1st Class Maths

PRACTICE PAPER FOR

AQA Level 2 Further Maths Paper 2 (June 2023)

------------------------------ **Disclaimer** ------------------------------

In 2022 I wrote a series of predicted papers that in many cases reflected the real exam paper very well. This was due to the exam boards providing advance information on the topics that were going to be in each paper. This information is no longer provided so "predicting" a paper is not possible. Nobody can know what topics and types of questions will come up in each paper, apart from the few examiners that write them.

This paper has been created based on the topics that did not occur on paper 1 and those that frequently appear in past papers. The paper should be excellent at helping students revise for exams, however should not be relied upon as the basis for revision. The topics from this paper may well appear in the real exams, however there is absolutely no guarantee of this for the reasons previously mentioned. Some topics may appear, some may not.

Ultimately the best way to prepare for the exams is to **revise all topics**.

@1stclassmaths

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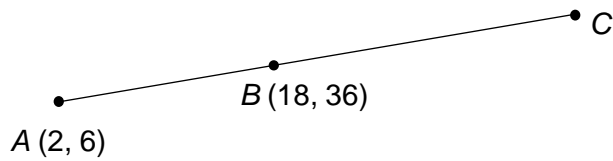Answer **all** questions in the spaces provided.

1 $\frac{3}{4}$ of h = 85% of $(h-3)$

Work out the value of h. **[3 marks]**

$h =$ _____

2 *ABC* is a straight line with $AB : AC = 2 : 5$

• *C*

Not drawn accurately

B (18, 36)

A (2, 6)

Work out the coordinates of point *C*. **[3 marks]**

$C =$ _____

Video Solutions

3 $A = \begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix}$

The point P (3, -2) is transformed by matrix A to point P'
Work out the coordinates of P' **[2 marks]**

$P' =$ _____

4 Solve $\dfrac{25^{2x}}{5} = 5^x$ **[3 marks]**

Answer _____

5 $x + y : x - y = 7 : 1$

Work out the ratio $x : y$

Give your answer in its simplest form. **[3 marks]**

Answer _____

14

Turn over ▶

6 Simplify fully $\dfrac{x(x + 2)^3 - 8(x + 2)^2}{x^2 - 4}$ **[4 marks]**

Answer _____

7 $y = \dfrac{9x - 3x^2}{x^2}$

Work out an expression for the rate of change of y with respect to x.   **[3 marks]**

Answer _____

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8 The nth term of a sequence is $\dfrac{2n^2 + 13}{3n^2 + 15n}$

8 (a) Two terms in the sequence have the value 0.5

Work out the both possible values of n. **[4 marks]**

$n = $ _____ and $n = $ _____

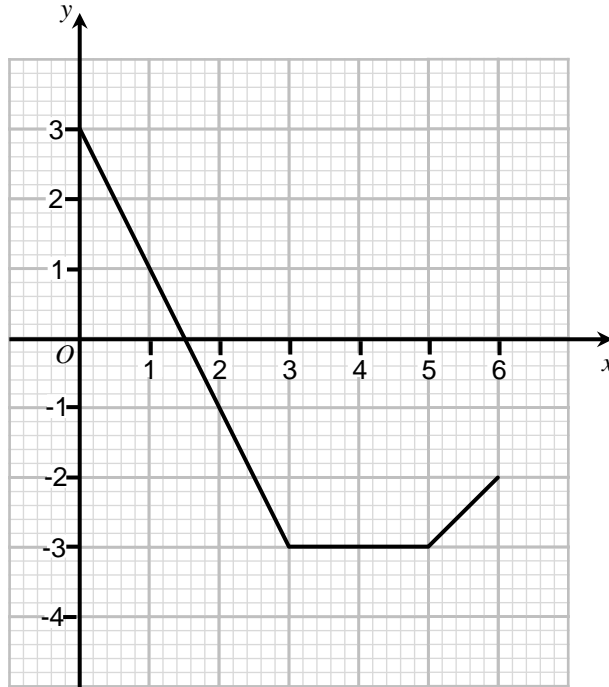**8 (b)** Write down the limiting value of the sequence as n → ∞ **[1 mark]**

Answer _____

12

Turn over ►

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9 (a)   Here is a graph of $y = f(x)$

Define f(x), stating clearly the domain for each part.   **[3 marks]**

f(x) = _____   _____ ≤ x < _____

_____   _____ ≤ x < _____

_____   _____ ≤ x ≤ _____

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9 (b)   The function g is given by $g(x) = \dfrac{3}{5x + 1}$

Write down the value of x for which the function not defined.   **[1 mark]**

Answer _____

9 (c)   The function h is given by $h(x) = \sin(x)$ with domain $180° \leq x \leq 360°$

Work out the range of the function.   **[2 marks]**

Answer _____

10   Work out the values of x for which $f(x) = 2x^2 + 20x$ is a decreasing function.

Give your answer as an inequality.   **[3 marks]**

Answer _____

9

Turn over ▶

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11   f$(x) = 4x^3 + 23x^2 + 30x - 9$

11 (a)   Use the factor theorem to show that $(4x - 1)$ is a factor of f(x).   **[2 marks]**

11 (b)   Hence, fully factorise f(x).   **[3 marks]**

Answer

Video Solutions

12 The nth term of a sequence is $an - bn^2$

The first term in the sequence is equal to 7
The fifth term in the sequence is equal to -5

Work out the 20th term of the sequence.

