

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

INTERNATIONAL AS MATHEMATICS

(9660/MA02) Unit PSM1 Pure Mathematics, Statistics and Mechanics

Monday 11 May 2026

08:00 UK Time

Time allowed: 1 hour 30 minutes

Materials

- For this paper you must have the OxfordAQA Booklet of Formulae and Statistical Tables (enclosed).
- You may use a graphical calculator.

Instructions

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- There are three sections to this paper.
- The maximum mark for this paper is 80. There are 40 marks for **Section A**, 20 marks for **Section B** and 20 marks for **Section C**.

Advice

- Unless stated otherwise, you may quote formulae, without proof, from the booklet.
- Show all necessary working; otherwise marks may be lost.

For Examiner's Use	
Question	Mark
1	
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MA02

Section A**Pure Mathematics**

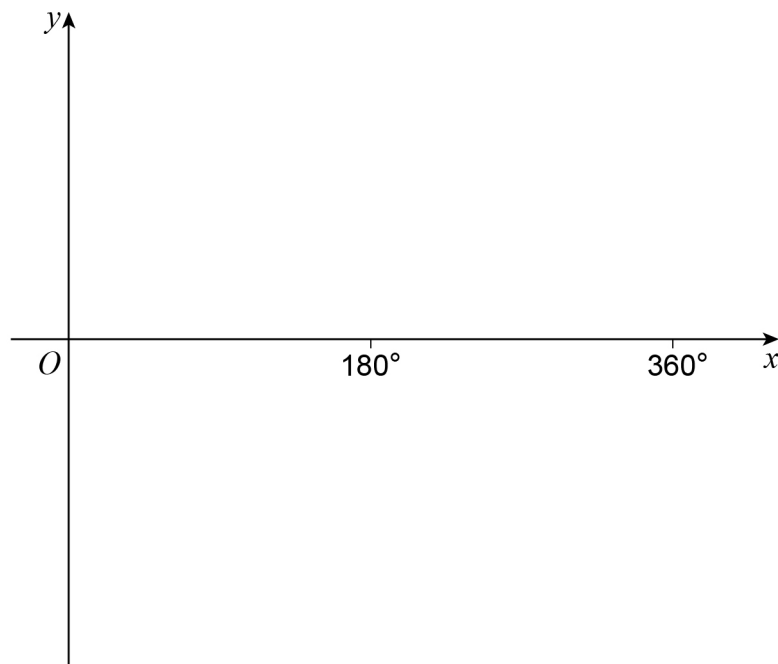
Answer **all** questions in the spaces provided.

- 1 (a)** On **Figure 1** sketch the graph of $y = 3\cos(x - 60^\circ)$ for $0^\circ \leq x \leq 360^\circ$

Show on your graph the values of any intercepts with the axes.

[3 marks]

Figure 1



1 (b) The functions f and g are defined by

$$f(x) = \tan x \quad \text{and} \quad g(x) = \sin(kx)$$

where k is a constant.

It is given that the period of g is equal to 8 times the period of f

Find the value of k

[2 marks]

$k =$ _____

5

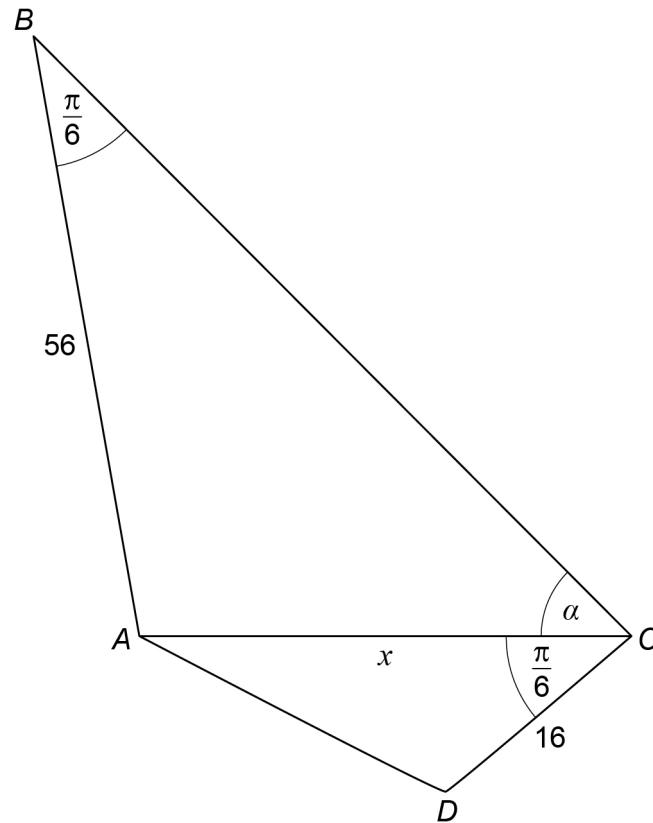
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2 **Figure 2** shows a triangle ABC and a triangle ACD

