

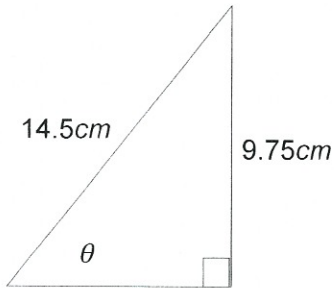
TRIGONOMETRY ASSIGNMENT

Note: Diagrams are NOT to scale and all solutions must be rounded correctly according to the question's instructions.

1. Determine  $x$  to nearest unit and angle  $\theta$  to the nearest degree.

(18)

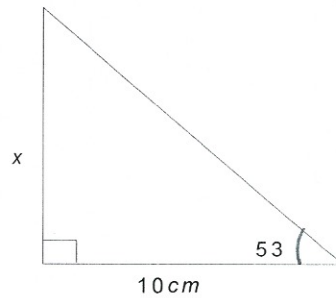
a)



$$\sin \theta = \frac{9.75}{14.5}$$

$$\angle \theta = 42^\circ$$

b)

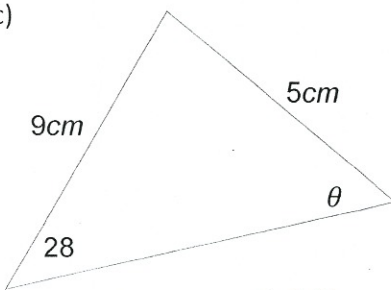


$$\tan 53^\circ = \frac{x}{10}$$

$$x = 10 \tan 53^\circ$$

$$x = 13 \text{ cm}$$

c)

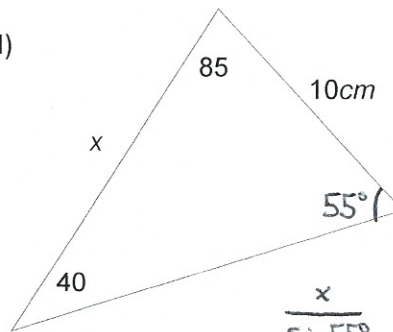


$$\frac{\sin \theta}{9} = \frac{\sin 28^\circ}{5}$$

$$\sin \theta = \frac{9 \sin 28^\circ}{5}$$

$$\angle \theta = 58^\circ$$

d)

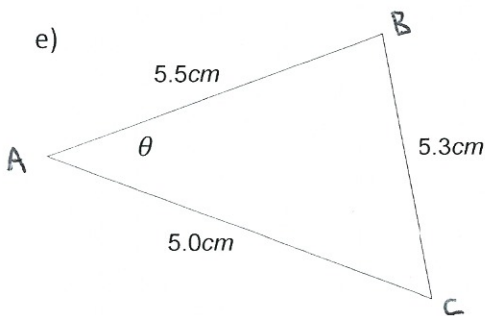


$$\frac{x}{\sin 55^\circ} = \frac{10}{\sin 40^\circ}$$

$$x = \frac{10 \sin 55^\circ}{\sin 40^\circ}$$

$$x = 13$$

e)

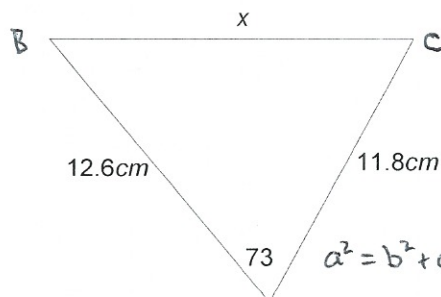


$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

$$= \frac{5^2 + 5.5^2 - 5.3^2}{2(5)(5.5)} = \frac{27.16}{55}$$

$$\angle A = 60^\circ$$

f)



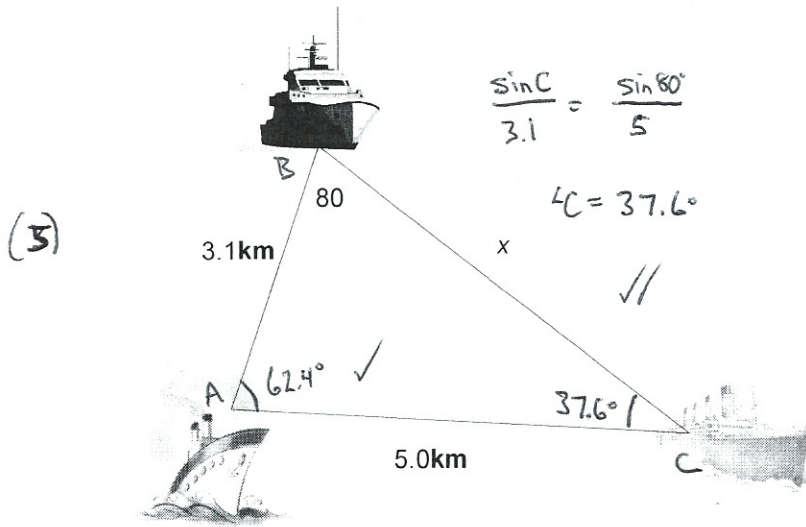
$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$A = 11.8^2 + 12.6^2 - 2(11.8)(12.6) \cos 73^\circ$$

$$= 211.06$$

$$\therefore a = 14 \text{ or } 15$$

2. A coast guard boat is tracking two ships using radar. At noon, the ships are 5.0 km apart and the angle between them is  $80^\circ$ . The closest ship is 3.1 km from the coast guard boat. How far, to the nearest tenth of kilometre, is the other ship from the coast guard boat?



