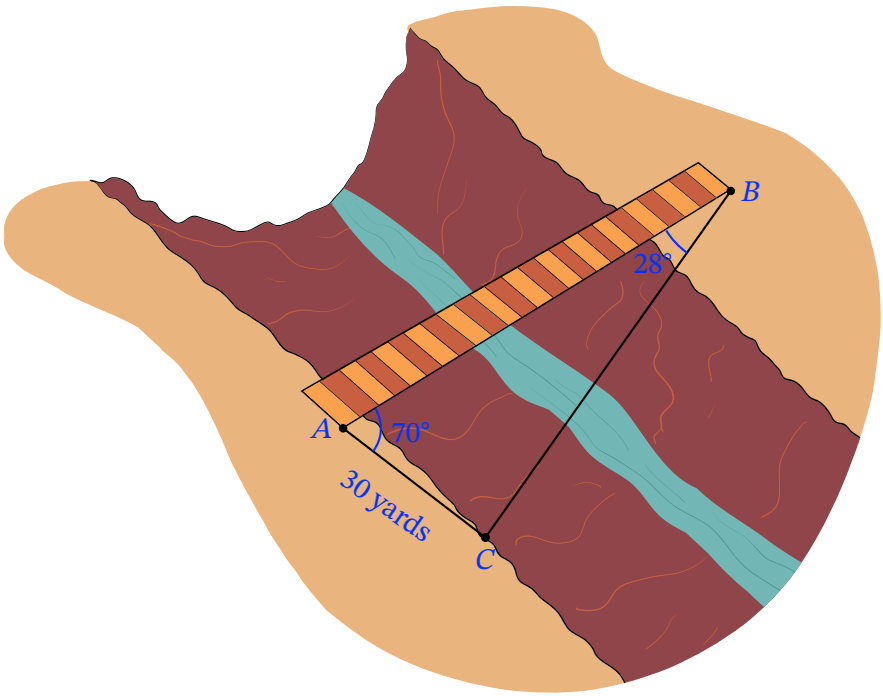
Worksheet: Law of Sines

Question Video

Q1: A bridge is to be constructed over a canyon stretching from point A to point B as seen in the given figure. A surveyor stands at a point C, 30 yards from point A, at the edge of the canyon. They measured that $m\angle CAB = 70°$, $m\angle ABC = 28°$. Work out the length of the bridge.



A 63.28 yards

B 31.61 yards

C 11.62 yards

D 14.50 yards

E 60.05 yards

Q2: A house is 66 metres tall. The angle of elevation from the base of the house to the top of a tower is 39°, and the angle of elevation from the top of the house to the top of the tower is 24°. Find the height of the tower giving the answer to the nearest metre.

A 81 m

B 181 m

C 233 m

D 147 m

Q3: ABC is a triangle where $\sin A = \frac{4}{7}$, $\sin B = \frac{4}{5}$ and $BC = 3.99$ cm. Find the length of $\overline{AB}$ giving the answer to two decimal places.

A 3.99 cm

B 5.59 cm

C 3.19 cm

D 6.98 cm

Q4: An airplane needs to head due north, but there is a wind blowing from the southwest at 60 km/h. The plane flies with an airspeed of 550 km/h. To end up flying due north, how many degrees west of north will the pilot need to fly the plane?

A 85.903°

B 4.823°

C 3.857°

D 4.096°

E 4.424°

Q5: James, Anthony, and Jennifer stand at three points, A, B, and C respectively. Suppose that $m\angle ABC = 48°$, $m\angle BAC = 54°$, and James is exactly 12 feet away from Anthony.

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- Find the distance between Anthony and Jennifer, to two decimal places.

A 9.38 feet

B 9.93 feet

C 14.51 feet

D 5.61 feet

E 9.12 feet

Find the distance between James and Jennifer, to two decimal places.

A 3.73 feet

B 9.12 feet

C 15.79 feet

D 5.48 feet

E 7.27 feet

Q6: LMN is a triangle where $m\angle L = 54°30'$, $m\angle N = 23°30'$ and $NL = 16.4$ cm. Find the lengths of $\overline{MN}$ and $\overline{LM}$ giving the answer to one decimal place.

