Chapter 9 – Trigonometric ratios

Pearson Edexcel

Example 1 – The cosine rule to find missing sides

Calculate the length of the side AB of the triangle ABC in which $AC = 6.5$ cm, $BC = 8.7$ cm and $\angle ACB = 100°$.

Example 2 – The cosine rule to find missing angles

Find the size of the smallest angle in a triangle whose sides have lengths 3 cm, 5 cm and 6 cm.

Example 3 – Bearings and the cosine rule

Coastguard station B is 8 km, on a bearing of 060°, from coastguard station A. A ship C is 4.8 km, on a bearing of 018°, away from A. Calculate how far C is from B.

Example 4 – Problem solving using the cosine rule

In $\triangle ABC$, $AB = x$ cm, $BC = (x + 2)$ cm, $AC = 5$ cm and $\angle ABC = 60°$.

Find the value of x.

Example 5 – The sine rule to find missing sides

In $\triangle ABC$, $AB = 8$ cm, $\angle BAC = 30°$ and $\angle BCA = 40°$. Find BC.

Example 6 – The sine rule to find missing angles

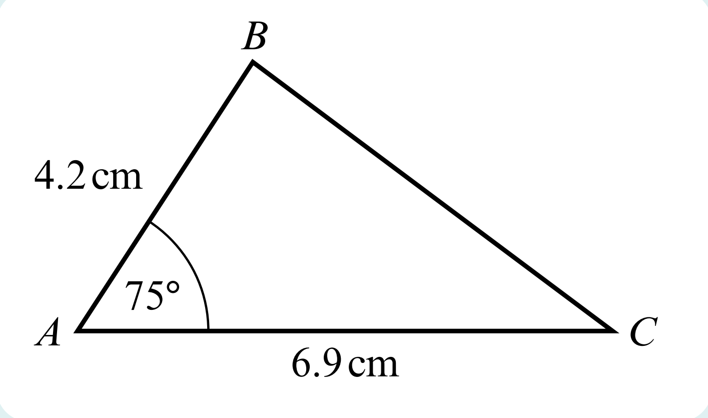
In $\triangle ABC$, $AB = 3.8$ cm, $BC = 5.2$ cm and $\angle BAC = 35°$. Find $\angle ABC$.

Example 7 – The since rule: the ambiguous case

In $\triangle ABC$, $AB = 4$ cm, AC $= 3$ cm and $\angle ABC = 44°$. Work out the two possible values of $\angle ACB$.

Example 8 – The area of a triangle

Work out the area of the triangle shown below.



Example 9 – Problem solving using the area of a triangle

In $\triangle ABC$, $AB = 5$ cm, $BC = 6$ cm and $\angle ABC = x$. Given that the area of $\triangle ABC$ is 12 cm^2 and that AC is the longest side, find the value of x.

Example 10 – Problem solving using the sine and cosine rules

The diagram shows the locations of four mobile phone masts in a field. $BC = 75$ m, $CD = 80$ m, angle $BCD = 55°$ and angle $ADC = 140°$.

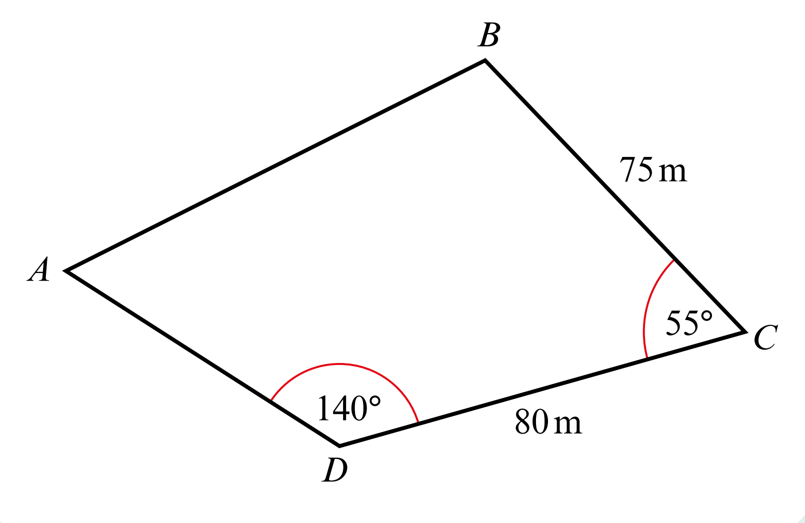
In order that the masts do not interfere with each other, they must be at least 70 m apart.

Given that A is the minimum distance from D, find:

a. the distance A is from B

b. the angle BAD

c. the area enclosed by the four masts



Example 11 – Sketching Trigonometric graphs

a. Sketch the graph of $y = \cos\theta$ in the interval $-360° \le \theta \le 360°$.

b. i. Sketch the graph of $y = \sin x$ in the interval $-180° \le x \le 270°$

ii. $\sin(-30°) = -0.5$. Use your graph to determine two further values of x for which $\sin x = -0.5$.

Example 12 – Transforming trigonometric graphs

Sketch on separate sets of axes the graphs of:

a. $y = 3\sin x$, $0 \le x \le 360°$

b. $y = -\tan\theta$, $-180° \le \theta \le 180°$

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Example 13 – Transforming trigonometric graphs

Sketch on separate sets of axes the graphs of:

a. $y = -1 + \sin x,\ 0 \le x \le 360°$ **b.** $y = \frac{1}{2} + \cos x,\ 0 \le x \le 360°$

Example 14 – Transforming trigonometric graphs

Sketch on separate sets of axes the graphs of:

a. $y = \tan(\theta + 45°),\ 0 \le \theta \le 360°$ **b.** $y = \cos(\theta - 90°),\ -360° \le \theta \le 360°$

Example 15 – Transforming trigonometric graphs

Sketch on separate sets of axes the graphs of:

a. $y = \sin 2x,\ 0 \le x \le 360°$ **b.** $y = \cos\frac{\theta}{3},\ -540° \le \theta \le 540°$

c. $y = \tan(-x),\ -360° \le x \le 360°$