# AREA OF TRIANGLE

DATE OF SOLUTIONS: 15/05/2018
MAXIMUM MARK: 40

# SOLUTIONS

GCSE (+ IGCSE) EXAM QUESTION PRACTICE

**1.** [Edexcel, 2015] Area of Triangle (From Sine of the Angle) **[3 Marks]**

*ABCD* is a kite.

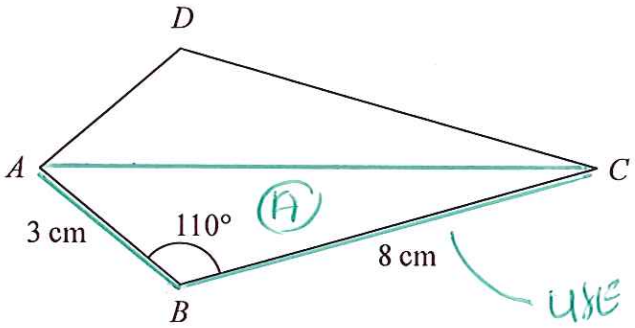



Diagram **NOT** accurately drawn

USE $A = \frac{1}{2}ab\sin C$

$AB = 3$ cm
$BC = 8$ cm
Angle $ABC = 110°$

Calculate the area of the kite *ABCD*.
Give your answer correct to 3 significant figures.

AREA OF (A) $= \frac{1}{2} \times 3 \times 8 \times \sin 110$ (M1)

$= 11.276...$ (A1)

$\therefore$ TOTAL AREA $= 11.276 \times 2$

$= 22.552...$

$= \underline{22.6\ cm^2}$ (A1)

**2.** [Edexcel, 2014] Area of Triangle (From Sine of the Angle) **[3 Marks]**

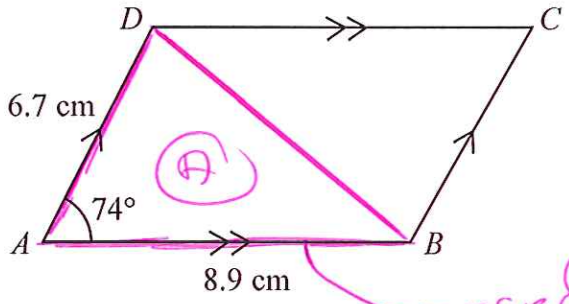



Diagram **NOT** accurately drawn

USE $A = \frac{1}{2}ab\sin C$

*ABCD* is a parallelogram.
*AB* = 8.9 cm.
*AD* = 6.7 cm.
Angle *BAD* = 74°

Calculate the area of parallelogram *ABCD*.
Give your answer correct to 3 significant figures.

(A) $= \frac{1}{2} \times 8.9 \times 6.7 \times \sin 74$ (M1)

$= 28.66$ (A1)

∴ WHOLE PARALLELOGRAM $= 28.66 \times 2$

$= 57.32$

$= 57.3\ cm^2$ (A1)

**3.** [New Question, by Maths4Everyone.com] Area of Triangle (From Sine of the Angle) **[4 Marks]**

[3 MARKS]

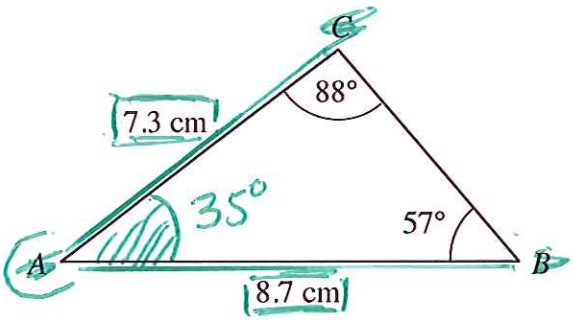



Diagram **NOT** accurately drawn

USE $A = \frac{1}{2}ab\sin C$

Calculate the area of triangle *ABC*.
Give your answer correct to 3 significant figures.

