Investigation 2

ACE Assignment Choices

Differentiated Instruction Solutions for All Learners

Problem 2.1

Core 1–6, 13–22
Other 23–28 and unassigned choices from previous problems

Problem 2.2

Core 7
Other 29–43, 58, and unassigned choices from previous problems

Problem 2.3

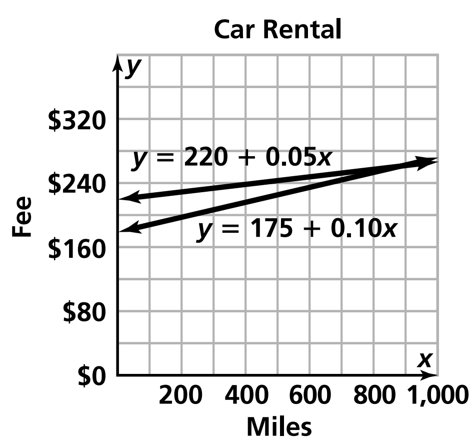
Core 8–11
Other 12, 44–57, 59, 60, and unassigned choices from previous problems

Adapted For suggestions about adapting Exercise 1 and other ACE exercises, see the CMP *Special Needs Handbook*.
Connecting to Prior Units 7–9, 17: *Moving Straight Ahead*; 13, 14, 16–18, 29–34, 36–41: *Accentuate the Negative;* 19–28: *Say It With Symbols;* 19–21: *Frogs, Fleas and Painted Cubes;* 42: *Covering and Surrounding;* 43: *What Did You Expect?*

Applications

1. **a.** A+: $175 + 0.10x = c$
   Zippy: $220 + 0.05x = c$

   b.



   c. 900 miles, $265

   d. Zippy will be cheaper for distances greater than 900 miles.

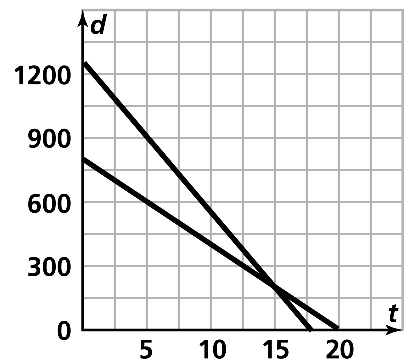
   e. If the car is driven 225 miles, A+ rental will charge $197.50.

2. **a.** Maggie: $d = 1250 - 70t$
   Ming: $d = 800 - 40t$

   b. $1{,}250 - 70t = 800 - 40t$;
   solution $t = 15$ minutes

   c. less than 15 minutes

   d. Answers will vary. If we use a graph of the equation in part (a), we have



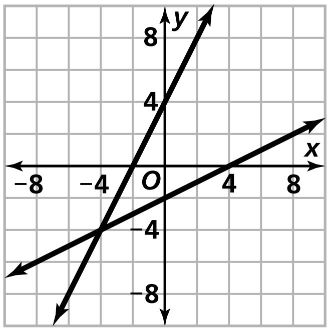
   We know that the intersection point is at $t = 15$ min. Checking other values:

t	Distance Between Girls
14	$270 - 240 = 30$
14.5	$235 - 220 = 15$
15	$200 - 200 = 0$
15.5	$180 - 165 = 15$
16	$160 - 130 = 30$

   We can say that at $t = 14.5$ or $t = 15.5$, the distance is less than 20 m.

3–6. Symbolic reasoning will vary. An example is shown for Exercise 3.

