Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel International GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Tuesday 19 May 2020

Morning (Time: 2 hours) | Paper Reference **4MA1/1H**

Mathematics A

Paper 1H

Higher Tier

You must have:
Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. 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.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
  Anything you write on the formulae page will gain NO credit.

Information

- The total mark for this paper is 100.
- 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.
- Check your answers if you have time at the end.

Turn over ▶

P62652A

1/1/1/1/

P 6 2 6 5 2 A 0 1 2 8

Pearson

International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

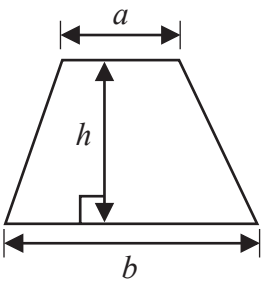
Sum to n terms, $S_n = \frac{n}{2}[2a + (n-1)d]$

The quadratic equation

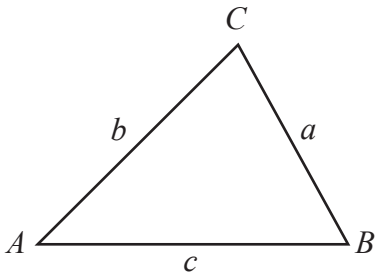
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Area of trapezium $= \frac{1}{2}(a+b)h$



Trigonometry



In any triangle ***ABC***

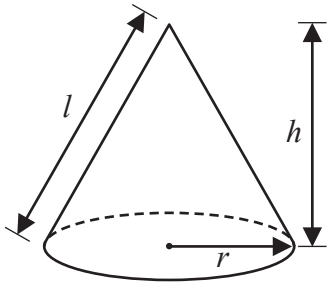
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc\cos A$

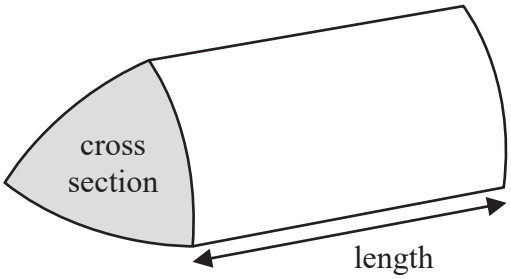
Area of triangle $= \frac{1}{2}ab\sin C$

Volume of cone $= \frac{1}{3}\pi r^2 h$

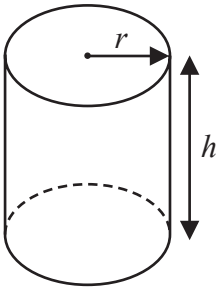
Curved surface area of cone $= \pi rl$



Volume of prism
= area of cross section × length

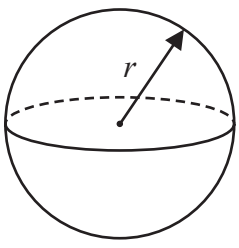


Volume of cylinder $= \pi r^2 h$
Curved surface area of cylinder $= 2\pi rh$



Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$

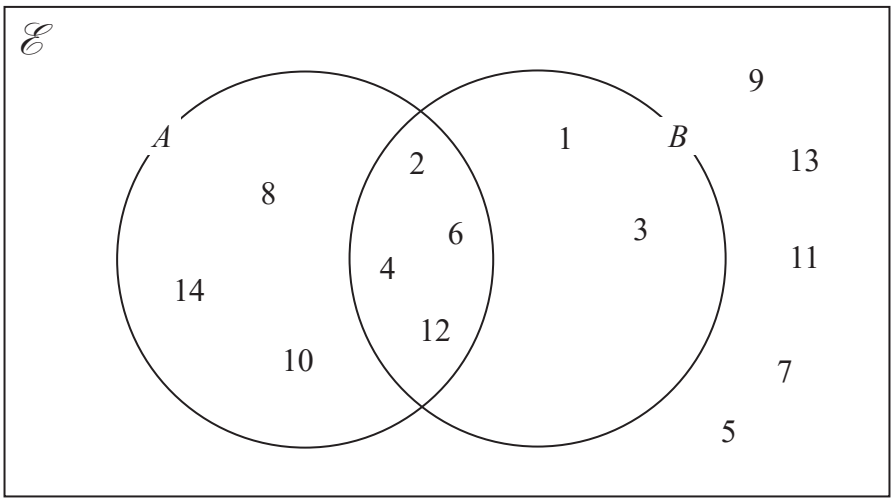


Answer ALL TWENTY FIVE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 The numbers from 1 to 14 are shown in the Venn diagram.