B1 [FOR '35' ANYWHERE IN WORKING]

M1 [CORRECT USE OF FORMULA]

$A = \frac{1}{2}ab\sin C$

$= \frac{1}{2} \times 7.3 \times 8.7 \times \sin 35$

$= 18.2139\ldots$

A1

18.2 ..... $cm^2$

~~(4)~~ (3)

**4.** [Edexcel, 2010] Area of Triangle (From Sine of the Angle) **[6 Marks]**

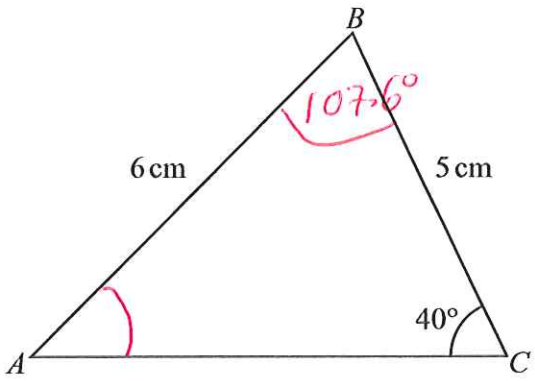



Diagram **NOT** accurately drawn

Calculate the area of triangle *ABC*.
Give your answer correct to 3 significant figures.

LOTS OF DIFFERENT METHODS.
YOU NEED TO USE SINE OR COSINE RULE FIRST

$$\frac{\sin A}{5} = \frac{\sin 40}{6} \Rightarrow \sin A = \frac{5 \times \sin 40}{6} \quad (M1)$$

$$A = \sin^{-1}\left(\frac{5 \times \sin 40}{6}\right) \quad (M1)$$

$$= 32.388^\circ \quad (A1)$$

$$\therefore B = 180 - (40 + 32.388)$$

$$= 107.612 \quad (B1)$$

$$\therefore \text{AREA} = \frac{1}{2} \times 5 \times 6 \times \sin 107.612 \quad (M1)$$

$$= 14.2969\ldots$$

$$14.3 \quad (A1)$$

..... $cm^2$

**5.** [Edexcel, 2008] Area of Triangle (From Sine of the Angle) **[4 Marks]**

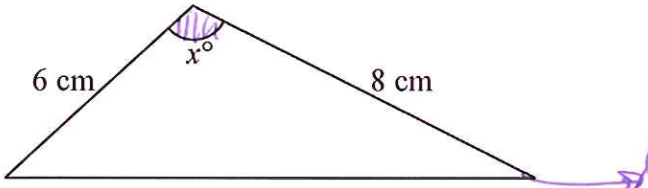



Diagram **NOT** accurately drawn

USE $A = \frac{1}{2}ab\sin C$

The area of the triangle is 12 cm$^2$.
The angle $x°$ is obtuse.
Calculate the value of $x$.

$\frac{1}{2} \times 6 \times 8 \times \sin x = 12$ (M1) [EQUATION]

$\Rightarrow 24 \times \sin x = 12$

$\sin x = 0.5$

$x = \sin^{-1}(0.5)$ } (M1) [EITHER]

$= \underline{30°}$ (A1)

BUT $x$ IS OBTUSE SO

$x = 180 - 30$

$= \underline{150°}$ (A1)

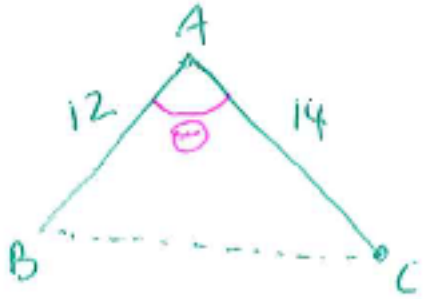
**6.** [Edexcel, 2016] Area of Triangle (From Sine of the Angle) **[4 Marks]**

$ABC$ is a triangle.

