Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 (*a*) Write 6.25×10^{-4} as an ordinary number.

0·000625

.....

(1)

(*b*) Work out $(2.4 \times 10^{12}) \div (9.6 \times 10^{4})$
Give your answer in standard form.

25 000 000

2·5 x 10^{7}

.....

(2)

(Total for Question 1 is 3 marks)

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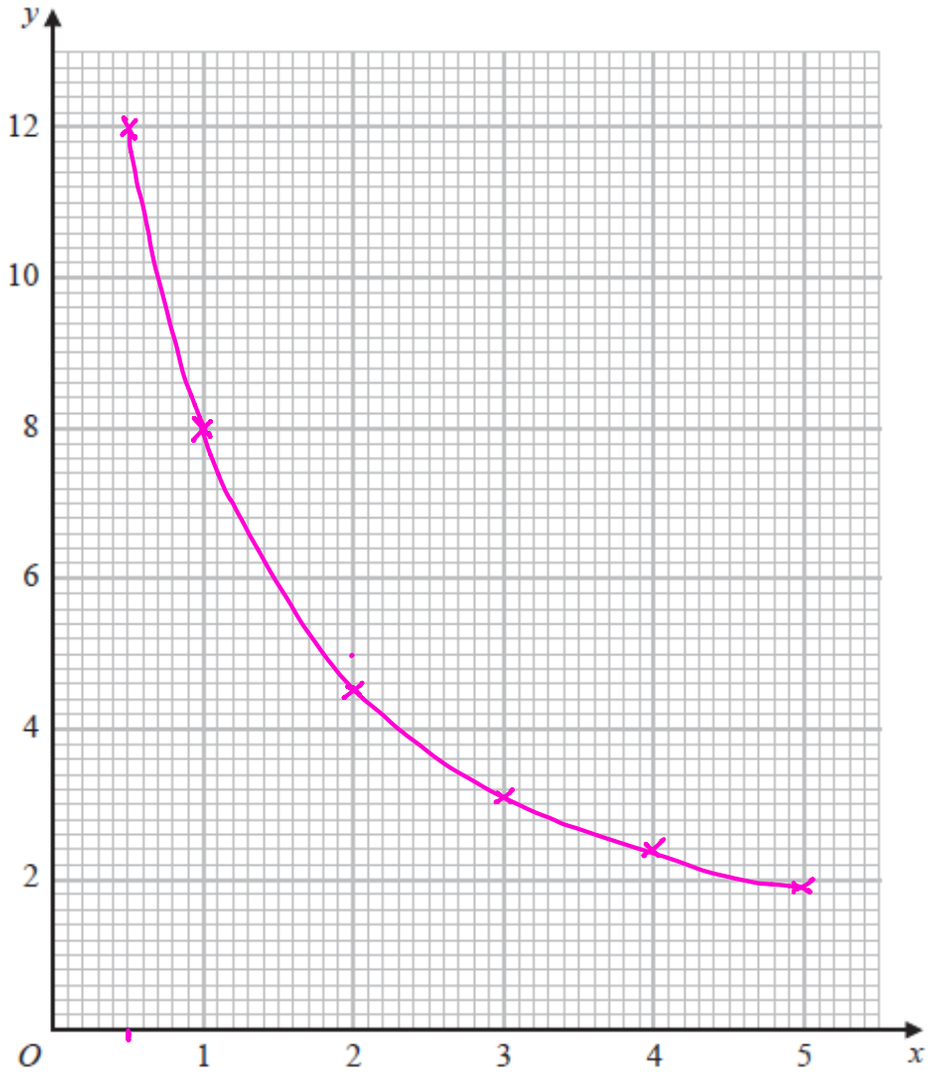
2 (*a*) Complete the table of values for $y = \frac{2}{x}\left(5 - \frac{1}{x}\right)$

$\frac{2}{1}(5 - \frac{1}{1}) = 2(4)$ $\quad$ $\frac{2}{2}(5 - \frac{1}{2}) = 5 - \frac{1}{2}$

x	0.5	1	2	3	4	5
y	12	8	4.5	3.1	2.4	1.9

(1)

(*b*) On the grid, draw the graph of $y = \frac{2}{x}\left(5 - \frac{1}{x}\right)$ for $0.5 \leq x \leq 5$



(2)

(Total for Question 2 is 3 marks)