(a) List the members of the set $A \cap B$

2, 4, 6, 12

(1)

(b) List the members of the set B'

5, 7, 8, 9, 10, 11, 13, 14

(1)

A number is picked at random from the numbers in the Venn diagram.

(c) Find the probability that this number is in set A but is **not** in set B.

$= \frac{3}{15}$ $= \frac{3}{14}$

02

(2)

(Total for Question 1 is 4 marks)

2 Toy cars are made in a factory.
The toy cars are made for 15 hours each day.
5 toy cars are made every 12 seconds.

For the toy cars made each day, the probability of a toy car being faulty is 0.002

Work out an estimate of the number of faulty toy cars that are made each day.

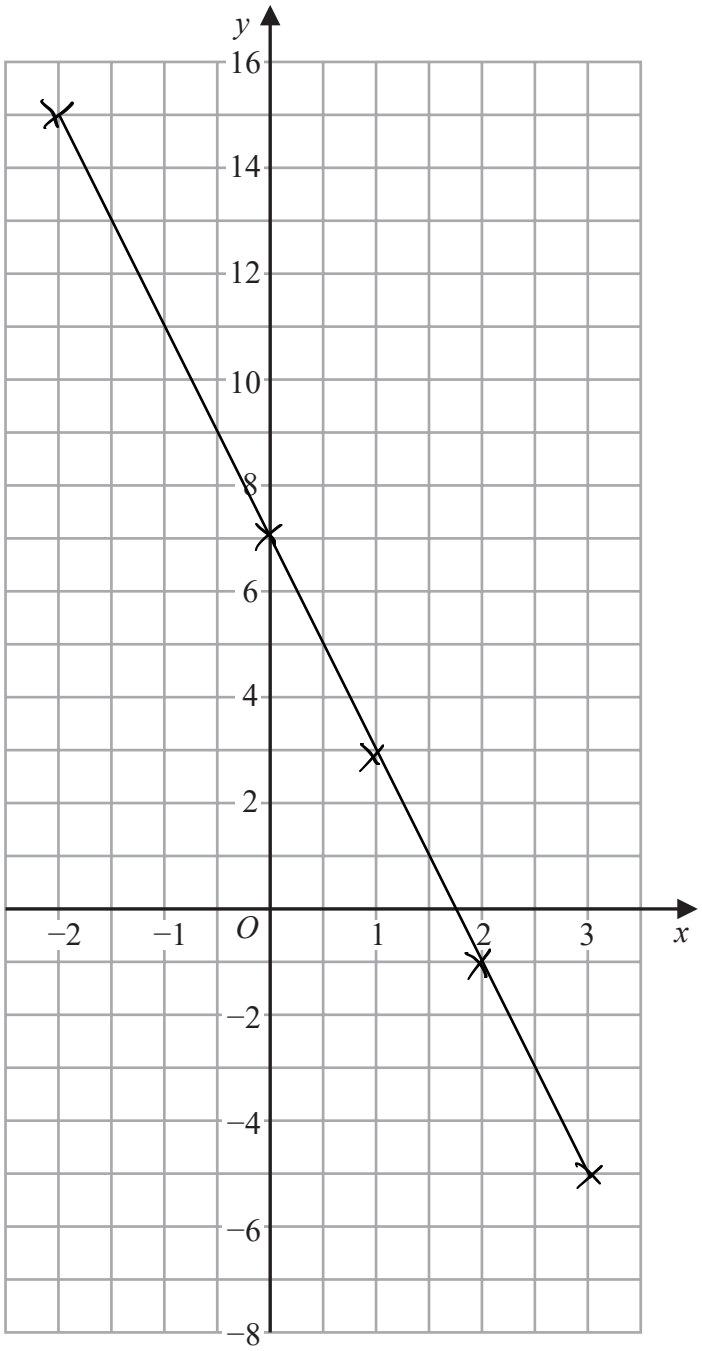
$= \frac{5}{12} \times 60 \times 60 \times 15 \times 0.002$

$= 45$

45

(Total for Question 2 is 4 marks)

3 On the grid, draw the graph of $y = 7 - 4x$ for values of x from -2 to 3



(Total for Question 3 is 3 marks)

4 Here is a list of six numbers written in order of size.

4 7 x 10 y y

8

The numbers have

a median of 9
a mean of 11

Find the value of x and the value of y.