$AB = 12$ cm
$AC = 14$ cm
The area of triangle $ABC$ is 72 cm²

USE $A = \frac{1}{2}ab\sin C$

Find, in degrees, the two possible sizes of angle $BAC$.
Give your answers correct to the nearest degree.




$\frac{1}{2} \times 12 \times 14 \sin\theta = 72$ (M1)

$\Rightarrow \sin\theta = \frac{72 \times 2}{12 \times 14}$

$\Rightarrow \sin\theta = \frac{6}{7}$ (M1)

$\therefore \theta = \sin^{-1}\left(\frac{6}{7}\right)$

$= 58.997...$

$= \underline{59^\circ}$ (A1)

BUT $\theta$ COULD ALSO BE OBTUSE $\Rightarrow 180 - 59 = \underline{121^\circ}$ (A1)

**7.** [Edexcel, 2015] Area of Triangle (From Sine of the Angle) **[6 Marks]**

Here is triangle *LMN*, where angle *LMN* is an obtuse angle.

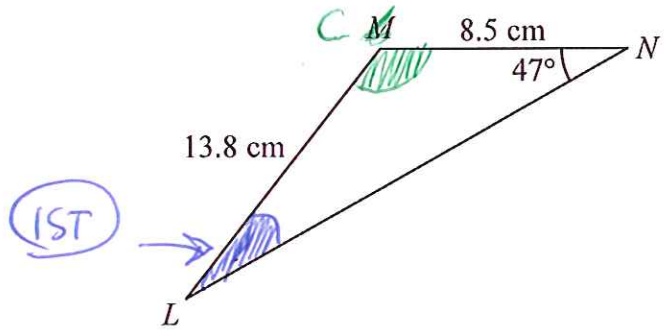



Diagram **NOT** accurately drawn

*ML* = 13.8 cm
*MN* = 8.5 cm
Angle *MNL* = 47°

Work out the area of triangle *LMN*.
Give your answer correct to 3 significant figures.

$A = \frac{1}{2}ab\sin C$

1ST FIND L:

$$\frac{\sin L}{8.5} = \frac{\sin 47}{13.8} \Rightarrow \sin L = 8.5 \times \frac{\sin 47}{13.8} \quad (M1)$$

$$= 0.45047... \quad (M1)$$

$$L = 26.77° \quad (A1)$$

$$\therefore M = 180 - (26.77 + 47)$$

I'VE LABELLED IT AS 'C'

$$= 106.23 \quad (A1)$$

$$A = \frac{1}{2} \times 8.5 \times 13.8 \times \sin 106.23 \quad (M1)$$

$$= 56.312...$$

$$= 56.3 \text{ cm}^2 \quad (A1)$$

**8.** [Edexcel, 2006] Area of Triangle (From Sine of the Angle) **[4 Marks]**

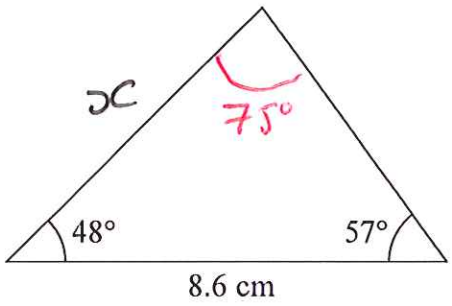



Diagram **NOT** accurately drawn

Calculate the area of the triangle.
Give your answer correct to 3 significant figures.

$$\frac{x}{\sin 57} = \frac{8.6}{\sin 75}$$ (M1)

$$x = \frac{8.6 \times \sin 57}{\sin 75}$$

$$= 7.4669...$$ (A1)

