Please check the examination deta Candidate surname	ils below before ent	Other names
Pearson Edexcel Level 1/Level 2 GCSE (9–1)	Centre Number	Candidate Number
Time 1 hour 30 minutes	Paper reference	a 1MA1/3H
Mathematics PAPER 3 (Calculator) Higher Tier		
<b>You must have:</b> Ruler graduated protractor, pair of compasses, pe Formulae Sheet (enclosed). Traci	l in centimetres n, HB pencil, er ng paper may b	and millimetres, aser, calculator, be used.

### 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 be used.
- If your calculator does not have a  $\pi$  button, take the value of  $\pi$  to be 3.142 unless the question instructs otherwise.

# Information

- The total mark for this paper is 80
- 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.
- Try to answer every question.
- Check your answers if you have time at the end.
- Good luck with your examination.











# MME GCSE Revision - GCSE Maths



# **GCSE Maths Predicted** Papers 2024



**GCSE Maths Revision Guide** 



**GCSE Maths Revision Cards** 



Course in a Box – GCSE Maths (Guaranteed Pass)



mmerevise.co.uk

#### Answer ALL questions.

Write your answers in the spaces provided.

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

1 Here is a right-angled triangle.



Work out the value of x.



x=7.5cm.

(Total for Question 1 is 2 marks)



2  $T = 4m^2 - 11$ 

-

(a) Work out the value of T when m = -3

$$T = 4 \times (-3)^2 - 11$$
  
= 4 × 9 - 11 = 25.

T = 25

(b) Make p the subject of the formula d = 3p + 4





(2)

(Total for Question 2 is 4 marks)

3 Rick, Selma and Tony are playing a game with counters.

Rick has some counters. Selma has twice as many counters as Rick. Tony has 6 counters less than Selma.

In total they have 54 counters.

the number of counters Rick has : the number of counters Tony has = 1 : p

Work out the value of *p*.

Rick mas r sweets Selma, s, and Tony F. r+s+t=54S=21. +: 5-6=21-6 r+2r+2r-6=54. 5r=60 r=12, s=24, t=18. r:t=l:p 12:18=1: P  $|\frac{1}{12} = |\frac{1}{12} = |\frac{1$ p=1.5. 1:1.5=1:7

(Total for Question 3 is 5 marks)

v = 1.5

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4 Jo is going to buy 15 rolls of wallpaper.

Here is some information about the cost of rolls of wallpaper from each of two shops.

### **Chic Decor**

3 rolls for £36

#### **Style Papers**

Pack of 5 rolls normal price £70

12% off the normal price

Jo wants to buy the 15 rolls of wallpaper as cheaply as possible.

Should Jo buy the wallpaper from Chic Decor or from Style Papers? You must show how you get your answer.

Chic Decor: 3 rolls for £36 15 rolls for 5×36 = £180. Style Papers: 5 rolls for £70 normal price 5 rolls for 70x (1-0.12) = £61.60 15 rolls for 3×61.60 = £184.80 Chic Decoris cheaper at £180 than Style papers at £184.80, so Jo Should chose Chic Decor.

(Total for Question 4 is 4 marks)



- Length (t cm)Frequency $0 < t \le 10$ 15 $10 < t \le 20$ 20 $20 < t \le 30$ 50 $30 < t \le 40$ 25 $40 < t \le 50$ 5
- 5 The table gives information about the lengths, in cm, of some pieces of string.

Amos draws a frequency polygon for the information in the table.



Write down two mistakes that Amos has made.

(Total for Question 5 is 2 marks)



Jessica runs for 15 minutes at an average speed of 6 miles per hour. 6 She then runs for 40 minutes at an average speed of 9 miles per hour.

It takes Amy 45 minutes to run the same total distance that Jessica runs.

