



DIXONS
SIXTH FORM
BRADFORD

SUMMER WORK

**A LEVEL
MATHS**

STUDENT NAME:

20
26

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About your Summer Work

A-Level Mathematics builds upon the fundamental concepts covered at GCSE. The topics included in this booklet will be assessed upon your arrival in September and only limited time will be allocated to revisiting these foundational principles in lessons.

To ensure a smooth transition into A-Level study, it is essential that you dedicate time over the summer to consolidating your understanding and preparing for the preliminary test, which will take place during the first week of term.

Guidance for Completion

- **Complete all tasks in this booklet to the best of your ability** and bring it with you to your first mathematics lesson.
- **There may be questions / topics which you have not learnt previously, please read into these independently and try to complete.**
- **Self-mark your work** using green or red pen, carefully reviewing and correcting any errors.
- Attempt every question, ensuring that you always show your full working.
- **Spend extra time on challenging topics**, using Corbettmaths videos for additional support where necessary.
- **Follow the week-by-week schedule** as a guide to manage your workload effectively throughout the summer.

Diligent preparation will help you build confidence and ensure you are ready to engage fully in your A-Level Mathematics journey.

Welcome to Mathematics

A-Level Mathematics: Subject Overview

A-Level Mathematics is one of the most widely studied subjects by students progressing to university. It develops essential analytical skills and problem-solving abilities that are fundamental across numerous disciplines. Students who excel in A-Level Mathematics embrace challenges, enjoy exploring mathematical concepts and recognise the value of consistent practice in mastering a wide range of problem-solving techniques.

Success in this subject requires a commitment to regular independent study. Beyond lessons, students should dedicate time to refining their skills through exercises, past exam questions and various learning resources, including **online retrieval practice**, **textbook-based procedural tasks**, and **exam-style problems**.

The Value of Mathematics in Further Study and Employment

Mathematics has long been regarded as a highly respected A-Level by universities and employers due to its rigorous content and the intellectual discipline required to succeed. It opens doors to a broad spectrum of courses and careers that demand strong numerical reasoning and logical thinking. In today's technology-driven world, mathematics students often demonstrate innovation and creativity in problem-solving—key qualities sought after in the modern workforce.

Course Structure

Students will study the Edexcel Specification for A-Level Mathematics, culminating in three 2 hour papers at the end of Year 2:

- **Paper 1 & 2 – Pure Mathematics:** Covers fundamental concepts such as algebra, coordinate geometry, graphs and calculus.
- **Paper 3 – Mechanics and Statistics:** Includes topics such as forces, kinematics and projectiles in mechanics, as well as probability distributions, data analysis, and hypothesis testing in statistics.

By fully engaging with the course and actively developing mathematical fluency, students will build a solid foundation for success in both higher education and future career pathways.

Careers & Higher Education A-Level

Mathematics is a facilitating subject, widely recognised as a highly respected qualification that is essential for certain university courses. If you are considering studying engineering, economics, mathematics, physics, statistics, actuarial science or computer science, most universities require A-Level Mathematics as part of their entry criteria. Additionally, for fields such as biochemistry, dentistry, business studies, geography and accounting, mathematics is often listed as a highly beneficial but not mandatory subject.

The Value of Mathematics in Career Development

Mathematics-related careers are among the most highly paid professions. Research indicates that students who complete A-Level Mathematics earn, on average, 11% more over their lifetime compared to those who do not. While some may assume that a degree in mathematics leads to a limited range of career options, this is far from the truth. Mathematics graduates are highly sought after and can pursue diverse career pathways, including finance, civil service, technology, research and engineering.

Engineering, in particular, offers a variety of degree routes, making it one of the most popular choices for mathematics students entering higher education. The strong analytical and problem solving skills developed through A-Level Mathematics provide a solid foundation for tackling complex challenges in a wide range of industries.

Actuarial Science: A Leading Mathematical Career

One example of a highly mathematical career is actuarial science. Actuaries play a key role in the business and financial sectors, using mathematical modelling and statistical analysis to assess risk and determine probability. This can involve tasks such as evaluating pension scheme liabilities or pricing commercial insurance policies. Due to the rigorous examination process required to qualify as an actuary, salaries in this field are highly competitive, making it an appealing profession for mathematically skilled individuals.

Links to key information:

<https://dixons6a.com/uploads/files/Maths.pdf>

<https://qualifications.pearson.com/en/qualifications/edexcel-a-levels/mathematics-2017.html>

<https://amsp.org.uk/teachers/11-16-maths/transition-to-level-3-maths/where-maths-meets-the-world-of-work/>

Suggested Reading / Viewing List

The Codebook by Simon Singh

The Simpsons and Their Mathematical Secrets by Simon Singh

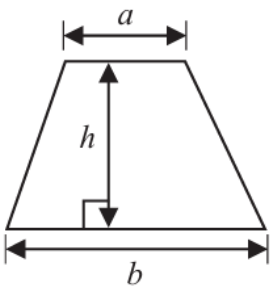
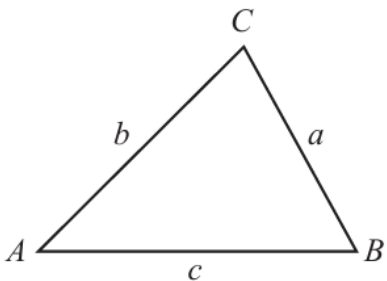
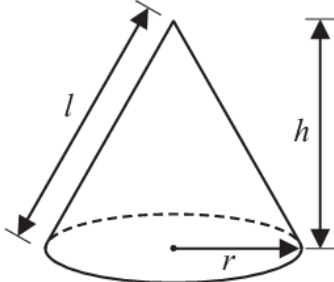
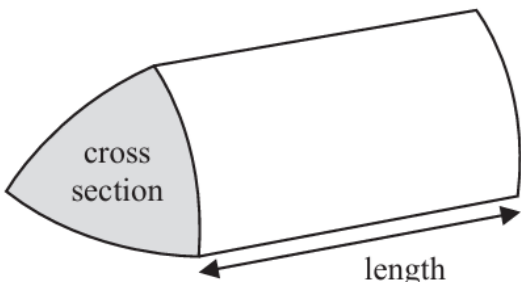
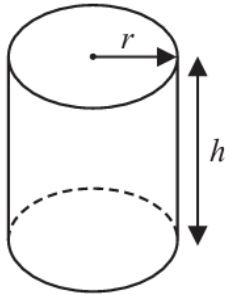
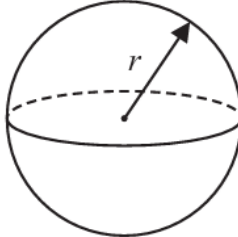
Infinity: The Quest to Think the Unthinkable by Brian Clegg

The Man who knew Infinity by Robert Kanigel

Humble Pi: A Comedy of Maths Errors by Matt Parker



Formula Sheet

Arithmetic series Sum to n terms, $S_n = \frac{n}{2} [2a + (n-1)d]$	Area of trapezium $= \frac{1}{2}(a+b)h$ 
The quadratic equation The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	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 $= \pi r l$ 	Volume of prism $= \text{area of cross section} \times \text{length}$ 
Volume of cylinder $= \pi r^2 h$ Curved surface area of cylinder $= 2\pi r h$ 	Volume of sphere $= \frac{4}{3}\pi r^3$ Surface area of sphere $= 4\pi r^2$ 

Question 1

Here are the first four terms of an arithmetic sequence.

1 4 7 10

(a) Find an expression, in terms of n , for the n th term of this sequence.

.....
(2)

The n th term of a different arithmetic sequence is $5n + 17$

(b) Find the 12th term of this sequence.

.....
(1)

(Total for Question 1 is 3 marks)

Question 2

450 students were asked how they travelled to school on Monday.

Each student walked or travelled by bus or travelled by car or travelled by bicycle.
Each student used just one method of travel.

One of these students is chosen at random.

The table shows information about the probability of each method of travel.

Method of travel	walk	bus	car	bicycle
Probability	0.20	x	$2x$	0.26

Work out how many of the 450 students travelled by car.

.....
(Total for Question 2 is 4 marks)

Question 3

Find the highest common factor (HCF) of 72 and 108. Show your working clearly.

.....
(Total for Question 3 is 2 marks)

Question 4

Ava records the number of kilometres she drives each month.

In April, Ava drove 943 kilometres.

This is 15% more than the number of kilometres she drove in March.

Work out the number of kilometres Ava drove in March.

..... kilometres

(Total for Question 4 is 3 marks)

Question 5

In the diagram, $ABCDE$ is a regular pentagon.

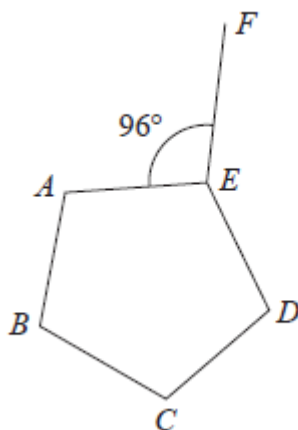


Diagram NOT
accurately drawn

Angle $AEF = 96^\circ$

Work out the size of the obtuse angle FED

Show your working clearly.

.....^o
(Total for Question 5 is 4 marks)



Question 6

(a) Expand and simplify $(m + 5)(m - 8)$

(b) Solve $3n - 4 = \frac{5n + 6}{3}$

Show clear algebraic working.

.....
(2)

$n =$

(3)

(Total for Question 6 is 5 marks)

Question 7

$$\mathcal{E} = \{23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34\}$$

$$A = \{\text{even numbers}\}$$

$$B = \{23, 29, 31\}$$

$$C = \{\text{multiples of 3}\}$$

(a) List the members of the set

(i) $B \cup C$

..... (1)

(ii) $A' \cap C$

..... (1)

(b) Is it true that $B \cap C = \emptyset$?

Tick (✓) one of the boxes below.

Yes

No

☐
☐

Give a reason for your answer.

.....

.....

(1)



The set D has 4 members and is such that $D \cap (A \cup C) = \emptyset$

(c) List the members of set D

(2)

(Total for Question 7 is 5 marks)

Question 8

A cylinder is placed on a table.

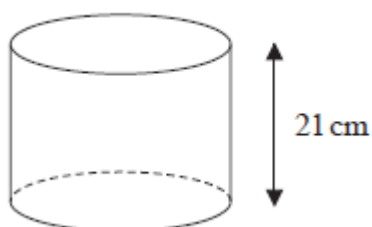


Diagram NOT
accurately drawn

The volume of the cylinder is 1575 cm^3

The force exerted by the cylinder on the table is 84 newtons.

$\text{pressure} = \frac{\text{force}}{\text{area}}$
--

Work out the pressure on the table due to the cylinder.

..... newtons/cm²

(Total for Question 8 is 3 marks)



Question 9

The table gives the amount of rice produced by each of two countries in 2020

Country	Amount of rice (tonnes)
Indonesia	3.5×10^7
Argentina	8.2×10^5

(a) Write 3.5×10^7 as an ordinary number.

.....
(1)

In 2020, Japan produced 6 780 000 more tonnes of rice than Argentina.

(b) Work out the amount of rice Japan produced in 2020
Give your answer in standard form.

..... tonnes
(2)

(Total for Question 9 is 3 marks)



Question 10

(a) Simplify $(2p)^0$ where $p > 0$

.....
(1)

$$y^9 \times y^{-3} = y^n$$

(b) Find the value of n

$n =$
(1)

(c) Simplify fully $(5a^4c^2)^3$

.....



(Total for Question 10 is 4 marks)



Question 11

The diagram shows a roof support.

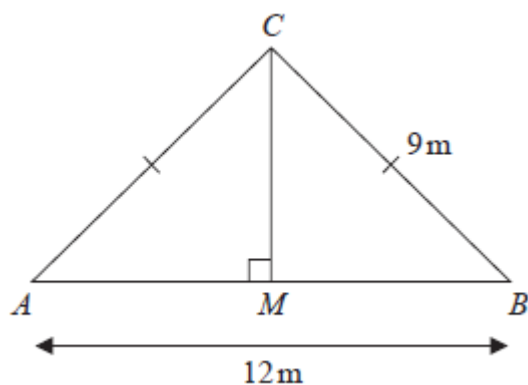


Diagram NOT
accurately drawn

The roof support is made from four lengths of wood, AB , AC , BC and MC

$$AC = BC = 9 \text{ m} \quad AB = 12 \text{ m}$$

$$\text{angle } AMC = 90^\circ$$

Lewis is going to buy lengths of wood to make the roof support.

The wood costs 21.50 euros per metre.

Each length of wood he buys has to be a whole number of metres.

Work out the total cost of the wood Lewis needs to buy.

Show your working clearly.

..... euros

(Total for Question 11 is 4 marks)

Question 12

(a) Factorise fully $6y^2 - 5y - 4$

.....
(2)

(b) Express $\frac{2x+1}{4x} + \frac{7-5x}{3x}$ as a single fraction in its simplest form.

(3)

(Total for Question 12 is 5 marks)

Question 13

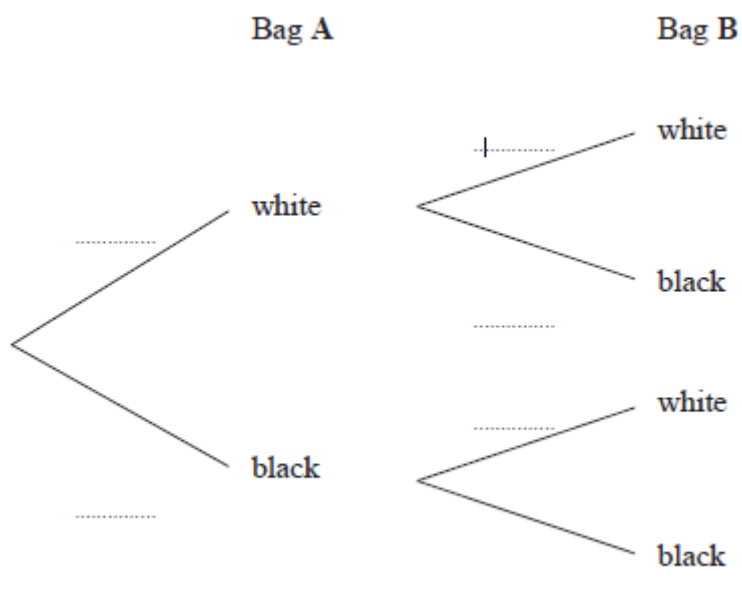
Harman has two bags of beads.

In bag **A**, there are 3 white beads and 7 black beads.

In bag **B**, there are 5 white beads and 4 black beads.

Harman takes at random a bead from bag **A** and a bead from bag **B**

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that Harman takes two beads of the same colour.

.....
(3)

(Total for Question 13 is 5 marks)

Question 14

The combined savings of Abel and Bahira are 15 435 dinars.

The savings of Bahira are 45% more than the savings of Abel.

The savings of Bahira are $\frac{3}{2}$ times the savings of Chanda.

Work out the savings of Chanda.

..... dinars

(Total for Question 14 is 5 marks)



Question 15

The function f is defined as

$$f : x \mapsto \frac{3x+1}{x-2}$$

(a) State the value of x that cannot be included in any domain of the function f

.....
(1)

(b) Express the inverse function f^{-1} in the form $f^{-1}(x) = \dots$

$f^{-1}(x) = \dots$
(3)

(Total for Question 15 is 4 marks)

Question 16

There are 20 sweets in a box.

15 of the sweets are red

5 of the sweets are yellow

Fred takes at random 3 sweets from the box.

Work out the probability that Fred takes at least one sweet of each colour from the box.

.....
(Total for Question 16 is 4 marks)

Question 17

Show that $\frac{1+\sqrt{5}}{3-\sqrt{5}}$ can be written in the form $a + \sqrt{b}$ where a and b are integers.

Show each stage of your working clearly.

(Total for Question 17 is 3 marks)

Question 18

A curve C has equation $y = x^3 - 40x + 1$

Find the coordinates of both the points on C at which the gradient is 8

(..... ,)

(..... ,)

(Total for Question 18 is 5 marks)

Question 19

Here is quadrilateral $ABCD$

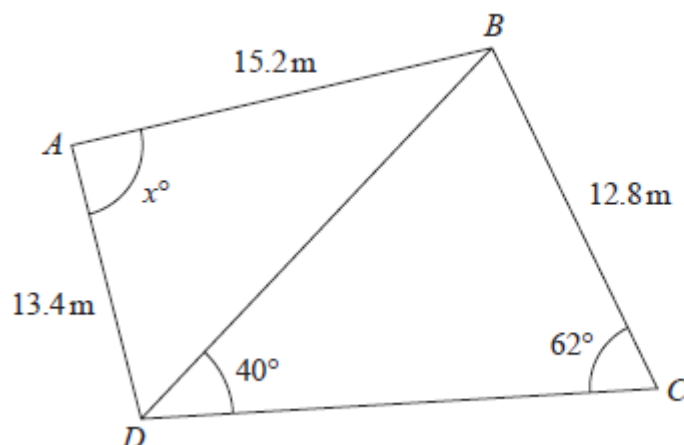


Diagram NOT
accurately drawn

Work out the value of x
Give your answer correct to 3 significant figures.