$\frac{10+x}{2} = 9$

$x = 8$

$\frac{4+7+8+10+2y}{6} = 11$

$29+2y=66$

$2y=37$

$y=18.5$

$x =$ 11 8

$y =$ 18.5

(Total for Question 4 is 4 marks)

TSCE

5 (a) Write 5.7×10^{-3} as an ordinary number.

0.0057

(1)

(b) Write 800 000 in standard form.

8×10^5

(1)

(c) Work out $\dfrac{3 \times 10^5 - 2.7 \times 10^4}{6 \times 10^{-2}}$

$= \dfrac{30 \times 10^4 - 2.7 \times 10^4}{6 \times 10^{-2}}$

$= \dfrac{27.3 \times 10^{4+6}}{6 \times 10^{-2}} = \dfrac{27.3 \times 10^6}{6} = 4.55 \times 10^6$

(2)

(Total for Question 5 is 4 marks)

6 A rocket travelled 100 km at an average speed of 28 440 km/h.

Work out how long it took the rocket to travel the 100 km.
Give your answer in seconds, correct to the nearest second.

spd $= 28440 \div 60 \div 60$
$= 7.9$ km/s

$t = 100 / 7.9$
$= 12.6$

13 seconds

(Total for Question 6 is 3 marks)

7 (a) Solve $5(4 - x) = 7 - 3x$
Show clear algebraic working.

$20 - 5x = 7 - 3x$

$13 = 2x$

$x = 6.5$

$x =$ .....

(3)

(b) Factorise fully $16m^3g^3 + 24m^2g^5$

$8m^2g^3(2m + 3g^2)$

(2)

(c) (i) Factorise $y^2 - 2y - 48$

not +

$-8 \quad +6$

$(y + 8)(y - 6)$

(2) 1

(ii) Hence, solve $y^2 - 2y - 48 = 0$

Efficient work

$-8, +6$

(1) 0

(Total for Question 7 is 8 marks)

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8 Here is a 10-sided polygon.

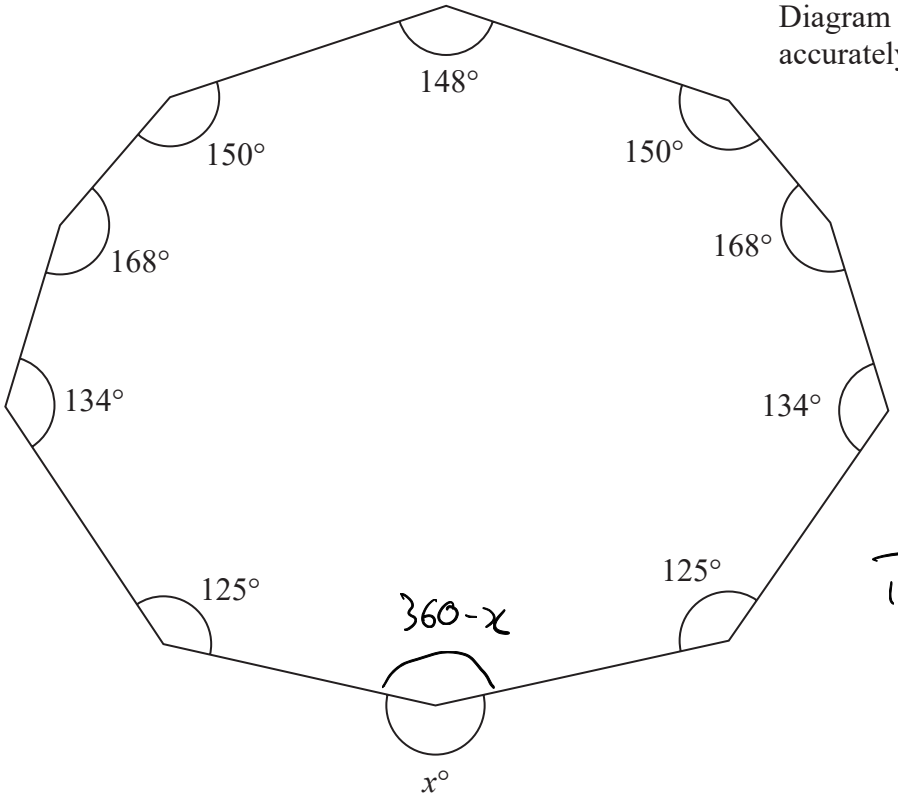


Diagram **NOT** accurately drawn

148
+150
+168
+134
+125
+125
+134
+168
+150
1302

Work out the value of x.

