

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

**Pearson Edexcel**

**Level 1/Level 2 GCSE (9–1)**

**Aiming for 9 – Spring 2022 practice paper**

Morning (Time: 1 hour 30 minutes)

Paper Reference **1MA1/1H**

**Mathematics**

**Paper 1 (Non-Calculator)**

**Higher Tier**

**You must have:** Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.  
Tracing paper may be used.

Total Marks

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*
- You must **show all your working**.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **Calculators may not be used.**



### Information

- The total mark for this paper is 80. There are 21 questions.
- Questions have been arranged in an ascending order of mean difficulty, as found by Grade 7 students in June and November examinations.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*

### Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

**Answer ALL TWENTY ONE questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages in your working.**

**1** (a) Find the value of  $\sqrt[4]{81 \times 10^8}$

.....  
(2)

(b) Find the value of  $64^{-\frac{1}{2}}$

.....  
(2)

(c) Write  $\frac{3^n}{9^{n-1}}$  as a power of 3

.....  
(2)

**(Total for Question 1 is 6 marks)**

2 Ted is trying to change  $0.\dot{4}\dot{3}$  to a fraction.

Here is the start of his method.

$$x = 0.\dot{4}\dot{3}$$

$$10x = 4.\dot{3}\dot{4}$$

$$10x - x = 4.\dot{3}\dot{4} - 0.\dot{4}\dot{3}$$

Evaluate Ted's method so far.

.....  
.....  
.....

**(Total for Question 2 is 1 mark)**

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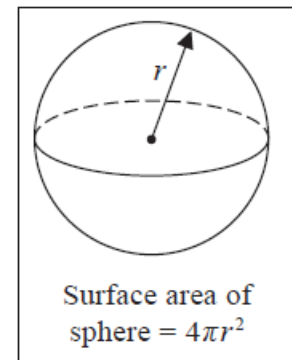
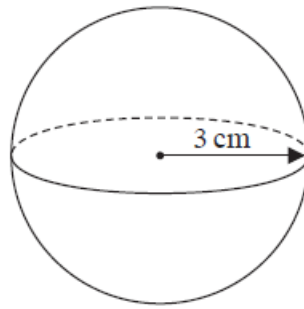
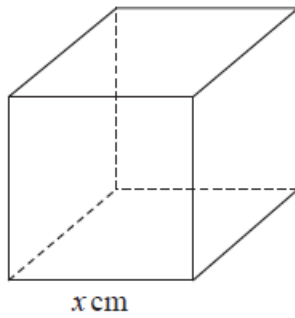
3 Solve  $x^2 = 5x + 24$

.....

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

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- 4 The diagram shows a cube with edges of length  $x$  cm and a sphere of radius 3 cm.



The surface area of the cube is equal to the surface area of the sphere.

Show that  $x = \sqrt{k\pi}$  where  $k$  is an integer.

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

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5 Make  $f$  the subject of the formula  $d = \frac{3(1-f)}{f-4}$

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

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6 Shirley wants to find an estimate for the number of bees in her hive.

On Monday she catches 90 of the bees.

She puts a mark on each bee and returns them to her hive.

On Tuesday she catches 120 of the bees.

She finds that 20 of these bees have been marked.

(a) Work out an estimate for the total number of bees in her hive.

.....  
**(3)**

Shirley assumes that none of the marks had rubbed off between Monday and Tuesday.

(b) If Shirley's assumption is wrong, explain what effect this would have on your answer to part (a).

.....  
.....  
.....  
**(1)**

**(Total for Question 6 is 4 marks)**

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- 7 The straight line  $L_1$  has equation  $y = 3x - 4$   
The straight line  $L_2$  is perpendicular to  $L_1$  and passes through the point  $(9, 5)$   
Find an equation of line  $L_2$

.....  
(Total for Question 7 is 3 marks)

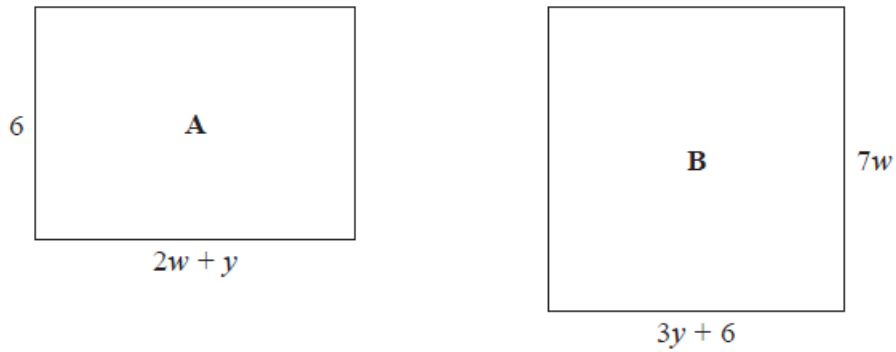
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- 8 Sally plays two games against Martin.  
In each game, Sally could win, draw or lose.  
In each game they play,  
    the probability that Sally will win against Martin is 0.3  
    the probability that Sally will draw against Martin is 0.1  
Work out the probability that Sally will win **exactly** one of the two games against Martin.