$x = \dots\dots\dots$

(Total for Question 19 is 5 marks)

Question 20

The diagram shows a sector $OABC$ of a circle centre O

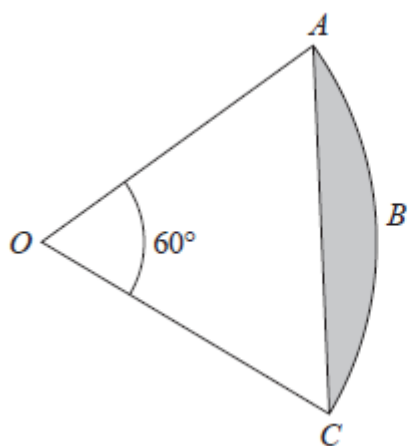


Diagram NOT
accurately drawn

Angle $AOC = 60^\circ$

The area of the shaded segment ABC is 38 cm^2

Work out the perimeter of the shaded segment ABC

Give your answer correct to one decimal place.

..... cm

(Total for Question 20 is 4 marks)

Question 21

A curve has equation $y = f(x)$

There is one minimum point on this curve.

The coordinates of this minimum point are $(5, -4)$

Write down the coordinates of the minimum point on the curve with equation

(i) $y = f(x + 7)$

(..... ,)
(1)

(ii) $y = f(x) - 6$

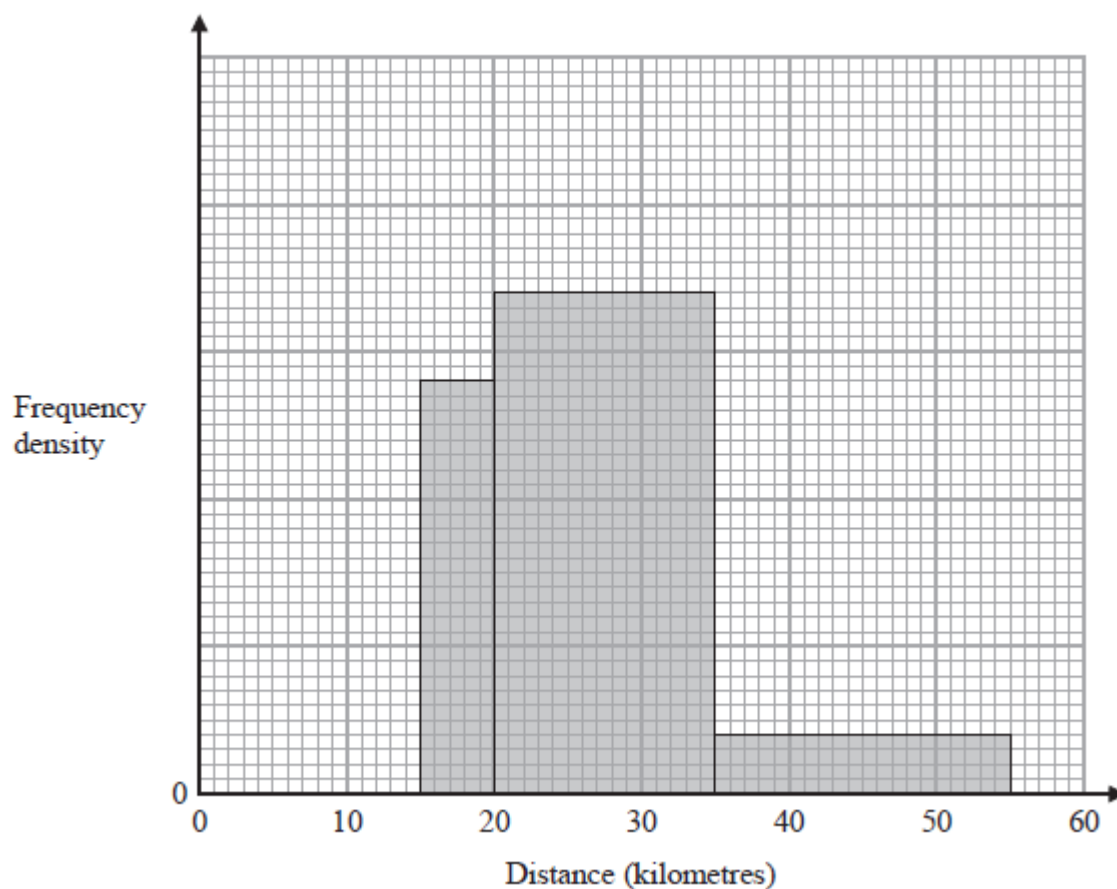
(..... ,)
(1)

(Total for Question 21 is 2 marks)



Question 22

The incomplete histogram shows some information about the distances, in kilometres, that 100 adults ran last week.



All of the adults ran at least 5 kilometres.

None of the adults ran more than 55 kilometres.

14 adults ran between 15 kilometres and 20 kilometres.

Complete the histogram.

(Total for Question 22 is 3 marks)

Question 23

A solid shape is made by removing a hemisphere, shown shaded, from a cone as shown in the diagram.

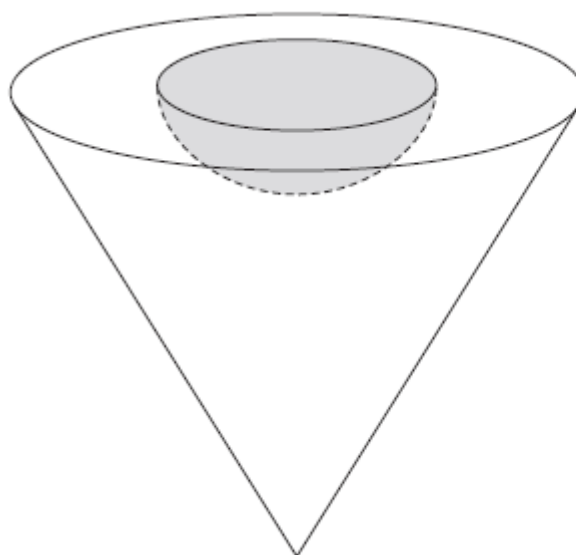


Diagram NOT
accurately drawn

The radius of the hemisphere is $2x$ cm

The radius of the base of the cone is $5x$ cm

The vertical height of the cone is $6x$ cm

The volume of the solid shape is 6948π cm³

Work out the **total** surface area of the solid hemisphere that has been removed from the cone.

Give your answer correct to the nearest integer.

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..... cm²

(Total for Question 23 is 5 marks)



Question 24

A polygon has n sides, where $n > 5$

The interior angles of the polygon form an arithmetic sequence.

The smallest angle of the polygon is 84°

The common difference of the sequence is 4°

Work out the sum of the interior angles of the polygon.

Show clear algebraic working.

.....^o
(Total for Question 24 is 6 marks)



Question 25

$$f(x) = 17 - 3x^2 + 12x$$

Write $f(x)$ in the form $a - b(x - c)^2$ where a , b and c are constants.

$$f(x) = \dots\dots\dots$$

(Total for Question 25 is 4 marks)



Weekly Task 2

Question 1

Here are eight numbers written in order of size

h 6 7 8 j 16 k k

where h, j and k are integers.

The median of the eight numbers is 10

The mode of the eight numbers is 18

The range of the eight numbers is 13

Work out the value of h , the value of j and the value of k

$h = \dots\dots\dots$

$j = \dots\dots\dots$

$k = \dots\dots\dots$ **(Total for Question 1 is 3 marks)****Question 2**

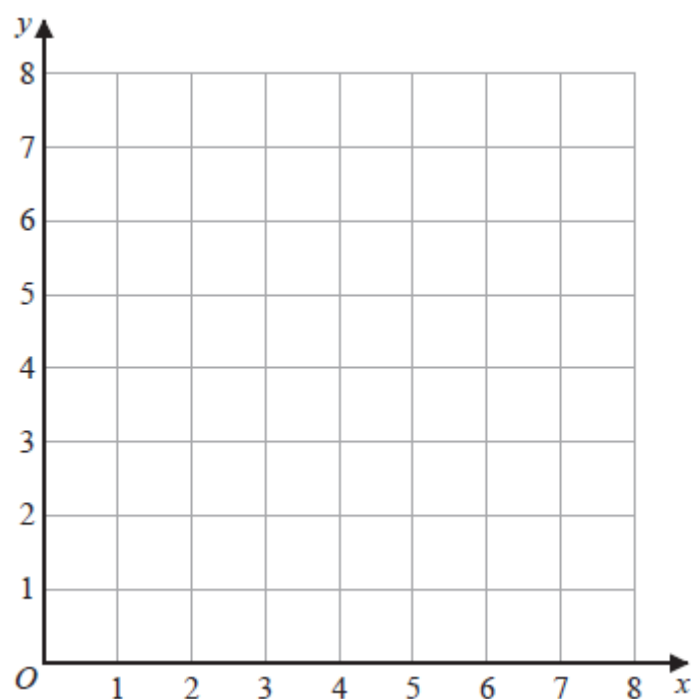
(a) On the grid, draw the straight line with equation

(i) $y = 2$

(ii) $x = 6$

(iii) $y = x + 1$

Label each line with its equation.

**(3)**

(b) Show, by shading on the grid, the region that satisfies all three of the inequalities

$$y \geq 2 \qquad x \leq 6 \qquad y \leq x + 1$$

Label the region **R**

(1)

(Total for Question 2 is 4 marks)



Question 3

A plane takes 9 hours 36 minutes to fly from New Delhi to Perth.

The plane flies at an average speed of 820 km/h.

Work out the total distance the plane flies.

..... km

(Total for Question 3 is 3 marks)

Question 4

Show that $2\frac{4}{7} \times 3\frac{1}{9} = 8$

(Total for Question 4 is 3 marks)

Question 5

The diagram shows triangle ABC

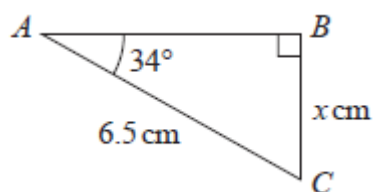


Diagram NOT
accurately drawn

Work out the value of x

Give your answer correct to one decimal place.

$x = \dots\dots\dots$ **(Total for Question 5 is 3 marks)**

Question 6

Change a speed of w metres per second to a speed in kilometres per hour.

Give your answer in terms of w in its simplest form.

..... kilometres per hour

(Total for Question 22 is 6 marks)



Question 7

The diagram shows a 6-sided shape $ABCDEF$

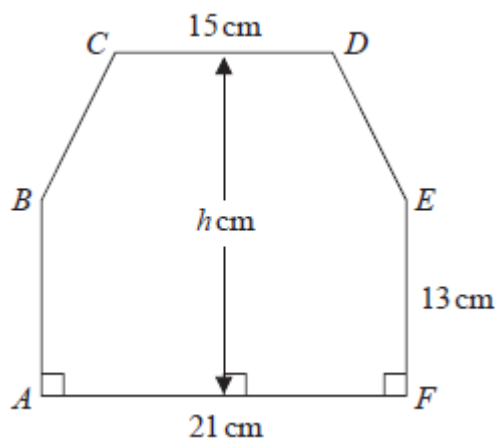


Diagram NOT
accurately drawn

$$AF = 21 \text{ cm} \quad CD = 15 \text{ cm} \quad AB = FE = 13 \text{ cm}$$

The perpendicular height of the shape is h cm

CD is parallel to AF

The area of the shape is 390 cm^2

Work out the value of h

$$h = \dots\dots\dots$$

(Total for Question 7 is 4 marks)

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Question 8

Ishir plants 600 bulbs in a garden.

He plants tulip bulbs, crocus bulbs and daffodil bulbs so that

number of tulip bulbs : number of crocus bulbs : number of daffodil bulbs = 9 : 4 : 2

45% of the tulip bulbs are for yellow flowers.

$\frac{5}{8}$ of the crocus bulbs are for yellow flowers.

All of the daffodil bulbs are for yellow flowers.

Work out the number of bulbs that are for yellow flowers.

.....
(Total for Question 8 is 5 marks)

Question 9

Giovanni invests 4500 koruna in a savings account for 4 years.

He gets 2.4% per year compound interest.

Work out how much money Giovanni will have in the savings account at the end of 4 years.

Give your answer correct to the nearest koruna.

..... koruna

(Total for Question 9 is 3 marks)



Question 10

Solve the simultaneous equations

$$6x + 4y = 1$$

$$3x + 5y = 8$$

Show clear algebraic working.

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(Total for Question 10 is 3 marks)



Question 11

(i) Factorise $x^2 + 9x - 22$

.....
(2)

(ii) Hence, solve $x^2 + 9x - 22 = 0$

.....
(1)

(Total for Question 11 is 3 marks)

Question 12

Ali uses a fitness tracker to count the number of steps he walks each day for 7 days.

For the first 4 days, his mean number of steps is 11 800

For the next 3 days, his mean number of steps is 13 207

Work out his mean number of steps for the 7 days.

.....
(Total for Question 12 is 3 marks)

Question 13

The table gives information about the distances, in km, that 70 teachers travel to school.

Distance (d km)	Frequency
$0 < d \leq 10$	7
$10 < d \leq 20$	17
$20 < d \leq 30$	18
$30 < d \leq 40$	14
$40 < d \leq 50$	10
$50 < d \leq 60$	4

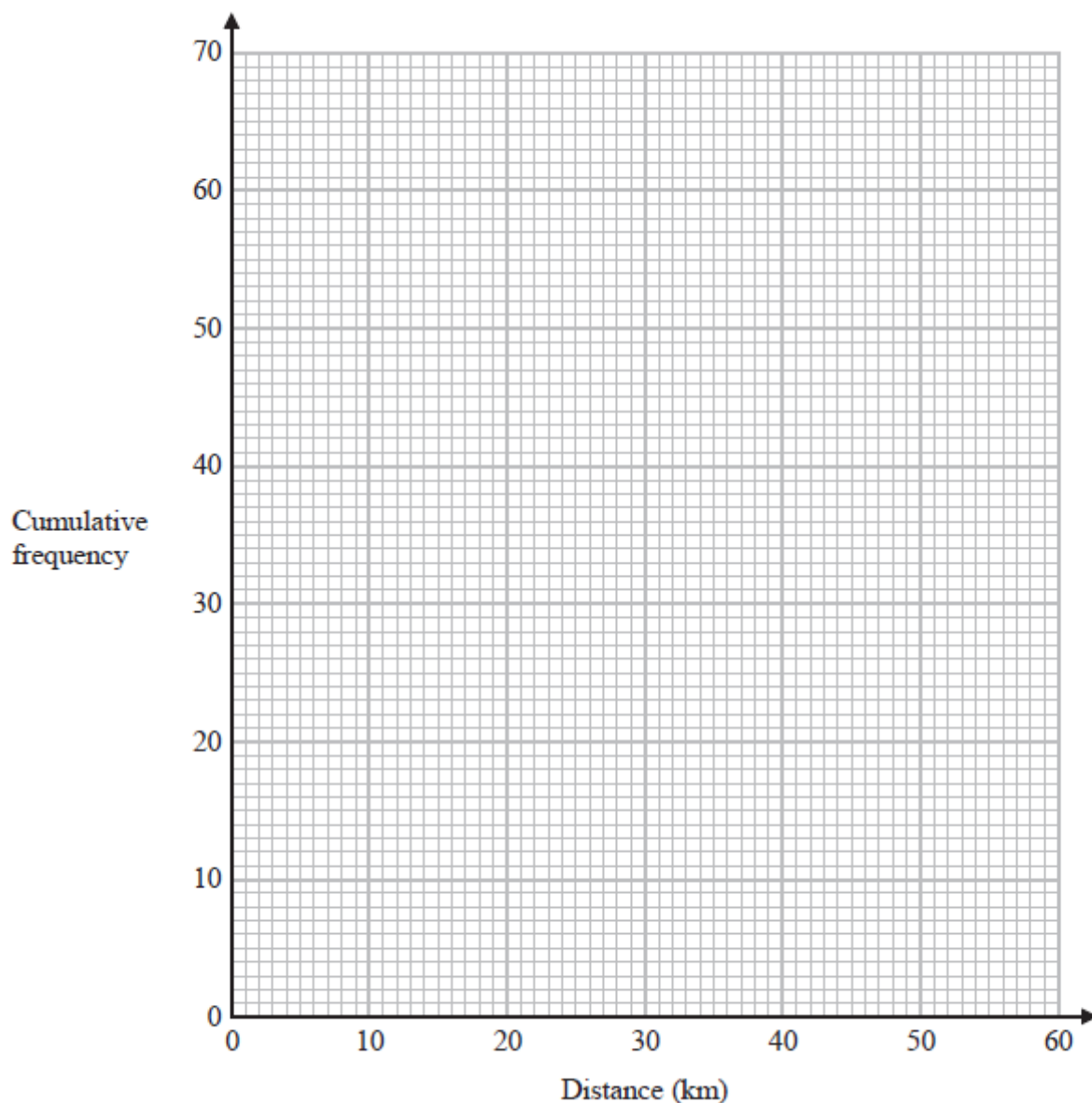
(a) Complete the cumulative frequency table.

