



Additional Assessment Materials

Summer 2021

Pearson Edexcel GCE in As Mathematics

8MA0\_01 (Public release version)

Resource Set 1: Topic 5

Trigonometry

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Additional Assessment Materials, Summer 2021

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## **General guidance to Additional Assessment Materials for use in 2021**

### **Context**

- Additional Assessment Materials are being produced for GCSE, AS and A levels (with the exception of Art and Design).
- The Additional Assessment Materials presented in this booklet are an optional part of the range of evidence teachers may use when deciding on a candidate's grade.
- 2021 Additional Assessment Materials have been drawn from previous examination materials, namely past papers.
- Additional Assessment Materials have come from past papers both published (those materials available publicly) and unpublished (those currently under padlock to our centres) presented in a different format to allow teachers to adapt them for use with candidate.

### **Purpose**

- The purpose of this resource to provide qualification-specific sets/groups of questions covering the knowledge, skills and understanding relevant to this Pearson qualification.
- This document should be used in conjunction with the mapping guidance which will map content and/or skills covered within each set of questions.
- These materials are only intended to support the summer 2021 series.

1.

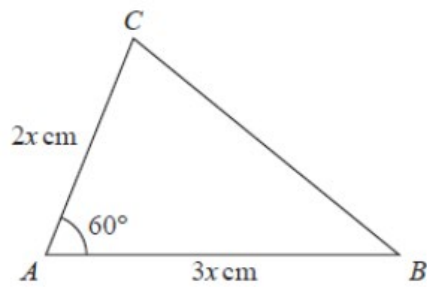


Figure 1

Figure 1 shows a sketch of a triangle  $ABC$  with  $AB = 3x$  cm,  $AC = 2x$  cm and angle  $CAB = 60^\circ$

Given that the area of triangle  $ABC$  is  $18\sqrt{3}$  cm<sup>2</sup>

(a) show that  $x = 2\sqrt{3}$

(3)

(b) Hence find the exact length of  $BC$ , giving your answer as a simplified surd.

(3)

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(Total for Question 1 is 6 marks)

2.

(i) Solve, for  $-90^\circ \leq \theta < 270^\circ$ , the equation,

$$\sin(2\theta + 10^\circ) = -0.6$$

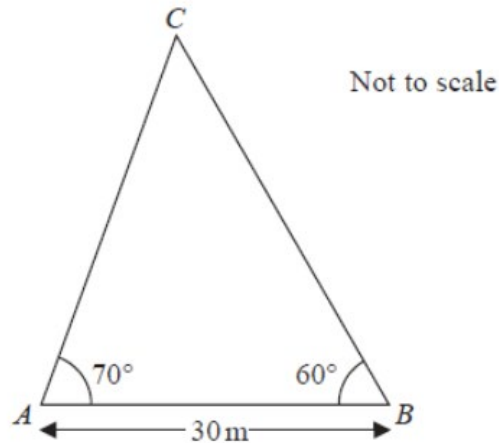
giving your answers to one decimal place.

(5)

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(Total for Question 2 is 5 marks)

3.



**Figure 1**

A triangular lawn is modelled by the triangle  $ABC$ , shown in Figure 1. The length  $AB$  is to be 30m long.

Given that angle  $BAC = 70^\circ$  and angle  $ABC = 60^\circ$ ,

(a) calculate the area of the lawn to 3 significant figures.

(4)

(b) Why is your answer unlikely to be accurate to the nearest square metre?

(1)

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**(Total for Question 3 is 5 marks)**

4.

In a triangle  $ABC$ , side  $AB$  has length 10 cm, side  $AC$  has length 5 cm, and angle  $BAC = \theta$  where  $\theta$  is measured in degrees. The area of triangle  $ABC$  is  $15 \text{ cm}^2$

(a) Find the two possible values of  $\cos \theta$

(4)

Given that  $BC$  is the longest side of the triangle,

(b) find the exact length of  $BC$ .

(2)

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**(Total for Question 4 is 5 marks)**

5.

Solve, for  $360^\circ \leq x < 540^\circ$ ,

$$12 \sin^2 x + 7 \cos x - 13 = 0$$

Give your answers to one decimal place.

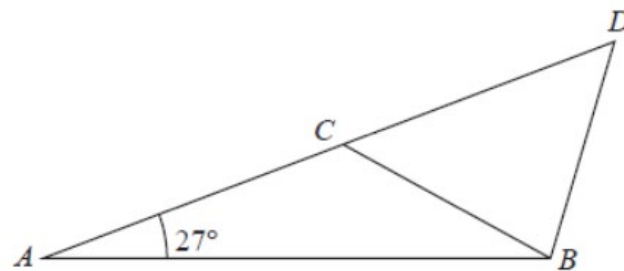
(Solutions based entirely on graphical or numerical methods are not acceptable.)

(5)

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(Total for Question 5 is 5 marks)

6.



