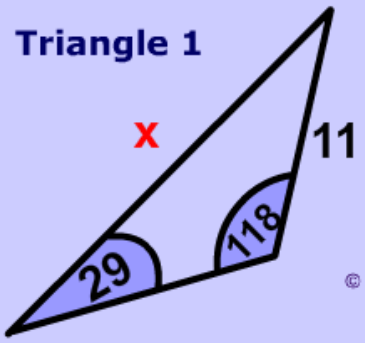
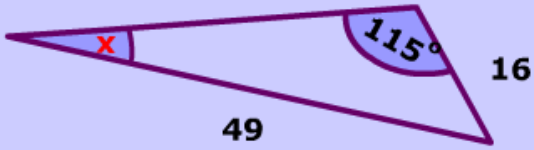
Look at each triangle below and, based on the given information, decide whether you could use the Law of Sines, the **Law of Cosines** (or neither)

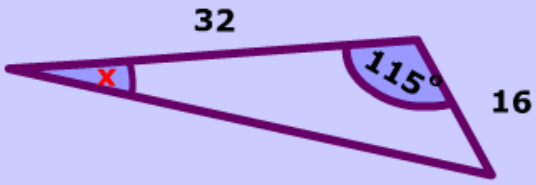
Triangle 1



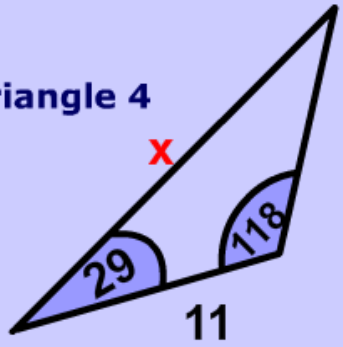
Triangle 2

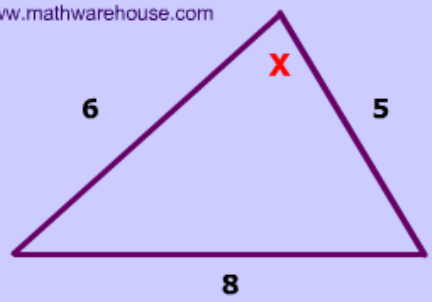


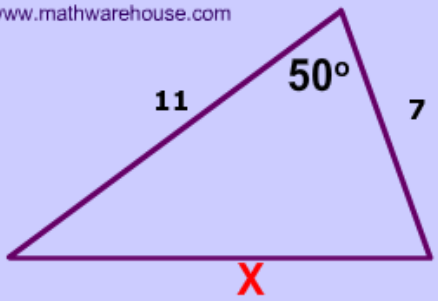
Triangle 3

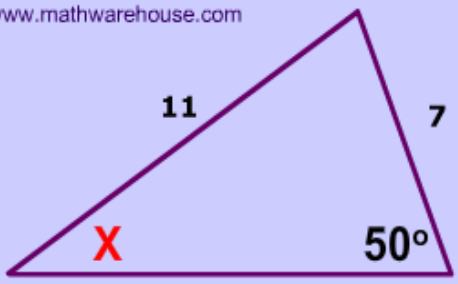


Triangle 4









Chapter 2

Solving Triangles

When solving triangles, it is important to choose the most appropriate method. The choice depends on the given information. Place the letter of the appropriate method beside the given information. There may be more than one answer.

A primary trigonometric ratios

B sine law

C cosine law

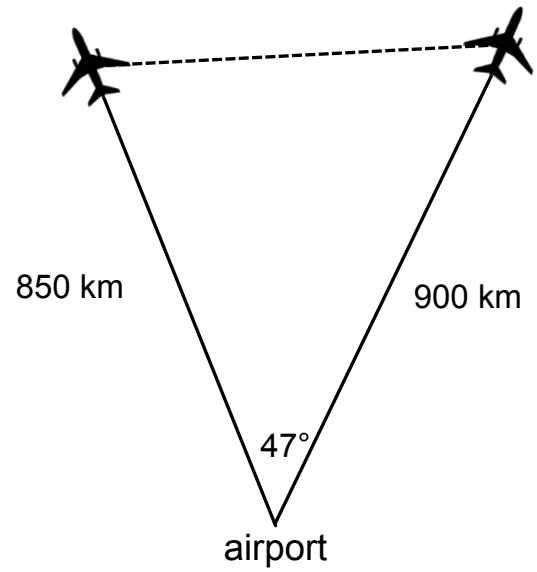
D none of the above

Given Information	Begin by using the method of	
Three sides		
Three angles		
Two angles and any side		
Right triangle		
Two sides and the angle between them		
Two sides and the angle opposite one of the sides		

Chapter 2

The Cosine Law

Two planes left an airport and are flying in different directions. The angle between their flight path is 47°. One hour later, plane A has travelled 850 km and plane B has travelled 900 km. How far apart are the two planes at this time? Round the distance to the nearest kilometer.