Distance (d km)	Cumulative frequency
$0 < d \leq 10$	
$0 < d \leq 20$	
$0 < d \leq 30$	
$0 < d \leq 40$	
$0 < d \leq 50$	
$0 < d \leq 60$	

(1)

(b) On the grid below, draw a cumulative frequency graph for your table.

(2)



(c) Use your graph to find an estimate for the interquartile range of the distances.

..... km

(2)

(d) Use your graph to find an estimate for the number of teachers who travel more than 46 km.

.....
(2)

(Total for Question 13 is 7 marks)

Question 14

(a) Show that $3y(2y + 5)(y + 7)$ can be written in the form $ay^3 + by^2 + cy$ where

a, b and c are integers.

(3)

(b) Solve $\frac{2x+3}{5} + \frac{6x-5}{4} = \frac{163}{100}$

Show clear algebraic working.

$$x = \dots\dots\dots$$

(4)

(Total for Question 14 is 7 marks)

Question 15

(a) Make g the subject of $e = \sqrt{\frac{7g+5}{11+2g}}$

$$\dots\dots\dots$$

(4)

(b) Solve the inequality $3y^2 + 4y - 32 > 0$

Show your working clearly.



.....
(3)

(Total for Question 15 is 7 marks)

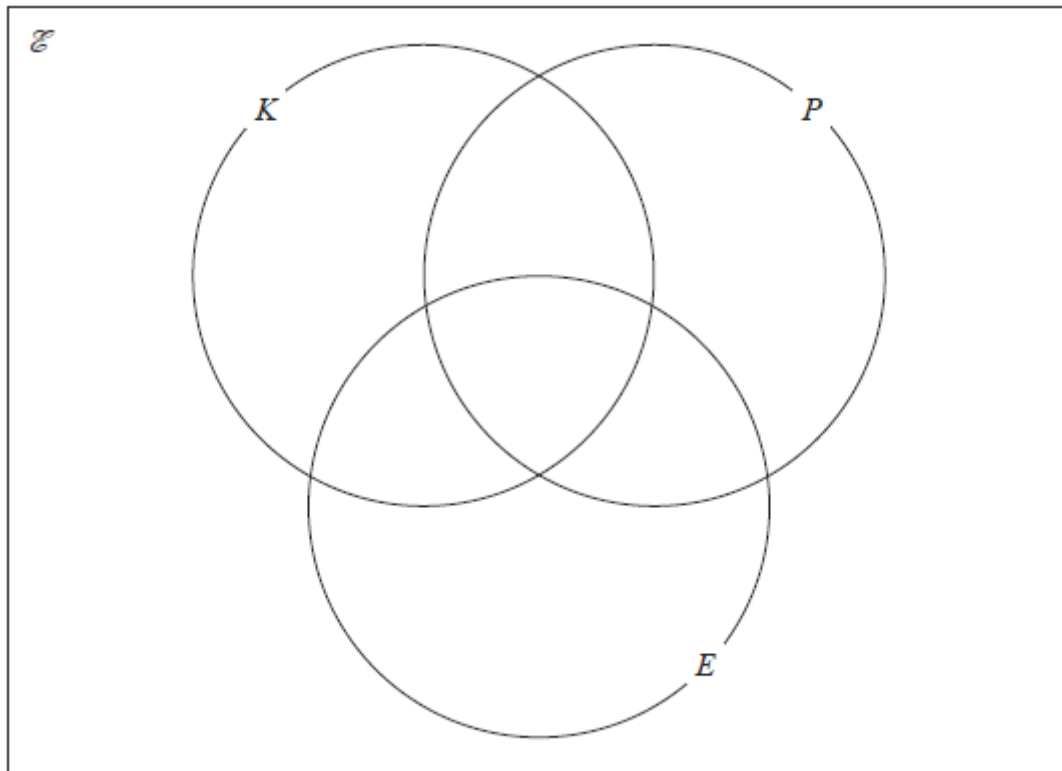
Question 16

60 art students were asked if they would like to attend workshops for knitting (K),
for photography (P) or for embroidery (E)

Of these students

- 9 chose knitting, photography and embroidery
- 17 chose knitting and photography
- 16 chose photography and embroidery
- 20 chose knitting and embroidery
- 28 chose photography
- 39 chose embroidery
- 2 chose none of the workshops

- (a) Using this information, complete the Venn diagram to show the numbers of students in each subset.



(3)

One of the students is chosen at random.

Given that this student chose photography,

(b) find the probability that this student also chose knitting.

.....

(2)

(c) Find $n(P \cap K')$

.....

(1)

(d) Find $n([P \cup E] \cap K)$

.....

(1)

(Total for Question 16 is 7 marks)

Question 17

Q is directly proportional to the square root of d

$Q = 4.5$ when $d = 324$

Find a formula for Q in terms of d

.....
(Total for Question 17 is 3 marks)

Question 18

The straight line **P** has equation $5y + 2x = 7$

Find the gradient of a straight line that is perpendicular to **P**

.....
(Total for Question 18 is 2 marks)

Question 19

$$G = \frac{c}{2f - 3h}$$

$c = 8$ correct to the nearest whole number

$f = 6.62$ correct to 2 decimal places

$h = 1.2$ correct to 1 decimal place

Work out the lower bound for the value of G

Give your answer correct to 3 decimal places.

Show your working clearly.

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

Question 20

Given that $k = x - y$ and $x = \frac{1}{4y}$

express $\frac{5k}{x+2}$ in the form $\frac{a-by^2}{c+dy}$ where a, b, c and d are integers.

.....
(Total for Question 20 is 3 marks)



Question 21

The diagram shows a square $ABCD$ and a circle.

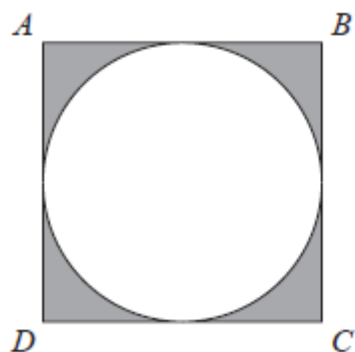


Diagram NOT
accurately drawn

The sides of the square are tangents to the circle.

The total area of the shaded regions is 80 cm^2

Work out the length of AC

Give your answer correct to 3 significant figures.

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..... cm

(Total for Question 21 is 5 marks)



Question 22

The straight line **L** has equation $x + y = 5$

The curve **C** has equation $2x^2 + 3y^2 = 210$

Find the coordinates of the points where **L** and **C** intersect.

Show clear algebraic working.

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

(Total for Question 22 is 5 marks)

Question 23

Simplify $\frac{30 \times 25^{2x+7}}{\sqrt{180} \times (\sqrt{5})^{4x+9}}$

Give your answer in the form 5^w where w is an expression in terms of x

Show each stage of your working clearly.

.....
(Total for Question 23 is 3 marks)



Question 24

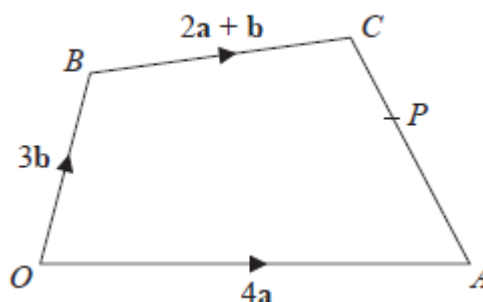


Diagram NOT
accurately drawn

The diagram shows a quadrilateral $OACB$ in which

$$\vec{OA} = 4\mathbf{a} \qquad \vec{OB} = 3\mathbf{b} \qquad \vec{BC} = 2\mathbf{a} + \mathbf{b}$$

(a) Find $\vec{AC}$ in terms of $\mathbf{a}$ and $\mathbf{b}$

Give your answer in its simplest form.

$$\vec{AC} = \dots\dots\dots$$

(2)



The point P lies on AC such that $AP : PC = 3 : 2$

The point Q is such that OPQ and BCQ are straight lines.

(b) Using a vector method, find $\vec{OQ}$ in terms of $\mathbf{a}$ and $\mathbf{b}$

Give your answer in its simplest form.

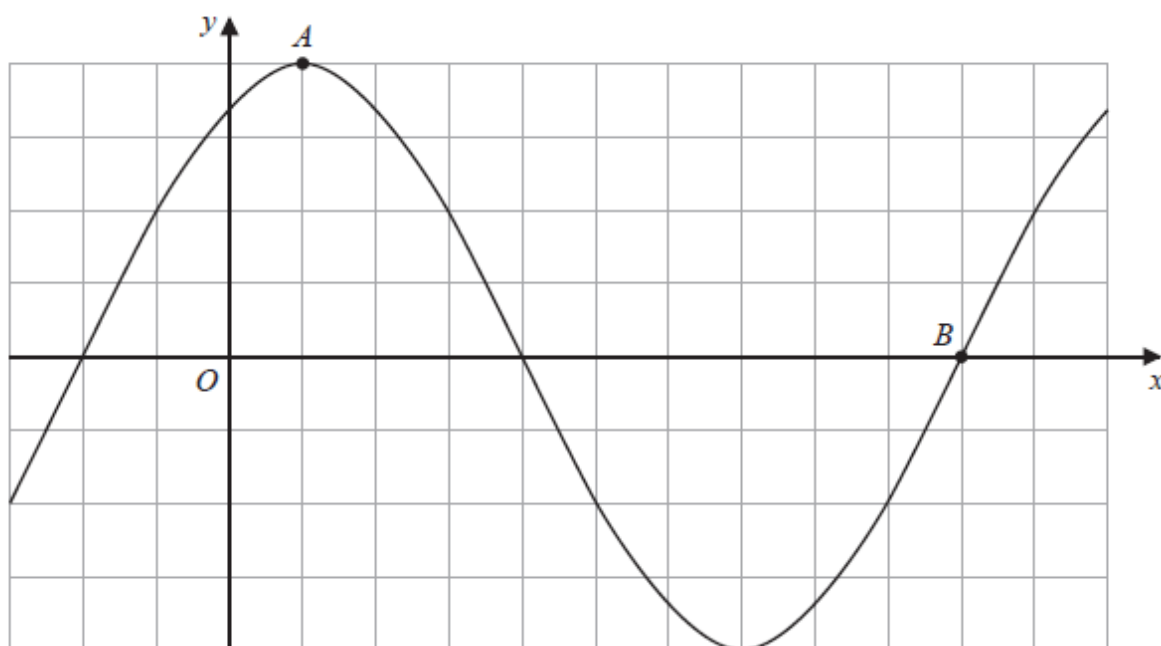
Show your working clearly.

$\vec{OQ} = \dots\dots\dots$

(Total for Question 24 is 6 marks)

Question 25

The diagram shows a sketch of the graph of $y = 2\sin(x + 60)^\circ$



- (i) Find the coordinates of the point A

(.....,) (1)

- (ii) Find the coordinates of the point B

(..... ,)

(1)

(Total for Question 25 is 2 marks)

Weekly Task 3

Question 1

Last season, the number of goals scored by Arjun, by Simon and by Kath for their football team were in the ratios 2 : 5 : 8

Simon scored 12 more goals than Arjun.

Work out the number of goals scored by Kath.

.....
(Total for Question 1 is 3 marks)



Question 2

The table gives information about the number of minutes that Abby spent walking each day in September.

Number of minutes (M)	Frequency
$0 < M \leq 30$	5
$30 < M \leq 60$	6
$60 < M \leq 90$	8
$90 < M \leq 120$	9
$120 < M \leq 150$	2

Work out an estimate for the total number of minutes that Abby spent walking in September.

..... minutes

(Total for Question 2 is 3 marks)



Question 3

Nanette buys 60 notebooks for a total cost of 780 dirhams.

Nanette sells 70% of the notebooks for 22 dirhams each.

She sells the remaining notebooks for 19 dirhams each.

Work out Nanette's percentage profit.

Give your answer correct to 3 significant figures.

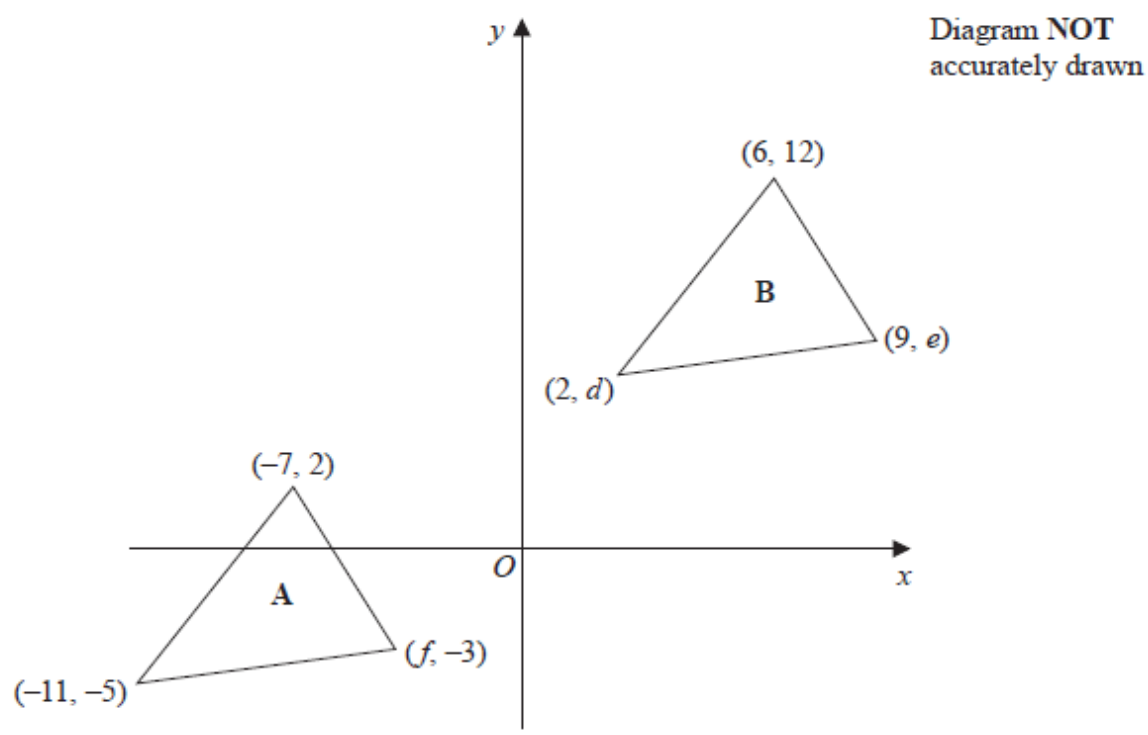
.....%

(Total for Question 3 is 4 marks)



Question 4

The diagram shows a sketch of triangle **A** and triangle **B** on a coordinate grid.