$S_i = 180(n-2)$

$= 180 \times 8$

$= 1440$

$1302 + (360 - x) = 1440$

$360 - x = 138$

$360 = 138 + x$

$x = 222$

$x =$ 222

(Total for Question 8 is 4 marks)

9 In a sale, normal prices are reduced by 20%

A bag costs 1080 rupees in the sale.

Work out the normal price of the bag.

$= 1080 \div 0.8$

$= 1350$

..... rupees

(Total for Question 9 is 3 marks)

9

10 $A = 2 \times 3^{43}$
$B = 16 \times 3^{37}$

(a) Find the highest common factor (HCF) of A and B.

$16 = 2^4$

$HCF = 2 \times 3^{37}$

(1)

(b) Express the number $A \times B$ as a product of powers of its prime factors.
Give your answer in its simplest form.

$= 2 \times 2^5 \times 3^{43} \times 3^{37}$

$= 2^6 \times 3^{80}$

2^5

(2)

(Total for Question 10 is 3 marks)

11 The diagram shows trapezium $ABCD$ in which BC and AD are parallel.

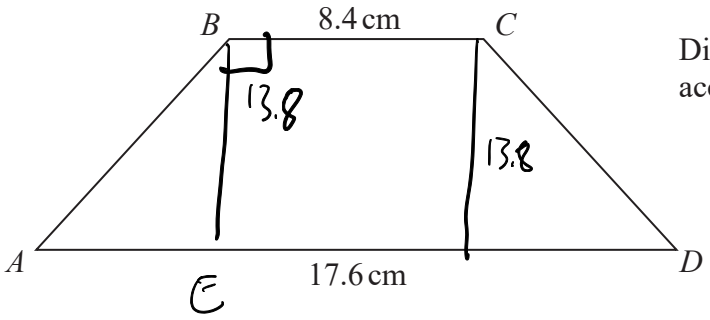


Diagram **NOT** accurately drawn

The trapezium has exactly one line of symmetry.

$BC = 8.4\,\text{cm}$
$AD = 17.6\,\text{cm}$

The trapezium has area $179.4\,\text{cm}^2$

Work out the size of angle ABC.
Give your answer correct to 1 decimal place.

$A = \frac{a+b}{2}h$

$179.4 = \frac{8.4+17.6}{2}h$

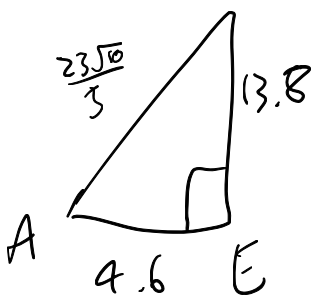
$179.4 = 13h$

$h = 13.8$

$AE = \frac{17.6-8.4}{2}$

$= 4.6$

$\sqrt{13.8^2+4.6^2}$



$\frac{\sin A}{a} = \frac{\sin B}{b}$

$\sin^{-1}\left(\frac{\sin 90}{23\sqrt{10}\div 5} \times 4.6\right)$ $ABE = 18.4°$

$= 90 + 18.4$

$ABE =$

108.9 °

(Total for Question 11 is 6 marks)

12 Solve the simultaneous equations

$$A \quad 7x - 2y = 34$$
$$B \quad 3x + 5y = -3$$

Show clear algebraic working.

$5A \quad 35x - 10y = 170$

$+ \quad 2B \quad 6x + 10y = -6$

$41x = 164$

$x = 4$

$7x - 2y = 34$

$28 - 2y = 34$

$-2y = 6$

$y = -3$

$x =$ 4

$y =$ −3

(Total for Question 12 is 4 marks)

13 Jan invests \$8000 in a savings account.
The account pays compound interest at a rate of x% per year.

At the end of 6 years, there is a total of \$8877.62 in the account.

Work out the value of x.
Give your answer correct to 2 decimal places.

$8000 \times (1+x)^6 = 8877.62$

$(1+x)^6 = 1.1097025$

$1+x = 1.0175$

$x = 0.0175$

$= 1.75\%$

$x =$ .....

(Total for Question 13 is 3 marks)

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14 F is inversely proportional to the square of v.

Given that $F = 6.5$ when $v = 4$

find a formula for F in terms of v.