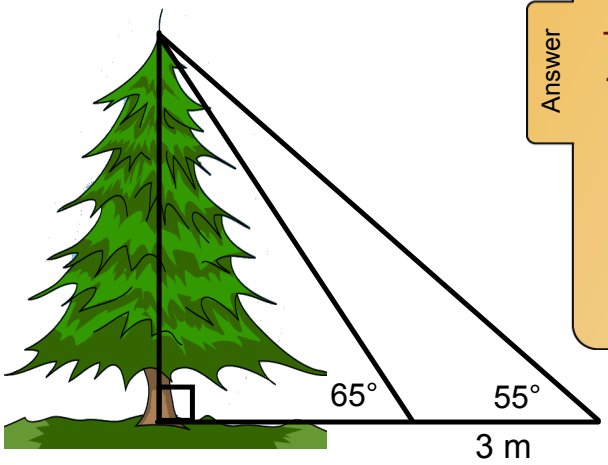
Answer

Click here for the Solution

Chapter 2

The Sine Law

Ling wants to approximate the height of the tree outside her house. From the ground, she measures the angle of elevation to the top of the tree to be 65°. She paces 3 m farther away from the tree and measures the angle of elevation to be 55°. Determine the height of the tree. Round the height to the nearest hundredth of a meter.



Answer

The height of the tree is 12.83 m.

Click here for the Solution

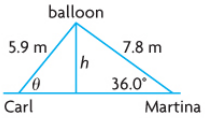
EXAMPLE 2 Solving a problem using the sine law

Martina and Carl are part of a team that is studying weather patterns. The team is about to launch a weather balloon to collect data. Martina's rope is 7.8 m long and makes an angle of 36.0° with the ground. Carl's rope is 5.9 m long. Assuming that Martina and Carl form a triangle in a vertical plane with the weather balloon, what is the distance between Martina and Carl, to the nearest tenth of a metre?

Sandra's Solution: Using the sine law and then the cosine law

Let h represent the height of the weather balloon.
Let θ represent the angle for Carl's rope.

Situation 1:

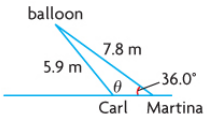


$$\sin 36.0 = \frac{h}{7.8}$$
$$7.8(\sin 36.0) = 7.8\left(\frac{h}{7.8}\right)$$
$$4.5847\ldots = h$$

I drew the triangle.

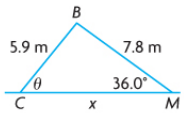
I noticed that this is a *SSA* situation. I had to determine the height of the triangle to determine if this is an ambiguous case.

Situation 2:



Carl's rope is longer than the height and shorter than Martina's rope, so there are two possible triangles. I drew the second triangle.

Situation 1:



$$\frac{\sin\theta}{7.8} = \frac{\sin 36^\circ}{5.9}$$
$$\sin\theta = \frac{7.8\sin 36^\circ}{5.9}$$
$$\sin\theta = 0.7770\ldots$$
$$\theta = \sin^{-1}(0.7770\ldots)$$
$$\theta = 50.9932\ldots^\circ$$

I substituted the side lengths and angles (including θ) into the formula for the sine law and isolated θ.

$$\angle B = 180^\circ - 36.0^\circ - 50.9932\ldots^\circ$$
$$\angle B = 93.0067\ldots^\circ$$

The measures of the angles in a triangle sum to 180°.

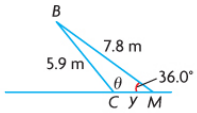
$$x^2 = 5.9^2 + 7.8^2 - 2(5.9)(7.8)\cos 93.0067\ldots^\circ$$
$$x^2 = 100.4777\ldots$$
$$x = 10.0238\ldots$$

In Situation 1, Martina and Carl are 10.0 m apart.

I used the cosine law to determine the distance, x, between Martina and Carl. I substituted the known measurements into the cosine law.

Situation 2:

I also considered the situation in which Carl is closer to Martina.



$$\frac{\sin\theta}{7.8} = \frac{\sin 36^\circ}{5.9}$$
$$\sin\theta = \frac{7.8\sin 36^\circ}{5.9}$$
$$\sin\theta = 0.7770\ldots$$
$$\theta = \sin^{-1}(0.7770\ldots)$$
$$\theta = 50.9932\ldots^\circ$$
$$\theta = 180^\circ - 50.9932\ldots^\circ$$
$$\theta = 129.0067\ldots^\circ$$

I used the sine law to determine θ.

I determined the measure of the supplementary angle, which is suitable for this situation.

$$\angle B = 180^\circ - 36.0^\circ - 129.0067\ldots^\circ$$
$$\angle B = 14.9932\ldots^\circ$$

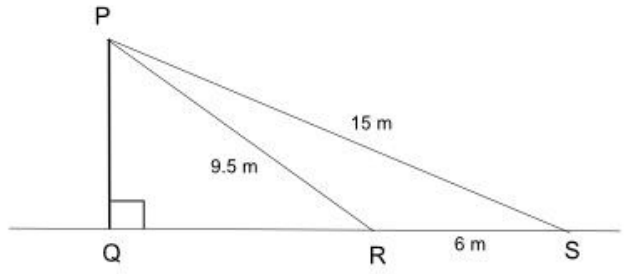
The measures of the angles in a triangle sum to 180°.

$$y^2 = 5.9^2 + 7.8^2 - 2(5.9)(7.8)\cos 14.9932\ldots^\circ$$
$$y^2 = 6.7433\ldots$$
$$y = 2.5968\ldots$$

I can use $\angle B$ in the cosine law to determine the distance, y, between Martina and Carl.

I substituted the measure of $\angle B$ and the given side lengths into the cosine law.

In the second situation, Martina and Carl are 2.6 m apart.
Martina and Carl are either 10.0 m apart or 2.6 m apart.



The diagram shows a vertical pole PQ standing on horizontal ground. R and S are points on the ground. PR = 9.5 m, RS = 6 m and PS = 15 m.

Calculate the angle of elevation of P from R.

A 18.4°	B 30.0°
C 150.0°	D 161.6°

Attachments

PM11-3s3.gsp