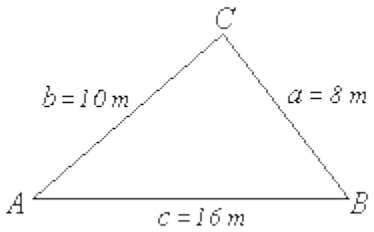
Review Exercise Set 15

Exercise 1: Solve the given triangle. Round measurements to the nearest tenth.



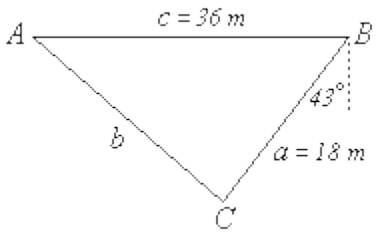
Exercise 2: Solve the triangle with the given conditions. Round measurements to the nearest tenth.

a = 12 in; b = 18 in; C = 114°

Exercise 3: Use Heron's formula to find the area of a triangle with the given sides. Round to the nearest square meter.

a = 10 m; b = 12 m; c = 16 m

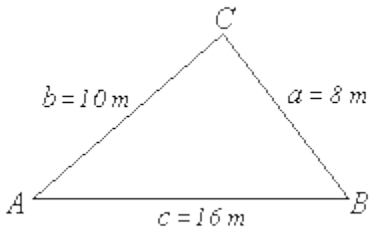
Exercise 4: Find b to the nearest tenth.



Exercise 5: Three circles with radii of 4 in, 9 in, and 12 in are arranged so that they touch each other. Line segments from the centers of each circle are connected to form a triangle. Use the radii of the circles to find the angles of the triangle. Round measurements to the nearest degree.

Review Exercise Set 15 Answer Key

Exercise 1: Solve the given triangle. Round measurements to the nearest tenth.



Find angle A

$$a^2 = b^2 + c^2 - 2bc\cos A$$
$$8^2 = 10^2 + 16^2 - 2(10)(16)\cos A$$
$$64 = 100 + 256 - 320\cos A$$
$$64 - 356 = -320\cos A$$
$$-292 = -320\cos A$$
$$\cos A = \frac{-292}{-320}$$
$$\cos A = 0.9125$$
$$A \approx 24.1°$$

Find angle B

$$b^2 = a^2 + c^2 - 2ac\cos B$$
$$10^2 = 8^2 + 16^2 - 2(8)(16)\cos B$$
$$100 = 64 + 256 - 256\cos B$$
$$100 - 320 = -256\cos B$$
$$-220 = -256\cos B$$
$$\cos B = \frac{-220}{-256}$$
$$\cos B = 0.859375$$
$$B \approx 30.8°$$

Find angle C

A + B + C = 180°
24.1° + 30.8° + C = 180°
C ≈ 180° - 54.9°
C ≈ 125.1°

Exercise 2: Solve the triangle with the given conditions. Round measurements to the nearest tenth.

a = 12 in; b = 18 in; C = 114°

Find c

$$c^2 = a^2 + b^2 - 2ab\cos C$$
$$c^2 = 12^2 + 18^2 - 2(12)(18)\cos 114°$$
$$c^2 = 468 - 432\cos 114°$$
$$c = \sqrt{468 - 432\cos 114°}$$
$$\approx 25.4\ in$$

Find angle A

$$\frac{\sin A}{a} = \frac{\sin C}{c}$$
$$\frac{\sin A}{12} \approx \frac{\sin 114°}{25.4}$$
$$\sin A \approx \frac{12\sin 114°}{25.4}$$
$$\sin A \approx 0.4316$$
$$A \approx 25.6°$$

Find angle B

A + B + C = 180°
25.6° + B + 114° ≈ 180°
B ≈ 180° - 139.6°
B ≈ 40.4°

Exercise 3: Use Heron's formula to find the area of a triangle with the given sides. Round to the nearest square meter.

