16. If $x > 2$ and $y = 3$ then $(x, 4)$ is in Quadrant I.

18. If $x > 4$ then $(x, 4)$ is in Quadrants I or IV.

20. If $(-x, y)$ is in Quadrant IV, then (x, y) must be in Quadrant III.

22. If $xy < 0$, then x and y have opposite signs. This happens in Quadrants II and IV.

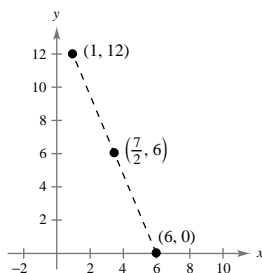
24. $(-3 + 6, 6 - 3) = (3, 3)$
 $(-5 + 6, 3 - 3) = (1, 0)$
 $(-3 + 6, 0 - 3) = (3, -3)$
 $(-1 + 6, 3 - 3) = (5, 0)$

26. $d = |8 - 1| = 7$

28. $d = |6 - (-4)| = |6 + 4| = 10$

30. $d = \sqrt{(0 - 8)^2 + (20 - 5)^2} = \sqrt{8^2 + 15^2} = \sqrt{64 + 225} = \sqrt{289} = 17$

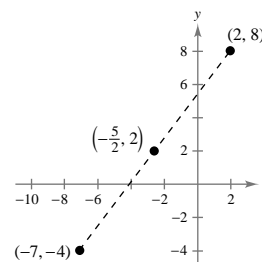
32. (a)



(b) $d = \sqrt{(1 - 6)^2 + (12 - 0)^2}$
 $= \sqrt{25 + 144} = 13$

(c) $(\frac{1 + 6}{2}, \frac{12 + 0}{2}) = (\frac{7}{2}, 6)$

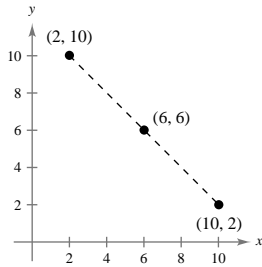
34. (a)



(b) $d = \sqrt{(-7 - 2)^2 + (-4 - 8)^2}$
 $= \sqrt{81 + 144} = 15$

(c) $(\frac{-7 + 2}{2}, \frac{-4 + 8}{2}) = (-\frac{5}{2}, 2)$

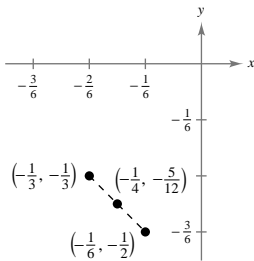
36. (a)



(b) $d = \sqrt{(2 - 10)^2 + (10 - 2)^2} = \sqrt{64 + 64} = 8\sqrt{2}$

(c) $\left(\frac{2 + 10}{2}, \frac{10 + 2}{2}\right) = (6, 6)$

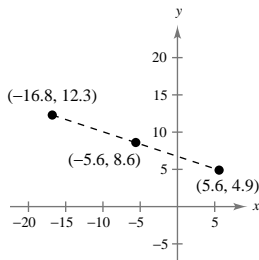
38. (a)



(b) $d = \sqrt{\left(-\frac{1}{3} + \frac{1}{6}\right)^2 + \left(-\frac{1}{3} + \frac{1}{2}\right)^2} = \sqrt{\frac{1}{36} + \frac{1}{36}} = \frac{\sqrt{2}}{6}$

(c) $\left(\frac{(-1/3) - (1/6)}{2}, \frac{(-1/3) - (1/2)}{2}\right) = \left(\frac{-1/2}{2}, \frac{-5/6}{2}\right) = \left(-\frac{1}{4}, -\frac{5}{12}\right)$

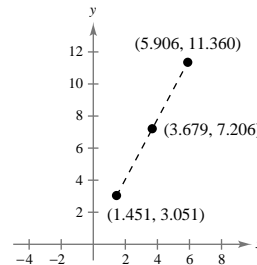
40. (a)



(b) $d = \sqrt{(-16.8 - 5.6)^2 + (12.3 - 4.9)^2}$
 $= \sqrt{501.76 + 54.76} = \sqrt{556.52}$

(c) $\left(\frac{-16.8 + 5.6}{2}, \frac{12.3 + 4.9}{2}\right) = (-5.6, 8.6)$

42. (a)



(b) $d = \sqrt{(1.451 - 5.906)^2 + (3.051 - 11.360)^2}$
 $\approx \sqrt{88.887} \approx 9.430$

(c) $\left(\frac{1.451 + 5.906}{2}, \frac{3.051 + 11.360}{2}\right) \approx (3.679, 7.206)$

