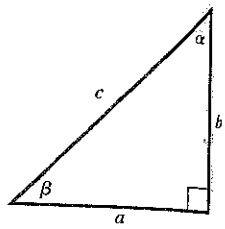
SECTION 1.5 EXERCISES

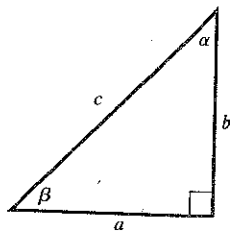
SKILLS

In Exercises 1–20, refer to the right triangle diagram and the given information to find the indicated measure. Write your answers for angle measures in decimal degrees.



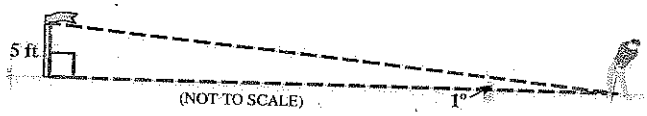
1. $\beta = 35°$, $c = 17$ in.; find a.
2. $\beta = 35°$, $c = 17$ in.; find b.
3. $\alpha = 55°$, $c = 22$ ft; find a.
4. $\alpha = 55°$, $c = 22$ ft; find b.
5. $\alpha = 20.5°$, $b = 14.7$ mi; find a.
6. $\beta = 69.3°$, $a = 0.752$ mi; find b.
7. $\beta = 25°$, $a = 11$ km; find c.
8. $\beta = 75°$, $b = 26$ km; find c.
9. $\alpha = 48.25°$, $a = 15.37$ cm; find c.
10. $\alpha = 29.80°$, $b = 16.79$ cm; find c.
11. $a = 29$ mm, $c = 38$ mm; find α.
12. $a = 89$ mm, $c = 99$ mm; find β.
13. $b = 2.3$ m, $c = 4.9$ m; find α.
14. $b = 7.8$ m, $c = 13$ m; find β
15. $\alpha = 21°17'$, $b = 210.8$ yd; find a.
16. $\beta = 27°21'$, $a = 117.0$ yd; find b.
17. $\beta = 15°20'$, $a = 10.2$ km; find c.
18. $\beta = 65°30'$, $b = 18.6$ km; find c.
19. $\alpha = 40°28'10''$, $a = 12{,}522$ km; find c.
20. $\alpha = 28°32'50''$, $b = 17{,}986$ km; find c.

In Exercises 21–38, refer to the right triangle diagram and the given information to solve the right triangle. Write your answers for angle measures in decimal degrees.



21. $\alpha = 32°$ and $c = 12$ ft
22. $\alpha = 65°$ and $c = 37$ ft
23. $\alpha = 44°$ and $b = 2.6$ cm
24. $\alpha = 12.0°$ and $b = 10.0$ m
25. $\alpha = 60°$ and $c = 5$ in.
26. $\alpha = 9.67°$ and $c = 5.38$ in.
27. $\beta = 72°$ and $c = 9.7$ mm
28. $\beta = 45°$ and $c = 7.8$ mm
29. $\alpha = 54.2°$ and $a = 111$ mi
30. $\beta = 47.2°$ and $a = 9.75$ mi
31. $\beta = 45°$, $b = 10.2$ km
32. $\beta = 85.5°$, $b = 14.3$ ft
33. $\alpha = 28°23'$ and $b = 1734$ ft
34. $\alpha = 72°59'$ and $a = 2175$ ft
35. $a = 42.5$ ft and $b = 28.7$ ft
36. $a = 19.8$ ft and $c = 48.7$ ft
37. $a = 35{,}236$ km and $c = 42{,}766$ km
38. $b = 0.1245$ mm and $c = 0.8763$ mm

APPLICATIONS



39. Golf. If the flagpole that a golfer aims at on a green measures 5 feet from the ground to the top of the flag and a golfer measures a 1° angle from top to bottom of the pole, how far (in horizontal distance) is the golfer from the flag? Round to the nearest foot.

40. Golf. If the flagpole that a golfer aims at on a green measures 5 feet from the ground to the top of the flag and a golfer measures a 3° angle from top to bottom of the pole, how far (in horizontal distance) is the golfer from the flag? Round to the nearest foot.

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42. Midair Re
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46. Glide Pat
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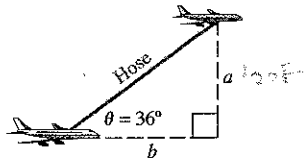
Exercises 41 and 42 illustrate a mid-air refueling scenario which military aircraft often enact. Assume the elevation angle that the hose makes with the plane being fueled is $\theta = 36°$.