- (a) Given that triangle **A** has been translated to give triangle **B**, work out the value of d , the value of e and the value of f

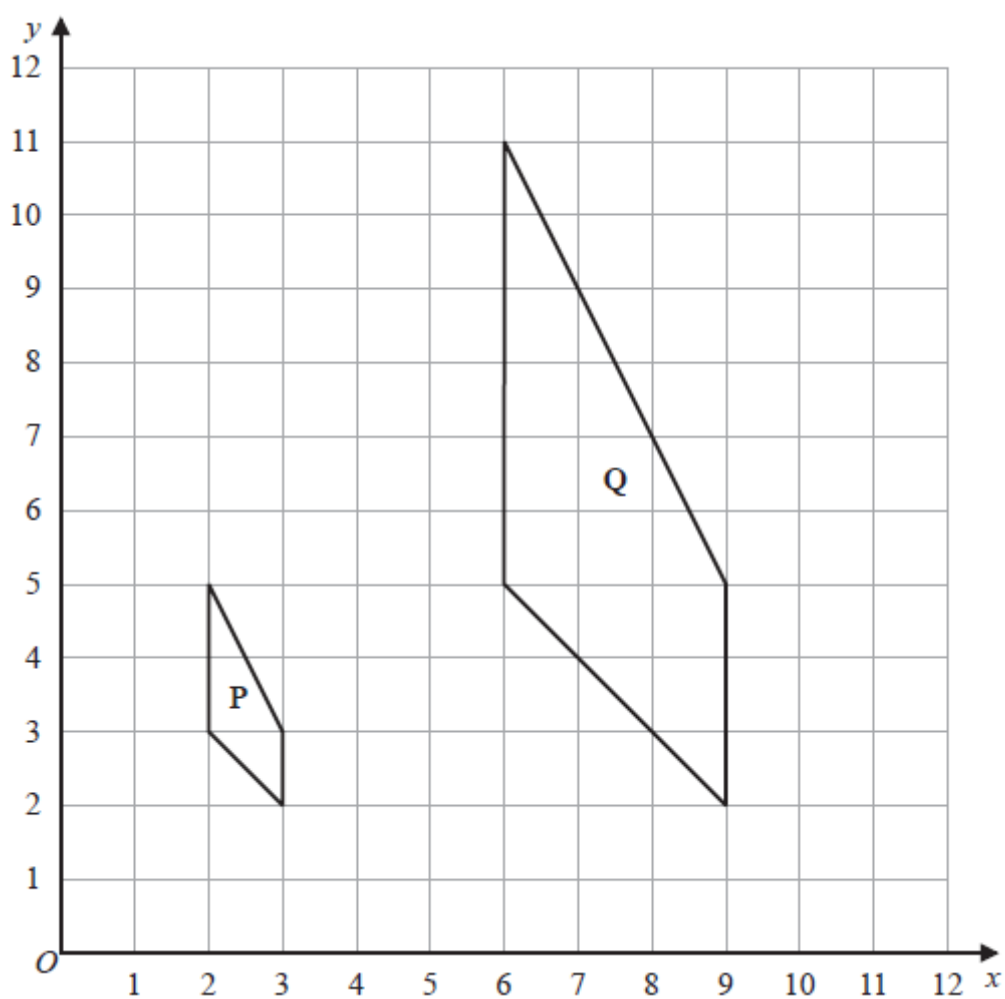
$d = \dots\dots\dots$

$e = \dots\dots\dots$ $f = \dots\dots\dots$

(3)



The diagram shows shape **P** and shape **Q** drawn on a grid.



(b) Describe fully the single transformation that maps shape **P** onto shape **Q**

.....
(3)

(c) On the grid above, rotate shape **P** 90° clockwise about (3, 5)
 Label your shape **R**

(2)

(Total for Question 4 is 8 marks)



Question 5

The diagram shows a shaded shape $AEBCD$ made by removing triangle AEB from rectangle $ABCD$

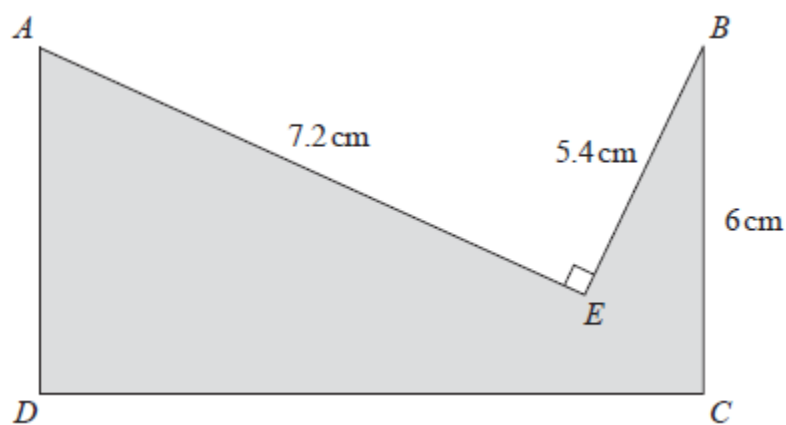


Diagram NOT
accurately drawn

$$AE = 7.2 \text{ cm} \quad BE = 5.4 \text{ cm} \quad BC = 6 \text{ cm} \quad AEB = 90^\circ$$

Work out the perimeter of the shaded shape.

..... cm

(Total for Question 5 is 4 marks)



Question 6

(a) Simplify $(2c^4 d^7)^3$

.....
(2)

(b) Find the value of $5y^0$ where $y > 0$

.....
(1)

(c) Factorise fully $16a^2b^3 + 20a^3b$

.....
(2)

(d) (i) Factorise $x^2 + 9x - 22$

.....
(2)

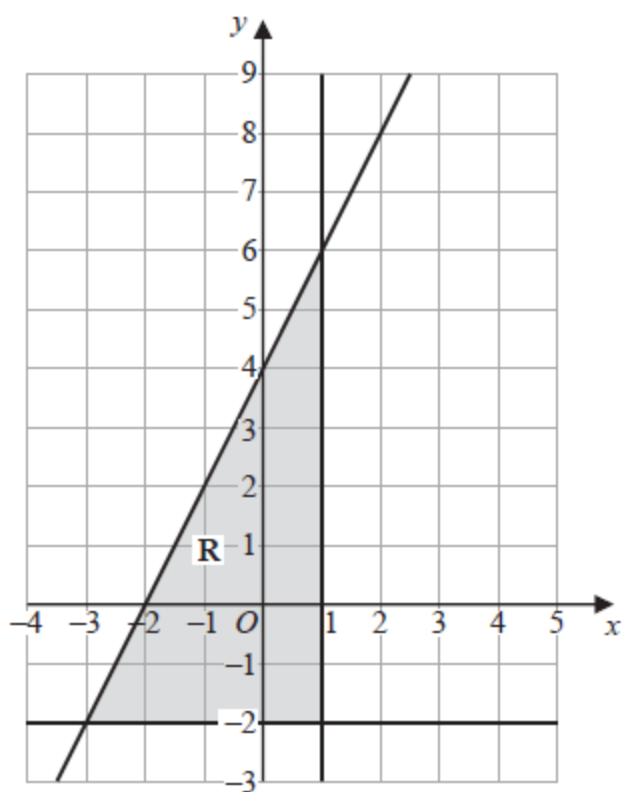
(ii) Hence solve $x^2 + 9x - 22 = 0$

.....
(1)

(Total for Question 6 is 8 marks)



Question 7



The region **R**, shown shaded in the diagram, is bounded by three straight lines.

Find the inequalities that define **R**

.....

.....
(Total for Question 7 is 4 marks)

Question 8

- (a) Write 300 as a product of its prime factors.
Show your working clearly.

.....
(2)

$$A = 2 \times 2 \times 2 \times 3 \times 3 \times 5$$

$$B = 2 \times 2 \times 3 \times 3 \times 3 \times 5$$

- (b) Find the lowest common multiple (LCM) of $5A$ and $7B$
Show your working clearly.

.....
(2)(Total for Question 8 is 4 marks)

Question 9

Solve the simultaneous equations

$$2x + 9y = 14.5$$

$$7x + 3y = 8$$

Show clear algebraic working.

 $x =$ $y =$ 

(Total for Question 9 is 3 marks)

Question 10

Here are the test marks of 15 students.

7 10 14 15 16 17 18 19 20 20 23 25 30 39 40

Find the interquartile range of these marks.

.....
(Total for Question 10 is 2 marks)**Question 11**The curve **C** has equation $y = 4x^3 + x^2 - 20x$ (a) Find $\frac{dy}{dx}$

$$\frac{dy}{dx} = \dots\dots\dots$$

(2)

(b) Find the x coordinates of the points on **C** where the gradient is 4
Show clear algebraic working.

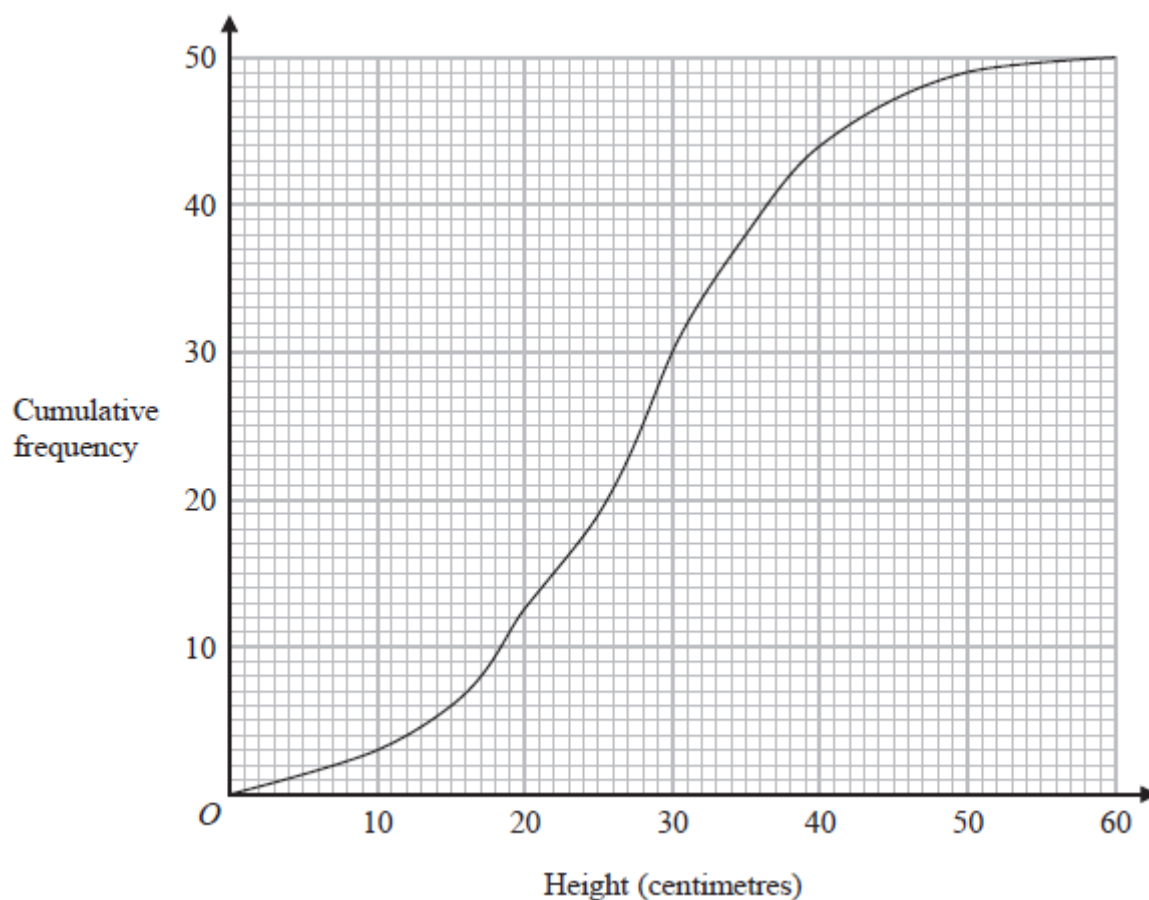
.....
(4)

(Total for Question 11 is 6 marks)



Question 12

The cumulative frequency graph shows information about the heights, in centimetres, of 50 plants in a flowerbed.



(a) Use the graph to find an estimate for the median height of these plants.

..... centimetres
(1)

(b) Use the graph to find the frequency for the class interval $30 < \text{Height} \leq 40$

.....
(1)

(c) Use the graph to find an estimate for the number of plants with a height greater than 35 centimetres.

.....
(2)

(Total for Question 12 is 4 marks)

Question 13

A is the point with coordinates $(-5, 12)$

B is the point with coordinates $(19, -48)$

Find an equation of the straight line that passes through the points A and B

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

Question 14

Factorise fully $50g^2 - 18$

.....
(Total for Question 14 is 3 marks)



Question 15

$$(a) \sqrt{2} \div \frac{8^3}{16^{\frac{3}{2}}} = 2^n$$

Work out the value of n
Show your working clearly.

$$n = \dots\dots\dots (3)$$

- (b) Find 4% of 4.5×10^{157}
Give your answer in standard form.

.....
(3)

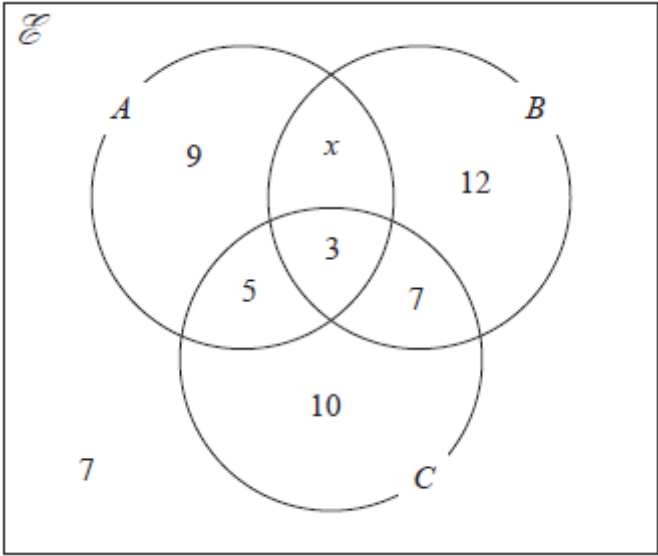
(Total for Question 15 is 6 marks)



Question 16

The Venn diagram shows a universal set $\mathcal{E}$ and sets A , B and C

The numbers and the letter x represent **numbers** of elements.



Given that $n(A \cup B) = 42$

(a) find the value of x

$x = \dots\dots\dots$
(1)

(b) Find $n(A')$

$\dots\dots\dots$
(1)

(c) Find $n(B' \cap C)$

.....
(1)

(Total for Question 16 is 3 marks)



Question 17

The functions g and h are such that

$$g(x) = \frac{11}{2x-5}$$

$$h(x) = x^2 + 4 \quad x \geq 0$$

(a) What value of x must be excluded from any domain of g ?

.....
(1)

(b) Solve $gh(x) = 1$

.....
(3)

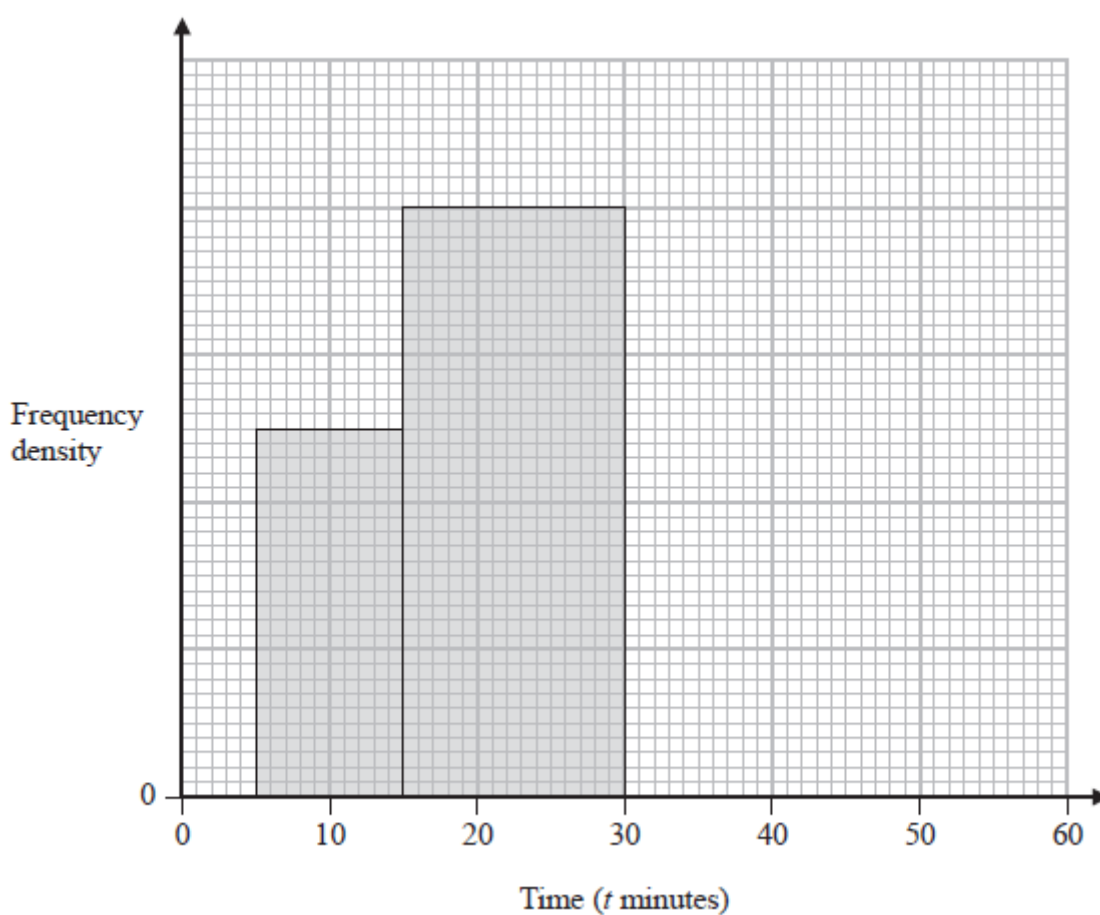
(Total for Question 17 is 4 marks)



Question 18

The incomplete table and incomplete histogram give information about the times, in minutes, that 140 people waited at a station for a train.