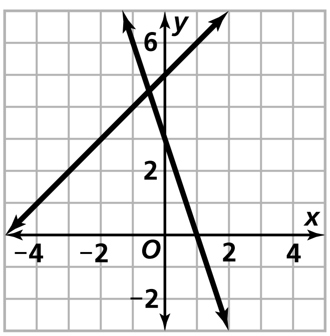
3. $(-4, -4)$



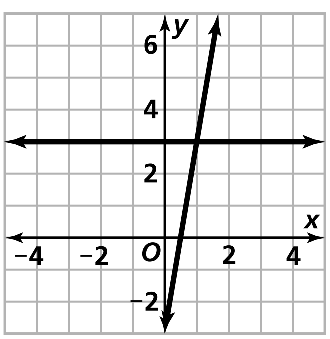
Check: $2x + 4 = \frac{1}{2}x - 2$

$$1.5x = -6$$
$$x = -4$$
$$y = 2(-4) + 4 = -4$$

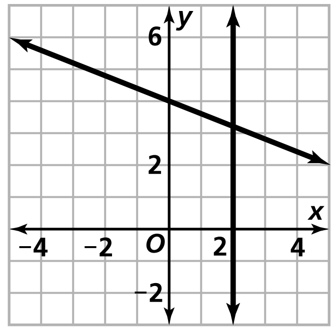
4. $(-\frac{1}{2}, \frac{9}{2})$



5. $(1, 3)$



6. $(2, \frac{16}{5})$

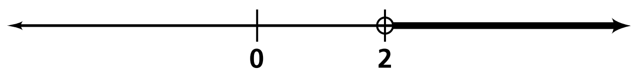


7. **a.** T **b.** T **c.** F

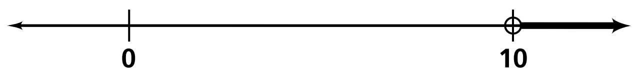
d. F **e.** T

f. Can not be determined.

8. $2 < x$

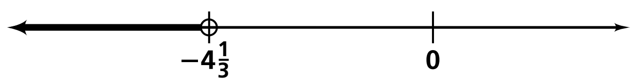


9. $x > 10$



10. $x \leq 12$

11. $x < -4\frac{1}{3}$



12. Symbolic reasoning will vary. An example is shown for part (a).

a. $x > 7.5$; Check: $0.4x > 3$

$$x > 7.5$$

b. $x > -5$ **c.** $x < \frac{2}{3}$ **d.** $x > 4$

e. $x = \frac{40}{19}$ or approximately $x = 2.11$

f. $x < \frac{40}{19}$ or approximately $x < 2.11$

Connections

13. -4 **14.** -23 **15.** 8 **16.** -8

17. -24 **18.** $\frac{3}{4}$

19. $y = 2x - 3$ **20.** $y = -4x + 1.5$

21. $y = -\frac{2}{3}x - \frac{1}{3}$ **22.** $y = -\frac{3}{4}x + 3$

23. slope $= 7$; y-intercept $= (0, -3)$; x-intercept $= (\frac{3}{7}, 0)$

24. slope $= -3$; y-intercept $= (0, 4)$; x-intercept $= (\frac{4}{3}, 0)$

25. slope $= \frac{2}{3}$; y-intercept $= (0, 12)$; x-intercept $= (-18, 0)$

26. slope $= -\frac{1}{4}$; y-intercept $= (0, -5)$; x-intercept $= (-20, 0)$

27. slope $= -17$; y-intercept $= (0, \frac{3}{4})$; x-intercept $= (\frac{3}{68}, 0)$

28. slope $= -\frac{3}{5}$; y-intercept $= (0, -6)$; x-intercept $= (-10, 0)$

29. $=$ **30.** $<$ **31.** $<$

32. $>$ **33.** $=$ **34.** $>$

35. **a.** on: $6^2 + 8^2 = 10^2$

b. inside: $7^2 + 7^2 < 10^2$

c. inside: $(-7)^2 + (-7)^2 < 10^2$

d. on: $(-6)^2 + 8^2 = 10^2$

e. outside: $(-7)^2 + 8^2 > 10^2$

f. outside: $(-7)^2 + (-8)^2 > 10^2$

36. $>$ **37.** $<$ **38.** $>$

39. $=$ **40.** $<$ **41.** $>$

42. **a.** $=$ **b.** $>$ **c.** $>$

d. $<$ **e.** $>$ **f.** $<$

43. **a.** $=$ **b.** $=$ **c.** $=$ **d.** $>$

44. B

45. Answers will vary. Some examples are:

a. $-\frac{1}{2} < \frac{3}{4}$ and $\frac{2}{-1} < \frac{4}{3}$

b. $\frac{1}{2} < \frac{3}{4}$ and $\frac{2}{1} > \frac{4}{3}$

46. Correct choice is H because $\frac{-1}{2.5} = -0.4$.

47. Correct choice is B; the midpoint is $(0, 3)$.

48. Solution of $5(2^x) > 1{,}000$ for approximately $x > 7.64$; for integer solution set, the inequality holds for $x > 7$.