Work out Amy's average speed. Give your answer in miles per hour.

distance = Speed x time.  
For Jessians first IS ninutes:  
IS ninutes = 0.25 hours  
distance = 0.25 × 6 = 1.5 miles.  
For the next to minutes:  
to minutes = 
$$\frac{40}{60} = \frac{2}{3}$$
 hours.  
distance =  $\frac{2}{3} \times 9 = 6$  miles.  
Total distance = 7.5 miles.  
Average speed = distance = time.  
Amy vanit in 45 minutes = 0.75 hours.  
Amy average speed =  $\frac{15}{6} = 6.75$   
= 10mpt.

1 Oniles per hour

(Total for Question 6 is 4 marks)



7 The diagram shows rectangle STUV. TQU and SRV are straight lines. All measurements are in cm.



The area of trapezium QUVR is  $A \text{ cm}^2$ 

Show that  $A = 2x^2 + 20x$ 

Show that A = 2x + 20xQUVR can be divided into a right angle triangle with hypotenuse QR and a rectangle with width RV and height UV. Rectangle area = 5 × 4 x = 20x. Triangle area = 2× (3x - 2x) × 4x  $= \frac{1}{2} \times 4x^{2} = 2x^{2}$ Total area OUVR: A

(Total for Question 7 is 3 marks)

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9

9 (a) Express  $\sqrt{\frac{10^{360}}{10^{150} \times 10^{90}}}$  as a power of 10  $= \left(\frac{10^{360}}{10^{150+90}}\right)^{1/2} = \left(\frac{10^{360}}{10^{240}}\right)^{1/2} = \left(\frac{10^{240}}{10^{240}}\right)^{1/2} = \left(\frac{10^{360-240}}{10^{240}}\right)^{1/2}$  $= \left( 10^{126} \right)^{\prime / 2}$ = 10 = 1060 1060 Liam was asked to express  $(12^{50})^2$  as a power of 12 Liam wrote  $(12^{50})^2 = 12^{50^2} = 12^{2500}$ Liam's method is wrong. (b) Explain why. (12<sup>50</sup>)<sup>2</sup> = 12 = 12<sup>100</sup>, not 12<sup>50</sup> A power outside the bracket is multiplied by the power inside. (Total for Question 9 is 4 marks)

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10 Jane bought a new car three years ago.

At the end of the first year the value of the car had decreased by 12.5% The value of the car then decreased by 10% each year for the next two years.

At the end of the three years, the value of the car was £17010

Work out the value of the car when Jane bought it three years ago.

Let x = the cars initial value.After 1 year: 5cx(1-0.125) = 0.875xAfter 2 years: 0.875x(1-0.1) = 0.7875xAfter 3 years: 0.7875x(1-0.1) = 0.70875x. 0.76875x = 17,010 x = 17010 = f24,000. 0.70875 = f24,000.

£24,000

(Total for Question 10 is 3 marks)

11 Rayheem has

16 shirts 5 pairs of jeans 3 jackets

Rayheem chooses an outfit to wear. An outfit is 1 shirt, 1 pair of jeans and 1 jacket.

Work out how many different outfits Rayheem can choose.

16 × 5 × 3 = 240 out fils.

240

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#### (Total for Question 11 is 2 marks)







DC = 8 cmAngle  $ADC = 45^{\circ}$ Angle  $ABC = 20^{\circ}$ 

Work out the length of AB. Give your answer correct to 3 significant figures.