Time (t minutes)	Frequency
$0 < t \leq 5$	23
$5 < t \leq 15$	
$15 < t \leq 30$	
$30 < t \leq 40$	18
$40 < t \leq 60$	14



Complete the table and the histogram.

Total for Question 18 is 4 marks)



Question 19

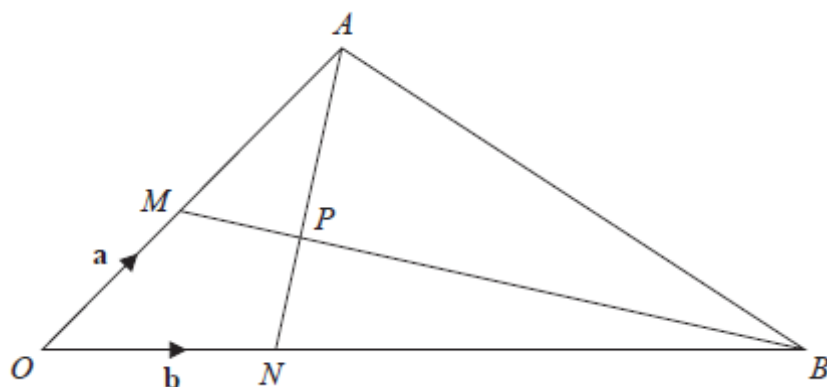


Diagram NOT
accurately drawn

OMA , ONB , MPB and NPA are straight lines.

M is the midpoint of OA

$ON : NB = 1 : 5$

$$\vec{OM} = \mathbf{a} \quad \vec{ON} = \mathbf{b}$$

(a) Find in terms of $\mathbf{a}$ and $\mathbf{b}$ the vector $\vec{AN}$

.....
(1)

(b) Use a vector method to find the ratio $AP : PN$

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$$AP : PN = \dots\dots\dots$$

(4)**(Total for Question 19 is 5 marks)**



Question 20

The sum of the first 80 terms of an arithmetic series, S , is 470

The 75th term of S is 14.5

The sum of the first X terms of S is 171

Work out the value of X

Show your working clearly.

$X = \dots\dots\dots$ **(Total for Question 20 is 6 marks)****Question 21**A curve has equation $y = f(x)$

There is only one turning point on the curve.

The coordinates of this turning point are (6, 5)

Write down the coordinates of the turning point on the curve with equation

(a) $y = f(x - 4)$

 $(\dots\dots\dots, \dots\dots\dots)$
(1)

(b) $y = f(3x)$

 $(\dots\dots\dots, \dots\dots\dots)$
(1)**(Total for Question 21 is 2 marks)**

Question 22

The diagram shows two circles with centre O and a regular pentagon $ABCDE$

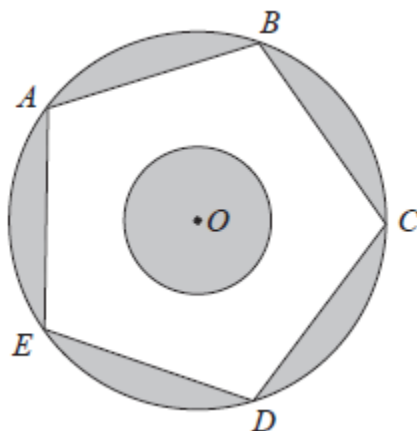


Diagram NOT
accurately drawn

A , B , C , D and E are points on the larger circle.
The pentagon has sides of length 8 cm.

The diagram is shaded such that

$$\text{shaded area} = \text{unshaded area}$$

Work out the radius of the smaller circle.
Give your answer correct to 3 significant figures.

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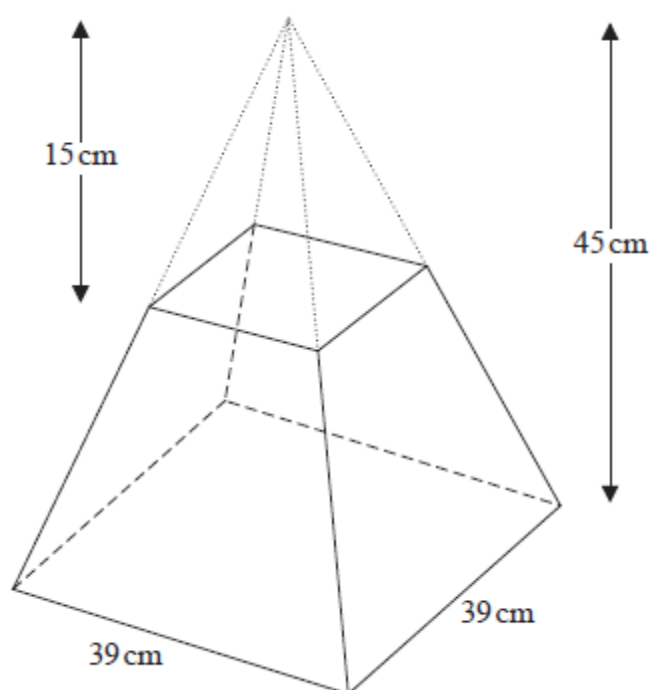
..... cm

(Total for Question 22 is 6 marks)



Question 23

A frustum is made by removing a small square-based pyramid from a similar large squared-based pyramid as shown in the diagram.



The height of the small pyramid is 15 cm.

The height of the large pyramid is 45 cm.

The square base of the large pyramid has side length 39 cm.

Work out the **total** surface area of the frustum.

Give your answer correct to the nearest whole number.

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..... cm²

(Total for Question 23 is 5 marks)

Weekly Task 4

Question 1

Show that $4\frac{2}{3} \div 1\frac{1}{5} = 3\frac{8}{9}$

(Total for Question 1 is 3 marks)



Question 2

A biased spinner can land on green or on yellow or on brown or on pink.

The table gives the probabilities that, when the spinner is spun, it will land on green or on yellow or on brown.

Colour	green	yellow	brown	pink
Probability	0.32	0.13	0.28	

Timucin spins the spinner 200 times.

Work out an estimate for the number of times the spinner lands on pink.

.....

(Total for Question 2 is 3 marks)

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Question 3

$ABCD$ is a trapezium.

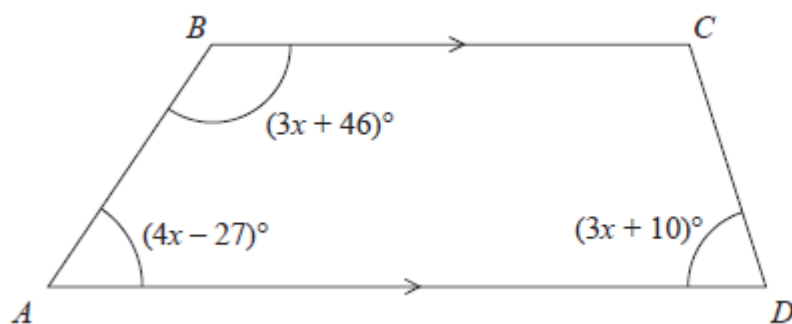


Diagram **NOT**
accurately drawn

BC is parallel to AD

Find the size of the largest angle inside the trapezium.

.....^o**(Total for Question 3 is 4 marks)**



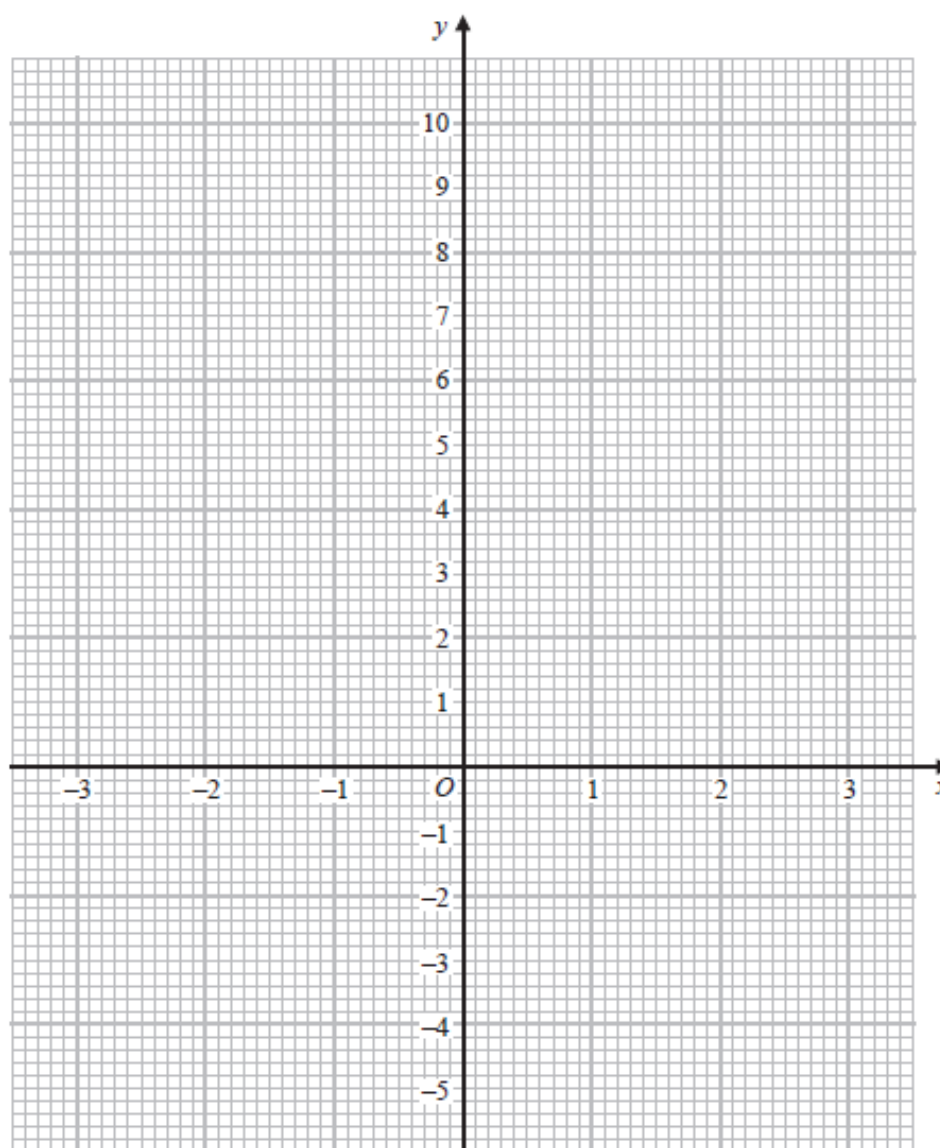
Question 4

(a) Complete the table of values for $y = x^2 - x - 4$

X	-3	-2	-1	0	1	2	3
Y		2			-4		

(2)

(b) On the grid below, draw the graph of $y = x^2 - x - 4$ for values of x from -3 to 3



(2)

(Total for Question 4 is 4 marks)



Question 5

Nancy has some coins with a total value of 85 pence.

She has only 2 pence coins and 5 pence coins.

The ratio

$$\text{number of 2 pence coins} : \text{number of 5 pence coins} = 1 : 3$$

Nancy has more 5 pence coins than 2 pence coins.

How many more?

.....

(Total for Question 5 is 4 marks)**Question 6**

(a) Write 76 000 000 in standard form.

.....

(1)

(b) Write 5.4×10^{-4} as an ordinary number.

.....

(1)**(Total for Question 6 is 2 marks)**

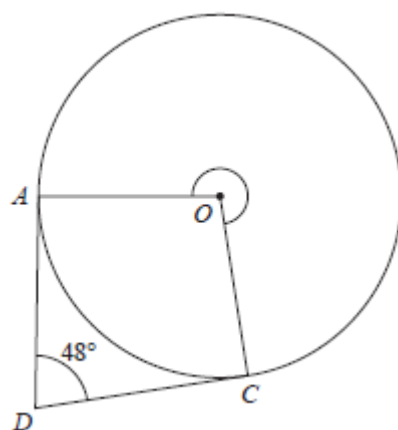
Question 7

Diagram NOT
accurately drawn

A and C are points on a circle, centre O

DA is the tangent to the circle at A and DC is the tangent to the circle at C

Angle $ADC = 48^\circ$

Work out the size of reflex angle AOC

..... °

(Total for Question 7 is 3 marks)



Question 8

Charlotte buys a painting for \$680

The value of the painting increases by 4% each year.

Work out the value of the painting at the end of 3 years.

Give your answer correct to the nearest \$

\$.....

(Total for Question 8 is 3 marks)

Question 9

Change a speed of 27 kilometres per hour to a speed in metres per second.

..... m/s

(Total for Question 9 is 3 marks)

Question 10

Team **A** and Team **B** take part in a quiz league.

After 11 rounds, Team **A** has a mean score per round of 17

After 9 rounds, Team **B** has a mean score per round of 18

Both teams take part in a further round.

After this round, both teams have a mean score per round of 18.5

In the further round, Team **A** scored more points than Team **B**.

How many more?

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

Question 11

Here is a 9-sided regular polygon $ABCDEFGHIJ$, with centre O

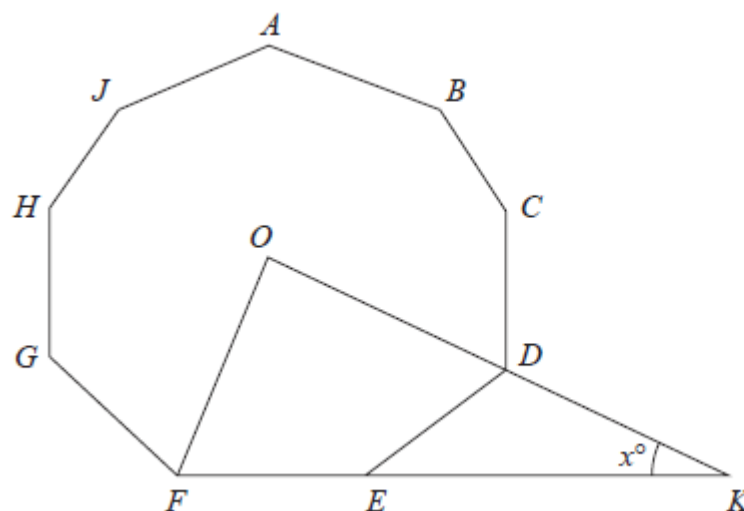


Diagram NOT
accurately drawn

ODK and FEK are straight lines.

Work out the value of x

$x = \dots\dots\dots$

(Total for Question 11 is 3 marks)

Question 12

The diagram shows right-angled triangle ABD

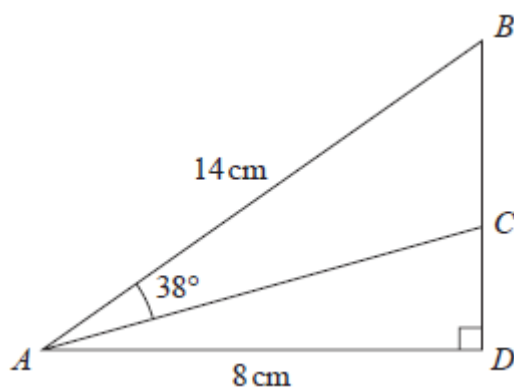


Diagram NOT
accurately drawn

$$AB = 14 \text{ cm} \quad AD = 8 \text{ cm}$$

C is the point on BD such that angle $BAC = 38^\circ$

Work out the length of CD

Give your answer correct to 3 significant figures.

..... cm

(Total for Question 12 is 4 marks)

Question 13

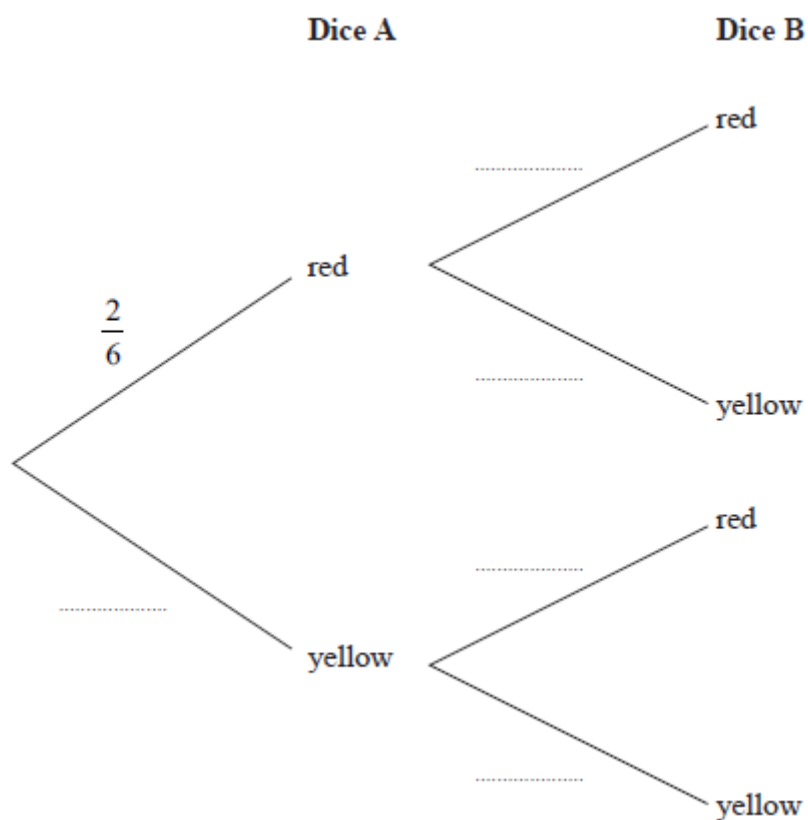
Narin has two fair 6-sided dice.