$F \propto 1/v^2$

$F = k/v^2$

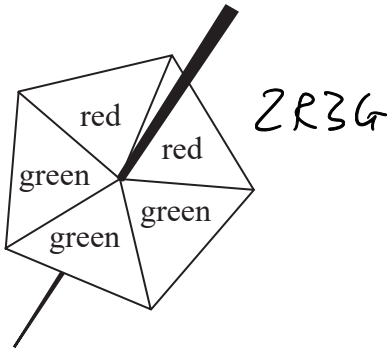
$6.5 = k/16$

$k = 104$

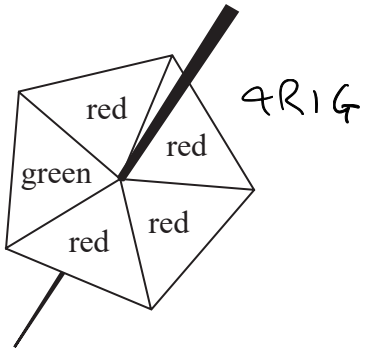
$F = 104/v^2$

(Total for Question 14 is 3 marks)

15 Harry has two fair 5-sided spinners.



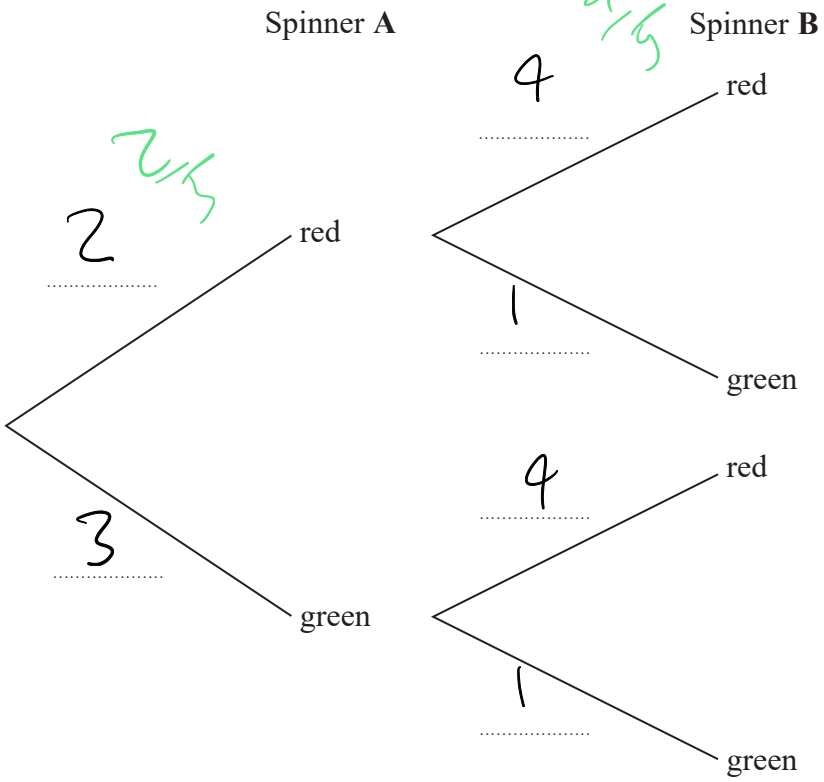
Spinner **A**



Spinner **B**

Harry is going to spin each spinner once.

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that at least one of the spinners will land on green.

$= 0.6 + 0.4 \times 0.2$

$= 0.68$

(3)

(Total for Question 15 is 5 marks)

16

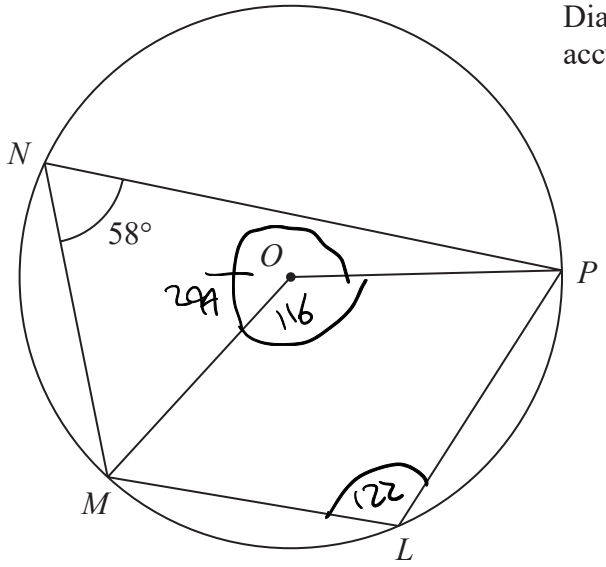


Diagram **NOT** accurately drawn

L, M, N and P are points on a circle, centre O

Angle $MNP = 58°$

(a) (i) Find the size of angle MLP

122 °

(ii) Give a reason for your answer.