a = 10 m; b = 12 m; c = 16 m

Find s

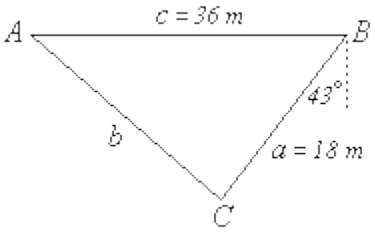
$$s = \frac{1}{2}(a + b + c)$$
$$= \frac{1}{2}(10 + 12 + 16)$$
$$= \frac{1}{2}(38)$$
$$= 19\ m$$

Exercise 3 (Continued):

Find Area

$$\begin{aligned} Area &= \sqrt{s(s-a)(s-b)(s-c)} \\ &= \sqrt{19(19-10)(19-12)(19-16)} \\ &= \sqrt{19(9)(7)(3)} \\ &= \sqrt{3591} \\ &\approx 60\ m^2 \end{aligned}$$

Exercise 4: Find b to the nearest tenth.



Find B

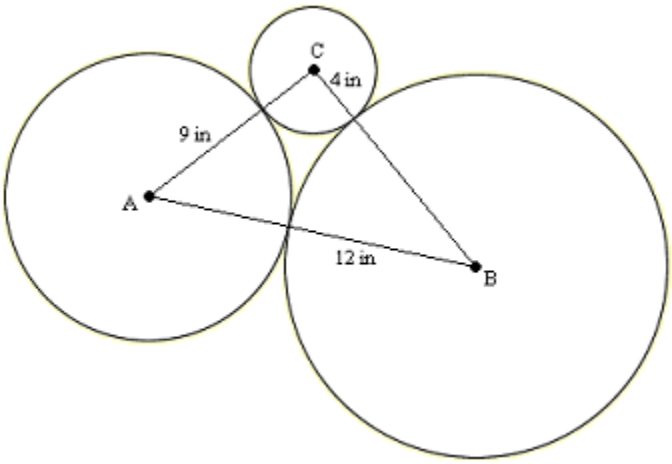
$$\begin{aligned} B &= 90° - 43° \\ &= 47° \end{aligned}$$

Find b

$$\begin{aligned} b^2 &= a^2 + c^2 - 2ac\cos B \\ &= 18^2 + 36^2 - 2(18)(36)\cos 47° \\ &= 324 + 1296 - 1296\cos 47° \\ &= 1620 - 1296\cos 47° \\ b &= \sqrt{1620 - 1296\cos 47°} \\ &\approx 27.1\,m \end{aligned}$$

Exercise 5: Three circles with radii of 4 in, 9 in, and 12 in are arranged so that they touch each other. Line segments from the centers of each circle are connected to form a triangle. Use the radii of the circles to find the angles of the triangle. Round measurements to the nearest degree.

Draw diagram of problem



Find the values of the sides of the triangle

The lengths of the sides of the triangle will be equal to the sum of the radii for the two circles whose centers are connected by the side.

a = 4 in + 12 in
a = 16 in

b = 4 in + 9 in
b = 13 in

c = 9 in + 12 in
c = 21 in

Find one of the angles (A, B or C)

$$a^2 = b^2 + c^2 - 2bc\cos A$$
$$16^2 = 13^2 + 21^2 - 2(13)(21)\cos A$$
$$256 = 169 + 441 - 546\cos A$$
$$-354 = -546\cos A$$
$$\frac{-354}{-546} = \cos A$$
$$\cos A \approx 0.64835$$
$$A \approx 50°$$

Exercise 5 (Continued):

Find angle B or C

$$\frac{\sin B}{b} = \frac{\sin A}{a}$$
$$\frac{\sin B}{13} = \frac{\sin 50^\circ}{16}$$
$$\sin B = \frac{13 \sin 50^\circ}{16}$$
$$\sin B \approx 0.62241$$
$$B \approx 38^\circ$$

Find angle C

$$A + B + C = 180^\circ$$
$$50^\circ + 38^\circ + C \approx 180^\circ$$
$$C \approx 92^\circ$$