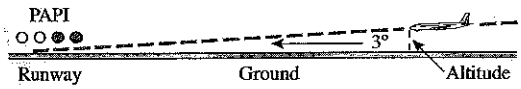


41. Midair Refueling. If the hose is 150 feet long, what should be the altitude difference a between the two planes? Round to the nearest foot.

42. Midair Refueling. If the smallest acceptable altitude difference a between the two planes is 100 feet, how long should the hose be? Round to the nearest foot.

Exercises 43–46 are based on the idea of a glide slope (the angle the flight path makes with the ground).

Precision Approach Path Indicator (PAPI) lights are used as a visual approach slope aid for pilots landing aircraft. Typical glide path for commercial jet airliners is 3°. The space shuttle has an outer glide approach of 18°–20°. PAPI lights are typically configured as a row of four lights. All four lights are on, but in different combinations of red or white. If all four lights are white, then the angle of descent is too high, if all four lights are red, then the angle of descent is too low, and if there are two white and two red, then the approach is perfect.



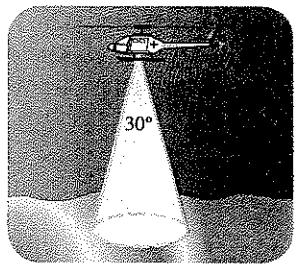
43. Glide Path of a Commercial Jet Airliner. If a commercial jetliner is 5000 feet (about 1 mile ground distance) from the runway, what should be the altitude of the plane to achieve 2 red/2 white PAPI lights? (Assume that this corresponds to a 3° glide path.)

44. Glide Path of a Commercial Jet Airliner. If a commercial jetliner is at an altitude of 450 feet when it is 5200 feet from the runway (approximately 1 mile ground distance), what is the glide slope angle? Will the pilot see white lights, red lights, or both?

45. Glide Path of the Space Shuttle Orbiter. If the pilot of the space shuttle orbiter is at an altitude of 3000 feet when she is 15,500 ft (approximately 3 miles ground distance) from the shuttle landing facility, what is her glide slope angle (round to the nearest degree)? Is she too high or too low?

46. Glide Path of the Space Shuttle Orbiter. If the same pilot in Exercise 45 raises the nose of the gliding shuttle so that she drops only 500 feet by the time she is 7800 feet from the shuttle landing strip (ground distance), what is her glide angle at that time (round to the nearest degree)? Is she within the specs (18°−20°) to land the shuttle?

In Exercises 47 and 48, refer to the illustration below which shows a search and rescue helicopter with a 30° field of view with a search light.

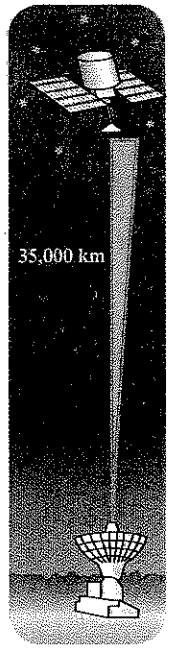


47. Search and Rescue. If the search and rescue helicopter is flying at an altitude of 150 feet above sea level, what is the diameter of the circle illuminated on the surface of the water?

48. Search and Rescue. If the search and rescue helicopter is flying at an altitude of 500 feet above sea level, what is the diameter of the circle illuminated on the surface of the water?

For Exercises 49–52, refer to the following:

Geostationary orbits are useful because they cause a satellite to appear stationary with respect to a fixed point on the rotating Earth. As a result, an antenna (dish TV) can point in a fixed direction and maintain a link with the satellite. The satellite orbits in the direction of the Earth's rotation at an altitude of approximately 35,000 kilometers.



49. Dish TV. If your dish TV antenna has a pointing error of 1″ (one second), how long would the satellite have to be to maintain a link? Round your answer to the nearest meter.

50. Dish TV. If your dish TV antenna has a pointing error of $\frac{1}{2}$″ (half a second), how long would the satellite have to be to maintain a link? Round your answer to the nearest meter.

51. Dish TV. If the satellite in a geostationary orbit (at 35,000 km) was only 10 meters long, about how accurately pointed would the dish have to be? Give the answer in degrees to two significant digits.

52. Dish TV. If the satellite in a geostationary orbit (at 35,000 km) was only 30 meters long, about how accurately pointed would the dish have to be? Give the answer in degrees to two significant digits.