

## 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)  $\frac{2\pi}{3}$

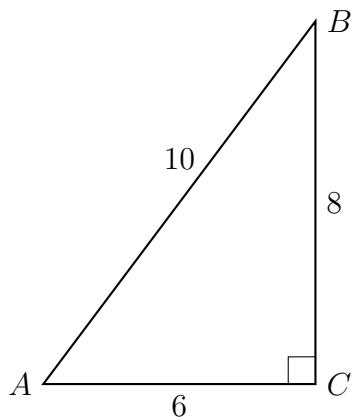
(b)  $\frac{\sqrt{3}}{2}$

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

(a)  $4.561 \times 10^4$

(b)  $1.90 \times 10^{-3}$

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]

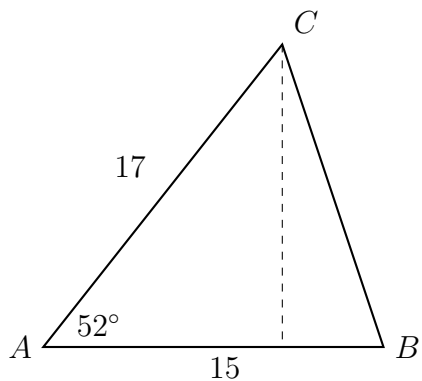
- (b) Find the measure of  $\angle A$ . [2 marks]

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

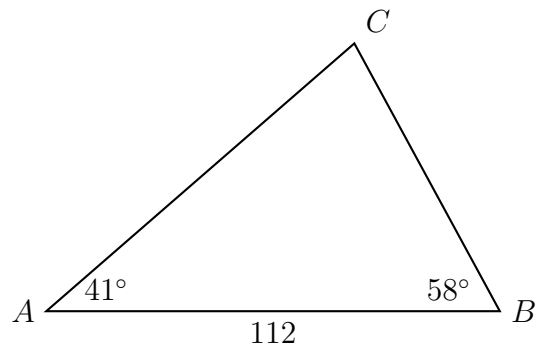
5. Find the area of triangle  $ABC$ , with  $AB = 15$ ,  $AC = 17$ ,  $m\angle A = 52^\circ$ .

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



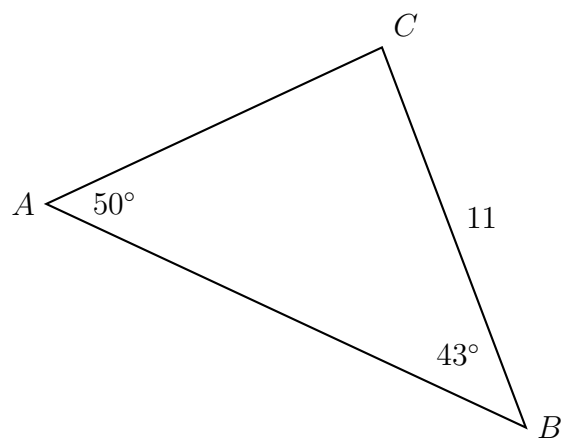
### Law of cosines

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  $\hat{A}BC = 43^\circ$

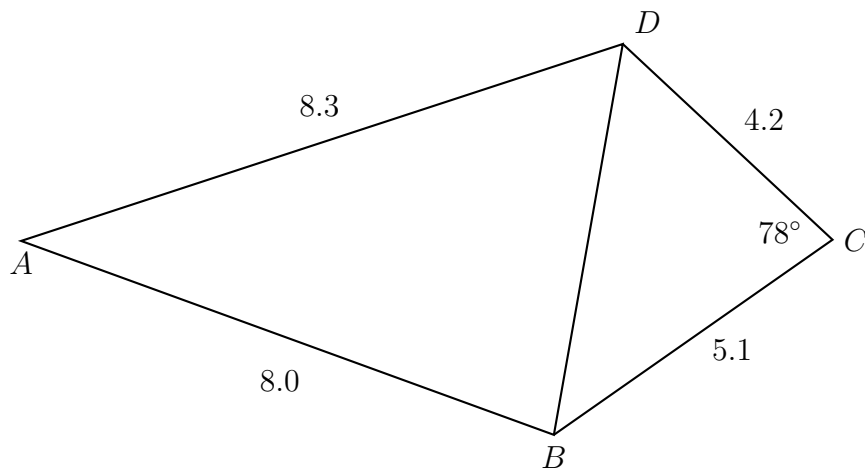
(a) Find  $AC$ .

[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]