Dice **A** has 2 red faces and 4 yellow faces.

Dice **B** has 1 red face and 5 yellow faces.

Narin is going to throw each dice once.

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that both dice land on yellow.

(2)

(Total for Question 13 is 4 marks)

Question 14

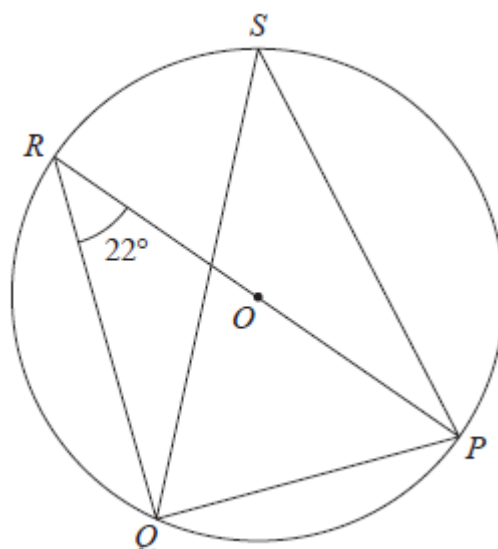


Diagram NOT
accurately drawn

P, Q, R and S are points on a circle, centre O

ROP is a diameter of the circle.

Angle $PRQ = 22^\circ$

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

.....^o

(1)

(ii) Give a reason for your answer.

.....
.....

(1)

(b) (i) Find the size of angle PSQ

.....^o

(1)

(ii) Give a reason for your answer.

.....
.....

(1)

(Total for Question 14 is 4 marks)

Question 15(a) Simplify fully $(32a^{15})^{\frac{3}{5}}$

(2)

(b) Express $\left(\frac{1}{10x}\right)^{-3}$ in the form px^n where p and n are integers.

(2)

(c) Solve $\frac{1-2y}{3} = \frac{4}{5} - \frac{2y-1}{2}$

Show clear algebraic working.



$$y = \dots\dots\dots$$

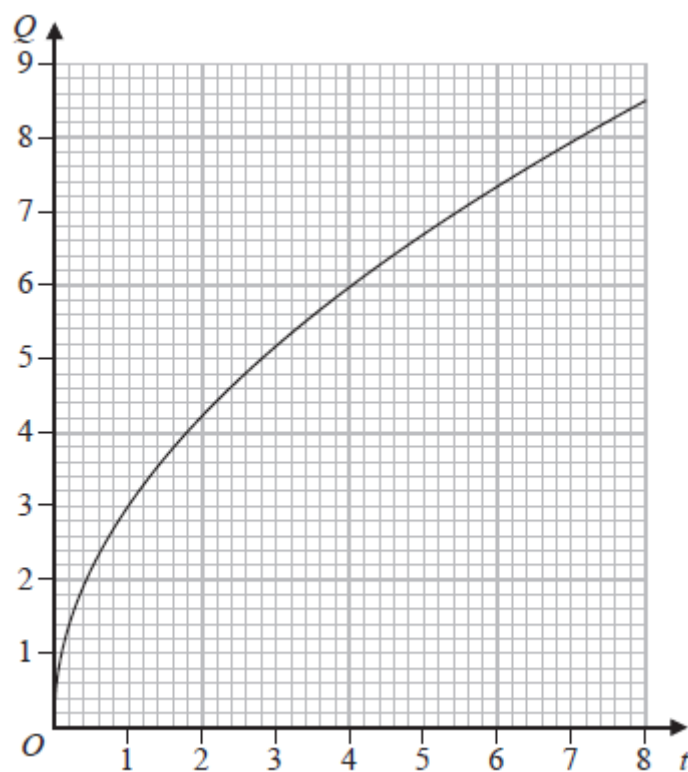
(3)

(Total for Question 15 is 7 marks)

Question 16

Q is directly proportional to $\sqrt{t}$

The graph shows the relationship between Q and t for $0 < t < 8$



(a) Find a formula for Q in terms of t

.....
(3)

Q is increased by 20%

(b) Find the percentage increase in t

.....%
(2)

(Total for Question 16 is 5 marks)

Question 17

(a) Expand and simplify $(x + 6)(3x - 2)(x + 6)$

.....
(3)

(b) Make e the subject of $w = \sqrt{\frac{e+g}{ef-d}}$

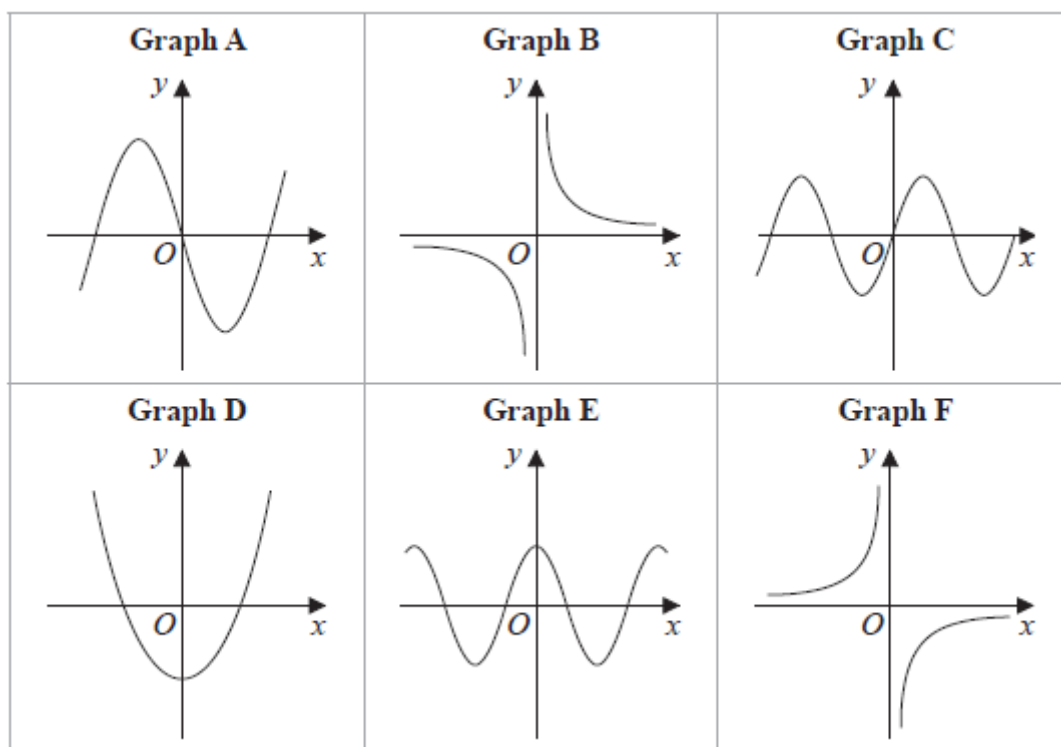
.....
(4)

(Total for Question 17 is 7 marks)

Question 18

Here are 6 graphs.





Complete the table below with the letter of the graph that could represent each given equation.

Write your answers on the dotted lines.

Equation	Graph
$y = \sin x$	
$y = -\frac{3}{x}$	
$y = 4x^3 - 5x$	

(Total for Question 18 is 3 marks)

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Question 19

Express $3x^2 - 6x + 5$ in the form $a(x - b)^2 + c$



.....

(Total for Question 19 is 3 marks)

Question 20

There are 12 counters in a bag.

3 of the counters are red

9 of the counters are green

Ameya, Jack and Ella each take at random one counter from the bag.

Work out the probability that at least one red counter is still in the bag.

.....
(Total for Question 20 is 3 marks)



Question 21

Solve the simultaneous equations

$$2x^2 + 3y^2 = 11$$

$$x = 3y - 1$$

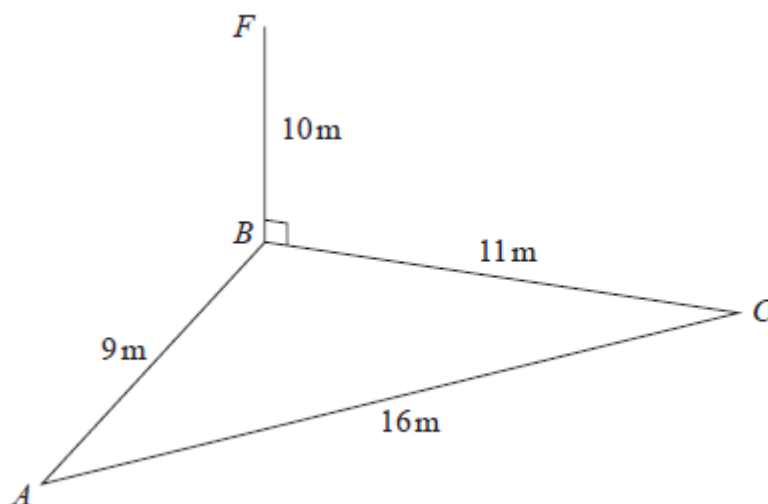
Show clear algebraic working.



(Total for Question 21 is 5 marks)

Question 22

The diagram shows a triangle ABC and a flagpole BF



A , B and C are points on horizontal ground.

BF is vertical.

$$AB = 9 \text{ m} \quad BC = 11 \text{ m} \quad AC = 16 \text{ m} \quad BF = 10 \text{ m}$$

D is the point on AC such that angle $BDC = 90^\circ$

Work out the size of the angle of elevation of the point F from the point D

Give your answer correct to one decimal place.

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..... °

(Total for Question 22 is 5 marks)



Question 23

The diagram shows a cuboid with a square cross section.

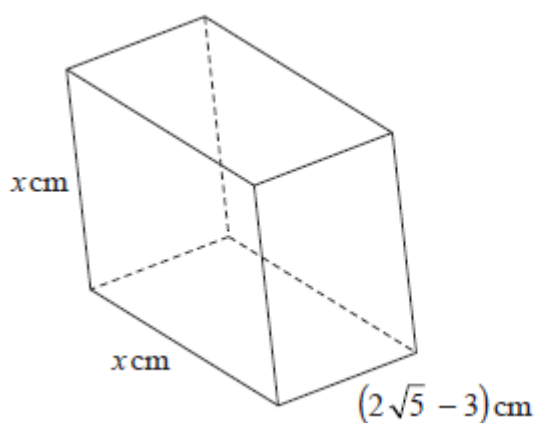


Diagram NOT
accurately drawn

The volume of the cuboid is $(13 + 6\sqrt{5}) \text{ cm}^3$

Without using a calculator, find the value of x

Give your answer in the form $a + \sqrt{b}$ where a and b are integers.

Show your working clearly.

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$x =$

(Total for Question 23 is 4 marks)



Question 24

$ABCD$ is a kite with $AB = AD$ and $CB = CD$

A is the point with coordinates $(-2, 10)$

B is the point with coordinates $\left(-\frac{27}{5}, 4\right)$

C is the point with coordinates $(4, -5)$

Work out the coordinates of D

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(..... ,)

(Total for Question 24 is 6 marks)



Question 25

A solid sphere has a radius of 2.8 centimetres, correct to 1 decimal place.

The sphere has a mass of $M\pi$ grams, where $M = 260$ correct to 2 significant figures.

Work out the upper bound for the density of the sphere.

Give your answer in g/cm^3 correct to 2 decimal places.

Show your working clearly.

..... g/cm³

(Total for Question 25 is 4 marks)

Weekly Task 5**Question 1**

Here are the first five terms of an arithmetic sequence.

1 5 9 13 17

(a) Find an expression, in terms of n , for the n th term of this sequence......
(2)The n th term of another arithmetic sequence is $3n + 5$ (b) Find an expression, in terms of m , for the $(2m)$ th term of this sequence.

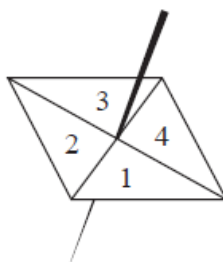
.....
(1)

(Total for Question 1 is 3 marks)



Question 2

Here is a biased 4-sided spinner.



The table gives the probabilities that, when the spinner is spun once, it will land on 1 or it will land on 3

Number	1	2	3	4
Probability	0.26		0.18	

The probability that the spinner will land on 2 is equal to the probability that the spinner will land on 4

Ravina is going to spin the spinner a number of times.

Ravina works out that an estimate for the number of times the spinner will land on 3 is 45

Work out an estimate for the number of times the spinner will land on 4

.....

(Total for Question 2 is 4 marks)



Question 3

- (a) Find the highest common factor (HCF) of 56 and 84
Show your working clearly.

.....
(2)

- (b) Find the lowest common multiple (LCM) of 60 and 72
Show your working clearly.

.....
(2)

(Total for Question 3 is 4 marks)

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Question 4

The diagram shows parts of three regular polygons, **A**, **B** and **C**, meeting at a point.

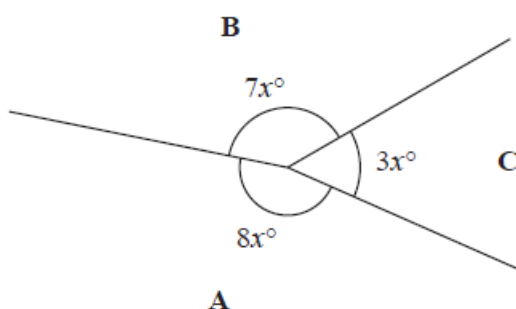


Diagram **NOT**
accurately drawn

Polygon **B** has n sides.

Work out the value of n .

$n = \dots\dots\dots$

(Total for Question 4 is 4 marks)



Question 5

(a) Expand and simplify $(n - 6)(n + 4)$

.....
(2)

(b) Solve $2x - 3 = \frac{3x - 5}{4}$

Show clear algebraic working.

$x =$
(3)

(Total for Question 5 is 5 marks)



Question 6

Asha bought an apartment.

The table gives information about the value of apartments, in euros, and the annual service charge band.

Value (x euros)	Service charge band
$x \geq 700\,000$	A
$600\,000 \leq x < 700\,000$	B
$500\,000 \leq x < 600\,000$	C
$400\,000 \leq x < 500\,000$	D
$0 < x < 400\,000$	E

In 2021, the value of Asha's apartment was 634 400 euros.

The value of Asha's apartment had increased by 4% from its value in 2020

- (a) Has the annual service charge band changed for Asha's apartment?
Show your working clearly.

(3)

Pam bought a boat.

In each year after Pam bought the boat, the value of the boat depreciated by 15%

- (b) Work out the total percentage by which the value of the boat had depreciated by the end of the second year after Pam bought the boat.

..... %
(3)

(Total for Question 6 is 6 marks)

Question 7

A cylinder is placed on the ground.

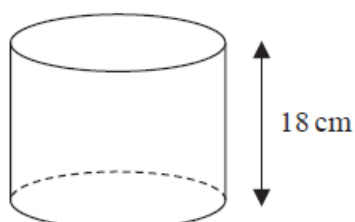


Diagram **NOT**
accurately drawn

The height of the cylinder is 18 cm.

The force exerted by the cylinder on the ground is 72 newtons.

The pressure on the ground due to the cylinder is 1.4 newtons / cm²

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

Work out the volume of the cylinder.

Give your answer correct to 3 significant figures.

..... cm³

(Total for Question 7 is 4 marks)

Question 8

(a) Write 0.000 089 in standard form.

.....
(1)

(b) Write 8.34×10^4 as an ordinary number.

.....
(1)

(Total for Question 8 is 2 marks)

Question 9

(a) Simplify $8 \times (4t)^0$

.....
(1)

$$x^6 \div x^{-5} = xp$$

(b) Find the value of p



$$p = \dots\dots\dots (1)$$

(c) Simplify fully $(2k^2m^4)^3$

$$\dots\dots\dots (2)$$

(Total for Question 9 is 4 marks)

Question 10

Two circles, C_1 and C_2 , are drawn on a centimetre grid, with a scale of 1 cm for 1 unit on each axis.

