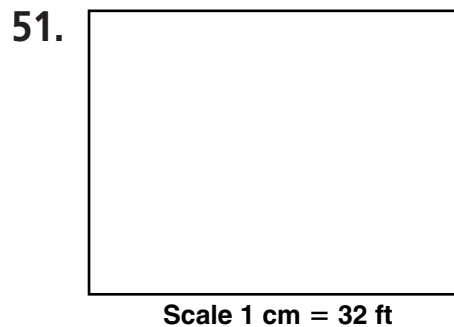
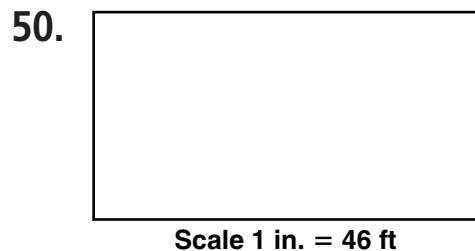


Answers for Lesson 7-1, pp. 368–370 Exercises (cont.)



52. Elaine did not convert units, and thought the ratios equaled 1.

53. $\frac{b}{d}$ or $\frac{a}{c}$

54. $\frac{c}{d}$ or $\frac{a}{b}$

55. $\frac{c + 2d}{d}$

56. $\frac{a}{b} = \frac{c}{d}$ (Given); $ad = bc$ (Cross-Product Prop.); $bc = ad$
(Symm. Prop. of =); $\frac{bc}{ac} = \frac{ad}{ac}$ (Div. Prop. of =);
 $\frac{b}{a} = \frac{d}{c}$ (Simplify)

57. $\frac{a}{b} = \frac{c}{d}$ (Given); $ad = bc$ (Cross-Prod. Prop.); $\frac{ad}{cd} = \frac{bc}{cd}$
(Div. Prop. of =); $\frac{a}{c} = \frac{b}{d}$ (Simplify)

58. $\frac{a}{b} = \frac{c}{d}$ (Given); $\frac{a}{b} + 1 = \frac{c}{d} + 1$ (Add. Prop. of =);
 $\frac{a + b}{b} = \frac{c + d}{d}$ (Subst.); $\frac{a + b}{b} = \frac{c + d}{d}$ (Simplify)

59. $x = 5$; $y = 24$

60. $x = 3$; $y = 15$

61. $x = 3$; $y = 21$

Answers for Lesson 7-2, pp. 375–378 Exercises

1. $\angle JHY$
2. $\angle R$
3. $\angle JXY$
4. HY
5. JT
6. HY
7. no; $\frac{20}{30} \neq \frac{36}{52}$
8. yes; $QRST \sim XWZY; \frac{3}{4}$
9. yes; $KLMJ \sim PQNO; \frac{3}{5}$
10. yes; $ABCD \sim FGHE; \frac{4}{5}$
11. No; corr. \angle s are not \cong .
12. yes; $\triangle ABC \sim \triangle FED; \frac{7}{5}$
13. $x = 4; y = 3$
14. $x = 20; y = 17.5; z = 7.5$
15. $x = 16; y = 4.5; z = 7.5$
16. $x = 6; y = 8; z = 10$
17. 6.6 in. by 11 in.
18. 3.6 in. by 6 in.
19. 70 mm
20. 54 in. by 87.37 in.
21. 2 : 3
22. 3 : 2
23. 50
24. 50
25. 70
26. $\frac{2}{3}$
27. 7.5 m
28. 5.6 m
29. Yes; corr. \angle s are \cong and corr. sides are proportional with a ratio of 1 : 1.
30. equal sign, similarity symbol; Answers may vary.
Sample: \cong figures are similar with = areas.
31. C
32. $x = 60, y = 25$
33. 2.6 cm
34. 3 : 4
35. 3 : 1
36. 2 : 1
37. 1 : 2
38. 4 : 3
39. 2 : 3
40. sides of 2 cm; \angle s of 60° and 120°