Not to scale

Figure 1

Figure 1 shows the design for a structure used to support a roof.

The structure consists of four steel beams,  $AB$ ,  $BD$ ,  $BC$  and  $AD$ .

Given  $AB = 12$  m,  $BC = BD = 7$  m and angle  $BAC = 27^\circ$

(a) find, to one decimal place, the size of angle  $ACB$ .

(3)

The steel beams can only be bought in whole metre lengths.

(b) Find the minimum length of steel that needs to be bought to make the complete structure.

(3)

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Total for Question 6 is 6 marks)

7.

(ii) (a) A student's attempt at the question

“Solve, for  $-90^\circ < x < 90^\circ$ , the equation  $7 \tan x = 8 \sin x$ ”

is set out below.

$$\begin{aligned}7 \tan x &= 8 \sin x \\7 \times \frac{\sin x}{\cos x} &= 8 \sin x \\7 \sin x &= 8 \sin x \cos x \\7 &= 8 \cos x \\\cos x &= \frac{7}{8} \\x &= 29.0^\circ \text{ (to 3 sf)}\end{aligned}$$

Identify two mistakes made by this student, giving a brief explanation of each mistake. (2)

(b) Find the smallest positive solution to the equation

$$7 \tan(4\alpha + 199^\circ) = 8 \sin(4\alpha + 199^\circ) \quad (2)$$

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**Total for Question 7 is 4 marks)**

8.

(a) Show that

$$\frac{10 \sin^2 \theta - 7 \cos \theta + 2}{3 + 2 \cos \theta} \equiv 4 - 5 \cos \theta \quad (4)$$

(b) Hence, or otherwise, solve, for  $0 \leq x < 360^\circ$ , the equation

$$\frac{10 \sin^2 x - 7 \cos x + 2}{3 + 2 \cos x} = 4 + 3 \sin x \quad (3)$$

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**Total for Question 8 is 7 marks)**

9.

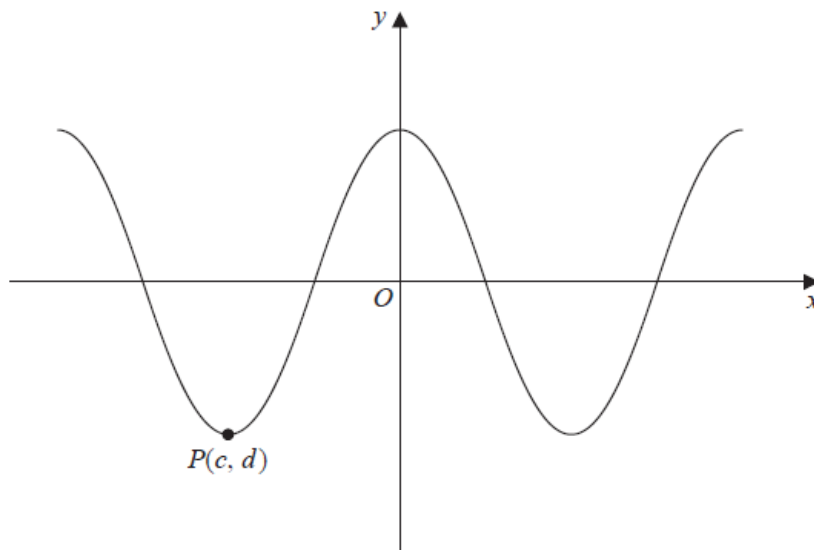


Figure 3

Figure 3 shows part of the curve with equation  $y = 3 \cos x^\circ$ .

The point  $P(c, d)$  is a minimum point on the curve with  $c$  being the smallest negative value of  $x$  at which a minimum occurs.

(a) State the value of  $c$  and the value of  $d$ . (1)

(b) State the coordinates of the point to which  $P$  is mapped by the transformation which transforms the curve with equation  $y = 3 \cos x^\circ$  to the curve with equation

(i)  $y = 3 \cos \left( \frac{x^\circ}{4} \right)$

(ii)  $y = 3 \cos(x - 36)^\circ$  (2)

(c) Solve, for  $450^\circ \leq \theta < 720^\circ$ ,

$$3 \cos \theta = 8 \tan \theta$$

giving your solution to one decimal place.

**In part (c) you must show all stages of your working.**

**Solutions relying entirely on calculator technology are not acceptable.** (5)

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**Total for Question 9 is 8 marks)**



10.

(a) Show that the equation

$$4 \cos \theta - 1 = 2 \sin \theta \tan \theta$$

can be written in the form

$$6 \cos^2 \theta - \cos \theta - 2 = 0$$

(4)

(b) Hence solve, for  $0 \leq x < 90^\circ$

$$4 \cos 3x - 1 = 2 \sin 3x \tan 3x$$

giving your answers, where appropriate, to one decimal place.

*(Solutions based entirely on graphical or numerical methods are not acceptable.)*

(4)

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**Total for Question 10 is 8 marks)**