LDAC=180-90-45=45. As ADC is isoceles, AC = 8cm. Now SHCAHTA. 8= sin(20) × AB.  $AB = \frac{8}{\sin(20)} = 23.39$ . = 33.4cm (3sf)

23.4 cm

(Total for Question 12 is 3 marks)



13 a and b are vectors such that

$$\mathbf{a} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$$
 and  $3\mathbf{a} - 2\mathbf{b} = \begin{pmatrix} 8 \\ -17 \end{pmatrix}$ 

Find b as a column vector.

$$3a - 2b = \binom{8}{-17}$$
  
=> 2b = 3a -  $\binom{8}{-17}$   
=  $3\binom{2}{-3} - \binom{8}{-17}$   
=  $\binom{3 \times 2 - 8}{3 \times -3 - -17} = \binom{-2}{8} = 2b$   
b =  $\frac{1}{2} \times \binom{-2}{8} = \binom{-1}{4}$ 

 $\left( \frac{-1}{4} \right)$ 

(Total for Question 13 is 3 marks)

14 (a) Factorise fully  $4p^2 - 36$ 

4(p-3)(p+3)

(b) Show that (m + 4)(2m - 5)(3m + 1) can be written in the form  $am^3 + bm^2 + cm + d$  where a, b, c and d are integers.

(m+4)(2n-5)(3m+1) $=(m+4)(6m^2-13m-5)$  $=6m^{3}-13n^{2}-5m+24m^{2}-52m-20$  $26m^{3} + 11m^{2} - 57m - 20$ 

a=6, b=11, c=-57, d=-20.

(f)

(Total for Question 14 is 5 marks)



15 P, Q, R and S are four points on a circle.



PXR and SXQ are straight lines.

Prove that triangle PQX and triangle SRX are similar.

Angles at the circumfrence subtended from the Same chord of a circle are equal so Angle PQX = Angle SKX and Angle Q PX = Angle RSX And as vertically opposite angles are equal Angle PXQ = Angle SXR. All three pairs of corresponding angles are equal the triangles are similar.

(Total for Question 15 is 3 marks)

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e = 6.8 correct to 1 decimal place.

f = 0.05 correct to 1 significant figure.

Work out the upper bound for the value of p. Give your answer correct to 3 significant figures. You must show all your working.

Upper bound for e = 6.85. Lower bound for f = 0.045. Upper bound of  $p = \sqrt{\frac{2 \times 6.85}{0.045}}$ p = 17.4 (3 sf).

17.4

(Total for Question 16 is 3 marks)



17 The table gives information about the distances, in miles, that some Year 10 students live from school.

Distance (d miles)	Frequency	frequency dersit
$0 < d \leq 1.0$	90	90
$1.0 < d \leqslant 1.5$	48	96
$1.5 < d \leq 2.0$	22	44
$2.0 < d \leq 3.0$	8	8
$3.0 < d \leq 5.0$	12	6.

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(a) On the grid, draw a histogram for this information.







The number of Year 11 students who live between 1 and 2 miles from school is m.

(b) Find an expression, in terms of *n*, for the number of Year 11 students who live between 3 and 5 miles from school.

$$n: 3 < d \le 5 = 5: -2$$
  
 $5 parts = n$ .  
 $2 parts = \frac{2n}{5} = 0.4n$ .

0.40

(Total for Question 17 is 5 marks)



18 Here is a prism ABCDSPQR.



The base ABCD of the prism is a square of side 14 cm T is the point on BC such that BT : TC = 4:3

The cross section of the prism is in the shape of a trapezium of area  $147 \text{ cm}^2$ CR = 12 cm

Find the size of the angle between the line *ST* and the base *ABCD*. Give your answer correct to 1 decimal place.

$$TC = \frac{3}{4+3} \times 14 = 6 \text{ cm}$$

$$TD = \sqrt{14^{2} + 6^{2}} = 2\sqrt{58}.$$
Area of trapezium:  

$$147 = \frac{1}{2} \times (SD + 12) \times 14$$

$$= \sum SD + 12 = 21 = \sum SD = 9 \text{ cm}.$$
Now S'HC<sup>A</sup>HT<sup>O</sup>A  

$$\tan(\angle D = 5) = \frac{9}{2\sqrt{58}}.$$

$$\angle D = \frac{9}{2\sqrt{58}} = \frac{30.577}{30.6}.$$

$$= 30.6^{\circ}(14p)$$
(Total for Question 18 is 5 marks)