Opposite angles in cyclic quad add to 180°

(2)

(b) Find the size of the reflex angle MOP

299

116 °

(2)

(Total for Question 16 is 4 marks)

17 A metal block has a mass of 5 kg, correct to the nearest 50 grams. UB = 5.025
The block has a volume of $(1.84 \times 10^{-3})\,m^3$, correct to 3 significant figures. LB = 1.835×10^{-3}

Work out the upper bound for the density of the block.
Give your answer in kg/m^3 correct to 1 decimal place.
Show your working clearly.

$$= \frac{5.025}{1.835 \times 10^{-3}}$$

$$= 2738.4$$

..... kg/m^3

(Total for Question 17 is 4 marks)

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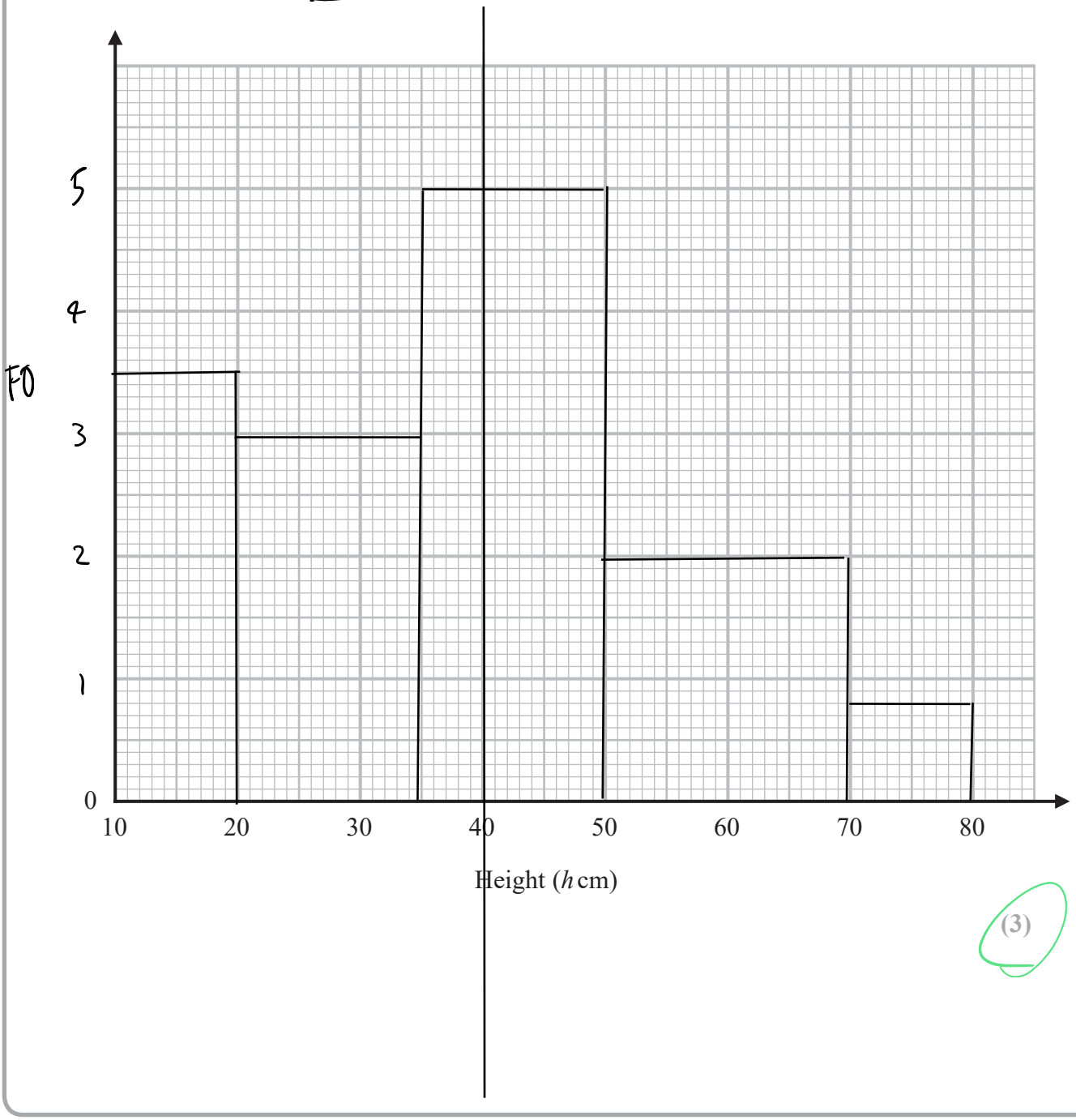
18 The table gives information about the heights, in centimetres, of some plants.