Figure 2



The length of $AB = 56$ cm

The length of $AC = x$ cm

The length of $CD = 16$ cm

The angle $ABC = \frac{\pi}{6}$ radians

The angle $ACB = \alpha$ radians, where $\sin \alpha = \frac{4}{5}$

The angle $ACD = \frac{\pi}{6}$ radians

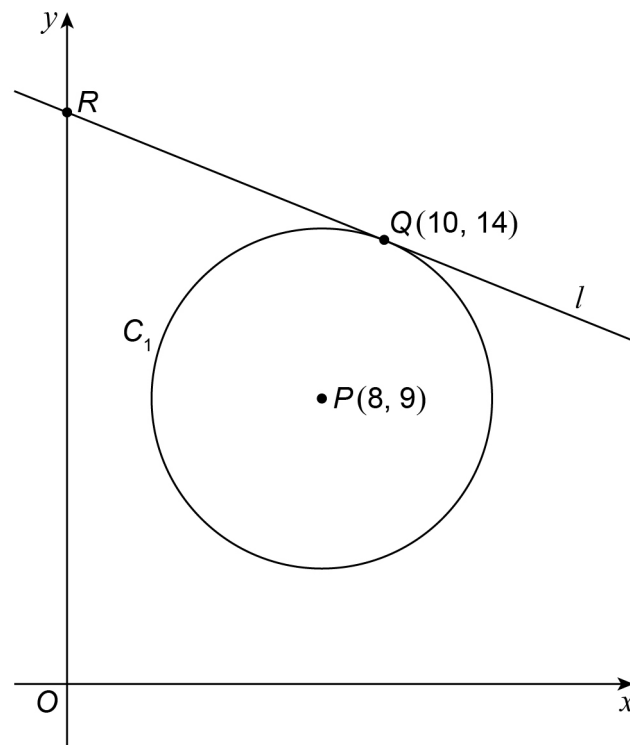
2 (a) Show that $x = 35$

[2 marks]



- 3 A circle C_1 and a line l are shown in **Figure 4**

Figure 4



The circle C_1 has centre $P(8, 9)$ and radius $\sqrt{29}$

The line l is the tangent to C_1 at the point $Q(10, 14)$ and intersects the y -axis at the point R

- 3 (a) Find the area of the triangle PQR

[5 marks]



Answer _____

- 3 (b) (i)** By expressing the equation of C_2 in the form $(x+a)^2 + (y+b)^2 = k$, where a , b and k are constants, find the radius and the coordinates of the centre of C_2

[illegible]

Radius _____ Centre _____

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4 (a) A curve has equation $y = 8 \times 3^{x-7}$

The point $(k, 5)$ lies on the curve, where k is a constant.

Find the value of k

Give your answer in the form $a + \log_3\left(\frac{b}{c}\right)$ where a and b are prime numbers and c is an integer.

[2 marks]

$k =$ _____

4 (b) A geometric series has first term 3 and common ratio $\frac{6}{5}$

The n th term of the series is u_n

Use logarithms to find the smallest value of n for which $u_n > 8700$

[3 marks]

$n =$ _____



5 (a)

$$9 \tan x - 4 \cos x = \frac{5}{\cos x}$$

Show that

$$(4 \sin x - 3)(\sin x + k) = 0$$

where k is a constant.

[3 marks]

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5 (b)

$$9 \tan 2\theta - 4 \cos 2\theta = \frac{5}{\cos 2\theta}$$

in the interval $0 < \theta < \frac{\pi}{2}$

Give your answers in radians to two decimal places.

Fully justify your answers.

[4 marks]

[illegible]

Answer

7



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6

$$\log_5 \left(\frac{x^7}{625} \right) + \log_5 49x - \log_5 x^6$$

can be written as

$$a((\log_5 bx) - a)$$

where a and b are prime numbers.

[5 marks]

[illegible]

5

Section B**Statistics**

Answer **all** questions in the spaces provided.

- 7** A sports team plays 6 games of hockey.
- The number of games the team wins is modelled by a binomial distribution with probability 0.15

- 7 (a)** Find the probability that the team wins exactly 2 games.
- Give your answer to three decimal places.

