GCSE (1 – 9)

The Sine Rule

Instructions

- Use black ink or ball-point pen.
- Answer all questions.
- Answer the questions in the spaces provided — there may be more space than you need.
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must show all your working out.

Information

- The marks for each question are shown in brackets — use this as a guide as to how much time to spend on each question.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end

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\[ \frac{a}{\sin A} = \frac{b}{\sin B} \]

Work out the value of \( x \).
Give your answer to 1 decimal place.

\[ \frac{x}{\sin(38)} = \frac{13}{\sin(100)} \]

\[ x = \frac{13}{\sin(100)} \times \sin(38) \]

\[ = 8.1 \text{ (idp)} \]

(Total for question 1 is 3 marks)

2

Work out the length of BC.
Give your answer to 3 significant figures.

\[ \frac{x}{\sin(42)} = \frac{5}{\sin(53)} \]

\[ x = \frac{5}{\sin(53)} \times \sin(42) \]

\[ = 4.19 \text{ (3sf)} \]

(Total for question 2 is 3 marks)
Work out the value of \( x \).
Give your answer to 3 significant figures.

\[
\sin x = \frac{\sin(95)}{6.7}
\]
\[
\sin x = \frac{\sin(95)}{6.7} \times 5.4
\]
\[
= 0.8029 \ldots
\]
\[
x = \sin^{-1}(\text{ans})
\]
\[
= 53.4 \text{ (3sf)}
\]

(Total for question 3 is 3 marks)

Work out the size of angle \( x \).
Give your answer to 3 significant figures.

\[
\sin x = \frac{\sin 60}{10}
\]
\[
\sin x = \frac{\sin(60)}{10}
\]
\[
\sin x = \frac{\sqrt{3}}{3}
\]
\[
x = \sin^{-1}(\text{ans})
\]
\[
= 35.3 \text{ (3sf)}
\]

(Total for question 4 is 3 marks)
Work out the length of AC.
Give your answer to 1 decimal place.

\[
\frac{x}{\sin(105)} = \frac{12}{\sin(55)}
\]

\[
x = \frac{12}{\sin(55)} \times \sin(105)
\]

\[
= 14.2 \ (1\ dp)
\]

14.2 cm

(Total for question 5 is 3 marks)

Work out the size of angle BAC.
Give your answer to 3 significant figures.

\[
\frac{\sin x}{20} = \frac{\sin(43)}{14}
\]

\[
\sin x = \frac{\sin(43)}{14} \times 20
\]

\[
\sin x = 0.97428\ldots
\]

\[
x = \sin^{-1}(0.97428)
\]

\[
= 77.0 \ (3sf)
\]

(Total for question 6 is 3 marks)
Work out the value of \( x \).
Give your answer to 1 decimal place.

\[
y^2 + 5^2 = 13^2
\]
\[
y^2 = 13^2 - 5^2
\]
\[
y^2 = 144
\]
\[
y = 12
\]

\[
180 - 65 - 40 = 75
\]

\[
\frac{x}{\sin(75)} = \frac{12}{\sin(40)}
\]
\[
x = \frac{12}{\sin(40)} \times \sin(75)
\]
\[
x = 18.0 \text{ (1dp)}
\]

\[\underline{18.0}\]

(Total for question 7 is 5 marks)
Work out the perimeter of triangle $ABC$. Give your answer to 3 significant figures.

\[
\frac{x}{\sin(48)} = \frac{13.1}{\sin(105)}
\]

\[
x = \frac{13.1}{\sin(105)} \times \sin(48)
\]

\[
x = 10.07861779
\]

\[
\frac{y}{\sin(27)} = \frac{13.1}{\sin(105)}
\]

\[
y = \frac{13.1}{\sin(105)} \times \sin(27)
\]

\[
y = 6.157072712
\]

\[
x + y + 13.1 = 29.3 \text{ m (3 sf)}
\]

\[
29.3 \text{ m}
\]

(Total for question 8 is 4 marks)
Work out the area of triangle $ABC$

Give your answer to 1 decimal place.

\[
\frac{x}{\sin(82)} = \frac{12}{\sin(40)}
\]

\[
x = \frac{12}{\sin(40)} \times \sin(82)
\]

\[
x = 18.487...
\]

Angle $ABC = 180 - 82 - 40$

\[
= 58
\]

Area $= \frac{1}{2} (18.487...) (12) \sin(58)$

\[
= 94.1 \text{ m}^2
\]

(Total for question 9 is 5 marks)
Angle $ABC$ is obtuse.
Work out the size of angle $ABC$.
Give your answer to 3 significant figures.

\[
\frac{\sin x}{20} = \frac{\sin (35)}{12}
\]

\[
\sin (x) = \frac{\sin (35)}{12} \times 20
\]

\[
\sin (x) = 0.95596...
\]

\[
x = \sin^{-1} (0.95596) = 72.9
\]

But $ABC$ is obtuse...

\[
180 - 72.9 = 107 \quad (3sf)
\]

(Total for question 10 is 4 marks)