44. (a) $(1, 0), (13, 5)$

$$\begin{aligned} d &= \sqrt{(13 - 1)^2 + (5 - 0)^2} \\ &= \sqrt{12^2 + 5^2} \\ &= \sqrt{169} = 13 \end{aligned}$$

$(13, 5), (13, 0)$

$d = |5 - 0| = |5| = 5$

$(1, 0), (13, 0)$

$d = |1 - 13| = |-12| = 12$

(b) $5^2 + 12^2 = 25 + 144 = 169 = 13^2$

46. (a) $(1, 5), (5, -2)$

$$\begin{aligned} d &= \sqrt{(1 - 5)^2 + (5 - (-2))^2} \\ &= \sqrt{(-4)^2 + (7)^2} \\ &= \sqrt{16 + 49} = \sqrt{65} \end{aligned}$$

$(1, 5), (1, -2)$

$d = |5 - (-2)| = |5 + 2| = |7| = 7$

$(1, -2), (5, -2)$

$d = |1 - 5| = |-4| = 4$

(b) $4^2 + 7^2 = 65 = (\sqrt{65})^2$

48. $\left(\frac{1996 + 2000}{2}, \frac{\$4,200,000 + \$5,650,000}{2} \right) = (1998, \$4,925,000)$

In 1998 the sales were \$4,925,000.

50. $d_1 = \sqrt{(1 - 3)^2 + (-3 - 2)^2} = \sqrt{4 + 25} = \sqrt{29}$

$d_2 = \sqrt{(3 + 2)^2 + (2 - 4)^2} = \sqrt{25 + 4} = \sqrt{29}$

$d_3 = \sqrt{(1 + 2)^2 + (-3 - 4)^2} = \sqrt{9 + 49} = \sqrt{58}$

$d_1 = d_2$. Triangle is isosceles.

52. $d_1 = \sqrt{(0 - 3)^2 + (1 - 7)^2} = \sqrt{9 + 36} = \sqrt{45} = 3\sqrt{5}$

$d_2 = \sqrt{(3 - 4)^2 + (7 - 4)^2} = \sqrt{1 + 9} = \sqrt{10}$

$d_3 = \sqrt{(4 - 1)^2 + (4 + 2)^2} = \sqrt{9 + 36} = \sqrt{45} = 3\sqrt{5}$

$d_4 = \sqrt{(0 - 1)^2 + (1 + 2)^2} = \sqrt{1 + 9} = \sqrt{10}$

Opposite sides have equal lengths of $3\sqrt{5}$ and $\sqrt{10}$. Figure is a parallelogram.

54. (a) $\left(\frac{3x_1 + x_2}{4}, \frac{3y_1 + y_2}{4} \right) = \left(\frac{3(1) + 4}{4}, \frac{3(-2) - 1}{4} \right) = \left(\frac{7}{4}, \frac{-7}{4} \right)$

$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) = \left(\frac{1 + 4}{2}, \frac{-2 - 1}{2} \right) = \left(\frac{5}{2}, \frac{-3}{2} \right)$

$\left(\frac{x_1 + 3x_2}{4}, \frac{y_1 + 3y_2}{4} \right) = \left(\frac{1 + 3(4)}{4}, \frac{-2 + 3(-1)}{4} \right) = \left(\frac{13}{4}, \frac{-5}{4} \right)$

(b) $\left(\frac{3x_1 + x_2}{4}, \frac{3y_1 + y_2}{4} \right) = \left(\frac{3(-2) + 0}{4}, \frac{3(-3) + 0}{4} \right) = \left(\frac{-3}{2}, \frac{-9}{4} \right)$

$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) = \left(\frac{-2 + 0}{2}, \frac{-3 + 0}{2} \right) = \left(-1, \frac{-3}{2} \right)$

$\left(\frac{x_1 + 3x_2}{4}, \frac{y_1 + 3y_2}{4} \right) = \left(\frac{-2 + 0}{4}, \frac{-3 + 0}{4} \right) = \left(\frac{-1}{2}, \frac{-3}{4} \right)$

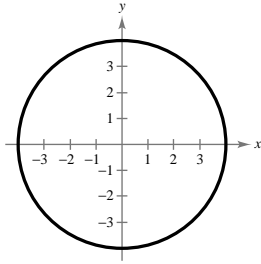
56. $(x - 0)^2 + (y - 0)^2 = 5^2$
 $x^2 + y^2 = 25$

58. $(x - 0)^2 + (y - \frac{1}{3})^2 = (\frac{1}{3})^2$
 $x^2 + (y - \frac{1}{3})^2 = \frac{1}{9}$

