

2.2 Applications of the laws of sines and cosines

1. Express each value as a decimal, first writing the whole calculator display, and then the 3 sig-fig approximation. [4 marks]

(a) $\frac{2\pi}{3}$

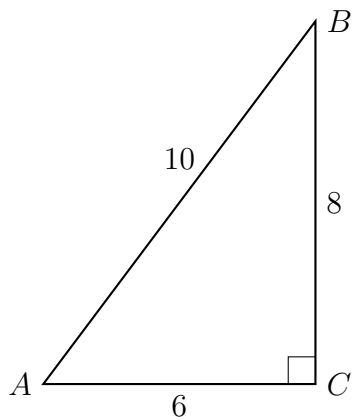
(b) $\frac{\sqrt{3}}{2}$

2. Express each value as a decimal, rounding to 3 sig-figs if necessary. [3 marks]

(a) 4.561×10^4

(b) 1.90×10^{-3}

3. $\triangle ABC$ is shown with $m\angle C = 90^\circ$ and the lengths of the triangle's sides are $BC = 8$, $AC = 6$, and $AB = 10$.



- (a) Write down the value of $\sin A$.
[1 mark]

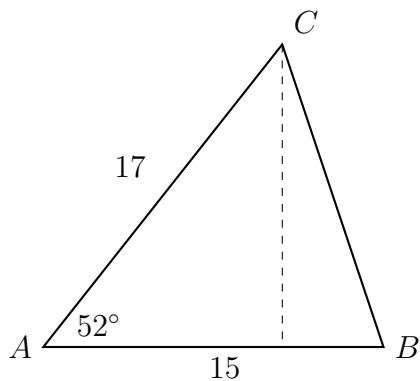
- (b) Find the measure of $\angle A$. [2 marks]

4. In right triangle ABC , hypotenuse \overline{AB} has a length of 26 cm, and side \overline{BC} has a length of 17.6 cm. What is the measure of angle B ?

Triangle area sine formula

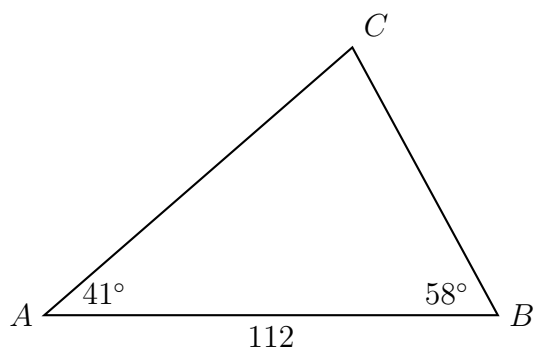
5. Find the area of triangle ABC , with $AB = 15$, $AC = 17$, $m\angle A = 52^\circ$.

Hint: To use the area formula $A = \frac{1}{2}bh$ first find the altitude using sine and the hypotenuse $AC = 17$.



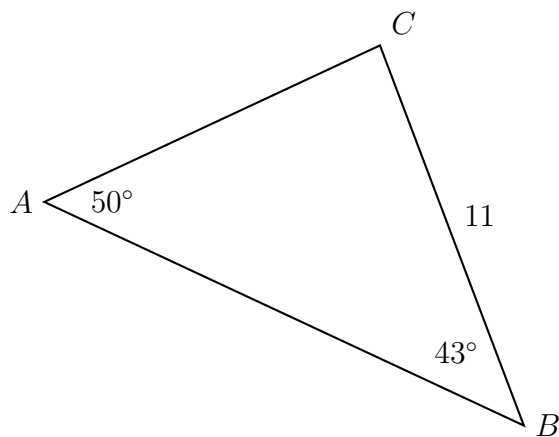
Law of sines

6. Solve the given triangle (determine the values of all lengths and angles)



Law of sines

7. The following diagram shows triangle ABC (not drawn to scale).



$BC = 11$, $\hat{C}AB = 50^\circ$, and $\hat{A}BC = 43^\circ$

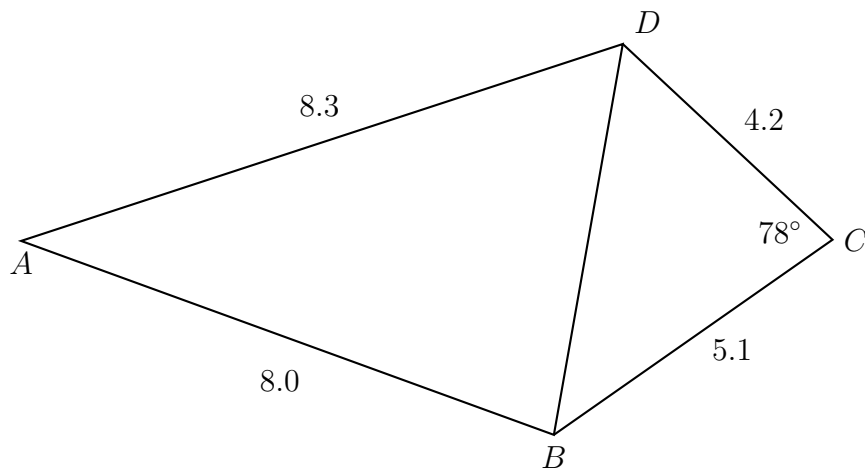
(a) Find AC .

[3 marks]

(b) Find the area of triangle ABC .

[3 marks]

8. The following diagram shows quadrilateral $ABCD$ (not drawn to scale).



$AB = 8.0$, $BC = 5.1$, $CD = 4.2$, $AD = 8.3$, and $\angle BCD = 78^\circ$

(a) Find BD .

[3 marks]

(b) Find $\angle ABD$.

[3 marks]

Precision application

9. BMI is a measure of a healthy personal weight,

$$BMI = \frac{w}{h^2}$$

where

w is a person's weight in kilograms, and

h is height in meters

- (a) Given a height of 160 cm and weight of 54 kg, find the BMI [3 marks]
- (b) These measurements are not exact. Assuming the height is between 159-161 cm and weight 53-55 kg, find the bounds of the BMI. [4 marks]

Sine ambiguous case

10. Triangle ABC has an area of 25, with $AB = 7$ and $AC = 8$.

(a) Find the two possible measures for \hat{A} .

[4 marks]

(b) Given that \hat{A} is obtuse, find BC .

[3 marks]

Solid geometry

11. Find the slant height of a pyramid with square base 4 meters on a side and height of 4 m. [3 marks]
12. Find the volume of a spherical balloon 36 meters in diameter. [3 marks]
13. A cone has a height of 24 cm and volume of $220.5\pi \text{ cm}^3$. Find its radius. [3 marks]