

Surname	
Other Names	
Centre Number	
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I declare this is my own work.	

AS MATHEMATICS

Paper 1

7356/1

Time allowed: 1 hour 30 minutes

At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.



- You must have the AQA Formulae for A-level Mathematics booklet.
- You should have a graphical or scientific calculator that meets the requirements of the specification.

INSTRUCTIONS

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer ALL questions.
- You must answer each question in the space provided for that question. 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 NOT write on blank pages.
- Show all necessary working; otherwise marks for method may be lost.
- Do all rough work in this book. Cross through any work that you do not want to be marked.



INFORMATION

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.

ADVICE

- Unless stated otherwise, you may quote formulae, without proof, from the booklet.
- You do not necessarily need to use all the space provided.

DO NOT TURN OVER UNTIL TOLD TO DO SO



SECTION A

Answer ALL questions in the spaces provided.

1 Express as a single logarithm

$$\log_{10} 2 - \log_{10} x$$

Circle your answer. [1 mark]

$$\log_{10}(2+x)$$

$$\log_{10}(2-x)$$

$$\log_{10}(2x)$$

$$\log_{10}\left(\frac{2}{x}\right)$$



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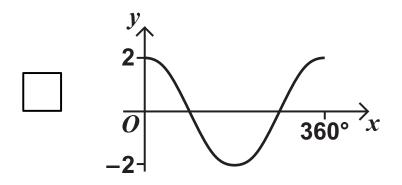


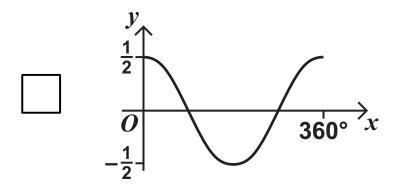
The graph of the function $y = \cos \frac{1}{2}x$ for $0^{\circ} \le x \le 360^{\circ}$ is one of the graphs shown opposite.

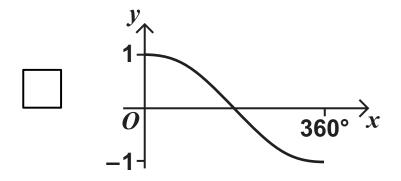
Identify the correct graph.

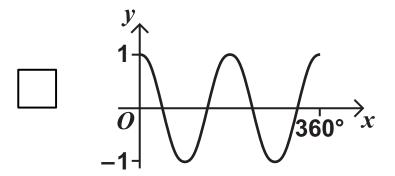


Tick (✓) ONE box. [1 mark]











3	Find the coefficient of the x^3 term in the
	expansion of $\left(3x + \frac{1}{2}\right)^4$ [3 marks]



			 	
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4	Find all the solutions of the equation
	$\cos^2\theta=10\sin\theta+4$
	for $0^{\circ} < \theta < 360^{\circ}$, giving your answers to the nearest degree.
	Fully justify your answer. [5 marks]
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Express $3x^3 + 5x^2 - 27x + 10$ in the form $(x-2)(ax^2 + bx + c)$, where a , b and c are integers. [3 marks]



1	



6	AB is a diameter of a circle where A is (1, 4) and B is (7, −2)
6 (a)	Find the coordinates of the midpoint of <i>AB</i> . [1 mark]
6 (b)	Show that the equation of the circle may be written as
	$x^2 + y^2 - 8x - 2y = 1$
	[4 marks]



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6 (c)	The circle has centre C and crosses the x -axis at points D and E .			
	Find the exact area of triangle DEC. [4 marks]			



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7	A curve has equation $y = a^2 - x^2$, where $a > 0$
	The area enclosed between the curve and the x -axis is 36 units.
	Find the value of a .
	Fully justify your answer. [6 marks]







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8 A curve has equation

$$y = x^3 - 6x + \frac{9}{x}$$

8 (a) Show that the x coordinates of the stationary points of the curve satisfy the equation

$$x^4 - 2x^2 - 3 = 0$$

[3 marks]



Deduce station	e that the cur ary points.	ve has exa [3 marks]	ctly two



8 (c)	Find the coordinates and nature of the two stationary points.			
	Fully justify your answer. [4 marks]			



(d)	Write down the equation of a line which is a tangent to the curve in two places. [1 mark]



9	Integers m and n are both odd.
	Prove that $m^2 + n^2$ is a multiple of 2 but NOT a multiple of 4 [5 marks]





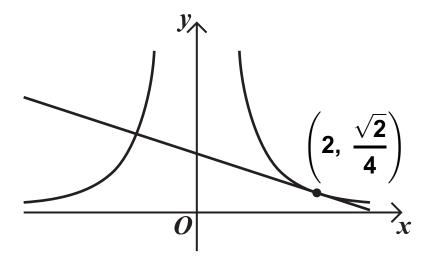
10	Curve C has equation $y = \frac{\sqrt{2}}{x^2}$
10 (a)	Find an equation of the tange

\ /		n of the tangent to <i>C</i> at the
	point $\left(2, \frac{\sqrt{2}}{4}\right)$	[4 marks]

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10 (b) Show that the tangent to C at the point $\left(2, \frac{\sqrt{2}}{4}\right)$ is also a normal to the curve at a different point.