Answers for Lesson 7-3, pp. 385–388 Exercises

1. Yes; $\triangle ABC \sim \triangle FED$; SSS \sim Thm.
2. No; more info. is needed.
3. Ex. 1: $\frac{2}{3}$ (for $\triangle ABC$ to $\triangle FED$); Ex. 2: Not possible; the \triangle aren't necessarily similar.
4. yes; $\triangle FHG \sim \triangle KHJ$; AA \sim Post.
5. No; $\frac{6}{3} \neq \frac{10}{4}$.
6. No; $\frac{20}{45} \neq \frac{25}{55}$.
7. Yes; $\triangle APJ \sim \triangle ABC$; SSS \sim Thm. or SAS \sim Thm.
8. Yes; $\triangle NMP \sim \triangle NQR$; SAS \sim Thm.
9. No; $\frac{32}{22} \neq \frac{45}{30}$.
10. AA \sim Post.; 7.5
11. AA \sim Post.; 2.5
12. AA \sim Post.; $12\frac{5}{6}$
13. AA \sim Post.; 12
14. AA \sim Post.; 8
15. AA \sim Post.; 15
16. SAS \sim Thm.; 12 m
17. AA \sim Post.; 220 yd
18. AA \sim Post.; 15 ft 9 in.
19. AA \sim Post.; 90 ft
20. Answers may vary. Sample: She can measure her shadow and use $\sim \triangle$ to find the length of the shadow of the proposed building.
21. 151 m
22. a. trapezoid
b. $\triangle RSZ \sim \triangle TWZ$; AA \sim Post.
23. a. No; the corr. \sphericalangle s may not be \cong .
b. Yes; every isosc. rt. \triangle is a 45° - 45° - 90° \triangle . Therefore, by AA \sim Thm. they are all \sim .
24. Yes; $\triangle GMK \sim \triangle SMP$; SAS \sim Thm.

Answers for Lesson 7-3, pp. 385–388 Exercises (cont.)

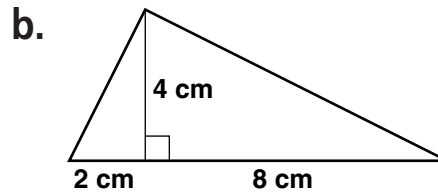
25. Yes; $\triangle AWW \sim \triangle AST$; SAS \sim Thm.
26. Yes; $\triangle XYZ \sim \triangle MNK$; SSS \sim Thm.
27. No; there is only one pair of \cong \sphericalangle s.
28. 45 ft
29. Check students' work.
30. 3 : 2
31. 2 : 1
32. 12 : 7
33. 4 : 3
34. 3 : 1
35. 3 : 2
36. 3 : 2
37. 2 : 1
38. 3 : 1
39. 6 : 1
40. Check students' work. Draw $\triangle ABC$. Construct $\angle A \cong \angle R$. Construct \overline{RS} such that $RS = 3AB$, and \overline{RT} such that $RT = 3AC$. Connect points S and T .
41. 1. $RT \cdot TQ = MT \cdot TS$ (Given)
2. $\frac{MT}{TQ} = \frac{RT}{TS}$ (Prop. of Proportions)
3. $\angle RTM \cong \angle STQ$ (Vert. \sphericalangle s are \cong .)
4. $\triangle RTM \sim \triangle STQ$ (SAS \sim Thm.)
42. 1. $\ell_1 \parallel \ell_2$, $\overline{EF} \perp \overline{AF}$, $\overline{BC} \perp \overline{AF}$ (Given)
2. $\angle EFD$ and $\angle BCA$ are right \sphericalangle s. (Def. of \perp)
3. $\angle EFD \cong \angle BCA$ (All rt. \sphericalangle s are \cong .)
4. $\angle BAC \cong \angle EDF$ (If \parallel lines, then corr. \sphericalangle s are \cong .)
5. $\triangle ABC \sim \triangle DEF$ (AA \sim)
6. $\frac{BC}{AC} = \frac{EF}{DF}$ (Def. of similar)

Answers for Lesson 7-3, pp. 385–388 Exercises (cont.)

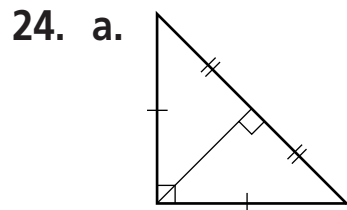
43. 1. $\frac{BC}{AC} = \frac{EF}{DF}$, $\overline{EF} \perp \overline{AF}$, $\overline{BC} \perp \overline{AF}$ (Given)
2. $\angle ACB$ and $\angle DFE$ are rt. \angle s. (Def. of \perp)
3. $\angle ACB \cong \angle DFE$ (All rt. \angle s are \cong .)
4. $\triangle ABC \sim \triangle DEF$ (SAS \sim)
5. $\angle BAC \cong \angle EDF$ (Def. of similar)
6. $\ell_1 \parallel \ell_2$, (If corr. \angle s are \cong , then \parallel lines.)
44. $\triangle ADC \sim \triangle CBD \sim \triangle ABC$; \overline{CD} is an altitude to the hypotenuse of a rt. triangle, $\triangle ABC$. Therefore, it divides $\triangle ABC$ into two triangles ($\triangle ADC$ and $\triangle CBD$) that are similar to each other and to the original triangle.

