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

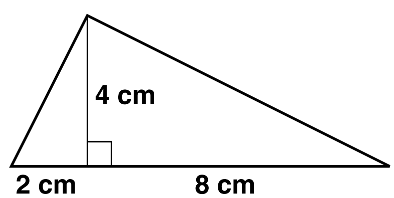
21. **a.** 18 mi

b. 24 mi

22. KNL; JNK

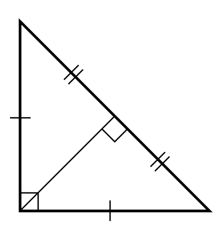
23. **a.** 4 cm

b.



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

24. **a.**



b. They are =. Explanations may vary. Sample: The altitude and hyp. segments are ≅ sides of two isosc. △s.

25. $(10, 6), (-2, 6)$

26. $4\sqrt{3}$

27. 14

28. 2

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

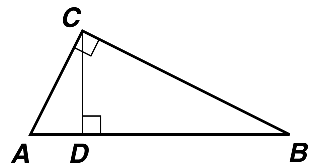
46. $\ell_1 = 6, h = 12, a = 3\sqrt{3}, h_2 = 9$

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 $AB = x\sqrt{2}$.

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; $AC \cdot BC = 2 \times$ area $\triangle ABC$ and $AB \cdot CD = 2 \times$ 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 $h = 3\sqrt{x}$.