[1 mark]

Answer _____

- 7 (b)** Find the probability that the team wins at least 1 game.
- Give your answer to three decimal places.

[2 marks]

Answer _____



- 7 (c)** Find the probability that the team wins more than 2 games and at most 4 games.

Give your answer to three decimal places.

[2 marks]

Answer _____

- 7 (d)** Explain why it may **not** be valid to use a binomial distribution to model the number of games the team wins.

[1 mark]

6

Turn over for the next question

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- 8** **Figure 5** shows the probability distribution for the random variable X

Figure 5

x	6	12	15
$P(X = x)$	0.2570	0.5418	0.2012

- 8 (a)** Show that the mean of X is 11.0616

[1 mark]

- 8 (b)** Find the variance of X

Give your answer to two decimal places.

[3 marks]

Answer _____



- 8 (c)** The random variable Y has mean 3 and variance 2.4
The random variable Z has a Bernoulli distribution with parameter p
 X , Y and Z are independent.

- 8 (c) (i)** It is given that $E(X + Y + Z) = 14.5$

Find the value of p

[2 marks]

$p =$ _____

- 8 (c) (ii)** Find $\text{Var}(X + Y + Z)$

Give your answer to one decimal place.

[2 marks]

Answer _____



9 Spinner A is numbered 1, 2, 3, 4 and the probability of landing on each number is equal.

Spinner B is numbered 1, 2, 3, 4, 5, 6, 7 and the probability of landing on each number is equal.

The number that spinner B lands on is independent of the number that spinner A lands on.

Both spinners are spun.

The number that each spinner lands on is recorded.

The sum T of these two numbers is calculated.

9 (a) Find the probability that T is equal to 9

[2 marks]

Answer _____

9 (b) Find the probability that T is equal to 6 given that spinner B lands on an even number.

[2 marks]

Answer _____



9 (c) X represents the event that spinner A lands on a prime number.

Y represents the event that T is equal to 9

Determine whether the events X and Y are independent.

[2 marks]

6

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Mechanics

10

The magnitude of the acceleration of the car and trailer is $a \text{ m s}^{-2}$

10 (a)

[3 marks]

[illegible]

10 (b) It is given that $a = 0.175$

Find the value of m and the magnitude of the tension in the rod.

[3 marks]

$m =$ _____

Magnitude of tension = _____

10 (c) Explain why the resistance forces are unlikely to have constant magnitudes.

[1 mark]

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[3 marks]

[illegible]

$$T =$$

3



12

A particle moves along a straight line.

At time $t = 0$ the particle is moving with velocity 4 m s^{-1}

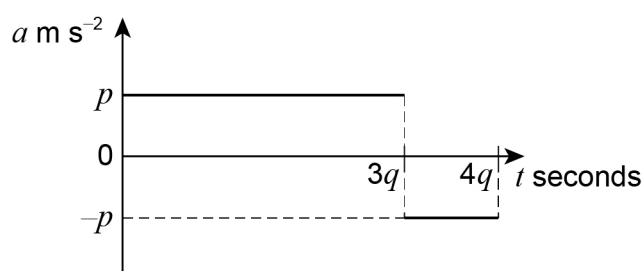
Between $t = 0$ and $t = 3q$ seconds, the acceleration of the particle is $p \text{ m s}^{-2}$ where p and q are positive constants.

Between $t = 3q$ seconds and $t = 4q$ seconds, the acceleration of the particle is $-p \text{ m s}^{-2}$

At time $t = 4q$ seconds, the particle is moving with velocity 10 m s^{-1}

The acceleration–time graph for the particle is shown in **Figure 6**

Figure 6



Find p in terms of q

[3 marks]

Answer _____

3



13 Two particles A and B are initially at rest on a smooth horizontal surface.

Particle A has mass 6 kg

Particle B has mass 2 kg

Particle A is set in motion with speed 4 m s^{-1} directly towards particle B

The particles collide.

After this collision, particle A continues in the same direction with speed 2.5 m s^{-1}

13 (a) Show that the speed of B after this collision is 4.5 m s^{-1}

[2 marks]

13 (b) Particle B hits a fixed wall 2 seconds after its collision with A

The wall is perpendicular to the direction of motion of B

The distance between the wall and the point where A and B collided is d metres.

13 (b) (i) Find the value of d

[1 mark]

$d =$ _____



[4 marks]

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Answer

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END OF QUESTIONS



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