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A $MN = 13.6$ cm and $LM = 16.4$ cm

B $MN = 13.6$ cm and $LM = 6.7$ cm

C $MN = 16.4$ cm and $LM = 6.7$ cm

D $MN = 6.7$ cm and $LM = 13.6$ cm

Q7: XYZ is a triangle where $YZ = 8$ cm, $m\angle Y = 22°$, and $m\angle Z = 23°$. W lies on $\overline{YZ}$ where $\overline{XW} \perp \overline{YZ}$. Find the length of $\overline{XW}$ giving the answer to two decimal places.

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A 1.66 cm

B 5.90 cm

C 1.59 cm

D 3.00 cm

E 4.24 cm

Q8: ABC is a triangle where $8 \sin A = 11 \sin B = 16 \sin C$. Find the ratio $a : b : c$.

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A $11 : 16 : 22$

B $16 : 11 : 8$

C $8 : 16 : 11$

D $22 : 16 : 11$

E $8 : 11 : 16$

Q9: ABC is a triangle where $m\angle A = 30°$ and $m\angle B = 105°$. Find the ratio of lengths $a : b : c$.

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A $\sqrt{6}+\sqrt{2} : 2 : 2\sqrt{2}$

B $2 : \sqrt{6}+\sqrt{2} : 2\sqrt{2}$

C $2 : \sqrt{6}-\sqrt{2} : 2\sqrt{2}$

D $1 : \sqrt{6}+\sqrt{2} : \sqrt{2}$

Q10: To determine how far a boat is from shore, two radar stations 500 feet apart find the angles out to the boat, as shown in the given figure. Determine the distance of the boat from station A and the distance of the boat from shore. Round your answers to the nearest whole foot.

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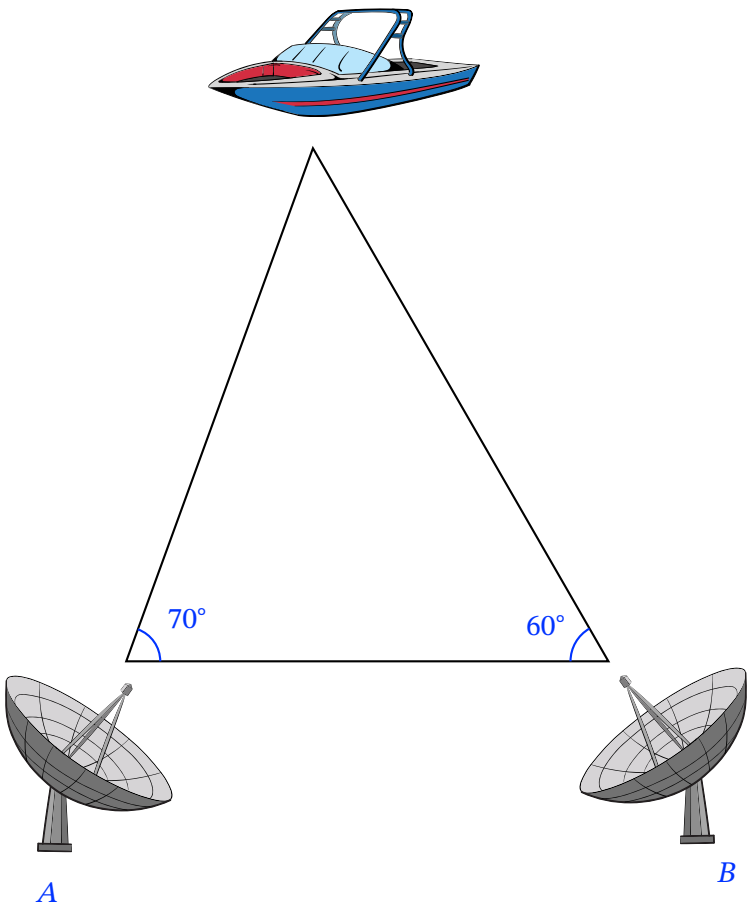


A 442 ft, 193 ft

B 565 ft, 193 ft

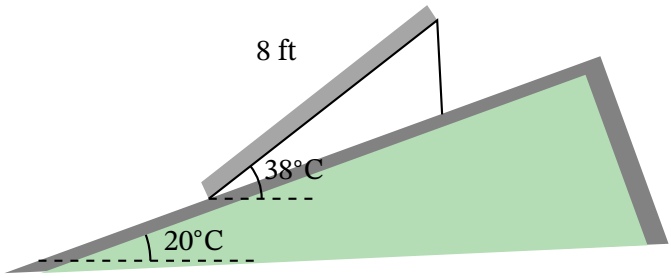
C 442 ft, 531 ft

D 613 ft, 576 ft

E 565 ft, 531 ft

Q11: The diagram shows an 8-foot solar panel mounted on the roof of a house. The roof is inclined at 20° to the horizontal, and, for maximum yield, the solar panel is placed at 38° to the horizontal. The solar panel is held in position by a vertical support. How long should the support be to hold the solar panel at an inclination of 38°? Give your answer to one decimal place.