Height (h cm)	Frequency
$10 < h \leqslant 20$	35
$20 < h \leqslant 35$	45
$35 < h \leqslant 50$	75
$50 < h \leqslant 70$	40
$70 < h \leqslant 80$	8

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



(3)

(b) Work out an estimate for the number of these plants with a height greater than 40 cm.

$= 5 \times 10 + 90 + 8$

$= 98$

98

(2)

(Total for Question 18 is 5 marks)

19 Without using a calculator, rationalise the denominator of $\frac{6}{3-\sqrt{7}}$

Simplify your answer.
You must show each stage of your working.

$= \frac{6}{3-\sqrt{7}} \times \frac{(3+\sqrt{7})}{(3+\sqrt{7})} = \frac{18+6\sqrt{7}}{9-7} = \frac{18+6\sqrt{7}}{2} = 9+3\sqrt{7}$

(Total for Question 19 is 3 marks)

20 **R** and **S** are two similar solid shapes.

Shape **R** has surface area 108 cm^2 and volume 135 cm^3
Shape **S** has surface area 300 cm^2

Work out the volume of shape **S**.

$SA_R \times SF^2 = SA_S$

$108 \times SF^2 = 300$

$SF^2 = \frac{25}{9}$

$SF = \frac{5}{3}$

$V_R \times SF^3 = V_S$

$= 135 \times \frac{125}{27}$

$= 625$

..... cm^3

(Total for Question 20 is 3 marks)

21 Express

$$\frac{1}{3x-2} \times \frac{9x^2-4}{3x^2-13x-10} - \frac{7}{x-1}$$

as a single fraction in its simplest form.

$= \frac{1}{(3x-2)} \times \frac{(3x-2)(3x+2)}{(3x+2)(x-5)} - \frac{7}{(x-1)}$

$= \frac{1}{(x-5)} - \frac{7}{(x-1)}$

$= \frac{(x-1) - 7(x-5)}{(x-5)(x-1)}$

$= \frac{x-1-7x+35}{x^2-6x+5}$

$= \frac{-6x+34}{x^2-6x+5}$

$= \frac{34-6x}{(x-5)(x-1)}$

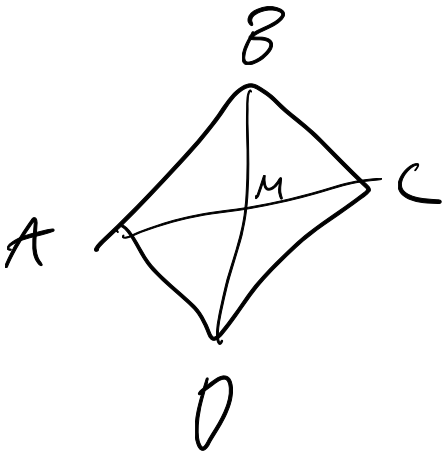
(Total for Question 21 is 5 marks)

22 *ABCD* is a rhombus.

The diagonals, *AC* and *BD*, intersect at the point *M*.
The coordinates of *M* are (6, −11)

The points *A* and *C* both lie on the line with equation $2y + 7x = 20$

Find the exact coordinates of the point where the line through *B* and *D* intersects the *y*-axis.



$x=0$

$2y+7x=20$

$2y+7x=c$

$y=\frac{c-7x}{2}$

$y=\frac{-7}{2}x+c$

negative reciprocal $\frac{2}{7}$

$y=mx+c$

$-11=\frac{2\times6}{7}+c$

$-11=\frac{12}{7}+c$

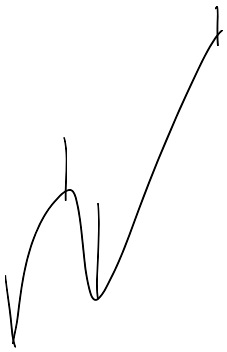
$c=\frac{-89}{7}$

(0 , $\frac{-89}{7}$)

(Total for Question 22 is 4 marks)

23 Curve **C** has equation $y = px^3 - mx$ where p and m are positive integers.

Find the range of values of x, in terms of p and m, for which the gradient of **C** is negative.



the middle bit

need to find min max coords

$\frac{dy}{dx} = 3px^2 - m$

$3px^2 - m = 0$

? not sure how to factorise

$3px^2 = M$

$\pm\sqrt{\frac{M}{3p}}$

$-\sqrt{\frac{M}{3p}} < x < \sqrt{\frac{M}{3p}}$

(Total for Question 23 is 4 marks)

24 Here are the first five terms of an arithmetic sequence.

8 (+7) 15 (+7) 22 (+7) 29 36

Work out the sum of all the terms from the 50th term to the 100th term inclusive.

