

Worksheet 1-5: The Sine Law (Non-Right Triangles)

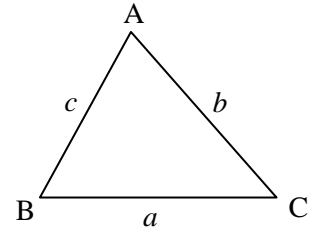
The sine law can be used to solve a non-right triangle when given:

- (a) the measures of **two angles and any side**
 (b) the measures of **two sides and an angle opposite to one of these sides**

$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$	$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$
--	--

for side lengths

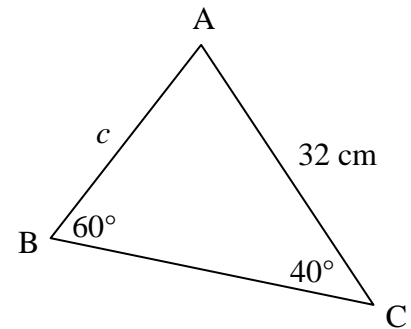
for angles



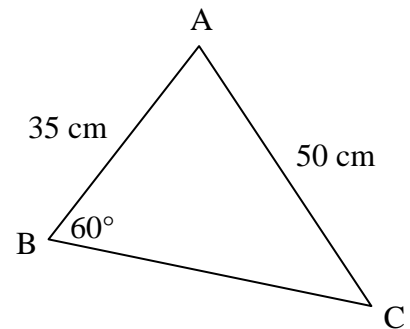
For Rule (b) above, why do we need the opposite angle of one side to use the sine law?

Find the Measure of a Side:

1. Find the measure of side c to the nearest centimetre.

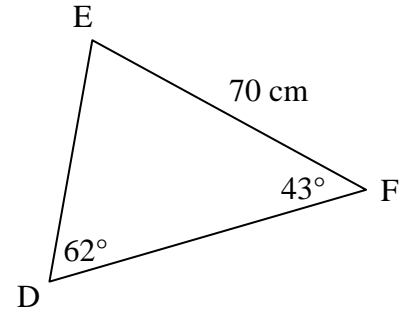
**Find the Measure of an Angle:**

2. Find the measure of $\angle C$ to the nearest tenth of a degree.

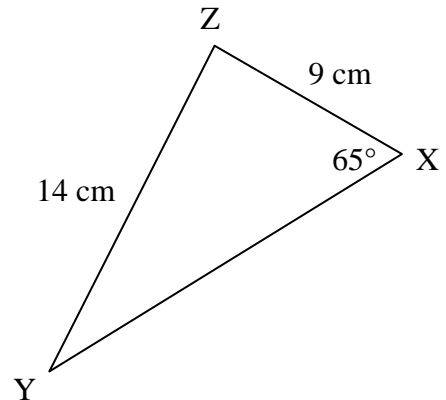


3. Solve the following triangles. Correct your answers to the nearest unit of measurement.

(a) When Two Angles and a Side are Given



(b) When Two Sides and an Opposite Angle are Given



4. You are asked to solve a triangle with two known sides using the sine law. Explain what additional information you need to know about the triangle in order to solve it.

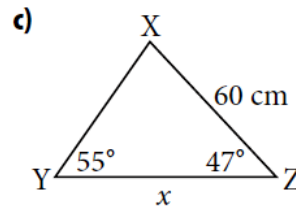
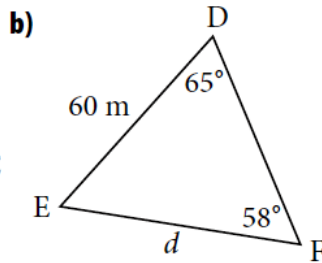
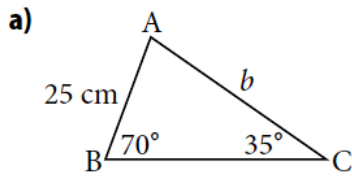
5. For $\triangle RST$, $\angle S = 83^\circ$, $\angle T = 26^\circ$, and $r = 53$ m. Solve the triangle, to the nearest degree and metre.

