

Sine Rule: Finding an Angle *extend*

1



In triangle ABC , $AB = 9$ cm, $BC = 7$ cm and angle $A = 42^\circ$. Find the two possible sizes of angle ABC , to 1 decimal place.

$$\sin C = 9 \sin 42^\circ \div 7$$

$$C = 59.4^\circ \text{ or } 120.6^\circ$$

$$B = 180^\circ - 42^\circ - C$$

$$78.6^\circ \text{ or } 17.4^\circ$$

Answer

2



In triangle ABC , angle $A = 30^\circ$, $BC = 4$ cm and $AC = 4\sqrt{2}$ cm. Angle B is obtuse. Find the exact size of angle B .

$$\sin B = \frac{4\sqrt{2} \times \frac{1}{2}}{4} = \frac{\sqrt{2}}{2}$$

$$\sin 45^\circ = \frac{\sqrt{2}}{2}, \text{ so } B = 180^\circ - 45^\circ$$

$$B = 135^\circ$$

Answer

3



A lighthouse L is 12 km from a port P on a bearing of 060° . A boat B is due east of P and 9 km from L . There are two places it could be: it is the one further from P . Find the bearing of B from L , to the nearest degree.

$$\text{angle } P = 30^\circ, \sin B = 12 \sin 30^\circ \div 9$$

$$B = 41.8^\circ, L = 108.2^\circ$$

$$\text{bearing} = 240^\circ - 108.2^\circ$$

$$132^\circ$$

Answer

4



In triangle ABC , $AB = 6$ cm, $AC = 11$ cm and angle $A = 40^\circ$. Find angle ABC to 1 decimal place.

$$BC^2 = 36 + 121 - 132 \cos 40^\circ$$

$$BC = 7.475, \text{ sine rule gives } 71.1^\circ$$

$$11 \text{ cm is longest: } 180^\circ - 71.1^\circ$$

$$108.9^\circ$$

Answer

5



In triangle PQR , $PQ = 2x$, $PR = 3x$ and angle $Q = 60^\circ$. Show that $\sin R = \frac{\sqrt{3}}{3}$, and find angle R to 1 decimal place.

$$\sin R = \frac{2x \times \frac{\sqrt{3}}{2}}{3x} = \frac{\sqrt{3}}{3}$$

R is opposite the shorter side, so acute

$$R = 35.3^\circ$$

Answer

6



Triangle ABC has an area of 40 cm^2 . $AB = 10$ cm, $BC = 13$ cm and angle B is acute. Find angle C to 1 decimal place.

$$\sin B = \frac{80}{130}, B = 37.98^\circ$$

$$AC^2 = 269 - 260 \cos B, AC = 8.004$$

$$\sin C = 10 \sin B \div 8.004$$

$$50.3^\circ$$

Answer

7



Show that there is no triangle with sides of 5 cm and 12 cm in which the angle opposite the 5 cm side is 30° .

$$\text{opposite 12 cm: } \sin = 12 \sin 30^\circ \div 5$$

$$= 1.2, \text{ but } \sin \text{ is never more than } 1$$

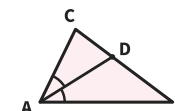
$$\sin \text{ would be } 1.2$$

Reason

8



AD bisects angle A . Use the sine rule to prove that $\frac{BD}{DC} = \frac{AB}{AC}$.



$$\frac{BD}{\sin \frac{1}{2}A} = \frac{AB}{\sin \angle ADB}$$

$$\frac{DC}{\sin \frac{1}{2}A} = \frac{AC}{\sin \angle ADC}$$

$$\angle ADC = 180^\circ - \angle ADB: \text{ equal sines}$$

$$\text{divide: } \frac{BD}{DC} = \frac{AB}{AC}$$

Proof