The centre of circle C_1 is at the point with coordinates $(-1, 3)$ and the radius of C_1 is 13 cm.

The centre of circle C_2 is at the point with coordinates $(7, 18)$ and the radius of C_2 is 6 cm.

(a) Work out the distance between the centre of C_1 and the centre of C_2

..... cm
(3)

(b) Explain why circle C_1 intersects circle C_2

.....
.....

(1)

(Total for Question 10 is 4 marks)

Question 11(a) Factorise $9x^2 - 4y^2$

(2)

(b) Express $\frac{7}{8} - \frac{x+3}{4x}$ as a single fraction in its simplest form.

.....
(3)

(Total for Question 11 is 5 marks)



Question 12

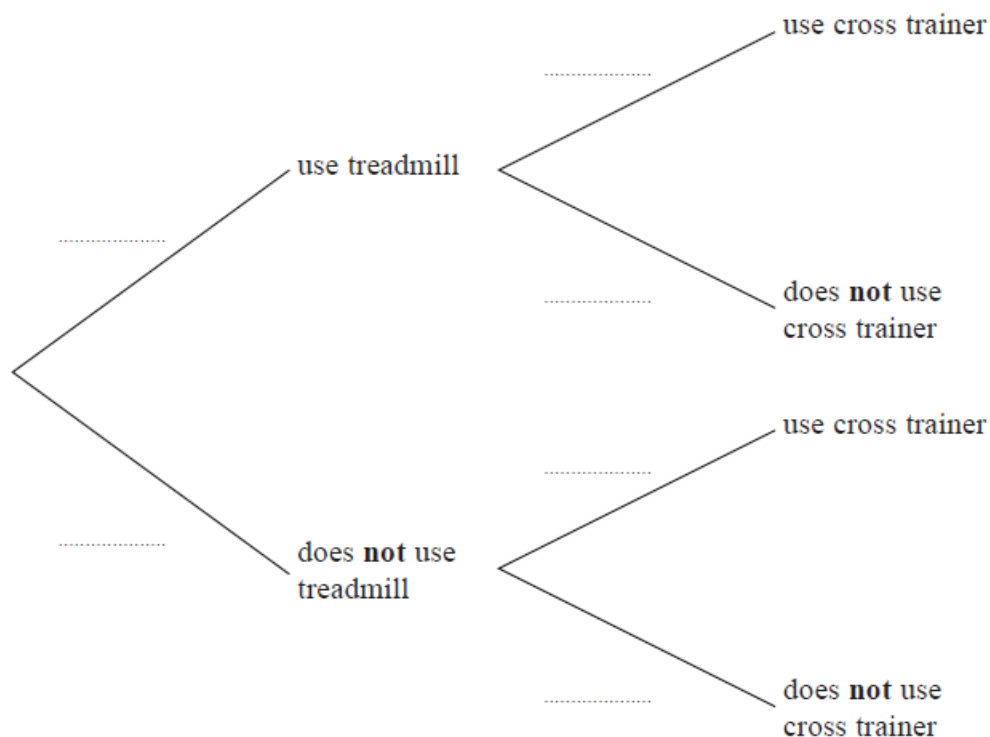
Rudolf goes to the gym.

The probability that he will use the treadmill is 0.8

When he uses the treadmill, the probability that he will use the cross trainer is 0.3

When he does **not** use the treadmill, the probability that he will use the cross trainer is 0.6

(a) Complete the probability tree diagram for this information.



(2)

(b) Work out the probability that Rudolf uses both the treadmill and the cross trainer.

.....

(Total for Question 12 is 4 marks)



Question 13

Antoine is going on holiday.

He makes 3 separate payments to cover the total cost of his holiday.

The following table shows how much money Antoine pays to the holiday company.

Payment	Amount paid
Payment 1	$\frac{3}{8}$ of the total cost
Payment 2	45% of the total cost
Payment 3	\$406

Work out how much Antoine has to pay for Payment 2

\$

(Total for Question 13 is 5 marks)

Question 14The function f is defined as

$$f : x \mapsto \frac{2x}{x-6} \quad x \neq 6$$

(a) Find $f(10)$
(1)(b) Express the inverse function f^{-1} in the form $f^{-1} : x \mapsto \dots$

$f^{-1} : x \mapsto \dots\dots\dots$

(3)

(Total for Question 14 is 4 marks)



Question 15

Abraham is going to play a computer game.

Abraham can win the game, draw the game or lose the game.

For any game that Abraham plays

the probability that he wins the game is 0.3

the probability that he draws the game is 0.5

the probability that he loses the game is 0.2

When Abraham wins a game, he scores +10 points.

When Abraham draws a game, he scores 0 points.

When Abraham loses a game, he scores −5 points.

Abraham plays 3 games and the points he scores in each of the 3 games are added together to get his total score.

Work out the probability that when he has played 3 games his total score is 0 points.

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

Question 16

Without using a calculator, show that $\frac{12}{\sqrt{2}-1} - (\sqrt{2})^5 = 2\sqrt{32} + 12$

Show your working clearly.

(Total for Question 16 is 3 marks)



Question 17

A particle P moves along a straight line.

The fixed point O lies on this line.

The displacement of P from O at time t seconds, $t \geq 1$, is s metres where

$$s = 4t^2 + \frac{125}{t}$$

The velocity of P at time t seconds, $t \geq 1$, is v m/s

Work out the distance of P from O at the instant when $v = 0$

..... m

(Total for Question 17 is 5 marks)



Question 18

Here is triangle ABC

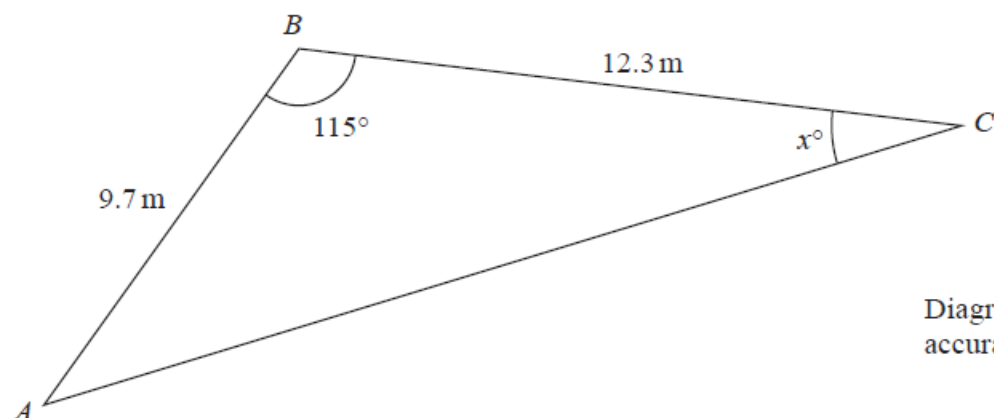


Diagram **NOT**
accurately drawn

Work out the value of x

Give your answer correct to 3 significant figures.

$x = \dots\dots\dots$

(Total for Question 18 is 5 marks)

Question 19

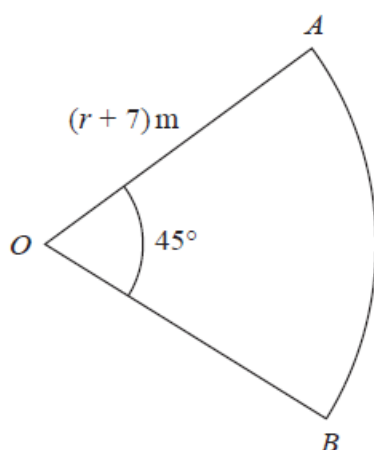


Diagram **NOT**
accurately drawn

OAB is a sector **S** of a circle with centre O and radius $(r + 7)$ metres.
Angle $AOB = 45^\circ$

A circle **C** has radius $(r - 2)$ metres.

The area of sector **S** is twice the area of circle **C**

Find the value of r

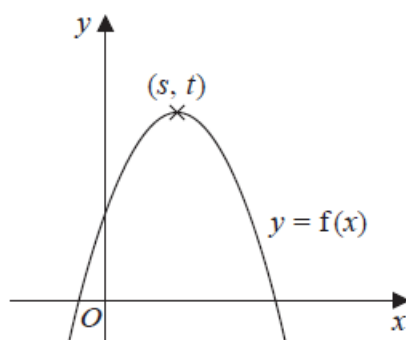
Show your working clearly.

$r = \dots\dots\dots$

(Total for Question 19 is 5 marks)

Question 20

The diagram shows a sketch of part of the curve with equation $y = f(x)$



There is one maximum point on this curve.

The coordinates of this maximum point are (s, t)

Find, in terms of s and t , the coordinates of the maximum point on the curve with equation

(i) $y = f(x - 2)$

(..... ,)
(1)

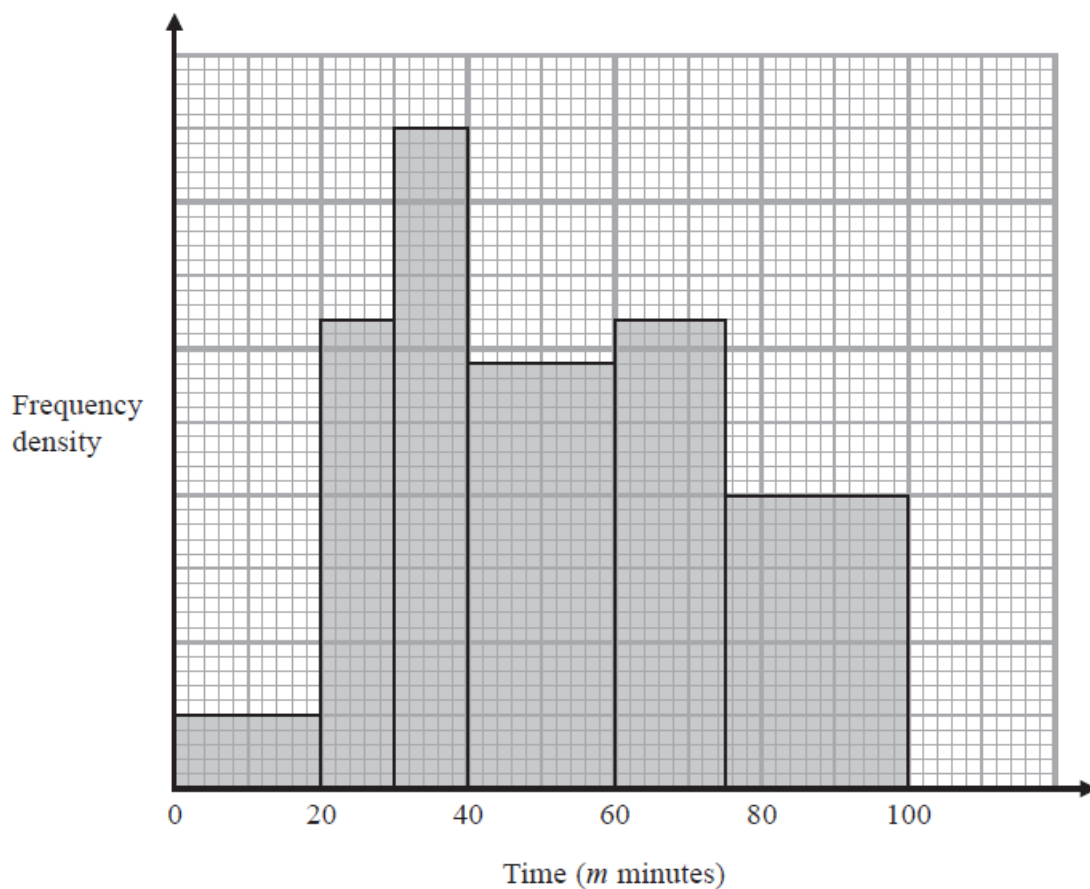
(ii) $y = 3f(x)$

(..... ,)
(1)

(Total for Question 20 is 2 marks)

Question 21

The histogram shows information about the total time, m minutes, taken by each child in a school to walk to school every day for one week.



There are no children for whom $m > 100$

There are 10 children for whom $m \leq 20$

Work out an estimate for the number of children for whom $50 < m \leq 80$

.....
(Total for Question 21 is 3 marks)

Question 22

A solid is made from a cone and a hemisphere.

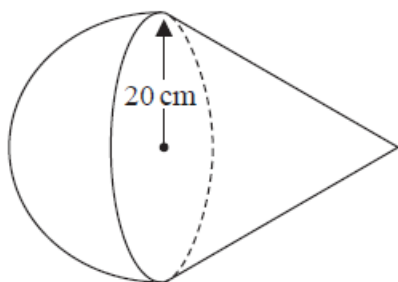


Diagram **NOT**
accurately drawn

The circular plane face of the hemisphere coincides with the circular base of the cone.

The radius of the hemisphere and the radius of the circular base of the cone are both 20 cm.

The curved surface area of the cone is $580\pi \text{ cm}^2$

The volume of the solid is $k\pi \text{ cm}^3$

Work out the exact value of k

$k = \dots\dots\dots$ **(Total for Question 22 is 5 marks)**

Question 23

A polygon has n sides, where $n > 5$

When arranged in order of size, starting with the largest number, the sizes of the interior angles of the polygon, in degrees, are the terms of an arithmetic sequence.

Here are the first five terms of this sequence.

177 175 173 171 169

Find the value of n

Show clear algebraic working.

$$n = \dots\dots\dots$$

(Total for Question 23 is 6 marks)

Question 24

Express each of a , b and c in terms of q so that

$$q + 12x - qx^2$$

can be written as $a - b(x - c)^2$

$a = \dots\dots\dots$

$b = \dots\dots\dots$

$c = \dots\dots\dots$

(Total for Question 24 is 4 marks)

Weekly Task 6

Question 1

Here are some integers where $a < b < c < d$

$a \qquad b \qquad c \qquad d \qquad d \qquad d$

The mode of the integers is 9

The median of the integers is 8

The range of the integers is 4

Work out the value of a , the value of b , the value of c and the value of d

$a = \dots\dots\dots$ $b = \dots\dots\dots$ $c = \dots\dots\dots$ $d = \dots\dots\dots$

(Total for Question 1 is 3 marks)



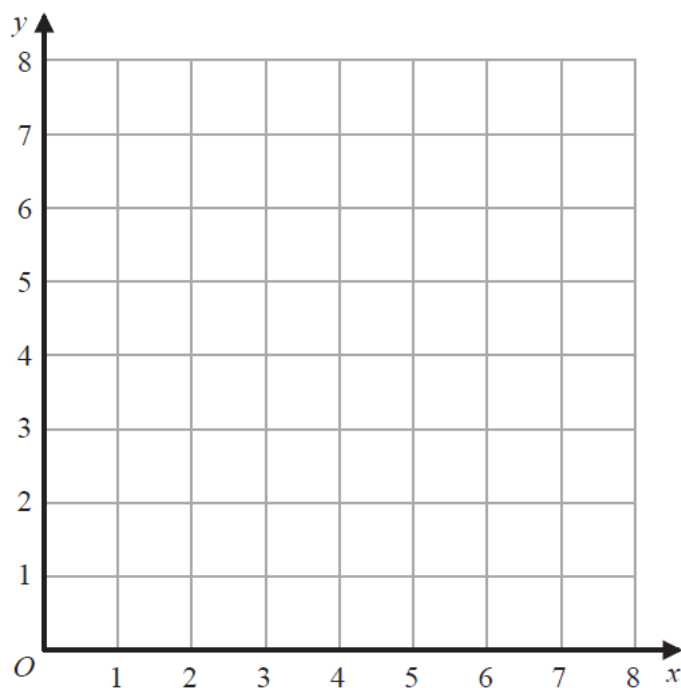
Question 2

(a) On the grid, draw and label with its equation the straight line with equation

(i) $y = 1$

(ii) $x = 2$

(iii) $x + y = 7$

**(3)**

(b) Show, by shading on the grid, the region that satisfies **all three** of the inequalities

$$y \geq 1 \quad x \geq 2 \quad x + y \leq 7$$

Label the region **R**.

(1)

(Total for Question 2 is 4 marks)

Question 3

An aeroplane travelled from New York City to Los Angeles.

The aeroplane travelled a distance of 3980 kilometres in 5 hours 24 minutes.

Work out the average speed of the aeroplane.

Give your answer in kilometres per hour correct to the nearest whole number.