3 The diagram shows a pentagon.

3sides = 180
4sides = 360
5sides = 540

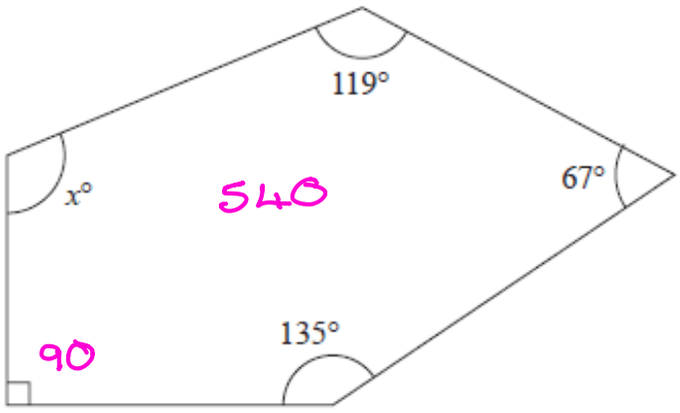


Diagram **NOT** accurately drawn

Work out the value of x

$540 - (90 + 135 + 67 + 119)$

$= 540 - 411$

$= 129$

$x =$ 129

(Total for Question 3 is 3 marks)

4 Some members of a library were asked to name the type of book that they each liked to read the best.

One of the members is chosen at random.
The table shows information about the probability of the type of book that this member answered.

Type of book	comedy	romance	mystery	thriller
Probability	0.24	0.40	$3x$	x

0·27 0·09

48 members answered comedy books.

Work out how many of the members answered mystery books.

$1 - (0.24 + 0.4) = 1 - 0.64$
$= 0.36$

so $4x = 0.36$
$x = 0.09$
$3x = 0.27$

so: $0.24 = 48$
$\div 24$ $0.01 = 2$ $\div 24$
$\times 27$ $0.27 = 54$ $\times 27$

54

(Total for Question 4 is 4 marks)

5 (*a*) Factorise $y^2 - 2y - 48$

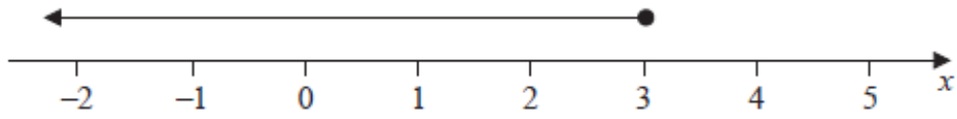
1, 48
2, 24
3, 16
4, 12
6, 8

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

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

(2)

(*b*) Write down the inequality shown on the number line



$x \leq 3$

(1)

(*c*) Solve the inequality $7w + 6 > 12w + 14$

$-14 \quad -14$

$7w - 8 > 12w$

$-7w \quad -7w$

$-8 > 5w$

$\frac{-8}{5} > w$

$w < -\frac{8}{5}$

(3)

(Total for Question 5 is 6 marks)

6 Matteo is going to invest £5000 for two years.

He can invest his money in Bank **G** or in Bank **H**.

Bank G	Bank H
1.6% per year compound interest	2.9% interest added after two years

1·016

1·029

The total amount of interest Matteo would receive at the end of two years from Bank **G** is more than the amount of interest Matteo would receive at the end of two years from Bank **H**.

How much more?

5000×1.016^2

$= 5161.28$

5000×1.029

$= 5145$

Difference $= 5145 - 5161.28$

$= 16.28$

£ 16·28

(Total for Question 6 is 4 marks)

7 Shane bought a car.

The amount Shane paid for the car was £32 000

Theresa also bought a car. To pay for this car, Theresa paid a deposit of £18 000 together with 14 monthly payments of £1160

Theresa paid more for her car than Shane paid for his car.

(*a*) Work out how much more Theresa paid as a percentage of the amount Shane paid.

Shane
32000

Theresa
1160 × 14 + 18000
= 34240

Difference = 2240

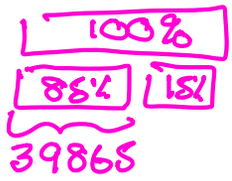
$\% = \frac{2240}{32000} \times 100$

.....7.....%

(4)

Kylie bought a van.

After 1 year, the value of the van was £39 865 ← 85%
During this year, the value of the van decreased by 15%



(*b*) Work out the value of the van when Kylie bought it.

