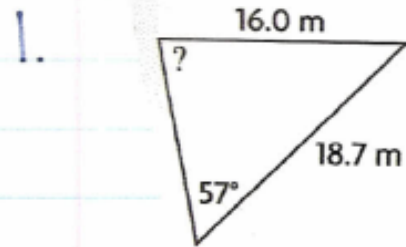


SOLUTIONS ⇒ CHAPTER 3 - CHAPTER TEST

Determine the measure of the indicated angle, to the nearest degree.



A. 59°

B. 46°

C. 44°

D. 79°

$$\frac{\sin \theta}{18.7} = \frac{\sin 57^\circ}{16.0}$$

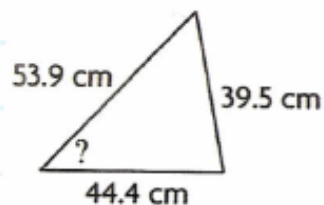
$$\frac{16.0 \sin \theta}{16.0} = \frac{18.7 \sin 57^\circ}{16.0}$$

$$\sin \theta = 0.9802$$

$$\theta = \sin^{-1} 0.9802$$

$$\theta = 79^\circ$$

2.

A. 54° C. 80° B. 46° D. 41°

$$\cos \theta = \frac{(53.9)^2 + (44.4)^2 - (39.5)^2}{2(53.9)(44.4)}$$

$$\cos \theta = \frac{2905.21 + 1971.36 - 1560.25}{4786.32}$$

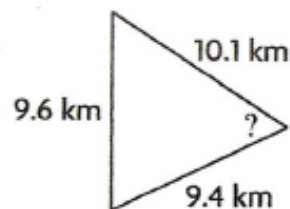
$$\cos \theta = \frac{3316.32}{4786.32}$$

$$\cos \theta = 0.6929$$

$$\theta = \cos^{-1}(0.6929)$$

$$\theta = 46^\circ$$

3.

A. 31° C. 59° B. 64° D. 22°

$$\cos \theta = \frac{(10.1)^2 + (9.4)^2 - (9.6)^2}{2(10.1)(9.4)}$$

$$\cos \theta = \frac{102.01 + 88.36 - 92.16}{189.88}$$

$$\cos \theta = \frac{98.21}{189.88}$$

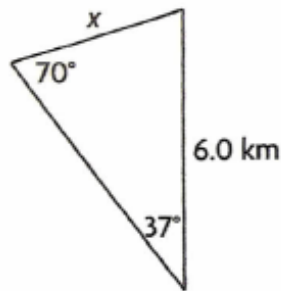
$$\cos \theta = 0.5172$$

$$\theta = \cos^{-1}(0.5172)$$

$$\theta = 59^\circ$$

Determine the indicated side length, to the nearest tenth of a unit.

4.



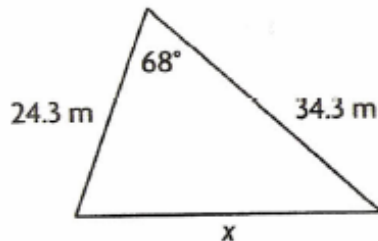
- A. 3.8 km C. 4.6 km
B. 4.2 km D. 5.0 km

$$\frac{x}{\sin 37^\circ} = \frac{6.0}{\sin 70^\circ}$$

$$x \sin 70^\circ = \frac{6.0 \sin 37^\circ}{\sin 70^\circ}$$

$$x = 3.8 \text{ km}$$

5.



- A. 27.2 m C. 22.2 m
B. 33.8 m D. 38.3 m

$$x^2 = (24.3)^2 + (34.3)^2 - 2(24.3)(34.3)\cos 68^\circ$$

$$x^2 = 590.49 + 1176.49 - 1666.98(0.3746)$$

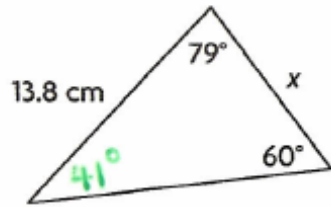
$$x^2 = 1766.98 - 624.4507$$

$$x^2 = 1142.5293$$

$$x = \sqrt{1142.5293}$$

$$x = 33.8 \text{ m}$$

6.



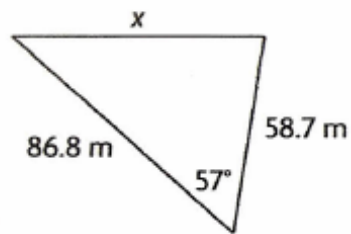
- A. 15.6 cm C. 12.2 cm
 B. 7.8 cm **D. 10.5 cm**

$$\frac{x}{\sin 60^\circ} = \frac{13.8}{\sin 41^\circ}$$

$$x \sin 60^\circ = 13.8 \sin 41^\circ$$

$$x = 10.5 \text{ cm}$$

7.



- A. 102.2 m C. 90.4 m
 B. 85.5 m **D. 73.7 m**

$$x^2 = (58.7)^2 + (86.8)^2 - 2(58.7)(86.8)\cos 57^\circ$$

$$x^2 = 3445.69 + 7534.24 - 10190.32(0.5446)$$

$$x^2 = 10979.93 - 5549.6483$$

$$x^2 = 5430.2817$$

$$x = \sqrt{5430.2817}$$

$$x = 73.7 \text{ m}$$

8. Determine the indicated side length, to the nearest tenth of a unit, or angle measure, to the nearest degree.

a) In $\triangle ABC$, $b=14.0\text{m}$, $c=9.3\text{m}$, and $\angle A=66^\circ$.

