

SINE FORMULA

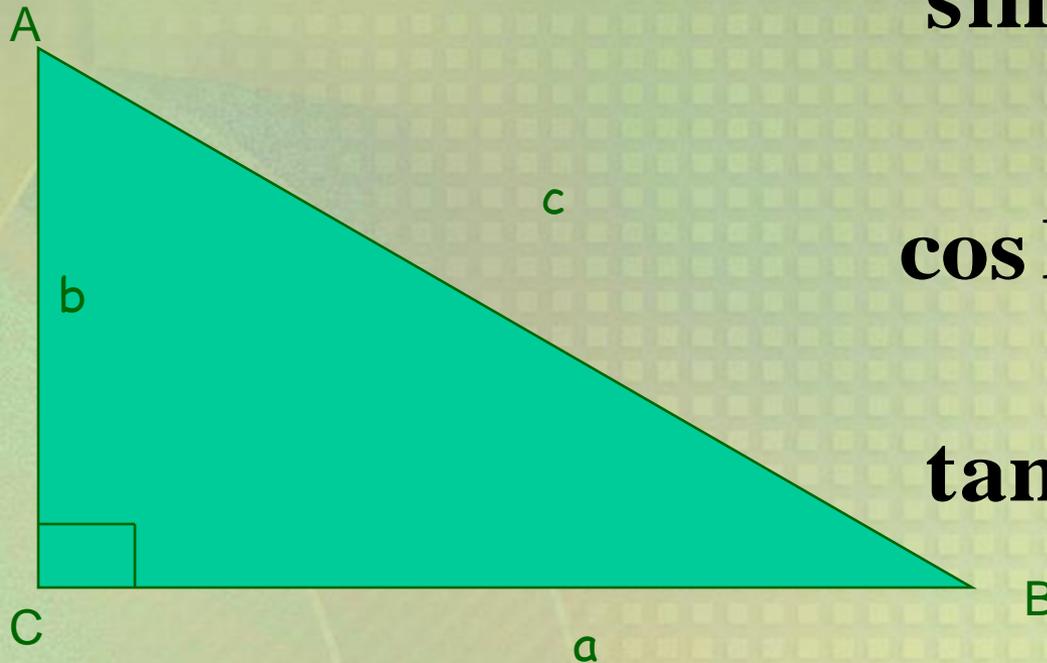
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Specific Instructional Objectives

- Find sides and angles of a triangle
- Apply sine rule to solve a problem

Introduction

- Trigonometric Ratio



$$\sin \mathbf{B} = \frac{\mathbf{AC}}{\mathbf{AB}} = \frac{b}{c}$$

$$\cos \mathbf{B} = \frac{\mathbf{BC}}{\mathbf{AB}} = \frac{a}{c}$$

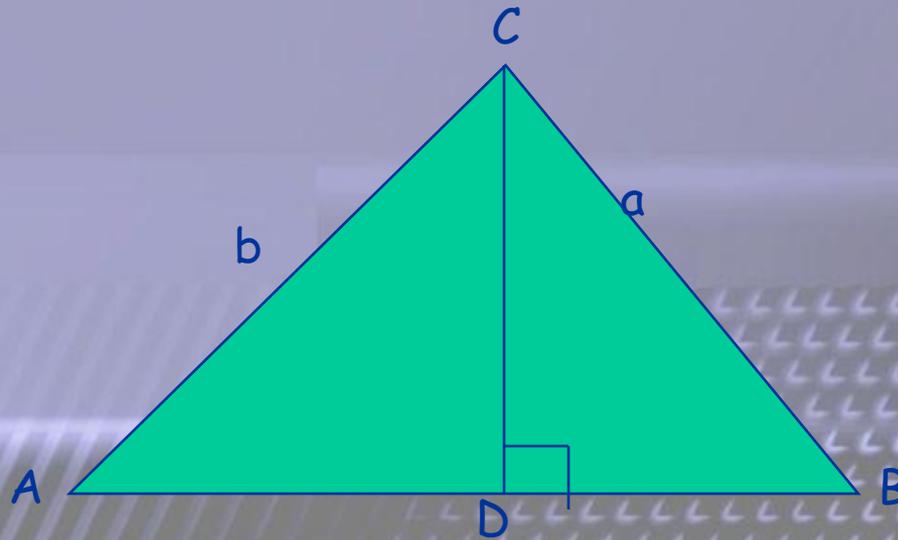
$$\tan \mathbf{B} = \frac{\mathbf{AC}}{\mathbf{BC}} = \frac{b}{a}$$