[5 marks]

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TURN OVER FOR SECTION B



SECTION B

Answer ALL questions in the spaces provided.

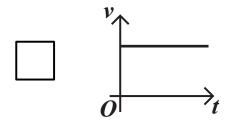
A car, initially at rest, moves with constant acceleration along a straight horizontal road.

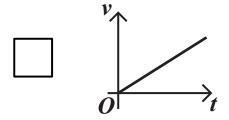
One of the graphs opposite shows how the car's velocity, $v \, \text{m s}^{-1}$, changes over time, t seconds.

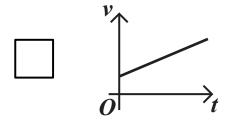
Identify the correct graph.

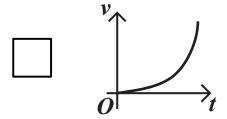


Tick (✓) ONE box. [1 mark]











12 A horizontal force of 30 N causes a crate to travel with an acceleration of $2 \,\mathrm{m\,s^{-2}}$, in a straight line, on a smooth horizontal surface.

Find the WEIGHT of the crate.

Circle your answer. [1 mark]

15 kg

15*g* N

15 N

15*g* kg



13	Two points A and B lie in a horizontal plane and have coordinates (-2, 7) and (3, 19) respectively.
	A particle moves in a straight line from <i>A</i> to <i>B</i> under the action of a constant resultant force of magnitude 6.5 N
	Express the resultant force in vector form. [3 marks]



14	A ball is released from rest from a height h metres above horizontal ground and falls freely downwards.
	When the ball reaches the ground, its speed is $v {\rm m} {\rm s}^{-1}$, where $v \leq 10$
	Show that
	$h \leq \frac{50}{g}$
	[3 marks]





15	Two particles, <i>P</i> and <i>Q</i> , are initially at rest at the same point on a horizontal plane.
	A force of $\begin{bmatrix} 4 \\ 0 \end{bmatrix}$ N is applied to P .
	A force of $\begin{bmatrix} 8 \\ 15 \end{bmatrix}$ N is applied to Q .
15 (a)	Calculate, to the nearest degree, the acute angle between the two forces. [2 marks]



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15 (b)	The particles begin to move under the action of the respective forces.
	P and Q have the same mass.
	P has an acceleration of magnitude 5 m s $^{-2}$
	Find the magnitude of the acceleration of Q. [3 marks]





	42
16	Jermaine and his friend Meena are walking in the same direction along a straight path.
	Meena is walking at a constant speed of $u \text{m s}^{-1}$
	Jermaine is walking $0.2\mathrm{ms^{-1}}$ more slowly than Meena.
	When Jermaine is d metres behind Meena he starts to run with a constant acceleration of $2 \mathrm{ms^{-2}}$, for a time of t seconds, until he reaches her.
16 (a)	Show that
	$d=t^2-0.2t$
	[4 marks]



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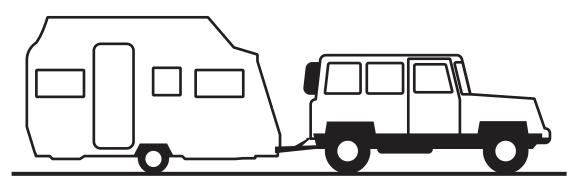
16 (b)	When Jermaine's speed is $7.8\mathrm{ms^{-1}}$, he reaches Meena.
	Given that $u = 1.4$ find the value of d . [2 marks]



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17



A car and caravan, connected by a tow bar, move forward together along a horizontal road.

Their velocity $v \, {\rm m \, s^{-1}}$ at time t seconds, for $0 \le t < 20$, is given by

$$v = 0.5 t + 0.01 t^2$$

17 (a) Show that when t = 15 their acceleration is $0.8 \,\mathrm{m\,s^{-2}}$ [2 marks]

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17 (b) The car has a mass of 1500 kg		
		The caravan has a mass of 850 kg
		When $t=15$ the tension in the tow bar is 800 N and the car experiences a resistance force of 100 N
17 (b)	(i)	Find the total resistance force experienced by the caravan when $t = 15$ [2 marks]



17 (b) (ii)	Find the driving force being applied by the car when $t = 15$ [3 marks]				



17 (c)	State one assumption you have made about the tow bar. [1 mark]

END OF QUESTIONS



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