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$a^2 = (14.0)^2 + (9.3)^2 - 2(14.0)(9.3) \cos 66^\circ$$

$$a^2 = 196 + 86.49 - 260.4(0.4067)$$

$$a^2 = 282.49 - 105.9047$$

$$a^2 = 176.5853$$

$$a = \sqrt{176.5853}$$

$$a = 13.3 \text{ m}$$

Therefore, $a = 13.3\text{m}$.

b) In $\triangle VWX$, $v = 60\text{ cm}$, $x = 85\text{ cm}$, and $\angle W = 20^\circ$.

$$w^2 = v^2 + x^2 - 2vx \cos W$$

$$w^2 = (60)^2 + (85)^2 - 2(60)(85)\cos 20^\circ$$

$$w^2 = 3600 + 7225 - 10200(0.9397)$$

$$w^2 = 10825 - 9584.94$$

$$w^2 = 1240.06$$

$$w = \sqrt{1240.06}$$

$$w = 35.2\text{ cm}$$

Therefore, $w = 35.2\text{ cm}$.

c) In $\triangle DEF$, $d = 42.2$ cm, $e = 47.8$ cm, and $f = 50.1$ cm.

$$\cos D = \frac{e^2 + f^2 - d^2}{2ef}$$

$$\cos D = \frac{(47.8)^2 + (50.1)^2 - (42.2)^2}{2(47.8)(50.1)}$$

$$\cos D = \frac{2284.84 + 2510.01 - 1780.84}{4789.56}$$

$$\cos D = \frac{3014.01}{4789.56}$$

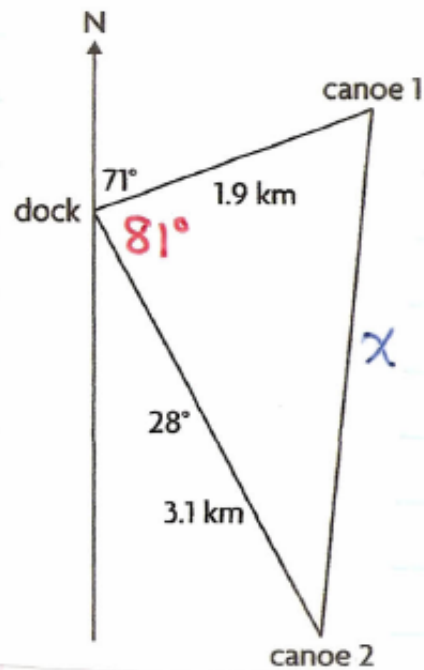
$$\cos D = 0.6293$$

$$D = \cos^{-1}(0.6293)$$

$$D = 51^\circ$$

Therefore, $\angle D = 51^\circ$.

9. A canoe leaves a dock on Lake Claire and heads in a direction $N71^\circ E$ for 1.9 km. At the same time, a second canoe travels in a direction $S28^\circ E$ from the dock for 3.1 km.



$$180^\circ - 71^\circ - 28^\circ = 81^\circ$$

$$x^2 = (1.9)^2 + (3.1)^2 - 2(1.9)(3.1)\cos 81^\circ$$

$$x^2 = 3.61 + 9.61 - 11.78(0.1564)$$

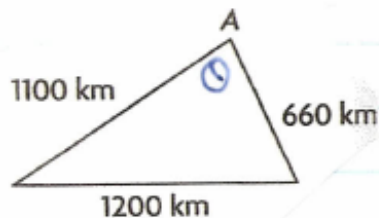
$$x^2 = 13.22 - 1.8424$$

$$x^2 = 11.3776$$

$$x = 3.4 \text{ km}$$

The distance between the canoes is 3.4 km, to the nearest tenth of a kilometer.

13. Two airplanes leave Hay River airport at the same time. One flies at 550 km/h. The other flies at 330 km/h. About 2 h later, they are 1200 km apart. Determine the angle between their paths, to the nearest degree.



$$\cos \theta = \frac{(1100)^2 + (660)^2 - (1200)^2}{2(1100)(660)}$$

$$\cos \theta = \frac{1210000 + 435600 - 1440000}{1452000}$$

$$\cos \theta = \frac{205600}{1452000}$$

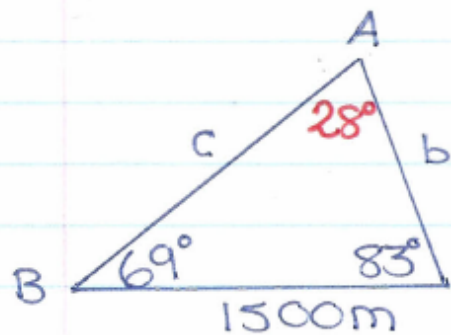
$$\cos \theta = 0.1416$$

$$\theta = \cos^{-1}(0.1416)$$

$$\theta = 82^\circ$$

14. An airplane is spotted by two observers on opposite sides of it. One the ground, the observers are 1500m apart. One observer's line of sight to the airplane makes an 83° angle with the ground. The other's line of sight makes a 69° angle with the ground. Determine the distance from each observer to the airplane.

$$180^\circ - 69^\circ - 83^\circ = 28^\circ$$



$$\frac{b}{\sin 69^\circ} = \frac{1500}{\sin 28^\circ}$$

$$\frac{c}{\sin 83^\circ} = \frac{1500}{\sin 28^\circ}$$

$$c \frac{\sin 28^\circ}{\sin 28^\circ} = \frac{1500 \sin 69^\circ}{\sin 28^\circ} \quad c \frac{\sin 28^\circ}{\sin 28^\circ} = \frac{1500 \sin 83^\circ}{\sin 28^\circ}$$

$$b = 2983 \text{ m}$$

$$c = 3171 \text{ m}$$

One observer was 2983m from the airplane, while the other observer was 3171m away.