.....  
(Total for Question 8 is 3 marks)

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9 The diagram shows two rectangles, **A** and **B**.



All measurements are in centimetres.

The area of rectangle **A** is equal to the area of rectangle **B**.

Find an expression for  $y$  in terms of  $w$ .

.....  
**(Total for Question 9 is 4 marks)**

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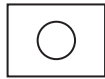
**10** Show that  $\frac{8+\sqrt{12}}{5+\sqrt{3}}$  can be written in the form  $\frac{a+\sqrt{3}}{b}$ , where  $a$  and  $b$  are integers.

**(Total for Question 10 is 4 marks)**

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11 There are four types of cards in a game.

Each card has a black circle or a white circle or a black triangle or a white triangle.



$$\begin{array}{l} \text{number of cards} \\ \text{with a black shape} \end{array} : \begin{array}{l} \text{number of cards} \\ \text{with a white shape} \end{array} = 3 : 5$$

$$\begin{array}{l} \text{number of cards} \\ \text{with a circle} \end{array} : \begin{array}{l} \text{number of cards} \\ \text{with a triangle} \end{array} = 2 : 7$$

Express the total number of cards with a black shape as a fraction of the total number of cards with a triangle.

.....  
**(Total for Question 11 is 3 marks)**

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- 12 Show that  $\frac{\sqrt{180} - 2\sqrt{5}}{5\sqrt{5} - 5}$  can be written in the form  $a + \frac{\sqrt{5}}{b}$  where  $a$  and  $b$  are integers.

**(Total for Question 12 is 4 marks)**

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- 13  $x$  is proportional to  $\sqrt{y}$  where  $y > 0$   
 $y$  is increased by 44%  
Work out the percentage increase in  $x$ .

.....%

**(Total for Question 13 is 3 marks)**

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**14** There are only 3 red counters and 5 yellow counters in a bag.

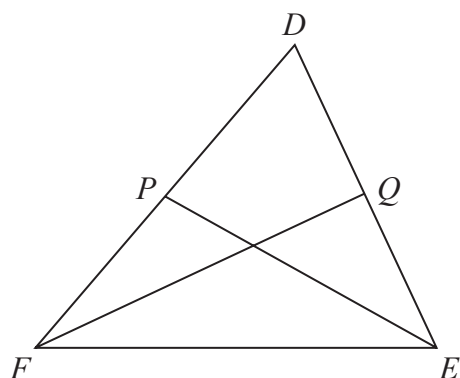
Jude takes at random 3 counters from the bag.

Work out the probability that he takes exactly one red counter.

.....  
**(Total for Question 14 is 4 marks)**

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15  $DEF$  is a triangle.



$P$  is the midpoint of  $FD$ .

$Q$  is the midpoint of  $DE$ .

$$\vec{FD} = \mathbf{a} \text{ and } \vec{FE} = \mathbf{b}$$

Use a vector method to prove that  $PQ$  is parallel to  $FE$ .