Answers for Lesson 7-4, pp. 394–396 Exercises

- | | |
|-----------------|-----------------|
| 1. 6 | 2. $2\sqrt{10}$ |
| 3. $4\sqrt{3}$ | 4. 12 |
| 5. $14\sqrt{2}$ | 6. 25 |
| 7. $6\sqrt{6}$ | 8. $3\sqrt{7}$ |
| 9. s | 10. r |
| 11. c | 12. $a; a$ |
| 13. h | 14. b |
| 15. 9 | 16. 20 |
| 17. 10 | 18. $6\sqrt{3}$ |
| 19. 12 | 20. 60 |
| 21. a. 18 mi | |
| b. 24 mi | |
| 22. $KNL; JNK$ | |
| 23. a. 4 cm | |



- c. Answers may vary. Sample: Draw a 10-cm segment. 2 cm from one endpoint, construct a \perp of length 4 cm. Connect to form a \triangle .



- b. They are \cong . Explanations may vary. Sample: The altitude and hyp. segments are \cong sides of two isosc. \triangle .

- | | |
|----------------------|-----------------|
| 25. (10, 6), (-2, 6) | 26. $4\sqrt{3}$ |
| 27. 14 | 28. 2 |

Answers for Lesson 7-4, pp. 394–396 Exercises (cont.)

29. $\sqrt{14}$

30. 1

31. 2.5

32. $10\sqrt{10}$

33. 121

34. $x = 12; y = 3\sqrt{7};$
 $z = 4\sqrt{7}$

35. $x = 12\sqrt{5}; y = 12;$
 $z = 6\sqrt{5}$

36. $x = 4; y = 2\sqrt{13};$
 $z = 3\sqrt{13}$

37. $12\sqrt{2}$

38. C

39. $\ell_1 = \sqrt{2}, \ell_2 = \sqrt{2}, a = 1, h_2 = 1$

40. $\ell_1 = 2\sqrt{13}, \ell_2 = 3\sqrt{13}, h = 13, a = 6$

41. $\ell_1 = \ell_2 = 6\sqrt{2}, h = 12, h_2 = 6$

42. $\ell_2 = 2\sqrt{3}, h = 4, a = \sqrt{3}, h_1 = 1$

43. $\ell_1 = 5, a = \frac{60}{13}, h_1 = \frac{25}{13}, h_2 = \frac{144}{13}$

44. $\ell_2 = \frac{4\sqrt{7}}{3}, h = \frac{16}{3}, a = \sqrt{7}, h_2 = \frac{7}{3}$

45. $\ell_1 = 8\sqrt{5}, \ell_2 = 4\sqrt{5}, h_1 = 4, h_2 = 20$

46. $\ell_1 = 6, h = 12, a = 3\sqrt{3}, h_2 = 9$

47. C is equidistant from A and B so C is on the \perp bisector of \overline{AB} (\perp Bis. Thm.) which thus must be \overline{CM} , the altitude to the hypotenuse. Since M is the midpoint of \overline{AB} , $AM = \frac{1}{2}AB$. Also, by Corollary 2 to Thm. 7-3, x is the geometric mean of AM and AB , so $\frac{\frac{1}{2}AB}{x} = \frac{AM}{x} = \frac{x}{AB}$. By the Cross-Product Property, $\frac{1}{2}AB^2 = x^2$, so $AB = x\sqrt{2}$.

Answers for Lesson 7-4, pp. 394–396 Exercises (cont.)

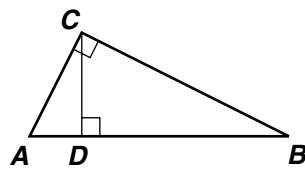
48. As in Exercise 47, the altitude to the hypotenuse \overline{CM} is the \perp bisector of \overline{AB} . Thus $AM = 10$ and $AB = 20 = BC = CA$. By Corollary 1 to Thm. 7-3, BC is the geometric mean of MB and BD , so $\frac{MB}{BC} = \frac{BC}{BD} = \frac{BC}{MB + MD}$. Substitute in the values for BC and MB and solve for MD . By the Cross-Product Property, $10(10 + MD) = 20^2$, so $MD = 30$. By Corollary 1 to Thm. 7-3, h is the geometric mean of MB and MD , so $\frac{MB}{h} = \frac{h}{MD}$, $h^2 = 300$, and $h = 3\sqrt{10}$.

49. 3

50. 4

51. 4.5

52. a.



Given: rt. $\triangle ABC$ with alt. \overline{CD} ;
Prove: $AC \cdot BC = AB \cdot CD$

b. Yes; $AC \cdot BC = 2 \times \text{area } \triangle ABC$ and $AB \cdot CD = 2 \times \text{area } \triangle ABC$.

53. a. By Corollary 2 to Thm. 7-3, $\frac{c}{a} = \frac{a}{r}$ and $\frac{c}{b} = \frac{b}{q}$. Combined with $c = q + r$, the resulting system can be reduced to $c^2 = a^2 + b^2$.

b. The square of the hypotenuse of a right triangle is equal to the sum of the squares of the legs of the triangle.