49. $x^2 - x - 6 < 0$ for $-2 < x < 3$.

50. Factored form: $y = x(x + 4)$, y-intercept: $(0, 0)$, x-intercepts $(0, 0)$ and $(-4, 0)$

51. Factored form: $y = (x + 2)(x + 2)$, y-intercept: $(0, 4)$, x-intercept $(-2, 0)$

52. Factored form: $y = (x - 2)(x + 5)$, y-intercept: $(0, -10)$, x-intercepts $(2, 0)$ and $(-5, 0)$

53. Factored form: $y = (x - 4)(x - 4)$, y-intercept: $(0, 16)$, x-intercept $(4, 0)$

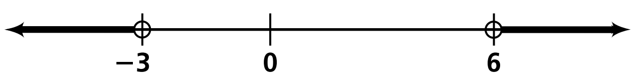
54. Factored form: $y = (x + 2)(x - 2)$, y-intercept: $(0, -4)$, x-intercepts $(-2, 0)$ and $(2, 0)$

55. Factored form: $y = (x + 1)(x + 3)$, y-intercept: $(0, 3)$, x-intercepts $(-1, 0)$ and $(-3, 0)$

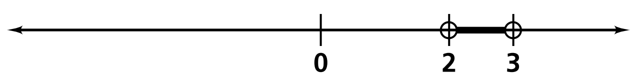
56. H

Extensions

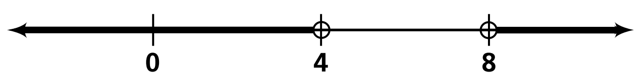
57. **a.** $x < -3$ or $x > 6$;



b. $x < 3$ and $x > 2$;



c. $x > 8$ or $x < 4$;



d. $x > -10$ and $x < 1$;

58. **a.** True, because $n = m + k$ for some $k > 0$ and $2^k > 1$, so $2^m < 2^m 2^k = 2^n$.

b. True, because we can only look at positive whole numbers. The area of a square with side length m is smaller than the area of a square with side length n (where m and n are positive whole numbers and $m < n$).

c. Not true because repeated multiplication by 0.5 produces smaller and smaller numbers.

d. Not true when $m = 5$ and $n = 10$, for example.

59. **a.** $5x^2 + 7 \leq 87$ when $-4 \leq x \leq 4$

b. $5x^2 + 7 > 87$ when $x < -4$ and when $x > 4$

60. **a.** $x < 3$ **b.** $x > 2$

Possible Answers to Mathematical Reflections

1. You can use a coordinate graph to solve a linear equation such as $ax + b = cx + d$ by graphing the two lines $y = ax + b$ and $y = cx + d$ and seeing where they intersect. To use a graph to solve inequalities of the form $ax + b < cx + d$, you would need to graph the two lines and see for which x-values the y-values given by $y = ax + b$ are less than ("lower than") the y-values given by $y = cx + d$.

2. The rules for solving inequalities are similar to but different in some ways from the rules for solving equations. You cannot necessarily "do the same thing to both sides" when working with inequalities. For example, you cannot simply divide both sides of an inequality by a negative number and get an equivalent inequality. To solve something such as $ax + b < cx + d$ symbolically, you could subtract d from both sides to get $ax + b - d < cx$. Then you could subtract ax from both sides (this is legitimate, even with inequalities) to get $b - d < cx - ax$. Then you could use the distributive property to write $b - d < x(c - a)$. If $c - a < 0$, you would have to write $\frac{b - d}{c - a} > x$ because you would be dividing by a negative number. If $c - a > 0$, you would write $\frac{b - d}{c - a} < x$.