..... kilometres per hour

(Total for Question 3 is 3 marks)

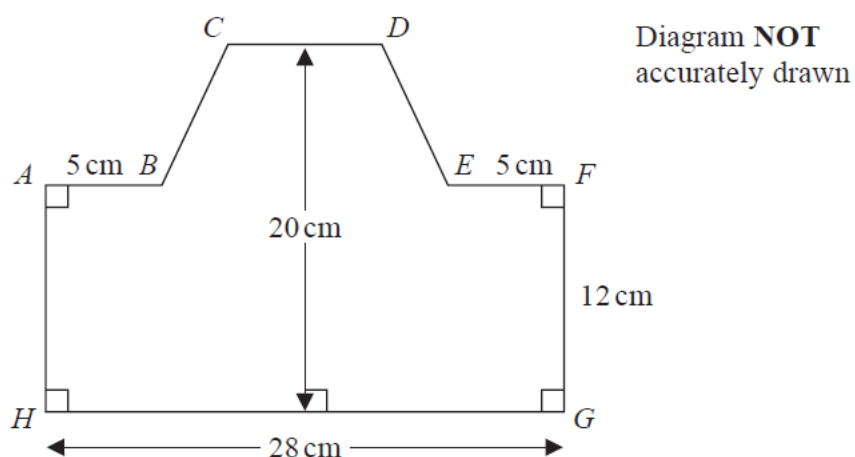
Question 4

Show that $5\frac{1}{3} - 2\frac{6}{7} = 2\frac{10}{21}$

(Total for Question 4 is 3 marks)

Question 5

The diagram shows an 8-sided shape $ABCDEFGH$.



$$HG = 28 \text{ cm}$$

$$FG = 12 \text{ cm}$$

$$AB = EF = 5 \text{ cm}$$

The height of the shape is 20 cm

CD is parallel to HG

The area of shape $ABCDEFGH$ is 434 cm^2

Find the length of CD .

..... cm

(Total for Question 5 is 4 marks)



Question 6

The diagram shows triangle PQR .

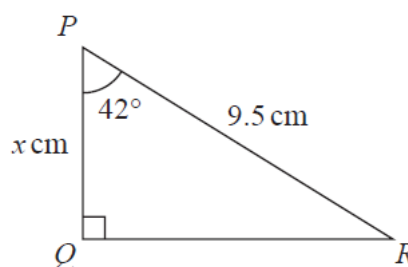


Diagram **NOT**
accurately drawn

Work out the value of x

Give your answer correct to one decimal place.

$x = \dots\dots\dots$

(Total for Question 6 is 3 marks)

Question 7

Change a speed of 81 kilometres per hour to a speed in metres per second.

..... metres per second

(Total for Question 7 is 3 marks)

Question 8

Behnaz makes 300 celebration cards so that

$$\begin{array}{ccccc} \text{number of} & & \text{number of} & & \text{number of} \\ \text{birthday cards} & : & \text{anniversary cards} & : & \text{congratulations cards} \end{array} = 7 : 5 : 3$$

$\frac{2}{5}$ of the birthday cards have numbers on them.

36% of the anniversary cards have numbers on them.

None of the congratulations cards have numbers on them.

Work out what fraction of the 300 cards have numbers on them.

Give your answer in its simplest form.

.....
(Total for Question 8 is 5 marks)

Question 9

Pasha invests 50 000 dollars in a savings account for 4 years.

He gets 1.3% per year compound interest.

Work out how much money Pasha will have in his savings account at the end of 4 years.

Give your answer correct to the nearest dollar.

..... dollars

(Total for Question 9 is 3 marks)



Question 10

Solve the simultaneous equations

$$7x + 3y = 3$$

$$3x - y = 7$$

Show clear algebraic working.

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(Total for Question 10 is 3 marks)**Question 11**(i) Factorise $x^2 + 5x - 24$

.....

(2)(ii) Hence, solve $x^2 + 5x - 24 = 0$

.....
(1)

(Total for Question 11 is 3 marks)



Question 12

Larry is a delivery man.

He has 7 parcels to deliver.

The mean weight of the 7 parcels is 2.7 kg

Larry delivers 3 of the parcels.

Each of these 3 parcels has a weight of W kg

The mean weight of the other 4 parcels is 3.3 kg

Work out the value of W

$W = \dots\dots\dots$ **(Total for Question 12 is 3 marks)**



Question 13

The table gives information about the ages, in years, of 80 people in a train carriage.

Age (a years)	Frequency
$0 < a \leq 20$	7
$20 < a \leq 30$	25
$30 < a \leq 40$	20
$40 < a \leq 50$	14
$50 < a \leq 60$	8
$60 < a \leq 70$	6

(a) Complete the cumulative frequency table.

Age (a years)	Cumulative frequency
$0 < a \leq 20$	
$20 < a \leq 30$	
$30 < a \leq 40$	
$40 < a \leq 50$	
$50 < a \leq 60$	
$60 < a \leq 70$	

(1)

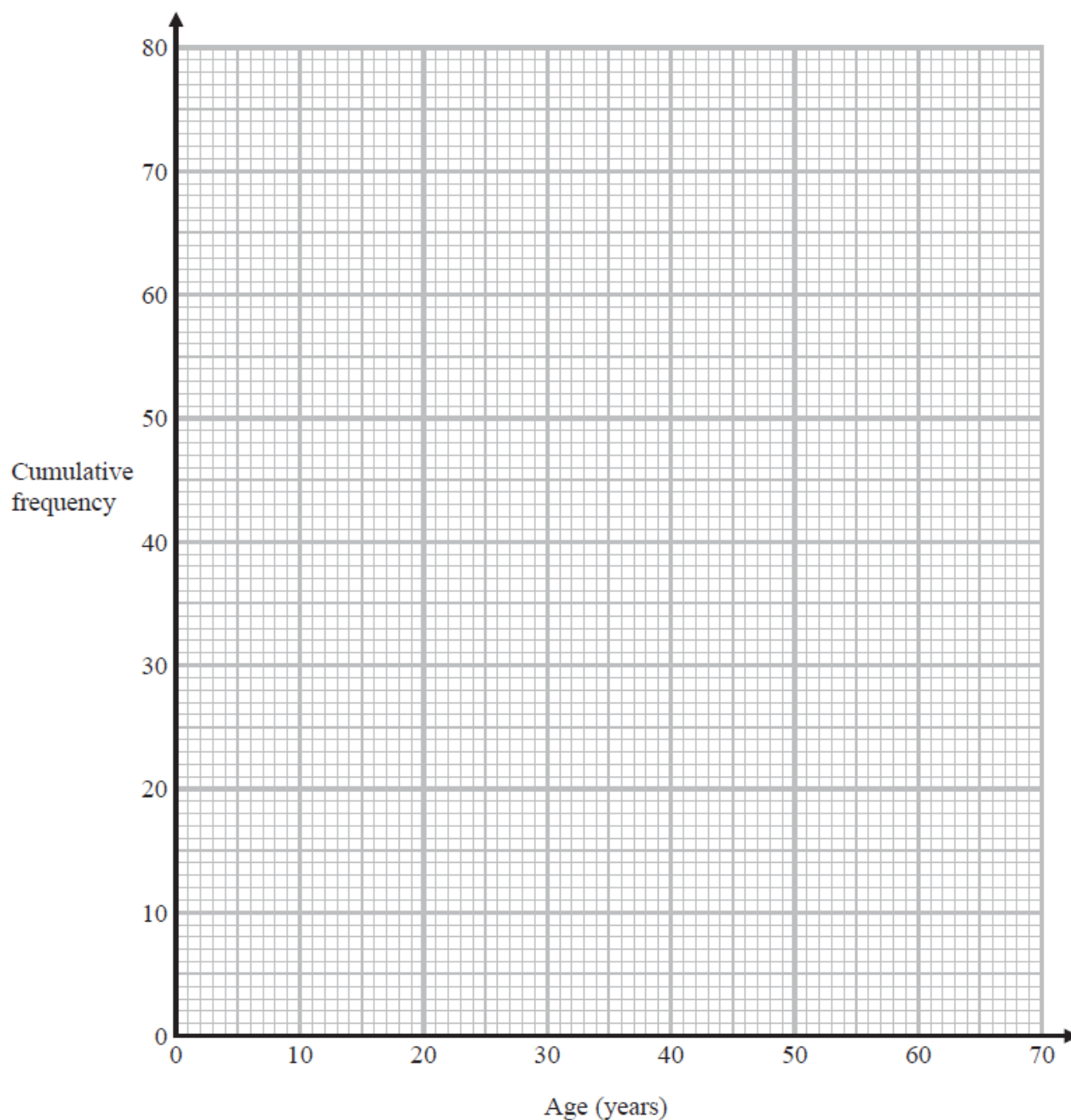
(b) On the grid on the next page, draw a cumulative frequency graph for your table.

(2)

(c) Use your graph to find an estimate for the median age of the 80 people.

..... years
(1)





Of the people in the train carriage, 60% of those who are aged between 18 and 65 are going to work. None of the other people in the train carriage are going to work.

- (d) Use your graph to find an estimate for the number of people in the train carriage who are going to work.

.....
(3)

(Total for Question 13 is 7 marks)

Question 14

- (a) Expand and simplify $(5 - x)(2x + 3)(x + 4)$
Show your working clearly.

.....
(3)

- (b) Make c the subject of $g = \frac{c+3}{4+c} - 7$

(4)

(Total for Question 14 is 7 marks)

Question 15

(a) Solve $\frac{4x+5}{3} - \frac{3-2x}{2} = 13$

Show clear algebraic working.

$$x = \dots\dots\dots$$

(4)

(b) Solve the inequality $2y^2 - 7y - 30 \leq 0$
Show your working clearly.



.....
(3)

(Total for Question 15 is 7 marks)



Question 16

100 farmers are asked if they have goats (G), sheep (S) or chickens (C) on their farms.

Of these farmers

31 have sheep

53 have chickens

6 have goats, sheep and chickens

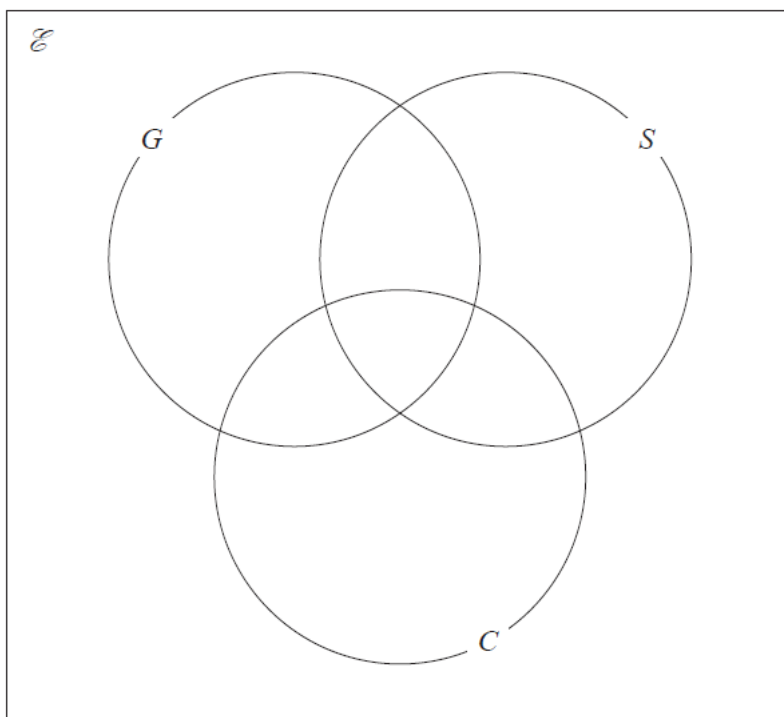
11 have sheep and goats

17 have sheep and chickens

18 have goats and chickens

20 do not have any goats, sheep or chickens

- (a) Using this information, complete the Venn diagram to show the number of farmers in each appropriate subset.



(3)

(b) Find

(i) $n(G)$

.....

(1)

(ii) $n([G \cup S]')$

.....

(1)

(iii) $n(G' \cap C)$

.....

(1)

One of the farmers who has chickens is chosen at random.

(c) Find the probability that this farmer also has goats.

.....

(2)

(Total for Question 16 is 8 marks)

Question 17

M varies directly as the cube of h

$M = 4$ when $h = 0.5$

Find the value of h when $M = 500$

.....
 (Total for Question 17 is 4 marks)

Question 24**Question 18**

$$X = \frac{2a - b}{f}$$

$a = 7.5$ correct to 1 decimal place.

$b = 3.42$ correct to 2 decimal places.

$f = 2$ correct to the nearest whole number.

Work out the upper bound of the value of X

Show your working clearly.

.....
 (Total for Question 18 is 3 marks)

Question 19

$$a = \frac{14}{3x - 7} \quad x = \frac{7}{4y - 3}$$

Express a in the form $\frac{py + q}{ry + s}$ where p, q, r and s are integers.

Give your answer in its simplest form.

$a = \dots\dots\dots$

(Total for Question 19 is 3 marks)



Question 20

The diagram shows four identical circles drawn inside a square.

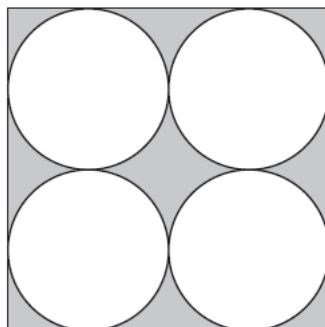


Diagram **NOT**
accurately drawn

Each circle touches two other circles and two sides of the square.

The region inside the square that is outside the circles, shown shaded in the diagram, has a total area of 40 cm^2

Work out the perimeter of the square.

Give your answer correct to 3 significant figures.

..... cm

(Total for Question 20 is 4 marks)



Question 21

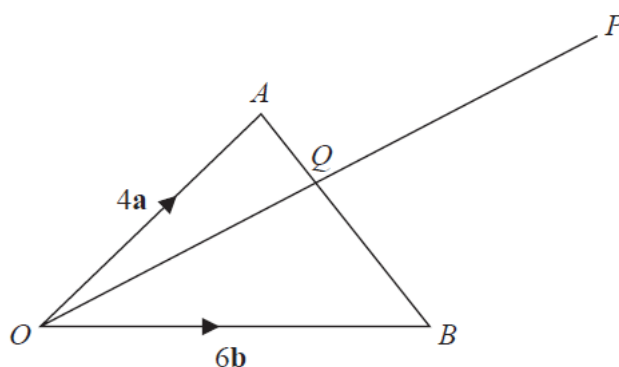


Diagram **NOT**
accurately drawn

OAB is a triangle.

Q is the point on AB such that OQP is a straight line.

$$\vec{OA} = 4\mathbf{a} \quad \vec{OB} = 6\mathbf{b} \quad \vec{AP} = 2\mathbf{a} + 8\mathbf{b}$$

Using a vector method, find the ratio $AQ : QB$

$$AQ : QB = \dots\dots\dots$$

(Total for Question 21 is 5 marks)

Question 22

$ABCD$ is a kite, with diagonals AC and BD , drawn on a centimetre square grid, with a scale of 1 cm for 1 unit on each axis.

A is the point with coordinates $(-3, 4)$

The diagonals of the kite intersect at the point M with coordinates $(0, 2)$

Given that $AB = AD = 6.5$ cm and the x coordinate of B is positive,

find the coordinates of the points B and D .

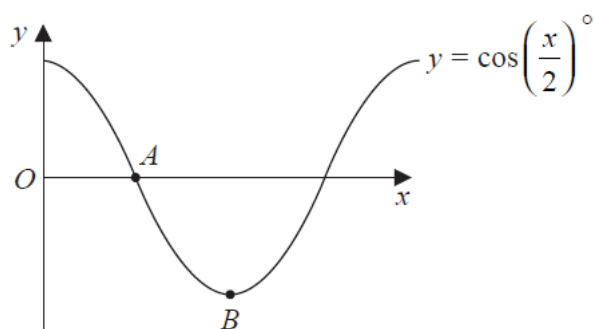
(..... ,)

(..... ,)

(Total for Question 22 is 7 marks)

Question 23

The diagram shows a sketch of the graph of $y = \cos\left(\frac{x}{2}\right)^\circ$



- (i) Find the coordinates of the point A

(..... ,)
(1)

- (ii) Find the coordinates of the point B

(..... ,)
(1)

(Total for Question 23 is 2 marks)

2026 SUMMER WORK



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Question 24

$$\frac{18 \times (\sqrt{27})^{4n+6}}{6 \times 9^{2n+8}} = 3^x$$

Express x in terms of n

Show your working clearly and simplify your expression.

$x = \dots\dots\dots$

(Total for Question 24 is 3 marks)

THE END

Congratulations on completing your Summer Work! 🎉

You've taken an important step towards preparing for A-level Maths and the effort you've put in now will help you build a strong foundation for September.

Before you finish, make sure all your answers are marked in green/red pen and check your work carefully. This will ensure you're fully ready to impress your teachers when they review your booklet in September.

Enjoy the rest of your summer and we can't wait to see you at Dixons Sixth Form, ready to take on the exciting challenge of A-level Maths!

See you soon! 🚀