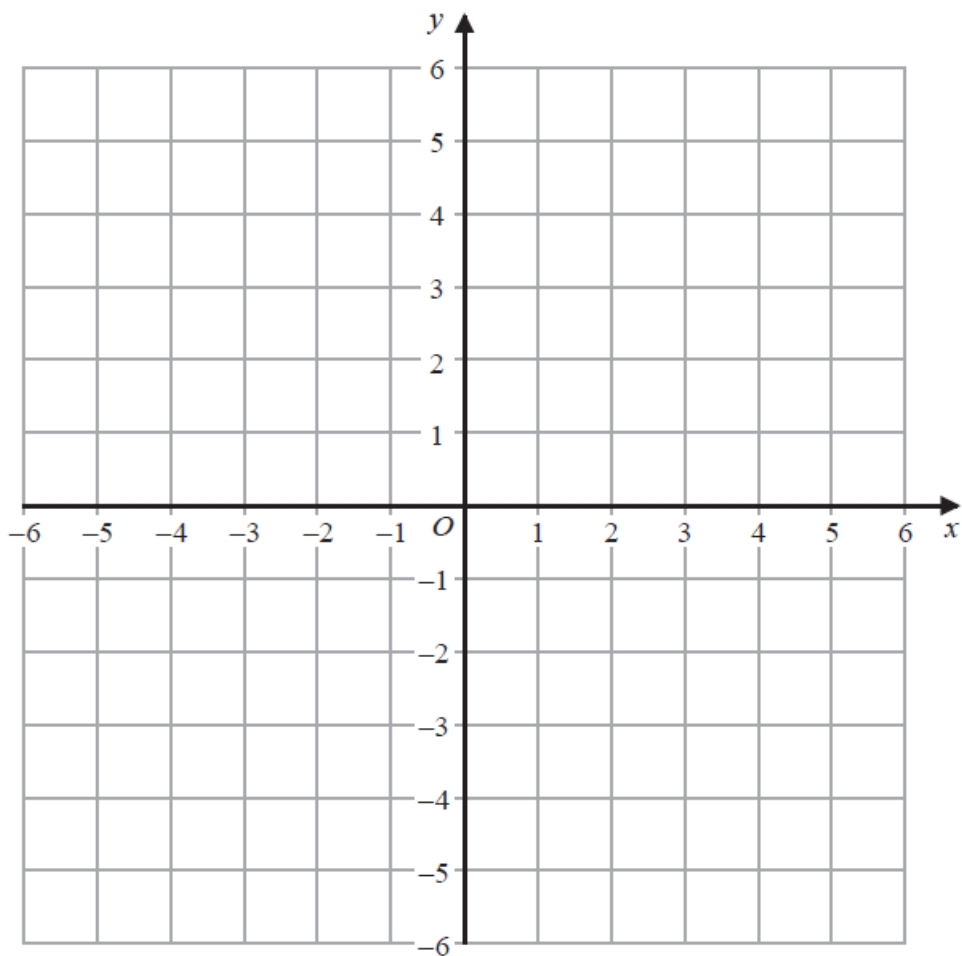
**(Total for Question 15 is 4 marks)**

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16 On the grid show, by shading, the region that satisfies all of these inequalities.

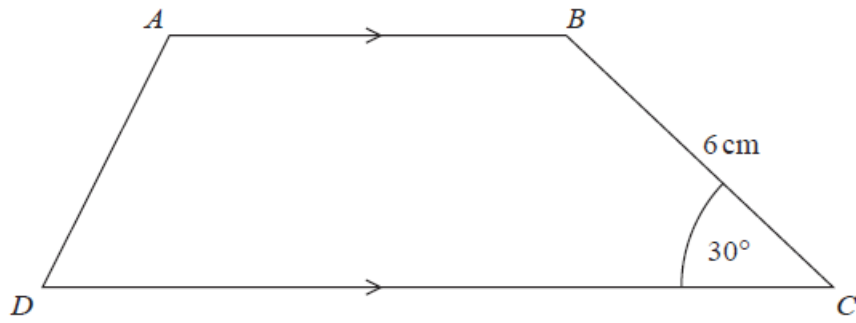
$$2y + 4 < x \quad x < 3 \quad y < 6 - 3x$$

Label the region **R**.



(Total for Question 16 is 3 marks)

17 Here is trapezium  $ABCD$ .



The area of the trapezium is  $66\text{ cm}^2$

the length of  $AB$  : the length of  $CD = 2 : 3$

Find the length of  $AB$ .

..... cm

**(Total for Question 17 is 5 marks)**

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18 The functions  $f$  and  $g$  are such that

$$f(x) = 3x^2 + 1 \text{ for } x > 0$$

and

$$g(x) = \frac{4}{x^2} \text{ for } x > 0$$

(a) Work out  $gf(1)$

.....  
(2)