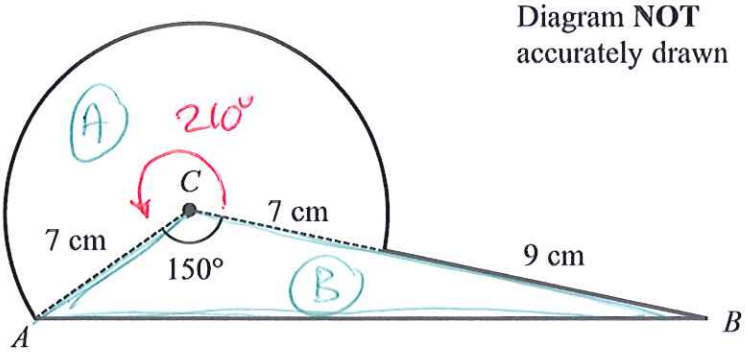
$$\text{AREA} = \frac{1}{2} \times 7.4669 \times 8.6 \times \sin 48$$ (M1)

$$= 23.86...$$

23.9 cm$^2$ (A1)

**9.** [Edexcel, 2013] Area of Triangle (From Sine of the Angle) **[6 Marks]**

Here is a shape.




The shape is made from triangle $ABC$ and a sector of a circle, centre $C$ and radius $CA$.
$CA = 7$ cm.
$CB = 16$ cm.
Angle $ACB = 150°$

Calculate the area of the shape.
Give your answer correct to 3 significant figures.

B1

AREA OF SECTOR $= \frac{210}{360} \times \pi \times 7^2$ M1

A1

$= 89.797...$ A1

AREA OF TRIANGLE $= \frac{1}{2} \times 7 \times 16 \times \sin 150°$ M1

B1

$= 28$ A1

TOTAL $= 89.797... + 28$

$= 117.797$

$= 118 \text{ cm}^2$ A1

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There is no warranty that these solutions will meet Your requirements or provide the results which You want, or that they are complete, or that they are error-free. If You find anything confusing within these solutions then it is Your responsibility to seek clarification from Your teacher, tutor or mentor.

Please report any errors or omissions that You find*. These solutions will be updated to correct errors that are discovered. It is recommended that You always check that You have the most up-to-date version of these solutions.

The methods used in these solutions, where relevant, are methods which have been successfully used with students. The method shown for a particular question is not always the only method and there is no claim that the method that is used is necessarily the most efficient or 'best' method. From time to time, a solution to a question might be updated to show a different method if it is judged that it is a good idea to do so.

Sometimes a method used in these solutions might be unfamiliar to You. If You are able to use a different method to obtain the correct answer then You should consider to keep using your existing method and not change to the method that is used here. However, the choice of method is always up to You and it is often useful if You know more than one method to solve a particular type of problem.

Within these solutions there is an indication of where marks **might** be awarded for each question. B marks, M marks and A marks have been used in a similar, but **not identical**, way that an exam board uses these marks within their mark schemes. This slight difference in the use of these marking symbols has been done for simplicity and convenience. Sometimes B marks, M marks and A marks have been interchanged, when compared to an examiners' mark scheme and sometimes the marks have been awarded for different aspects of a solution when compared to an examiners' mark scheme.

B1 – This is an unconditional accuracy mark (the specific number, word or phrase must be seen. This type of mark cannot be given as a result of 'follow through').

M1 – This is a method mark. Method marks have been shown in places where they might be awarded for the method that is shown. If You use a different method to get a correct answer, then the same number of method marks would be awarded but it is not practical to show all possible methods, and the way in which marks might be awarded for their use, within these particular solutions. When appropriate, You should seek clarity and download the relevant examiner mark scheme from the exam board's web site.

A1 – These are accuracy marks. Accuracy marks are typically awarded after method marks. If the correct answer is obtained, then You should normally (but not always) expect to be awarded all of the method marks (provided that You have shown a method) and all of the accuracy marks.

Note that some questions contain the words 'show that', 'show your working out', or similar. These questions require working out to be shown. Failure to show sufficient working out is likely to result in no marks being awarded, even if the final answer is correct.

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