

E Michaelmas Cosine And Sine Rule

Here we are dealing with a triangle with sides a , b , c and angles A , B , C such that each angle is opposite the same letter side.

- The *cosine rule* states that

$$c^2 = a^2 + b^2 - 2ab \cos C.$$

We use it when

- we have all three sides and want any angle,
- we have two sides and an angle and want the other side.

- The *sine rule* states that

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

We use it when

- we have a side opposite an angle pair and a length and want the angle opposite,
- we have a side opposite an angle pair and an angle and want the side opposite.

- Patrons are reminded that it is worth remembering that $\sin 30^\circ = \cos 60^\circ = \frac{1}{2}$.

Questions

Find the missing angles and lengths (all answers to 3 significant figures):

- Triangle ABC with $AB = 5$, $AC = 7$, $\hat{BAC} = 32^\circ$. Find BC . 3.83
- Triangle DEF with $EF = 8$, $\hat{EDF} = 57^\circ$, $\hat{DFE} = 23^\circ$. Find DE . 3.73
- Triangle XYZ with $XY = 10$, $XZ = 8$, $YZ = 3$. Find \hat{YXZ} . 14.4°
- Triangle PQR with $PQ = 6$, $PR = 8$, $\hat{PQR} = 40^\circ$. Find \hat{PRQ} . 28.8°
- Triangle XYZ with $XZ = 10$, $YZ = 3$, $\hat{ZYX} = 101^\circ$. Find XY . 11.0
- Triangle LMN with $MN = 11$, $\hat{MLN} = 100^\circ$, $\hat{LNM} = 38^\circ$. Find LM . 6.88
- Triangle ABC with $AB = 5.9$, $BC = 4.2$, $AC = 6.2$. Find \hat{ABC} . 73.6°
- Triangle ABC with $AC = 8.1$, $BC = 4.3$, $\hat{ABC} = 121^\circ$. Find \hat{BAC} . 27.1°
- Triangle PQR with $QR = 6.2$, $PQ = 5.1$, $\hat{PQR} = 57^\circ$. Find PR . 5.48
- Triangle ABC with $AC = 7$, $\hat{CAB} = 120^\circ$, $\hat{ABC} = 40^\circ$. Find BC . 9.43
- Triangle LMN with $LM = 10$, $MN = 6$, $LN = 5$. Find \hat{LNM} . 131°
- Triangle XYZ with $XZ = 9$, $XY = 11$, $\hat{ZYX} = 97^\circ$. Find \hat{XYZ} . 54.3°