85% = 39865 ÷ 85
1% = 469
× 100 ↓ 100% = 46900

£ 46900

(3)

(Total for Question 7 is 7 marks)

8 Change a speed of 90 kilometres per hour to a speed in metres per second.
Show your working clearly.

90 000 metres = 1 hour
= 3600 seconds
÷ 3600
25 metres = 1 second
÷ 3600

25 ..... m/s

(Total for Question 8 is 3 marks)

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9 Solve $\frac{x+3}{4} - \frac{7-x}{5} = 4.3$

Show clear algebraic working.

$\times 20 \quad \frac{x+3}{4} - \frac{7-x}{5} = 4.3 \times 20$

$5(x+3) - 4(7-x) = 86$

$5x + 15 - 28 + 4x = 86$

$9x - 13 = 86$

$9x = 99$

$x = 11$

$x =$ 11

(Total for Question 9 is 3 marks)

10 Given that the surface area of a sphere is 49π cm^2, find the volume of the sphere.

Give your answer correct to the nearest integer.

$V = \frac{4}{3}\pi r^3$

$A = 4\pi r^2$

$49\pi = 4\pi r^2$

$r^2 = \frac{49\pi}{4\pi}$

$r = \sqrt{\frac{49\pi}{4\pi}} = 3.5$

Volume $= \frac{4}{3} \times \pi \times 3.5^3$

$= 179.59...$

180 ..... cm^3

(Total for Question 10 is 3 marks)

11 80 students entered a dancing competition.
The table gives information about the length of time, in minutes, for which each student spent dancing.

Frequency	Time (m)		
$0 < m \leq 12$	11		
$12 < m \leq 24$	25		
$24 < m \leq 36$	23		
$36 < m \leq 48$	15		
$48 < m \leq 60$	6		

6 × 11 = 66
18 × 25 = 450
30 × 23 = 690
42 × 15 = 630
54 × 6 = 324
80 2160

Work out an estimate for the mean length of time the students spent dancing.

2160 ÷ 80 = 27

.....27..... minutes

(Total for Question 11 is 4 marks)

12 The diagram shows rectangle *ABCD*

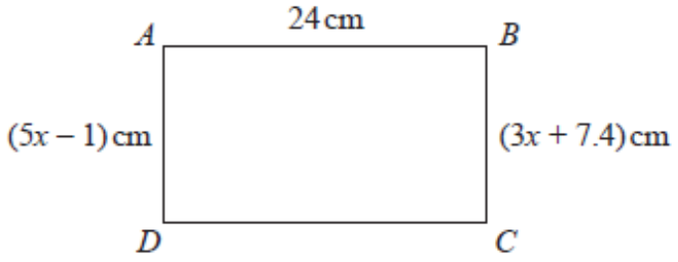


Diagram **NOT** accurately drawn

Work out the perimeter of the rectangle.
Show your working clearly.

$5x - 1 = 3x + 7.4$

$2x = 8.4$

$x = 4.2$

AD $5 \times 4.2 - 1 = 20$

Perimeter: $24 + 24 + 20 + 20$

$= 88$

88 ..... cm

(Total for Question 12 is 4 marks)

13 The weight of a cake is 2.75 kg, correct to 2 decimal places.

2·74 2·75 2·76

LB UB

(*a*) Write down the lower bound of the weight of the cake.

2·745 kg

(1)

(*b*) Write down the upper bound of the weight of the cake.

2·755 kg

(1)

Penny has worked out $\frac{81.3 \times 59.2}{1.9^2}$.

Her answer is 13 332.299 17

Penny's answer is not sensible.

(*c*) By rounding each number to one significant figure, work out a suitable estimate to show that her answer is not sensible.
Show your working clearly.

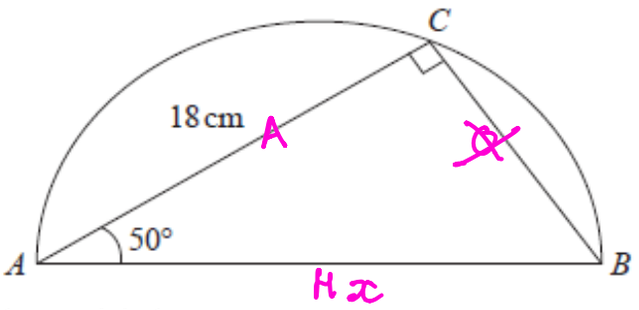
$\frac{80 \times 60}{2^2} = \frac{4800}{4} = 1200$

(2)

(Total for Question 13 is 4 marks)

14 The diagram shows a triangle ABC inside a semicircle.

Diagram **NOT** accurately drawn



A, B and C are points on the semicircle.