The function  $h$  is such that  $h = (fg)^{-1}$

(b) Find  $h(x)$

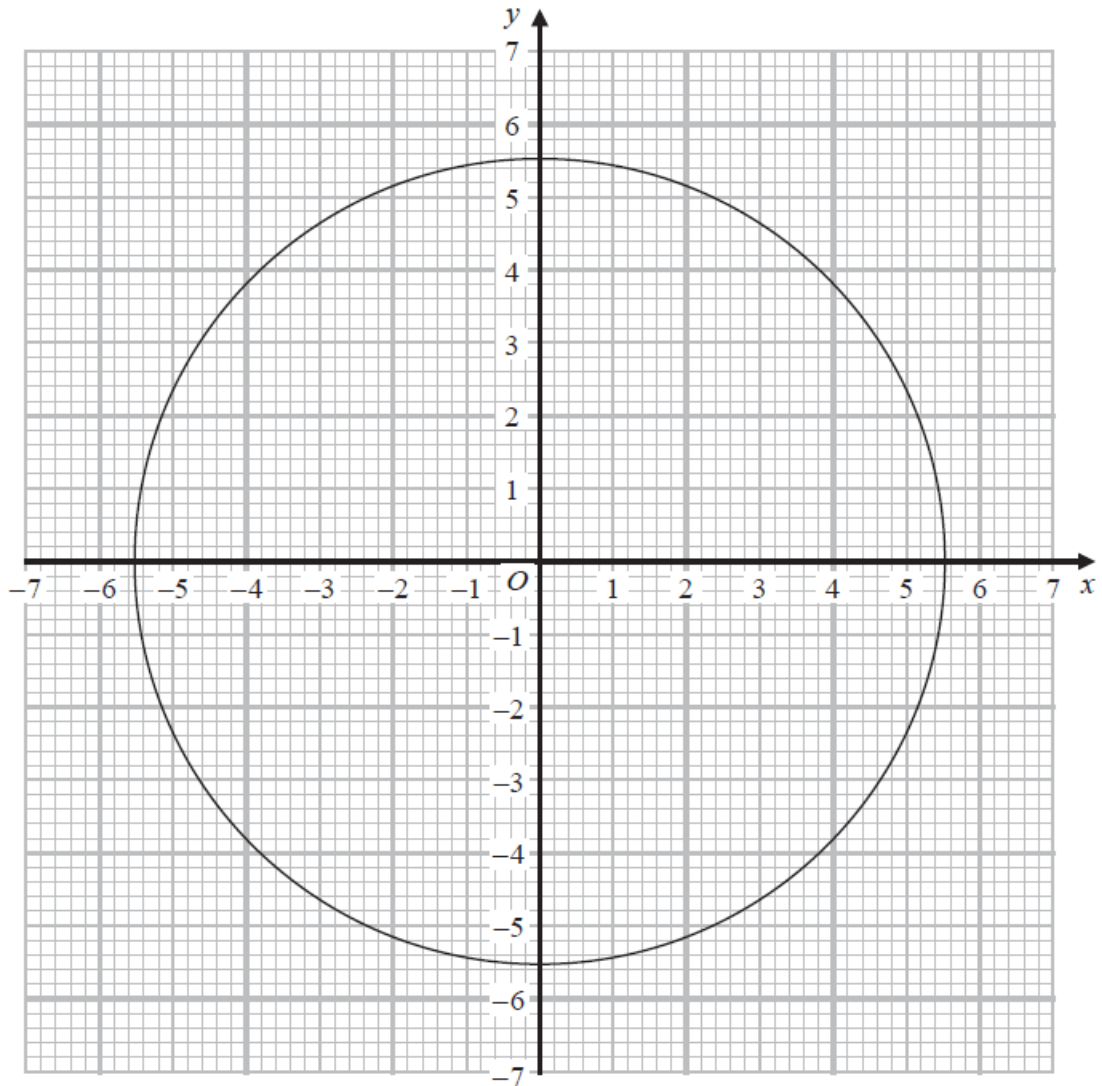
.....  
(4)

**(Total for Question 18 is 6 marks)**

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19 The diagram shows the graph of  $x^2 + y^2 = 30.25$



Use the graph to find estimates for the solutions of the simultaneous equations

$$\begin{aligned}x^2 + y^2 &= 30.25 \\y - 2x &= 1\end{aligned}$$

.....

**(Total for Question 19 is 3 marks)**

- 20 Find the coordinates of the turning point on the curve with equation  $y = 9 + 18x - 3x^2$   
You must show all your working.

(..... , .....)

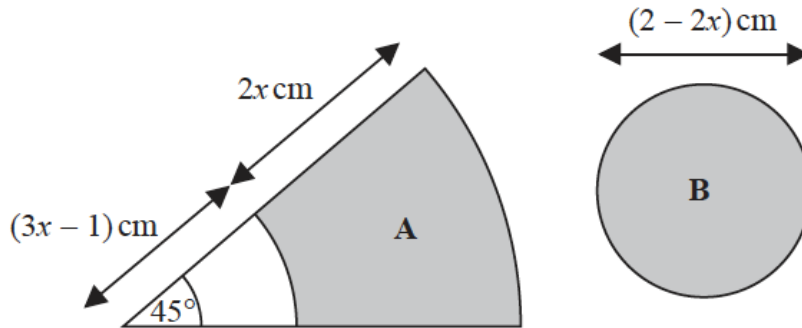
**(Total for Question 20 is 4 marks)**

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21 The diagram shows two shaded shapes, **A** and **B**.

Shape **A** is formed by removing a sector of a circle with radius  $(3x - 1)$  cm from a sector of the circle with radius  $(5x - 1)$  cm.

Shape **B** is a circle of diameter  $(2 - 2x)$  cm.



The area of shape **A** is equal to the area of shape **B**.

Find the value of  $x$ .

You must show all your working.

.....  
(Total for Question 21 is 5 marks)

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**TOTAL FOR PAPER IS 80 MARKS**

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