Look triangle ABC

$$\sin A = \frac{CD}{AC} \Rightarrow CD = AC \sin A = b \sin A$$

$$\sin B = \frac{CD}{BC} \Rightarrow CD = BC \sin B = a \sin B$$

then $b \sin A = a \sin B \Rightarrow \frac{a}{\sin A} = \frac{b}{\sin B} \quad (1)$

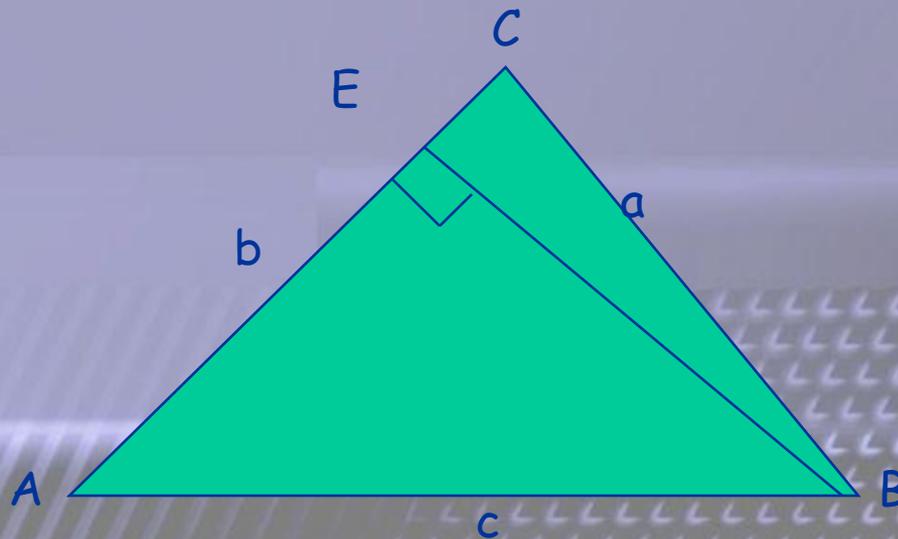


Look triangle ABC

$$\sin A = \frac{BE}{AB} \Rightarrow BE = AB \sin A = c \sin A$$

$$\sin C = \frac{BE}{BC} \Rightarrow BE = BC \sin B = a \sin C$$

then $c \sin A = a \sin C \Rightarrow \frac{a}{\sin A} = \frac{c}{\sin C} \quad (2)$



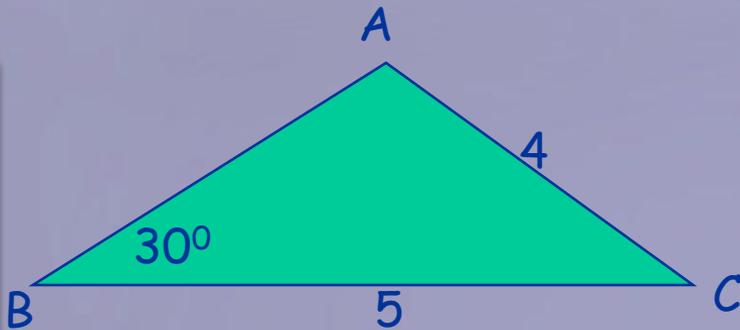
$$\frac{\mathbf{a}}{\mathbf{\sin A}} = \frac{\mathbf{b}}{\mathbf{\sin B}} \quad (1)$$

$$\frac{\mathbf{a}}{\mathbf{\sin A}} = \frac{\mathbf{c}}{\mathbf{\sin C}} \quad (2)$$


From (1) and (2) it can be concluded

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

Example 1



Look this figure!