Question Video



A 3.2 ft

B 12.2 ft

C 4.3 ft

D 2.6 ft

E 5.2 ft

Q12: In triangle ABC, $AC = 97$ m, $m\angle BAC = 101°$, and $m\angle ACB = 53°$. Determine the length of $\overline{AB}$ to the nearest meter.

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A 217 m

B 177 m

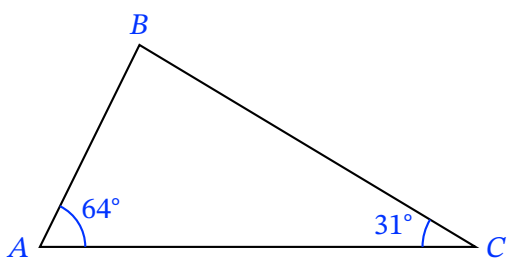
C 79 m

D 53 m

E 119 m

Q13: For the given figure, $AB = 3$ and $BC = a$. Use the Law of Sines to work out a. Give your answer to two decimal places.

Question Video



A 6.00

B 5.82

C 5.24

D 1.72

E 6.48

Q14: ABC is a triangle, where $a = 9$, $b = 6$, and $m\angle A = 58.1°$. Find $m\angle B$ to the nearest tenth of a degree.

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A $34.5°$

B $0.6°$

C $69.4°$

D $1.2°$

E $55.5°$

Q15: ABC is an obtuse-angled triangle at A where $b = 15$ cm, $\tan C = \frac{6}{5}$ and $m\angle B = 27°$. Find lengths a and c giving the answer to the nearest integer.

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A $a = 32$ cm and $c = 25$ cm

B $a = 15$ cm and $c = 25$ cm

C $a = 32$ cm and $c = 15$ cm

D $a = 25$ cm and $c = 32$ cm

Q16: ABC is a triangle where $a = 96$ and $m\angle B = 3m\angle A = 90°$. Find length c giving the answer in terms of sin.

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A $\frac{96 \sin 60°}{\sin 90°}$

B $\frac{96 \sin 60°}{\sin 30°}$

C $\frac{96 \sin 30°}{\sin 60°}$

D $\frac{\sin 60°}{9} 6 \sin 30°$

E $\frac{96 \sin 90°}{\sin 60°}$

Q17: The diameter of a circle $\overline{AD}$ is 82 cm. $\overline{AB}$ and $\overline{AC}$ are two chords on opposite sides of a circle with lengths 5.1 cm and 48.4 cm respectively. Find the length $\overline{BC}$ giving the answer to two decimal places.

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A 30.94 cm

B 52.42 cm

C 3.26 cm

D 104.85 cm

Q18: ABC is a triangle where $2\sin A = 3\sin B = 4\sin C$ and the perimeter is 169 cm. Find the values of a and c giving the answer to the nearest centimetre.

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A $a = 78$ cm and $c = 52$ cm

B $a = 39$ cm and $c = 78$ cm

C $a = 78$ cm and $c = 39$ cm

D $a = 52$ cm and $c = 39$ cm

Q19: Which rule could be used to find the length of an unknown side of a triangle, given the measures of two angles and the length of one other side?

A double angle rule

B angles sum rule

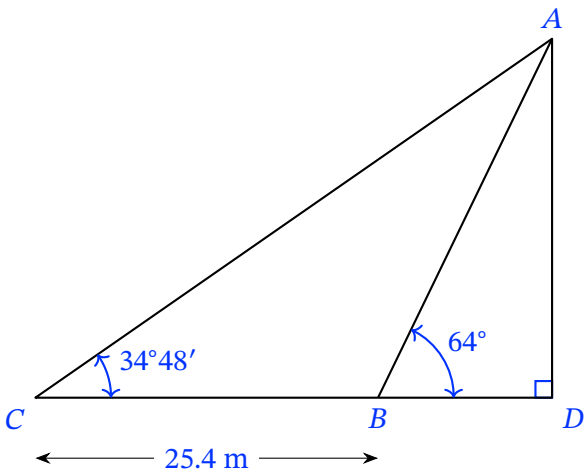
C tangent rule

D cosine rule

E sine rule

Q20: Two men are standing in front of a minaret AD at the points B and C respectively where the distance between them is 25.4 m. Find the height of the minaret giving the answer to one decimal place.