6. For $\triangle DEF$, $\angle F = 35^\circ$, $f = 42$ m, and $d = 64$ m. Solve the triangle, to the nearest degree and metre.

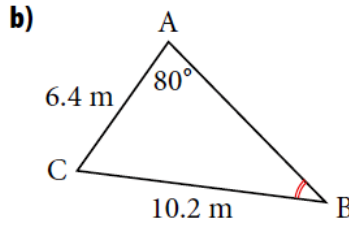
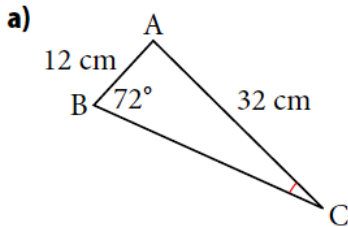
Answers: 1. 24 cm; 2. 37.3° ; 3. (a) $\angle E = 75^\circ$, $f = 54$ cm, $e = 77$ cm, (b) $\angle Y = 36^\circ$, $\angle Z = 79^\circ$, $z = 15$ cm;
4. To use the Sine Law formula, we need two angles and one opposite side or two sides and one opposite angle, so the measure of an angle that is opposite one of the known sides is needed in the situation;
5. $\angle R = 71^\circ$, $s = 56$ m, $t = 25$ m; 6. $\angle D = 61^\circ$, $\angle E = 84^\circ$, $e = 73$ m

Practise

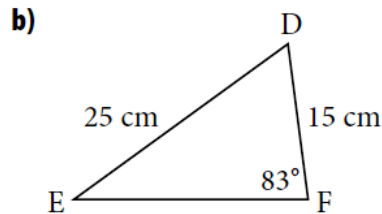
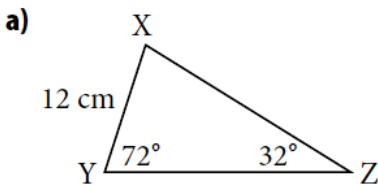
1. Find the measure of the indicated side in each triangle.



2. Find the measure of the unknown angle as indicated.



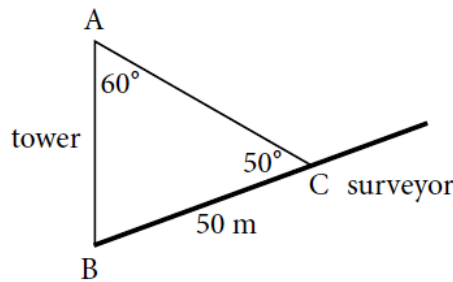
3. Solve each triangle.



4. a) Solve $\triangle ABC$, given $\angle B = 39^\circ$, $\angle C = 79^\circ$, and $a = 24$ cm.

b) Solve $\triangle DEF$, given $\angle D = 75^\circ$, $d = 25$ m, and $e = 10$ m.

5. A communication tower is built on the slope of a hill. A surveyor, 50 m uphill from the base of the tower, measures an angle of 50° between the ground and the top of the tower. The angle from the top of the tower to the surveyor is 60° . Calculate the height of the tower to the nearest metre.



Answers

1. a) 41.0 cm b) 64.1 m c) 71.6 cm 4. a) $\angle A = 62^\circ$, $b = 17.1$ cm, $c = 26.6$ cm
 2. a) 20.9° b) 38.2° b) $\angle E = 22.7^\circ$, $\angle F = 82.3^\circ$, $f = 25.6$ m
 3. a) $\angle X = 76^\circ$, $x = 22.0$ cm, $y = 21.5$ cm 5. 44 m
 b) $\angle D = 60.4^\circ$, $\angle E = 36.6^\circ$, $d = 21.9$ cm