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19 Show that 
$$\frac{3x}{x+2} - \frac{2x+1}{x-2} - 1$$
 can be written in the form  $\frac{ax+b}{x^2-4}$   
where *a* and *b* are integers.  

$$\frac{3x}{x+2} - \frac{2x+1}{x-2} - 1 - \frac{3x(x-2)}{(x+2)(x-2)} - \frac{(2x+1)(x+2)}{(x+2)(x-2)} - \frac{(2x+2)(x-2)}{(x+2)(x-2)}$$

$$= \frac{3x(x-2) - (2x+1)(x+2) - (x+2)(x-2)}{(x+2)(x-2)}$$

$$= \frac{3x^2 - 6x - 2x^2 - 5x - 2 - x^2 + 4}{(x+2)(x-2)}$$

$$= \frac{-11x + 2}{x^2 - 4}$$

$$\alpha = -11, \quad b = 2.$$
(Total for Question 19 is 4 marks)



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20 The profit made by a shop increases each year.

The profit made by the shop in year n is  $\pounds P_n$ 

Given that the profit made by the shop in the next year is  $\pounds P_{n+1}$  then

 $P_{n+1} = aP_n + 800$  where *a* is a constant.

The table shows the profit made by the shop in 2018 and in 2019

Year	2018	2019
Profit	£24000	£29600

Work out the profit predicted to be made by the shop in 2021

$$P_{2019} = a \times 24000 + 800 = 29600$$

$$a \times 24000 = 28800$$

$$a = \frac{28800}{24000} = 1.2$$

$$P_{220} = 1.2 \times 29600 + 800$$

$$= £36,320$$

$$P_{2021} = 1.2 \times 36320 + 800$$

$$= £44384$$

£44384

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(Total for Question 20 is 4 marks)



21 Ray has nine cards numbered 1 to 9

Ray takes at random three of these cards.

He works out the sum of the numbers on the three cards and records the result.

Work out the probability that the result is an even number.

There are four ways the sum could be an even hunber: E, E, E, AO, OE & OEO & EOO  $P(E, E, E) = \frac{4}{9} \times \frac{3}{8} \times \frac{2}{7} = \frac{1}{21}$  $P(0,0,E) = \frac{5}{9} \times \frac{4}{8} \times \frac{4}{7} = \frac{10}{63}$  $P(0, E, 0) = \frac{5}{9} \times \frac{4}{8} \times \frac{4}{7} = \frac{10}{63}$  $P(E, 0, 0) = \frac{4}{9} \times \frac{5}{8} \times \frac{4}{7} = \frac{10}{63}$  $P(Sunis even) = \frac{1}{21} + \frac{10}{63} + \frac{10}{63} + \frac{10}{63}$ = 1

11/23

(Total for Question 21 is 4 marks)



22 L is the straight line with equation y = 2x - 5

C is a graph with equation  $y^2 = 6x^2 - 25x - 8$ 

Using algebra, find the coordinates of the points of intersection of L and C. You must show all your working. DO NOT WRITE IN THIS AREA

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For L: 
$$y^2 = (2x-5)^2 = 4x^2 - 20x + 25$$
.  
Where Land (meet:  
 $4x^2 - 20x + 25 = 6x^2 - 25x - 8$ .  
=)  $2x^2 - 5x - 33 = 0$ .  
 $(2x - 11)(x + 3) = 0$   
 $x = \frac{1}{2}$  or  $x = -3$ .  
To find y values  
 $y = 2x(\frac{1}{2}) - 5$  and  $y = 2x(-3) - 5$   
 $y = 6$   
 $y = -11$   
Points of intersection are (5.5, 6) and  
 $(-3, -11)$   
(5.5, 6)  
(5.5, 6) and  
 $(-3, -11)$   
(Total for Question 22 is 5 marks)  
TOTAL FOR PAPER 15 80 MARKS