



Surname _____

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I declare this is my own work.

AS MATHEMATICS

Paper 1

7356/1

Thursday 16 May 2024 Afternoon

Time allowed: 1 hour 30 minutes

At the top of the page, write your surname and forename(s), your centre number, your candidate number and add your signature.

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J U N 2 4 7 3 5 6 1 0 1

MATERIALS

For this paper you must have:

- **the AQA Formulae for A-level Mathematics booklet**
- **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. Do not write 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).**
- **Show all necessary working; otherwise marks for method may be lost.**
- **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.**
- **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 It is given that $\tan \theta^\circ = k$, where k is a constant.

Find $\tan (\theta + 180)^\circ$

Circle your answer. [1 mark]

$$-k$$

$$-\frac{1}{k}$$

$$\frac{1}{k}$$

$$k$$



2 Curve C has equation $y = \frac{1}{(x-1)^2}$

State the equations of the asymptotes to curve C

Tick (✓) ONE box. [1 mark]

$x = 0$ and $y = 0$

$x = 0$ and $y = 1$

$x = 1$ and $y = 0$

$x = 1$ and $y = 1$

[Turn over]



[Turn over]



4 (a)(i) By using a suitable trigonometric identity, show that the equation

$$\sin \theta \tan \theta = 4 \cos \theta$$

can be written as

$$\tan^2 \theta = 4 \quad [1 \text{ mark}]$$

4 (a)(ii) Hence solve the equation

$$\sin \theta \tan \theta = 4 \cos \theta$$

where $0^\circ < \theta < 360^\circ$

Give your answers to the nearest degree.
[3 marks]



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[Turn over]



5 A student is looking for factors of the polynomial $f(x)$

They suggest that $(x - 2)$ is a factor of $f(x)$

The method they use to check this suggestion is to calculate $f(-2)$

They correctly calculate that $f(-2) = 0$

They conclude that their suggestion is correct.

5 (a) Make ONE comment about the student's METHOD. [1 mark]



5 (b) Make TWO comments about the student's CONCLUSION. [2 marks]

1 _____

2 _____

[Turn over]



[Turn over]



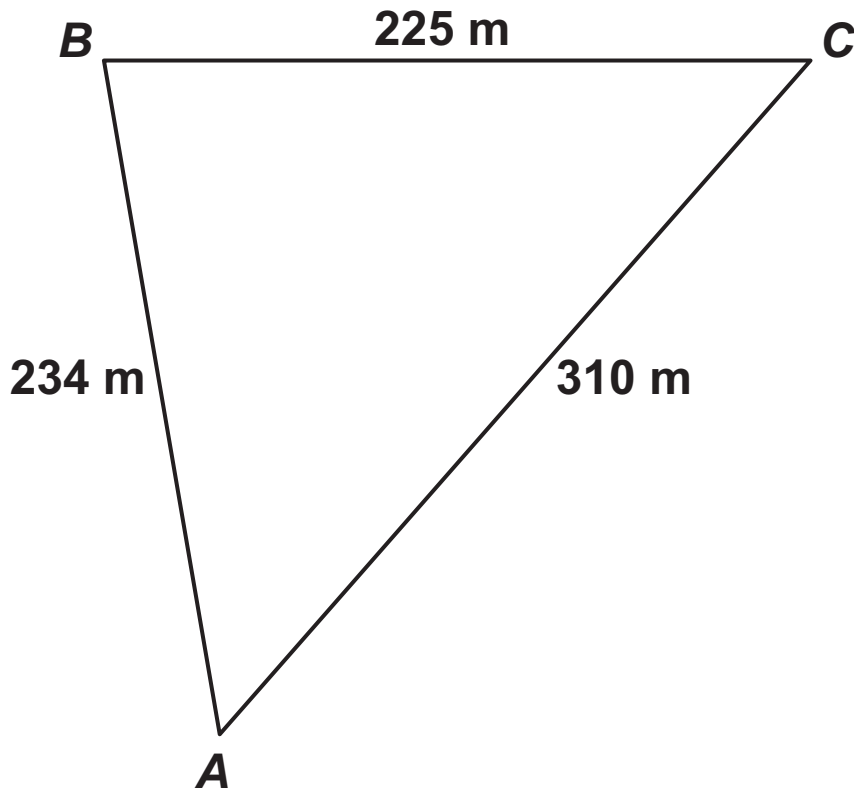
- 7 A triangular field of grass, ABC , has boundaries with lengths as follows:

$$AB = 234 \text{ m}$$

$$BC = 225 \text{ m}$$

$$AC = 310 \text{ m}$$

The field is shown in the diagram below.



7 (a) Find angle A [2 marks]

[Turn over]



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[Turn over]



9 A curve has equation $y = f(x)$ where

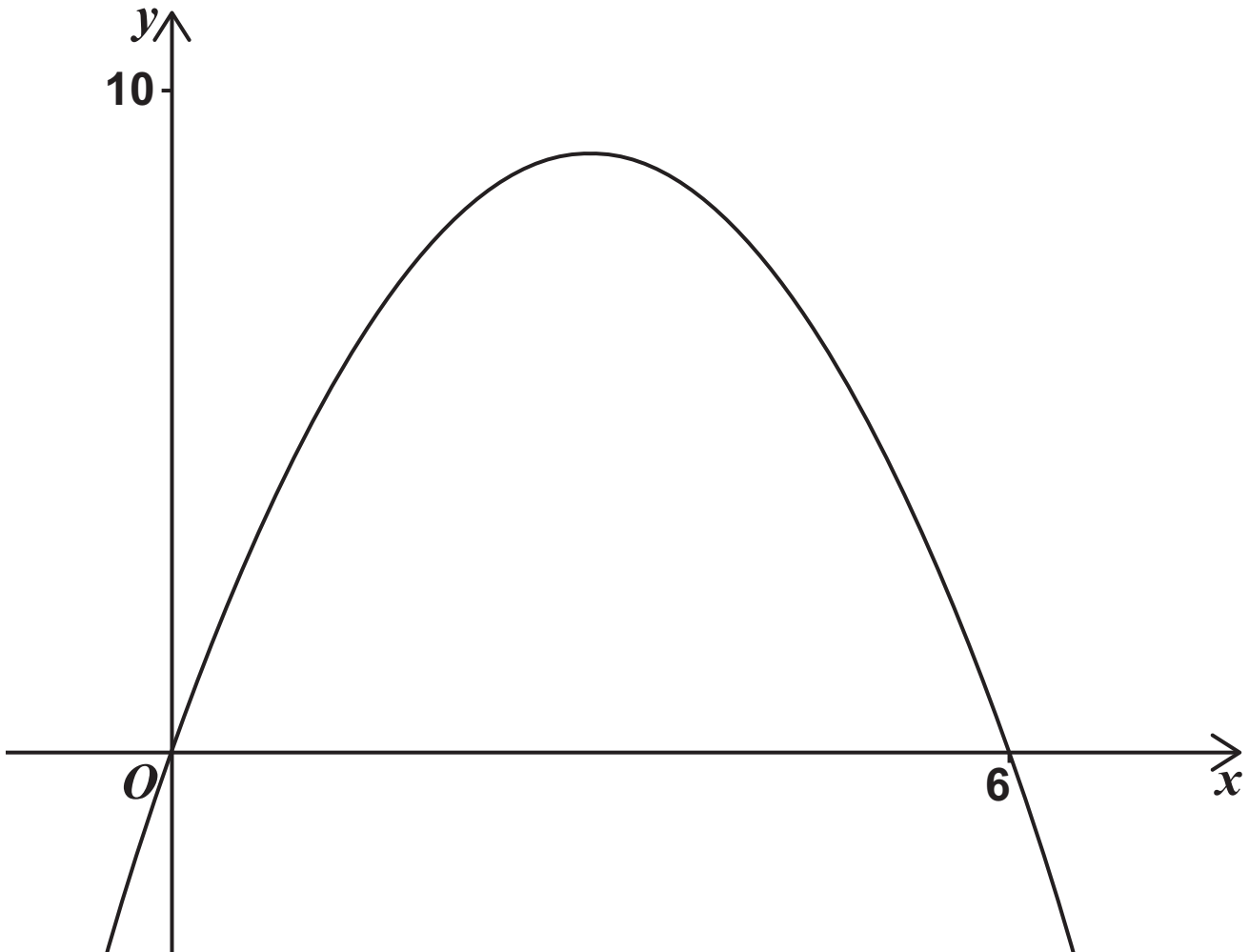
$$f(x) = x(6 - x)$$

9(a) Find $f'(x)$ [2 marks]



9(b) The diagram below shows the graph of $y = f(x)$

On the same diagram sketch the gradient function for this curve, stating the coordinates of any points where the gradient function cuts the axes. [3 marks]



[Turn over]



11 (b) Find the set of values of x for which g is an increasing function. [2 marks]

[Turn over]



- 12 The monthly mean temperature of a city, T degrees Celsius, may be modelled by the equation

$$T = 15 + 8 \sin(30m - 120)^\circ$$

where m is the month number, counting January = 1, February = 2, through to December = 12

- 12 (a) Using this model, calculate the monthly mean temperature of the city for May, the fifth month. [2 marks]



12 (b) Using this model, find the month with the highest mean temperature. [2 marks]

[Turn over]



12 (c) Climate change may affect the parameters, 8, 30, 120 and 15, used in this model.

12 (c)(i) State, with a reason, which parameter would be increased because of an overall rise in temperatures. [1 mark]

12 (c)(ii) State, with a reason, which parameter would be increased because of the occurrence of more extreme temperatures. [1 mark]



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[Turn over for Section B]



SECTION B

Answer ALL questions in the spaces provided.

- 13 A particle is moving in a straight line with constant acceleration $a \text{ m s}^{-2}$

The particle's velocity, $v \text{ m s}^{-1}$, varies with time, t seconds, so that

$$v = 3 - 4t$$

Deduce the value of a

Circle your answer. [1 mark]

–4

–1

3

4



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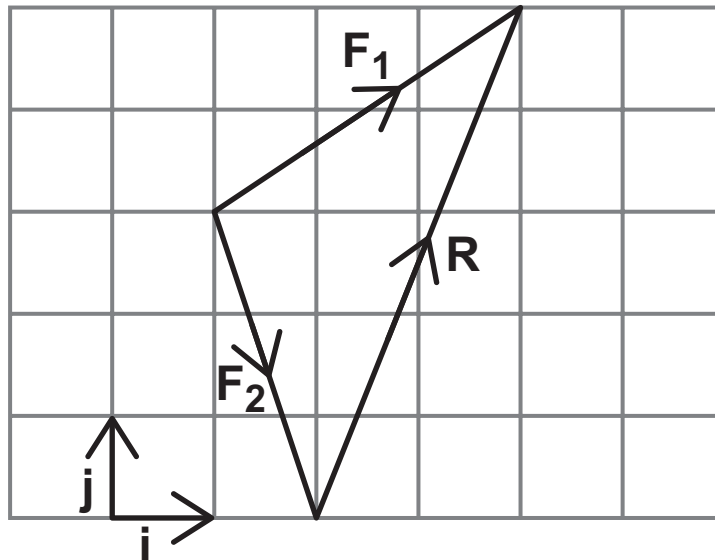


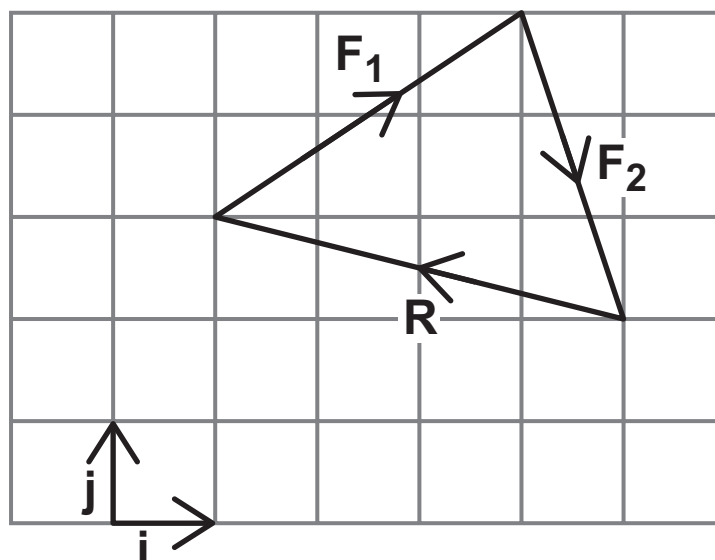
- 14 Two forces, $F_1 = 3i + 2j$ newtons and $F_2 = i - 3j$ newtons, are added together to find a resultant force, R newtons.

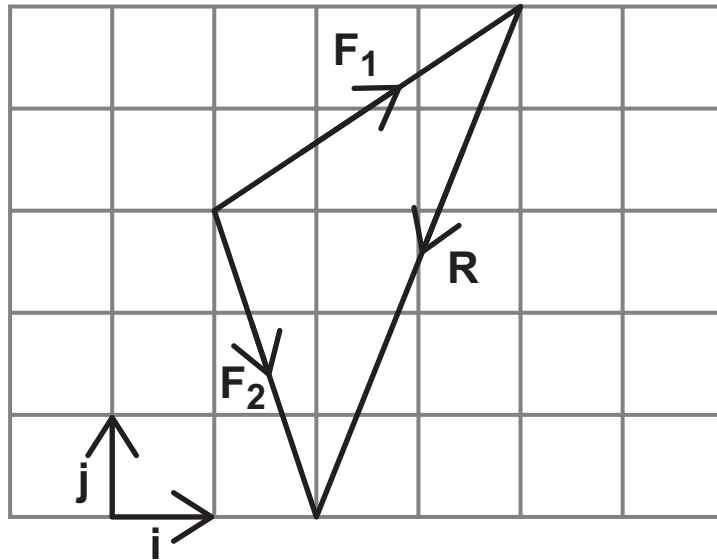
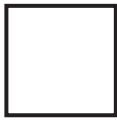
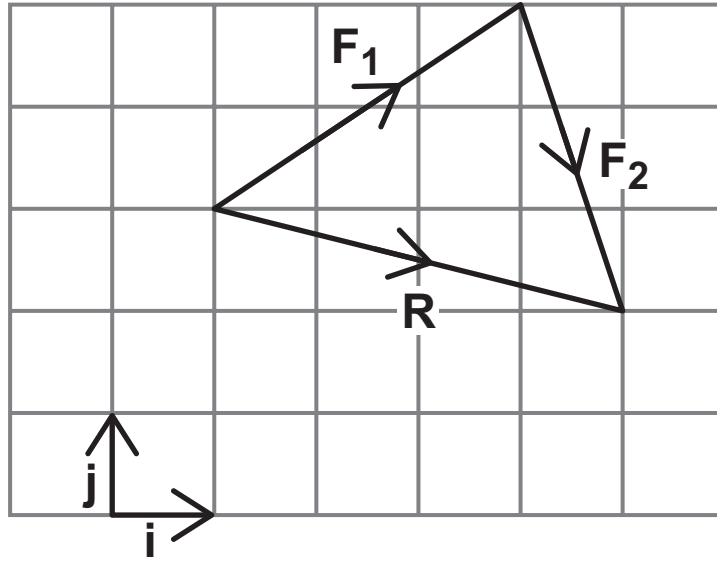
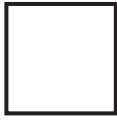
This vector addition can be represented using a diagram.

Identify the diagram below and on the opposite page, which correctly represents this vector addition.

Tick (✓) ONE box. [1 mark]



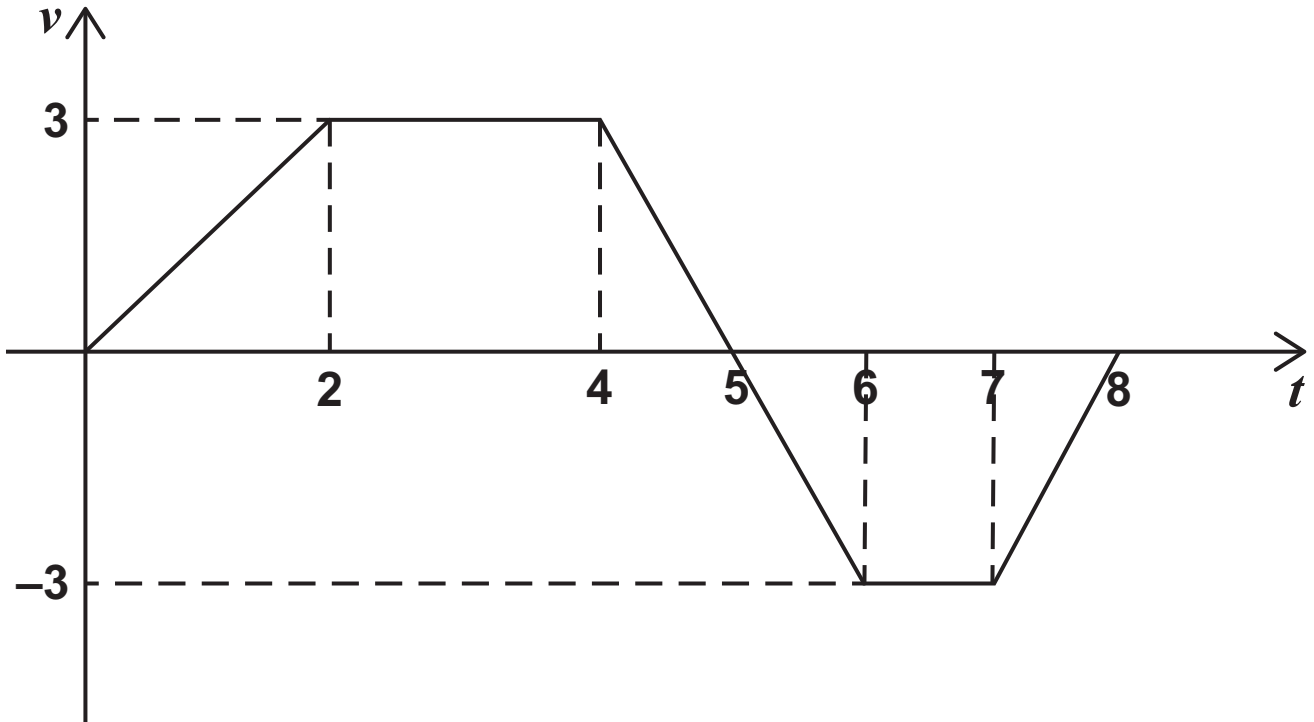




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- 15 A graph indicating how the velocity, $v \text{ m s}^{-1}$, of a particle changes with respect to time, t seconds, is shown below.



- 15(a) Find the total distance travelled by the particle over the 8 second period shown. [3 marks]



15 (b) A student claims that

“The displacement of the particle is less than the distance travelled.”

State the range of values of t for which this claim is true. [1 mark]

[Turn over]





[Turn over]



[Turn over]



18 (b) A constant resultant force, of magnitude R newtons, acts on a particle so that it moves in a straight line passing through the same two points A and B

At A , the speed of the particle is 3 m s^{-1} in the direction from A to B

The particle takes 2 seconds to travel from A to B

The mass of the particle is 150 grams.

Find the value of R [3 marks]

[Turn over]



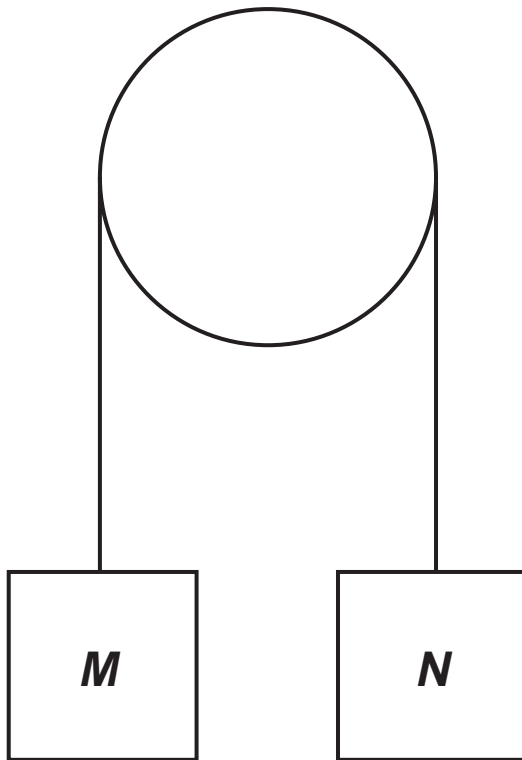


- 19 Two objects, M and N , are connected by a light inextensible string that passes over a smooth peg.

M has a mass of 0.6 kilograms.

N has a mass of 0.5 kilograms.

M and N are initially held at rest, with the string taut, as shown in the diagram below.



M and N are released at the same instant and begin to move vertically.

You may assume that air resistance can be ignored.

[Turn over]



[Turn over]



19 (b) The speed of N , 0.5 seconds after its release, is $\frac{g}{k}$ m s⁻¹ where k is a constant.

Find the value of k [2 marks]



19 (c) State ONE assumption that must be made for the answer in part (b) to be valid. [1 mark]

END OF QUESTIONS



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