54. As in Exercise 47, the altitude to the hypotenuse \overline{CM} is the \perp bisector of \overline{AB} . Thus, $AM = MB = x$ and $AB = 2x = BC = CA$. By Corollary 1 to Thm. 7-3, BC is the geometric mean of MB and BD , so $\frac{x}{2x} = \frac{2x}{BD} = \frac{2x}{x + MD}$. By the Cross-Product Property, $x(x + MD) = 4x^2$, so $MD = 3x$. By Corollary 1 to Thm. 7-3, h is the geometric mean of MB and MD , so $\frac{x}{h} = \frac{h}{3x}$, $h^2 = 3x^2$, and $h = 3\sqrt{x}$.

Answers for Lesson 7-5, pp. 400–404 Exercises

1. 7.5
2. 8
3. 5.2
4. d
5. c
6. b
7. d
8. 7.5
9. $3\frac{1}{3}$
10. 9.6
11. 6
12. 4.8
13. 35
14. 3.6
15. $\frac{40}{7}$
16. 12
17. KS
18. SQ
19. JP
20. KP
21. KM
22. PM
23. JP
24. LW
25. 559 ft
26. 671 ft
27. 2.4 cm and 2.6 cm; 3.3 cm and 8.7 cm; 3.8 cm and 9.2 cm
28. Answers may vary. Sample: 9 cm and 13.5 cm
29. $x = 18$ m; $y = 12$ m

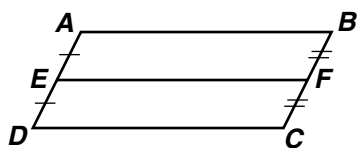
30. a.  b. isosceles; \triangle - \angle Bisector Thm.

31. 20
32. 2.5
33. $\frac{2}{7}, 3$

Answers for Lesson 7-5, pp. 400–404 Exercises (cont.)

45. a. A midsegment of a \square connects the midpts. of 2 opp. sides.

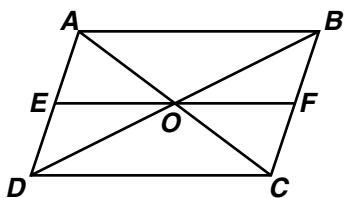
b.



Given: $\square ABCD$ with \overline{EF} connecting the midpts. of \overline{AD} and \overline{BC} Prove: $\overline{AB} \parallel \overline{EF}$; $\overline{EF} \parallel \overline{CD}$

1. $\square ABCD$ (Given)
2. $\overline{AE} \parallel \overline{BF}$ and $\overline{ED} \parallel \overline{FC}$ (Def. of \square)
3. $\overline{AD} \cong \overline{BC}$ (Opp. sides of \square are \cong .)
4. E and F are midpts. of \overline{AD} and \overline{BC} . (Given)
5. $AE = ED = \frac{1}{2}AD$; $BF = FC = \frac{1}{2}BC$ (Def. of midpt.)
6. $AE = BF$, $ED = FC$ (Subst.)
7. $ABFE$ and $EFCD$ are \square (If one pair of opp. sides of a quad. is \cong and \parallel , it is a \square .)
8. $\overline{AB} \parallel \overline{EF}$ and $\overline{EF} \parallel \overline{CD}$ (Opp. sides of a \square are \parallel .)

c.



Given: $\square ABCD$ with midsegment \overline{EF} Prove: \overline{EF} bisects \overline{AC} and \overline{BD} .
 Since $\overline{AB} \parallel \overline{EF} \parallel \overline{DC}$ by part (b), and \overline{EF} bisects \overline{AD} , by the Side-Splitter Thm., \overline{EF} bisects \overline{AC} and \overline{BD} .

Answers for Lesson 7-5, pp. 400–404 Exercises (cont.)

46. If a ray passes through the vertex of an angle of a triangle and splits the opposite side into segments that are proportional to the other two sides of the triangle, then the ray bisects the angle. Explanations may vary. Sample: Refer to diagram in proof of Theorem 7-5, p. 400. It is given that $\frac{CD}{DB} = \frac{CA}{BA}$, and by the Side-Splitter Thm., $\frac{CD}{DB} = \frac{CA}{AF}$, so $BA = AF$. $\triangle ABF$ is isosceles by the Isos. Triangle Thm., so $\angle 3 \cong \angle 4$. $\angle 2 \cong \angle 4$ by the Alt. Int. Angles Thm., and $\angle 1 \cong \angle 3$ by the Corr. Angles Thm., so by substitution, $\angle 1 \cong \angle 2$, and therefore \overline{AD} bisects $\angle CAB$.
47. a. 14
b. 11