$S_{100} - S_{99}$

$a = 8, d = 7$

$S_n = \frac{n}{2}(2a + (n-1)d)$

$= 50(16 + 99 \times 7) - 24.5(16 + 98 \times 7)$

$= 50 \times 709 - 24.5 \times 352$

$= 26,826$

(Total for Question 24 is 4 marks)

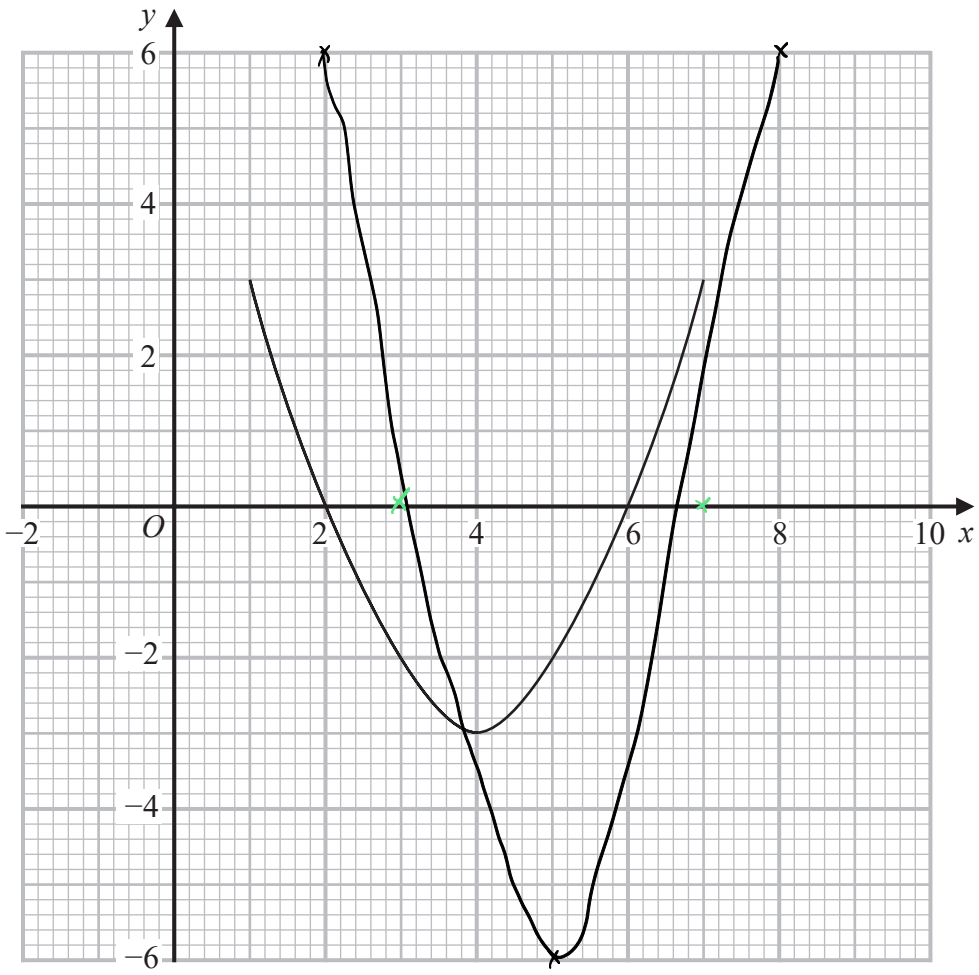
25 The curve with equation $y = g(x)$ is transformed to the curve with equation $y = -g(x)$ by the single transformation **T**.

(a) Describe fully the transformation **T**.

Reflect in the line $y = 0$

(1)

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



(b) On the grid, draw the graph of $y = 2f(x - 1)$

(2)

(Total for Question 25 is 3 marks)

TOTAL FOR PAPER IS 100 MARKS

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