Solve all missing sides and angles given that side a is 5 cm, side b is 4 cm and angle B is 30°

Solution

$$\frac{a}{\sin A} = \frac{b}{\sin B} \Rightarrow \frac{5}{\sin A} = \frac{4}{\sin 30^{\circ}}$$

$$4 \sin A = 5 \sin 30^{\circ} \Rightarrow \sin A = \frac{5 \times 0,5}{4} = 0,625$$

$$A = 38,68^{\circ} \text{ atau } \angle A = 38,68^{\circ}$$

$$\angle C = 180^{\circ} - \angle B - \angle A = 180^{\circ} - 30^{\circ} - 38,68^{\circ}$$

$$\angle C = 111,32^{\circ}$$

$$\frac{c}{\sin C} = \frac{b}{\sin B} \Rightarrow \frac{c}{\sin 111,32^{\circ}} = \frac{4}{\sin 30^{\circ}}$$

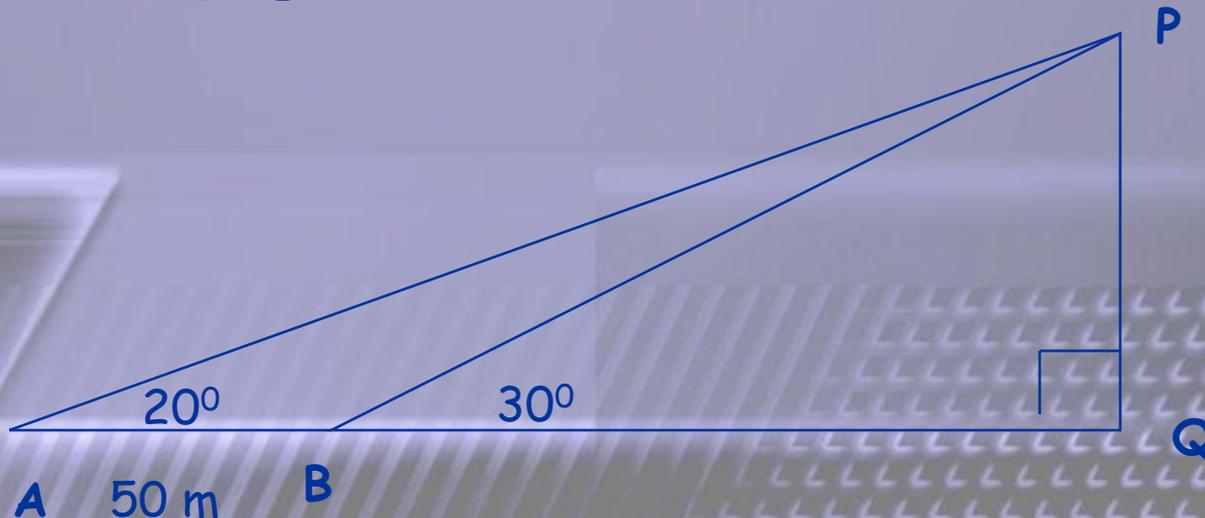
$$c = \frac{4 \sin 111,32^{\circ}}{\sin 30^{\circ}} = \frac{4 \times 0,93}{0,5} = 7,45 \text{ cm}$$

Classrom Exercise

1. Solve for all missing sides and angles of $\triangle ABC$ if,

- (a) $A = 45^\circ$, $B = 60^\circ$, $a = 6$ cm
- (b) $C = 95^\circ$, $b = 85$ cm, $c = 30$ cm
- (c) $A = 115^\circ$, $a = 46$ cm, $c = 32$ cm

2. Look this figure! If $AB = 50$ m, find PQ !



Solve for all missing sides and angles of $\triangle ABC$ if,

(a) $A = 1000$, $B = 400$, $b = 3$ cm

(b) $C = 370$, $C = 980$, $c = 15$ cm

(c) $A = 240$, $C = 1000$, $a = 42$ cm

(d) $A = 950$, $B = 150$, $b = 27$ cm

2. Points A and C are on opposite sides of a river. Point B is located so that the distance from A to B is 50 m. The angle formed by AC and AB is 75° , and the angle formed by AB and BC is 35° . Find the distance from A to C



Good Luck