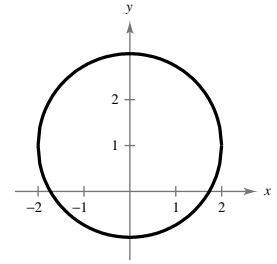
60. $r = \sqrt{(3 - (-1))^2 + (-2 - 1)^2} = \sqrt{16 + 9} = 5$
 $(x - 3)^2 + (y + 2)^2 = 5^2 = 25$

62. Center = $(\frac{-4 + 4}{2}, \frac{-1 + 1}{2}) = (0, 0)$
 $r = \sqrt{(4 - 0)^2 + (1 - 0)^2} = \sqrt{17}$
 $x^2 + y^2 = 17$

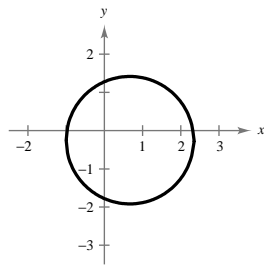
64. $x^2 + y^2 = 16$
 Center: $(0, 0)$
 Radius: $\sqrt{16} = 4$



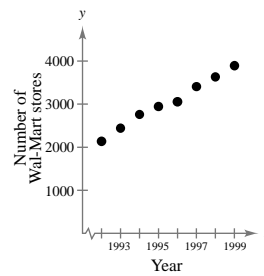
66. $x^2 + (y - 1)^2 = 4$
 Center: $(0, 1)$
 Radius: $\sqrt{4} = 2$



68. $(x - \frac{2}{3})^2 + (y + \frac{1}{4})^2 = \frac{25}{9}$
 Center: $(\frac{2}{3}, -\frac{1}{4})$
 Radius: $\frac{5}{3}$



70.



72. Change = $1.65 - 1.39 = 0.26$
 (Answers will vary.)

74. (a) Superbowl 27 was in 1993 and superbowl 21 inches 1987.

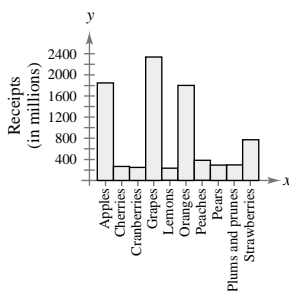
Increase = $850 - 600 \approx 250,000$ dollars

(b) Superbowl 33 was in 1999.

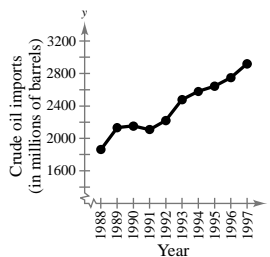
Increase = $1600 - 850 \approx 750,000$ dollars

76. No, there are many variables that will affect the final exam score.

78.

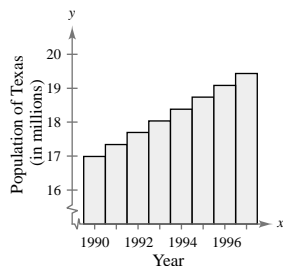


80.



The graph shows crude oil imports on the rise from 1991 to 1997.

82. (a)



(b) Solve for x in the equation $P = 19$:

$$0.35x + 16.99 = 19$$

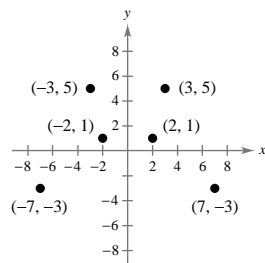
$$0.35x = 2.01$$

$$x = \frac{2.01}{0.35} \approx 5.74$$

The population of Texas exceeded 19 million near the end of 1995

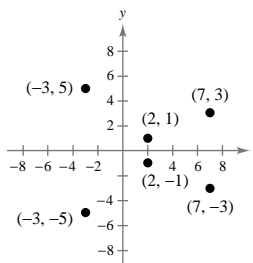
84. $d = \sqrt{(45 - 10)^2 + (40 - 15)^2} = \sqrt{35^2 + 25^2} = \sqrt{1850} = 5\sqrt{74} \approx 43$ yards

86. (a)



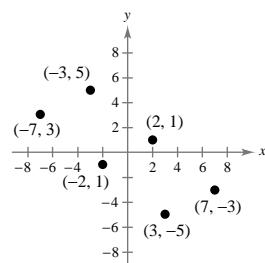
The points are reflected through the y -axis

(b)



The points are reflected through the x -axis

(c)



The points are rotated 180° about the origin.
(reflected through the origin)