Question Video



A 42.1 m

B 26.7 m

C 17.0 m

D 14.5 m

Q21: ABC is a triangle where $m\angle A = 138°$, $a = 13$ cm and $b = 7$ cm. Find $m\angle B$ giving the answer to the nearest second.

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A $53°34′59″$

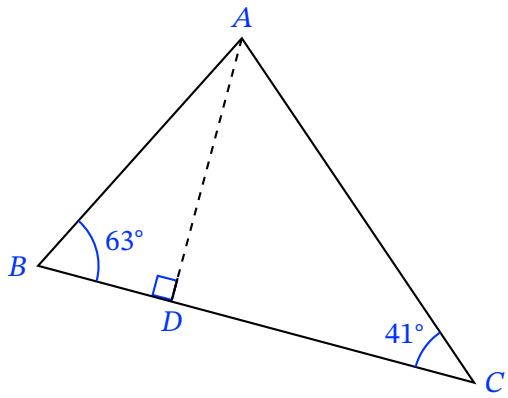
B $158°52′53″$

C $21°7′7″$

D $111°7′7″$

Q22: In the figure $AC = 3.5$.

Question Video



What is AB? Give your answer to two decimal places.

A 3.12

B 2.30

C 2.58

D 2.64

E 1.59

Q23: Cities A, B, and C are located such that city A is due west of city B, city C is on a bearing of 35° from city B, and city C is 100 miles from city A and 70 miles from city B. Find the distance between cities A and B giving your answer to one decimal place.

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A 41.8 miles

B 70.0 miles

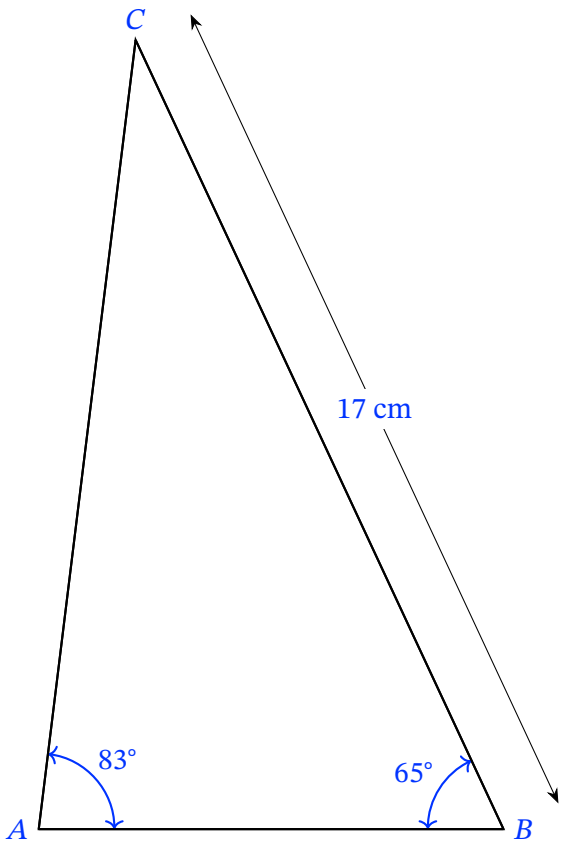
C 116.2 miles

D 63.5 miles

E 100.0 miles

Q24: The scale of a map is 1 cm : 1.35 km. The position of three towns on a map form a triangle. Towns B and C are 17 cm apart, and the angles of towns A and B are 83° and 65° respectively. Find the actual distance between towns A and B and between towns A and C giving the answer to the nearest kilometre.

Question Video



A The actual distance between city A and B is 12 km and the actual distance between city A and C is 7 km

B The actual distance between city A and B is 9 km and the actual distance between city A and C is 16 km

C The actual distance between city A and B is 12 km and the actual distance between city A and C is 21 km

D The actual distance between city A and B is 36 km and the actual distance between city A and C is 21 km

Q25: ABC is an equilateral triangle of side length 12 cm that is inscribed in a circle. Find the radius of the circle, giving the answer to two decimal places.

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A 20.78 cm

B 6.93 cm

C 13.86 cm

D 3.46 cm