AB is the diameter of the semicircle.

Angle $ACB = 90°$
Angle $BAC = 50°$
$AC = 18$ cm

Work out the perimeter of the semicircle.
Give your answer correct to 2 significant figures.

$\cos 50 = \frac{18}{x}$

$x = \frac{18}{\cos 50} = 28.003...$

so diameter = 28 cm
radius = 14 cm

Perimeter $= 28 + \frac{1}{2}\pi \times 28$

$= 71.98...$

72 ..... cm

(Total for Question 14 is 5 marks)

15 In a box, there are only green sweets, orange sweets and yellow sweets.

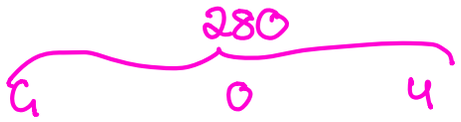
There are 280 sweets in the box so that

the number of green sweets : the number of orange sweets = 2 : 3

and

the number of orange sweets : the number of yellow sweets = 1 : 5

Work out how many green sweets there are in the box.



G : O
2 : 3

O : Y
1 : 5
x3 ↓ ↓ x3
3 : 15

so G : O : Y
2 : 3 : 15.

280 ÷ 20 = 14

2 x 14 = 28
3 x 14 = 42
15 x 14 = 210

28

(Total for Question 15 is 3 marks)

16 The table gives information about the weights, in kg, of the parcels that Pedro delivers on Monday.

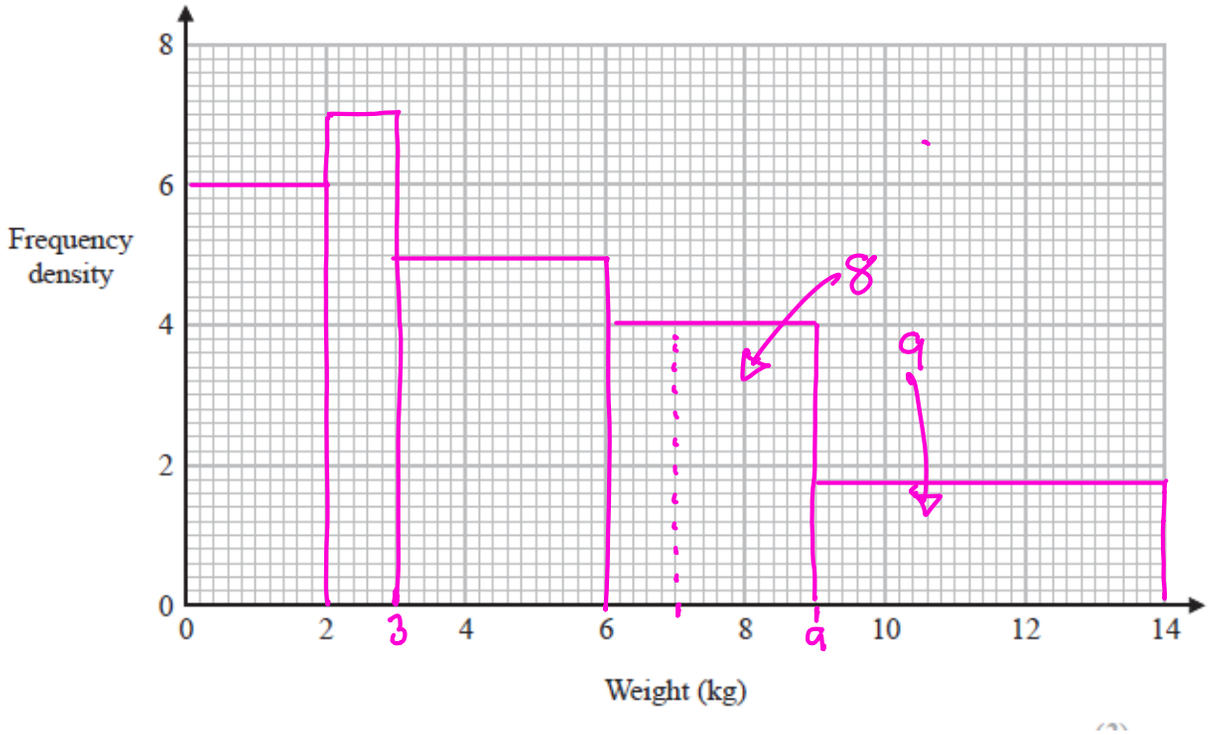
Weight (w kg)	Frequency
$0 < w \leq 2$	12
$2 < w \leq 3$	7
$3 < w \leq 6$	15
$6 < w \leq 9$	12
$9 < w \leq 14$	9

55

width: 2, 1, 3, 3, 5

frequency density: 12 ÷ 2 = 6; 7 ÷ 1 = 7; 15 ÷ 3 = 5; 12 ÷ 3 = 4; 9 ÷ 5 = 1·8

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



(3)

One of the parcels that Pedro delivered on Monday is chosen at random.