[4 marks]

Answer

9

Turn over ▶

Video Solutions

Do not write outside the box

13 $M = \begin{pmatrix} k & 0 \\ 0 & k \end{pmatrix}$

13 (a)   Describe fully the transformation represented by matrix **M**.   **[1 mark]**

_____

_____

_____

13 (b)   Describe fully the transformation represented by matrix **M²**.   **[2 marks]**

_____

_____

_____

13 (c) Here are two transformations in the $x - y$ plane.

A: Reflection in the y-axis.
B: Reflection in the line $y = x$

Use matrix multiplication to show that transformation A followed by B is equivalent to a single rotation.

[4 marks]

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14 Integers are made using all of the digits 1, 2, 3, 4, 7 and 9.

Each integer made

      is greater than 300,000
      is less than 500,000
      is even

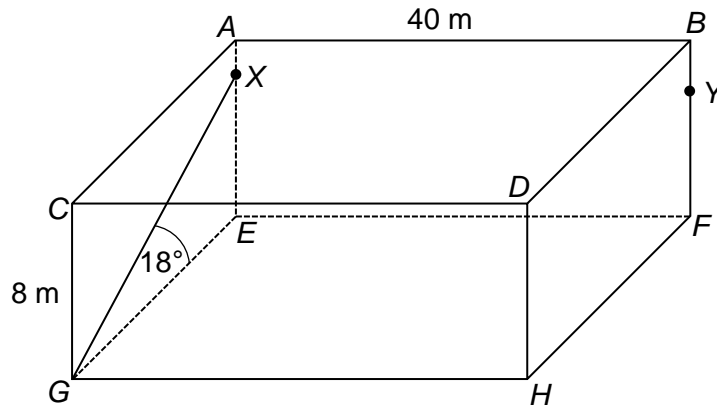How many integers can be made? **[3 marks]**

Answer _____

10

Turn over ▶

15 The diagram shows a sports hall in a shape of a cuboid ABCDEFGH.

The height of the sports hall, CG = 8 m
The width of the sports hall, AB = 40 m

Two security cameras are fixed at points X and Y.

The camera at point X is located at 90% of the height of the sports hall.
The camera at point Y is located at 80% of the height of the sports hall.

The angle of elevation of the camera at X from the point G is 18°
Calculate the angle of elevation of the camera at Y from the point G.
Give your answer to the nearest degree. **[5 marks]**

°

Answer _____

16 The graphs of $x^2 + y^2 = 225$ and $y = 9$ are shown below.
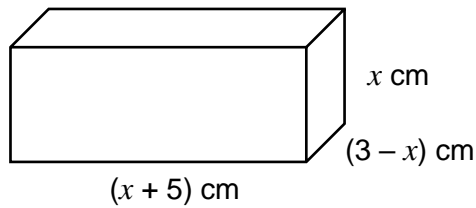The graphs intersect at the point P and Q.
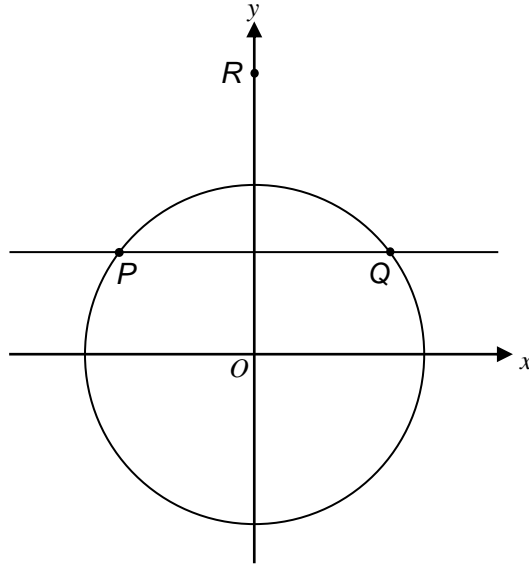
The tangents to the circle at points P and Q both intersect the y-axis at point R.

Work out the area of the triangle PQR.

[6 marks]

Answer _____ units^2

11

Turn over ▶

17 This lengths of a cuboid are x cm, $(3 - x)$ cm and $(x + 5)$ cm

x cm

Not drawn accurately

$(3 - x)$ cm

$(x + 5)$ cm

17 (a) Show that the volume of the cuboid, V, is given by $V = 15x - 2x^2 - x^3$ **[3 marks]**

17 (b) Use differentiation to work out the maximum value of V as x varies. **[5 marks]**
Give your answer to 1 decimal place.

Answer _____ cm^3

Do not write outside the box

18 (a) Show that $\dfrac{1}{\cos^2\theta} + \dfrac{2\sin\theta - \cos\theta}{\cos\theta} \equiv \tan^2\theta + 2\tan\theta$ **[3 marks]**

18 (b) Hence solve $\dfrac{1}{\cos^2\theta} + \dfrac{2\sin\theta - \cos\theta}{\cos\theta} = 3$ for $0° \leq \theta \leq 360°$ **[4 marks]**

Answer _____

15