$$\frac{\sin C}{3.1} = \frac{\sin 80^\circ}{5}$$

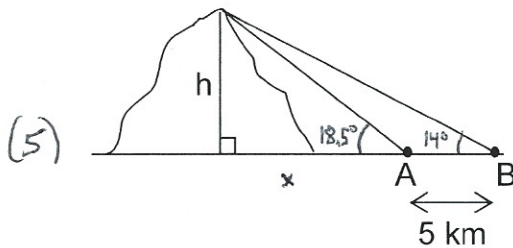
$$\angle C = 37.6^\circ$$

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

$$= 5^2 + 3.1^2 - 2(5)(3.1) \cos 62.4^\circ$$

$$a = 4.5 \text{ km}$$

3. John climbs a mountain and would like to determine its height. The angle of elevation from town A to the top of the mountain is  $18.5^\circ$ , and from town B is  $14^\circ$ . If towns A and B are in a straight line with the base of the mountain, and are 5 km apart, find the height of the mountain.



$$\tan 18.5^\circ = \frac{h}{x}$$

$$\tan 14^\circ = \frac{h}{x+5}$$

$$h = x \tan 18.5^\circ$$

$$h = (x+5) \tan 14^\circ$$

$$x \tan 18.5^\circ = x \tan 14^\circ + 5 \tan 14^\circ$$

$$h = 14.6 \tan 18.5^\circ$$

$$x(\tan 18.5^\circ - \tan 14^\circ) = 5 \tan 14^\circ$$

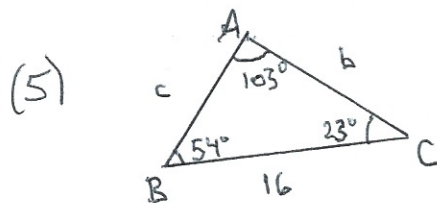
$$x = \frac{5 \tan 14^\circ}{(\tan 18.5^\circ - \tan 14^\circ)}$$

$$\boxed{h = 4.9 \text{ km}}$$

$$x = 14.6$$

4. Solve the following triangle, round each length to the nearest tenth and each angle to the nearest degree.

$\triangle ABC$ , where  $\angle C = 23^\circ$ ,  $\angle B = 54^\circ$ , and  $a = 16$



$$\angle A = 180^\circ - 54^\circ - 23^\circ$$

$$= 103^\circ$$

$$\frac{b}{\sin 54^\circ} = \frac{16}{\sin 103^\circ}$$

$$b = \frac{16 \sin 54^\circ}{\sin 103^\circ}$$

$$\therefore b = 13.3$$

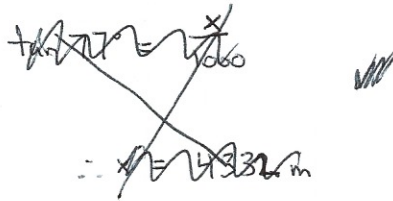
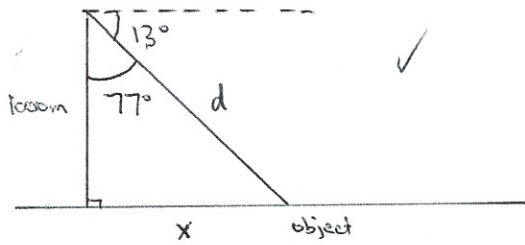
$$\frac{c}{\sin 23^\circ} = \frac{16}{\sin 103^\circ}$$

$$c = \frac{16 \sin 23^\circ}{\sin 103^\circ}$$

$$c = 6.4$$

5. An observer in a search and rescue aircraft observes an object on the water at an angle of depression of  $13^\circ$ . If the aircraft is flying at a height of 1000 m, determine the distance to the sighted object from the airplane to the nearest metre. (Hint: Draw a diagram)

(3)

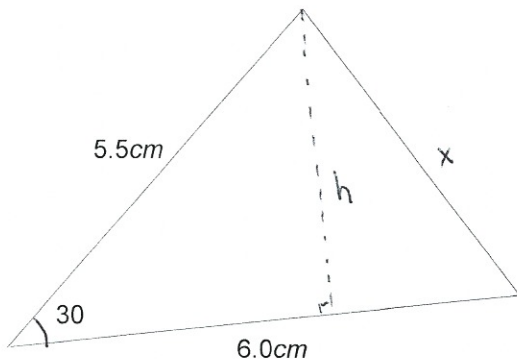


$$\cos 77^\circ = \frac{1000}{d}$$

$$d = 4445 \text{ m}$$

6. Calculate the area and perimeter of the following triangle.

(5)



$$\sin 30^\circ = \frac{h}{5.5}$$

$$h = 5.5 \sin 30^\circ$$

$$h = 2.75$$

$$A = \frac{1}{2} b h$$

$$= \frac{1}{2} (6.0 \text{ cm})(2.75 \text{ cm})$$

$$\therefore A = 8.25 \text{ cm}^2$$

$$x^2 = 5.5^2 + 6.0^2 - 2(5.5)(6.0) \cos 30^\circ$$

$$= 66.25 - 57.1576$$

$$x = 3.0$$

$$P = 5.5 + 6.0 + 3.0$$

$$\therefore P = 14.5 \text{ cm}$$