(*b*) Using the information in the table, find an estimate for the probability that this parcel weighs more than 7 kg.

4 × 2 = 8

8 + 9 = 17

17/55

.....

(2)

(Total for Question 16 is 5 marks)

17 The points A and B are on a coordinate grid.

The coordinates of A are (6, 4)
The coordinates of B are (17, j) where j is a constant.

The midpoint of AB has coordinates (k, 15) where k is a constant.

Find the value of j and the value of k

A (6, 4) mid (k, 15) B (17, j)

$\frac{17+6}{2} = k$

$k = 11.5$

$\frac{4+j}{2} = 15$ $4+j = 30$ $j = 26$

$j =$ 26

$k =$ 11.5

(Total for Question 17 is 3 marks)

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18 Here is a list giving the numbers of runs scored last week by the eleven members of cricket team **A**.

2 3 4 6 21 26 27 32 34 61 72

The interquartile range of the numbers of runs scored last week by the eleven members of cricket team **B** was 42

Using a suitable calculation, write down one comparison between the numbers of runs scored by the members of cricket team **A** and the members of cricket team **B**.
Show your working clearly.

A IQR = 34 - 4 = 30

B IQR = 42

The IQR for team A is smaller which suggests the runs scored were more consistent for this team

(Total for Question 18 is 3 marks)

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19 The acceleration, a, of an object is given by

$$a = \frac{v - u}{t}$$

where

$v = 45.23$ correct to 2 decimal places
$u = 5.12$ correct to 2 decimal places
$t = 8.5$ correct to 2 significant figures

By considering bounds, work out the value of a to a suitable degree of accuracy.
Show your working clearly and give a reason for your answer.

v = 45.23 → 45.225, 45.235

u = 5.12 → 5.115, 5.125

t = 8.5 → 8.45, 8.55

UB $\frac{45.235 - 5.115}{8.45}$ ↑ ↓

$= 4.74479..$

LB $\frac{45.225 - 5.125}{8.55}$ ↓ ↑

$= 4.6900..$

Both UB and LB would round to 4.7

$a =$ 4.7

(Total for Question 19 is 5 marks)

20 The diagram shows the cross section of a circular water pipe.

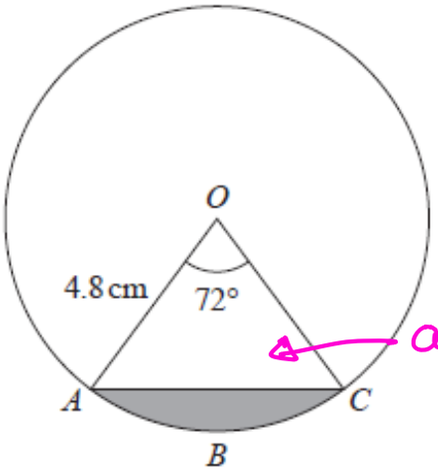

Diagram **NOT** accurately drawn

area of sector
$= \frac{72}{360} \times \pi \times 4.8^2$
$= 14.476\ldots$

area of $\triangle$:
$\frac{1}{2} \times 4.8 \times 4.8 \times \sin 72$
$= 10.956\ldots$

OABC is a sector of the circle, centre *O*

The shaded region in the diagram represents the water flowing in the pipe.

The water flows at 14 cm/s in the pipe.

Work out the volume of water that has flowed through the pipe in 3 minutes.
Give your answer in cm^3 correct to 3 significant figures.

$3 \times 60 = 180$ secs.

Shaded area $= 14.476\ldots - 10.956\ldots$
$= 3.520\ldots cm^2$

Volume in 3 minutes

$14 \times 3.520 \times 180$
cm/s cm^2 seconds

$= 8870.4\ cm^3$

3.s.f. $= 8870\ cm^3$

8870 ..... cm^3

(Total for Question 20 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS