

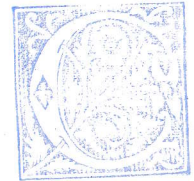
WELSH JOINT EDUCATION

COMMITTEE

GCSE LEVEL

PAST PAPERS

MATHEMATICS JUNE 1996



MATHEMATICS

TIER A PAPER 1

A.M. TUESDAY, 4 June 1996

(2½ hours)

Centre Number

Candidate's Name (in full)

Candidate's Examination Number

INSTRUCTIONS TO CANDIDATES

Write your centre number, name and candidate number in the spaces provided above.

Answer **all** the questions in the spaces provided.

INFORMATION FOR CANDIDATES

An electronic calculator will be required.

A formula booklet is available and may be used.

You should give details of your method of solution, especially when a calculator is used.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

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For Examiner's use only

Question	Maximum Mark	Mark Awarded
1	5	
2	4	
3	4	
4	5	
5	7	
6	3	
7	5	
8	5	
9	4	
10	5	
11	3	
12	9	
13	7	
14	9	
15	4	
16	4	
17	9	
18	8	
TOTAL		

1. Solve the following simultaneous equations by an algebraic (not graphical) method.

$$5x + 4y = 2$$

$$2x + 3y = 5$$

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[5]

2. For each of the following sequences, find an expression, in terms of n , for the n th term.

(a) $\frac{1}{2}, \frac{1}{4}, \frac{1}{6}, \frac{1}{8}, \frac{1}{10}, \dots$

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.....

.....

n th term =

[2]

(b) $2, 5, 8, 11, 14, \dots$

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.....

.....

n th term =

[2]

3. This question is about finding a solution to the equation

$$x^3 + 3x = 48$$

by a 'trial and improvement method'.

- (a) Complete the entries in the following table:

x	$x^3 + 3x$
3.2	42.368
3.3	
3.4	
3.5	53.375

[1]

- (b) Between which two consecutive values of x used in the table in (a) would you say the solution to the equation lies?

.....

[1]

- (c) Using a value for x with 2 decimal places, show how to decide which of your two values in (b) is the solution to the equation correct to 1 decimal place.

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Solution correct to 1 decimal place is $x = \dots$

[2]

4. (a) Show how you would use your calculator to calculate the value of:

$$\frac{26.3 \times 17.52}{33.9 + 40.7}$$

Write each key you would use in a separate box.

Answer =

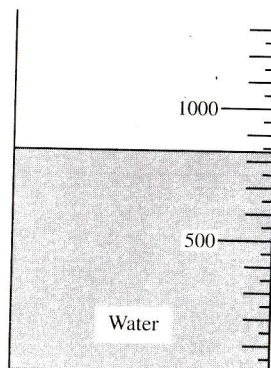
[3]

- (b) Evaluate $6.283 \times \sqrt{\frac{78.6}{981}}$ correct to 3 decimal places.

Answer = (correct to 3 decimal places.)

[2]

5. (a)



The diagram represents a cylinder that can be used to measure volumes of liquids in cm^3 .

There is some water in the measuring cylinder. The statement below refers to the measurement of the volume of the water in the cylinder.

Complete the statement by entering a number in **each** of the two places marked by a dotted line.

The volume of the water represented in the diagram is
measured correct to the nearest cm^3 .

- (b) A rectangular card measures 128 mm long by 73 mm wide, each measurement being made correct to the nearest mm.

- (i) Write down the least and greatest possible values for the length of the card.

Least = Greatest = [1]

- (ii) Write down the least and greatest possible values for the width of the card.

Least = Greatest = [1]

- (iii) Seven of these cards are placed end to end to form a continuous rectangular strip. What is the greatest possible length of this rectangular strip?

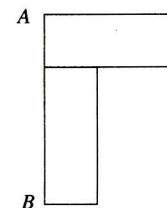
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..... [1]

- (iv)



Two of the cards are placed as shown in the diagram. What is the least possible value of the distance AB ?

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..... [2]



6. Do not use a calculator when answering this question.
All working must be shown.

Show clearly how you would obtain an **ESTIMATE** for the following:

$$\frac{5518 \times 0.09}{96 \times (4.8)^2}$$

7. (a) Write **each** of the following numbers in standard form.

(i) 240 000

(ii) 0.00038

- (b) Find, in standard form, the value of:

(i) $(2.34 \times 10^9) \times (7.86 \times 10^{-4})$

(ii) $\frac{(4.29 \times 10^{-3})}{(7.80 \times 10^4)}$

8. (a) Calculate, in fractional form, the value of

$$y = \frac{a - b}{c + d}$$

when $a = \frac{5}{6}$, $b = \frac{1}{3}$, $c = \frac{2}{3}$ and $d = \frac{1}{2}$.

- (b) Calculate the value of $\left(\frac{w}{3} + ut\right)^{n+3}$

when $w = 45$, $u = -3$, $t = 4$ and $n = -1$.

9. The variable y varies as the square of x . When $x = 3$, $y = 36$.

- (a) Find a formula for y in terms of x .

- (b) Use your answer in (a) to find the value of y when $x = 5$.

10. (a) Expand the following expression, simplifying your answer as far as possible.

$$(x - 3)(2x + 5)$$

.....

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.....

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[2]

- (b) Make w the subject of the following:

$$3w + 6a = 2(c - w).$$

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.....

.....

[3]

11. (a) The inequality

$$3n + 13 < 5n - 6$$

can be rearranged into **one** of the following forms:

EITHER the form $n < \text{a number}$;
OR the form $n > \text{a number}$.

Rearrange the inequality into whichever form is correct.

.....

.....

.....

.....

[2]

- (b) Write down the least or greatest whole number value of n that satisfies your inequality, stating whether it is the least or the greatest.

.....

[1]

12. Do not use a calculator when answering this question.
All working must be shown.

- (a) Show clearly that $3.10\dot{4}$ is a rational number.

.....

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.....

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[2]

- (b) Find the difference between $5 + 2\sqrt{2}$ and $3 - \sqrt{2}$ and state whether this difference is rational or irrational.

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[2]

- (c) Two different irrational numbers are represented by a and b .

- (i) Give an example of a and b for which the **sum** of a and b is rational and write down the value of the sum of a and b for your numbers.

.....

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.....

[2]

- (ii) Give an example of a and b for which the **difference** between a and b is rational and write down the value of the difference between a and b for your numbers.

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.....

[2]

13. On her holiday in Italy, Mandy hires an Italian car. The first time she calls at a garage and fills her car's fuel tank with petrol, she notes that the kilometre reading is 64558 kilometres. The second time she calls at a garage to fill the car's tank with petrol, the kilometre reading is 64832 and the volume of petrol needed to fill the tank is 18.7 litres. The kilometre readings are correct to the nearest kilometre and the volume of petrol is correct to the nearest tenth of a litre.

(i) Write down the maximum and minimum possible values for the volume of petrol that was needed to fill the tank.

..... [1]

(ii) Calculate the maximum and minimum possible distances that the car travelled between these two visits to the garage, showing all your workings.

..... [4]

(iii) Mandy wishes to find the maximum number of kilometres the car travels on one litre of petrol on average. Using your answers to (i) and (ii), calculate this maximum value.

..... [2]

14. Tom measures the length of the side of a solid cube as 15 cm correct to the nearest centimetre.

(i) Calculate the minimum possible value of the volume of the cube.

..... [2]

(ii) Tom uses a value of 225 cm^2 for the area of one face of the cube. Calculate the maximum possible error in this value.

.....

- (iii) Calculate the maximum possible distance between any two corners of the cube.

..... [5]

15. Simplify **each** of the following.

(i) $(3x^2y^2)(2x^3y^{-2})$

..... [2]

(ii) $\frac{(2a^2b)^3}{4ab^2}$

..... [2]

16. Solve the equation

$$6x^2 - 10x - 3 = 0$$

giving your answers correct to 2 decimal places.

..... [4]

17. The graph opposite shows the curve

$$y = x^3 - 7x^2 + 10x$$

between $x = 0$ and $x = 5$.

- (a) (i) Write down the value of x at a point where the gradient of the curve is zero.

[1]

- (ii) Use the graph to calculate the gradient of the curve at $x = 4.5$.

[3]

- (b) By drawing an appropriate line on your graph, find the value of x which satisfies the equation

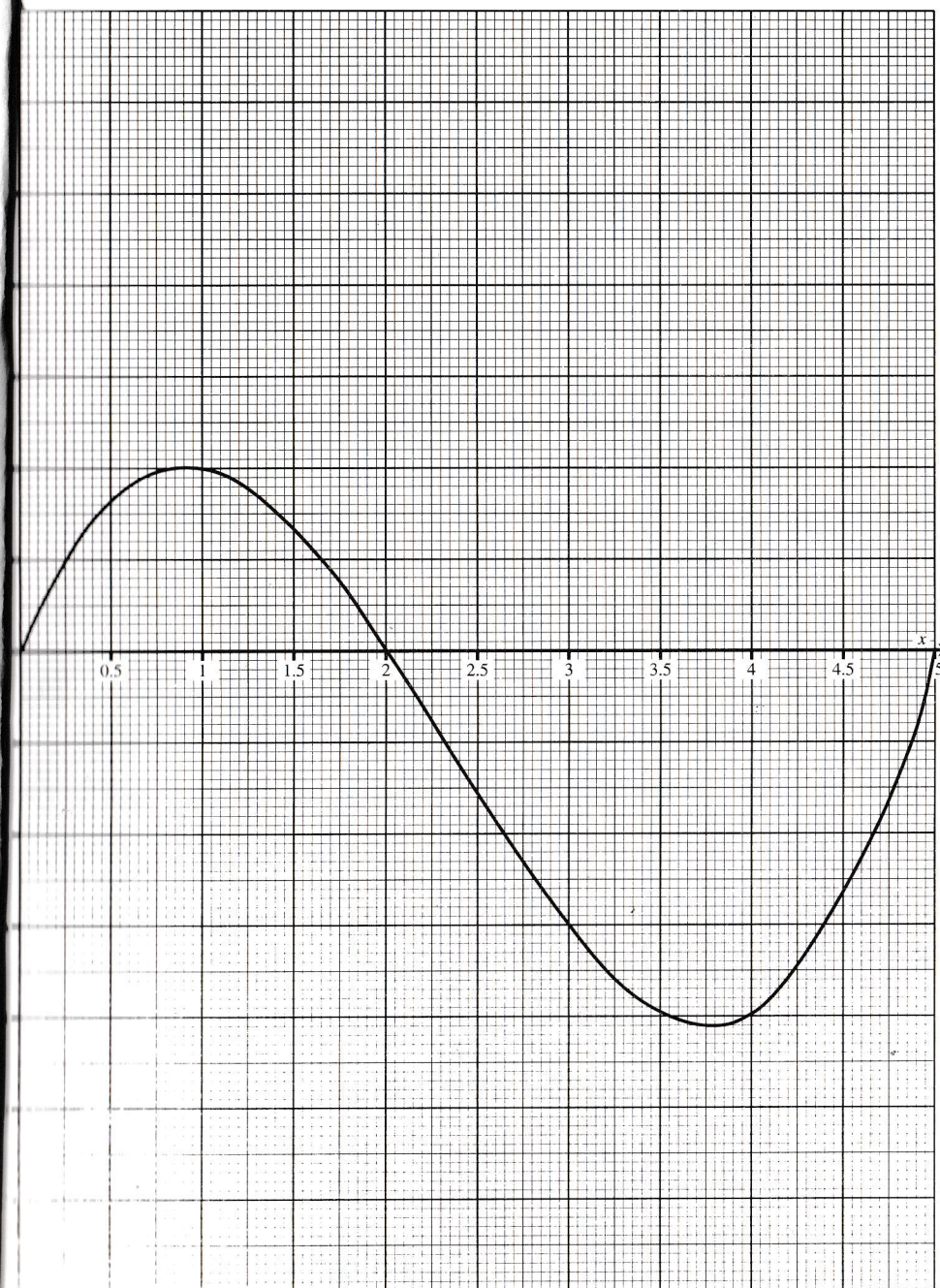
$$x^3 - 7x^2 + 18x - 8 = 0$$

and lies between $x = 0$ and $x = 5$.

[4]

- (c) Without making any calculations, use the graph of $y = x^3 - 7x^2 + 10x$ to draw the graph of $y = x^3 - 7x^2 + 10x + 2$.

[1]



18. (a) (i) Show that the equation

$$\frac{1}{x} - \frac{1}{x+2} = \frac{2}{15}$$

can be written in the form

$$x^2 + 2x - 15 = 0.$$

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[3]

- (ii) Hence solve the equation

$$\frac{1}{x} - \frac{1}{x+2} = \frac{2}{15}.$$

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[2]

- (b) (i) Express $\frac{1}{x} - \frac{1}{x+1}$

as a single fraction, simplifying your answer as far as possible.

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[2]

- (ii) Using your answer to (b)(i), write down a positive solution to the equation

$$\frac{1}{x} - \frac{1}{x+1} = \frac{1}{72}.$$

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[1]

MATHEMATICS

TIER A PAPER 2

A.M. FRIDAY, 7 June 1996

(2 ½ hours)

Centre Number

Candidate's Name (in full)

Candidate's Examination Number

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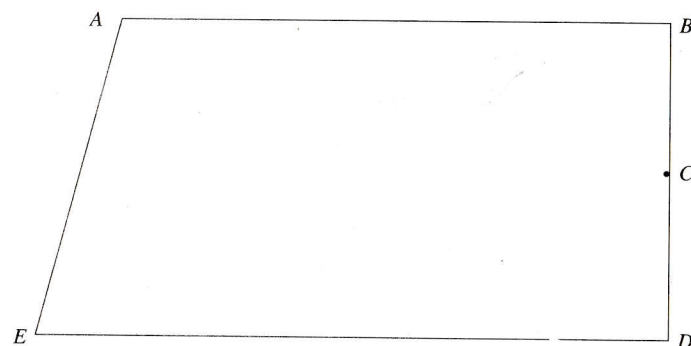
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2	5	
3	9	
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5	2	
6	2	
7	5	
8	6	
9	5	
10	2	
11	6	
12	5	
13	3	
14	4	
15	3	
16	2	
17	7	
18	10	
19	10	
20	6	
TOTAL		

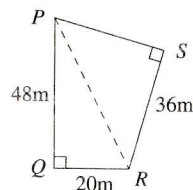
1. The diagram below is drawn on a scale of 1 cm to 1 m. It shows a security compound $ABCDE$. A light has to be placed so that it is not more than 4 m from DE and closer to A than to B . It must also be less than 6 m from C .

Shade the region where the light can be placed.



Scale 1 cm to 1 m

2.



This diagram shows a park $PQRS$.
 PQ is 48 m long.
 QR is 20 m long.
 RS is 36 m long.
Angles PQR and RSP are right angles.
There is a path PR running across the park.

- (a) Calculate the length of the path, PR .

- (b) Calculate the length of the side of the park, PS .

[4]

3. A shopkeeper keeps a record of the amount spent, correct to the nearest pound, by the first 40 customers she serves on a Wednesday. Her results are recorded in this table.

Amount (£)	Frequency f	Mid-point x	fx
1 to 5	10		
6 to 10	13		
11 to 15	6		
16 to 20	6		
21 to 25	3		
26 to 30	2		

- (a) Which is the modal class ?

[1]

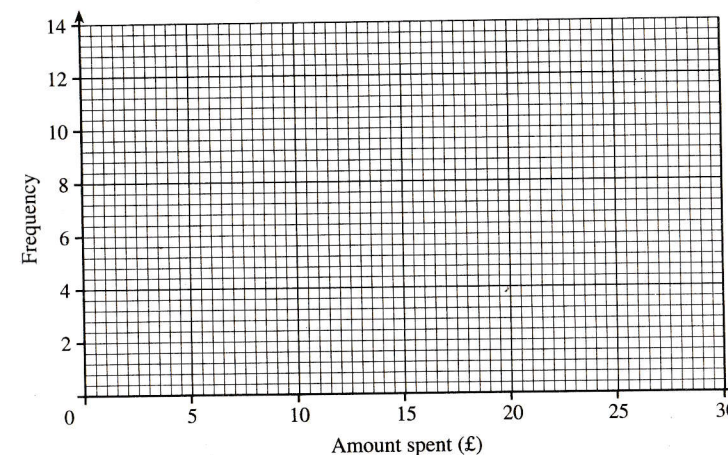
- (b) Complete the mid-point column of the table.

[1]

- (c) Calculate an estimate of the mean amount spent per customer for the first 40 customers on the Wednesday.

[3]

- (d) On the grid below, draw a frequency polygon for the information in the table.

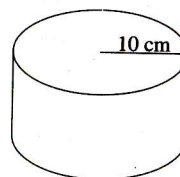


[2]

- (e) The shopkeeper also keeps a record for the first 40 customers she serves on a Saturday. The modal class is £1 to £5. The mean amount spent per customer is £16.30. Does the shopkeeper take a greater amount of money from the first 40 people on Wednesday or Saturday ? Explain how you obtain your answer.

[2]

4. In this question take π as 3.14 or use the π button on your calculator.
The volume of a cylinder is 1885 cm^3 .
The radius of the cylinder is 10 cm.
Calculate the height of the cylinder.



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[4]

5. A fair 6 sided dice is rolled 300 times. Approximately how many times would you expect it to show the number 4?

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[2]

6. The table below shows the probabilities that the age (in complete years) of the winner of a snooker championship will lie within various ranges.

Age range	15 to 19	20 to 29	30 to 39	40 to 49	over 49
Probability	0.12	0.68	0.11	0.07	0.02

What is the probability that the winner will be less than 30 years old?

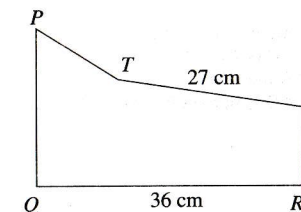
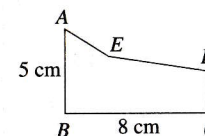
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[2]

7. A firm has a small logo, labelled $ABCDE$, on its letter headings and a larger, **similar** logo, labelled $PQRST$, on its boxes.

The length of AB is 5 cm.
The length of BC is 8 cm.
The length of QR is 36 cm.
The length of ST is 27 cm.



- (a) Calculate the length of PQ .

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.....

[3]

- (b) Calculate the length of DE .

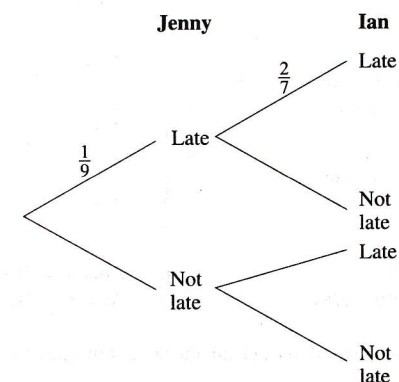
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[2]

8. The probability that Jenny is late for school is $\frac{1}{9}$.
Independently, the probability that Ian is late for school is $\frac{2}{7}$.

- (a) Complete this tree diagram.



[3]

- (b) Calculate the probability that just one of the two pupils is late for school.

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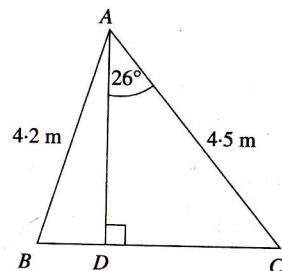
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[3]

9. This diagram shows a sail $ABDC$.

AC is 4.5 m long.
 AB is 4.2 m long.
 Angle DAC is 26° .
 AD is perpendicular to BC .



- (a) Calculate the height, AD , of the sail.

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.....

[3]

- (b) Calculate angle ABD .

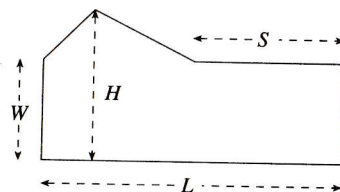
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[2]

10. A borough surveyor wants to calculate the area of a piece of ground with lengths W , H , L and S , as shown in the diagram.



Only one of the following formulae can be used to calculate the area of the ground.

- (i) Area = $\frac{1}{2} (WHL + HLS)$
 (iii) Area = $\frac{1}{2} (HL + WS + WL - HS)$

- (ii) Area = $\frac{1}{2} (H + L + W - S)$
 (iv) Area = $\frac{1}{2} (WL + HS + H - S)$

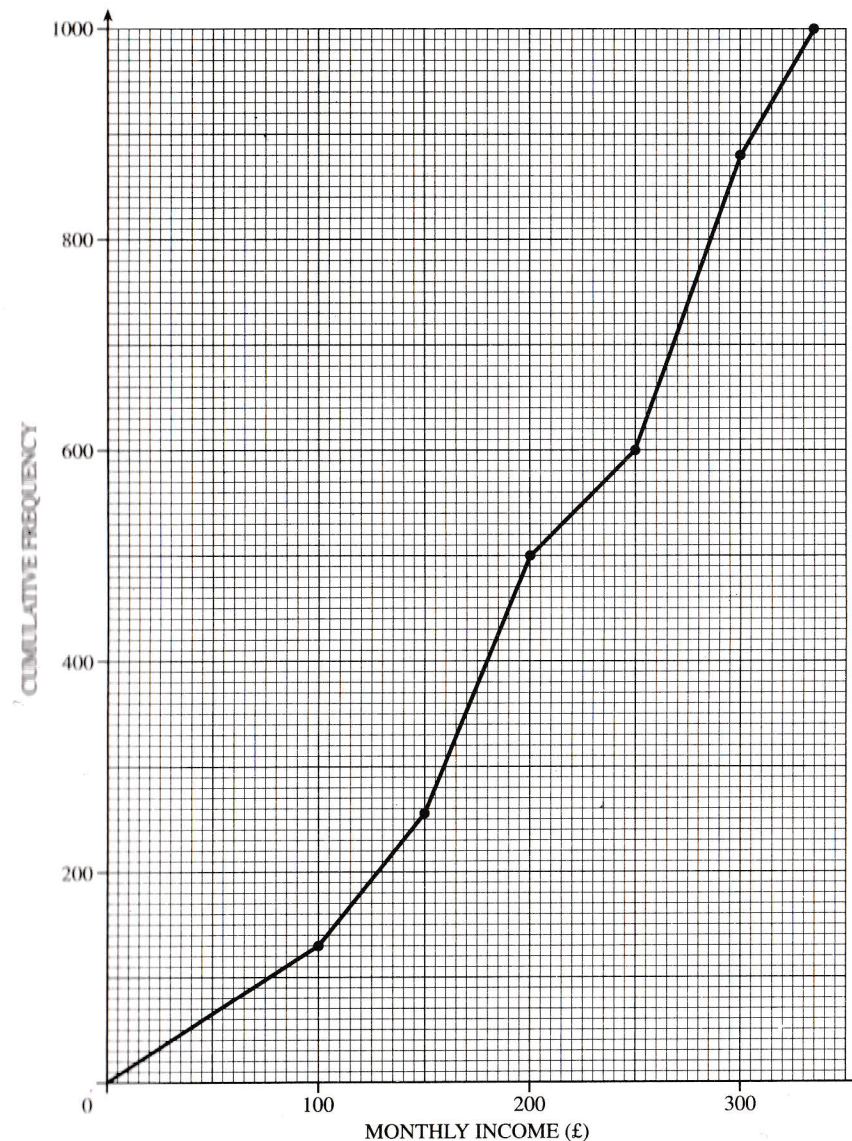
Which of the four formulae can be used to calculate the area of the piece of ground? Give a reason for your answer.

.....

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[2]

11. The diagram below shows the cumulative grouped frequency distribution of the monthly incomes of the 1000 workers in a factory near the village of Ranja.



- (a) Estimate the median of the monthly incomes.

[1]

- (b) Estimate how many of the workers earn more than £260 per month.

[2]

- (c) The table below shows the **cumulative** grouped frequency distribution of the monthly incomes of the 1000 workers in a factory near the village of Janpur.

Income	$\leq £100$	$\leq £150$	$\leq £200$	$\leq £250$	$\leq £300$
Cumulative frequency	200	450	800	950	1000

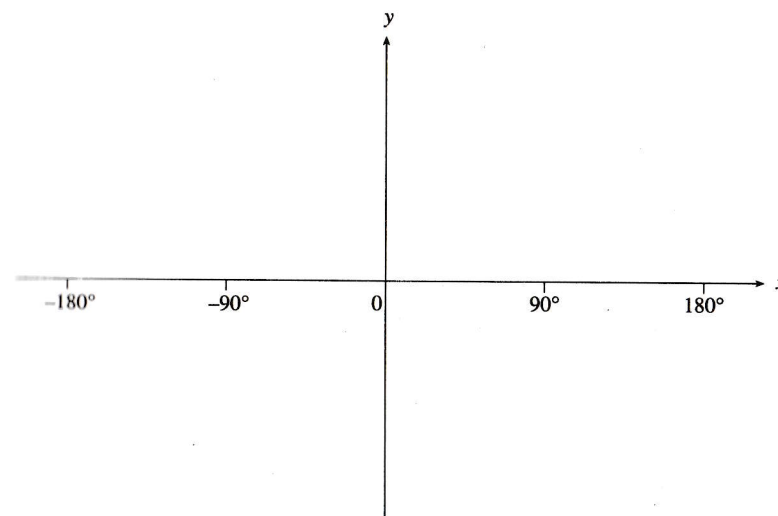
Draw a cumulative frequency diagram to show this information on the grid on the previous page.

[2]

- (d) Which workers, those near Ranja or those near Janpur, have higher median earnings?

[1]

12. On the axes below, sketch the graph of $y = \cos x$ for values of x from -180° to $+180^\circ$.



Use your sketch, together with your calculator, to find all the solutions of

$$\cos x = 0.8$$

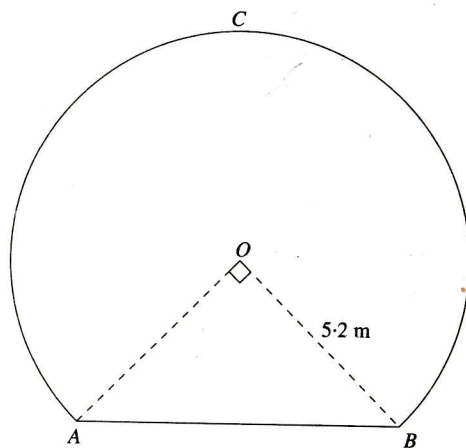
between $x = -180^\circ$ and $+180^\circ$.

[5]

13. In this question take π as 3.14 or use the π button on your calculator. Calculate the radius of the sphere whose surface area is 4070 cm^2 .

[3]

14. In this question take π as 3.14 or use the π button on your calculator.
The diagram shows the cross section of a road tunnel. The arc ACB is part of a circle with centre O and radius 5.2 m. The road surface, AB , is horizontal with OA and OB being radii of the circle and $\angle AOB = 90^\circ$.



- (a) Calculate the area of triangle AOB .

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- (b) Calculate the area of cross-section of the tunnel.

[2]

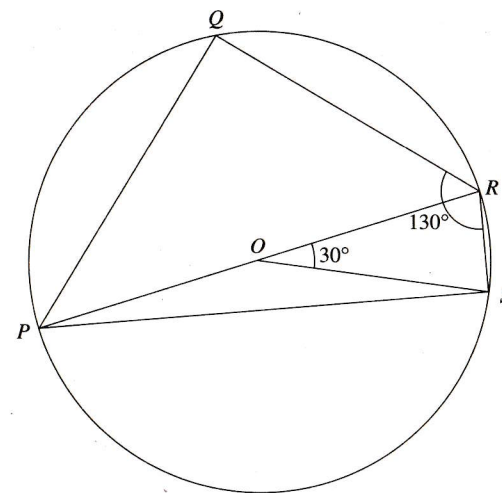
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[2]

15. In the diagram below, P , Q , R and S are points on the circumference of a circle centre O . The line PR is a diameter of the circle, $\angle POR = 30^\circ$ and $\angle QRS = 130^\circ$.



Find the values of

(i) $\angle SPR$,

(ii) $\angle PQR$,

(iii) $\angle QPR$.

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.....

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[3]

16. The governors of a school are planning to open the school swimming pool for public use at certain times when the school is closed. They want to know how many pupils and their families are prepared to pay to use the pool if it is open at weekends and during the school holidays. They have prepared a questionnaire on the subject for pupils to take home and complete with their families, and want to select a sample of pupils for this purpose.

Write down a factor that you think they should take into account when constructing a stratified sample for this survey, explaining why you have chosen that factor.

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[2]

17. Large numbers of packets of a particular cereal are produced. Each packet contains a free badge which is coloured red or yellow or green. Equal numbers of badges of each colour are produced and the badges are distributed at random in the packets.

- (a) Donald has a green badge and wants to collect a complete set, i.e. one of each colour. He selects two packets at random. Calculate the probability that the two badges from these packets will complete his set.

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[3]

- (b) Vafa selects two packets at random. Calculate the probability that the two badges obtained are of different colours.

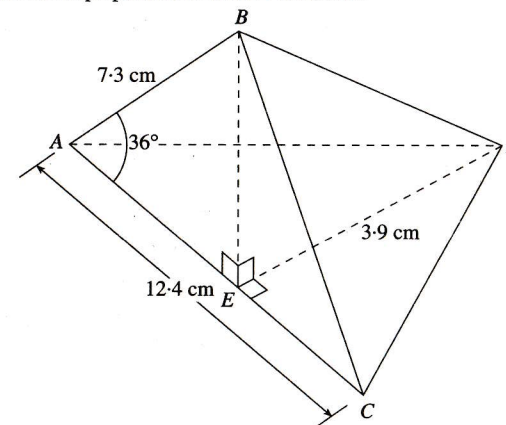
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[4]

18. In the tetrahedron $ABCD$, the plane ABC is at right angles to the plane of ACD . The perpendicular from B to AC meets the perpendicular from D to AC at E .



Given that $AC = 12.4$ cm, $AB = 7.3$ cm, $ED = 3.9$ cm and $\hat{BAC} = 36^\circ$, calculate each of the following.

- (a) The length of BC .

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[4]

- (b) The length of AD .

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[3]

- (c) $\hat{BDE}$.

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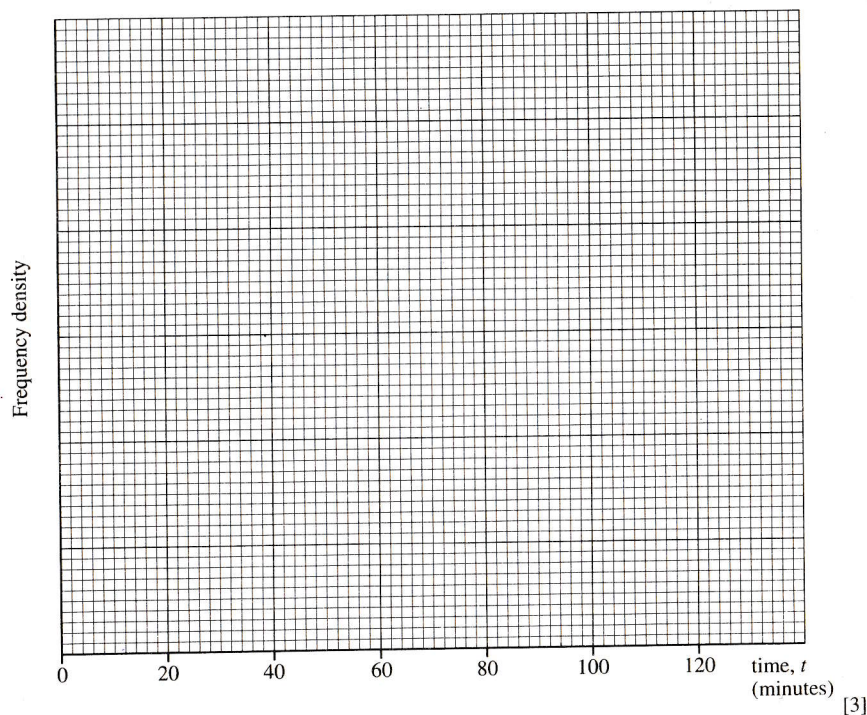
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[3]

19. A car breakdown service claims that, on average, a rescue vehicle will arrive at the scene of a car breakdown within 45 minutes of being informed by telephone of the breakdown location. On a particular weekday, there were 90 calls between 10 a.m. and 4 p.m., and the times taken for the rescue vehicles to arrive at these breakdowns are summarised in the grouped frequency distribution below.

Rescue waiting times, t minutes	Frequency	Frequency density
$10 \leq t < 30$	14	
$30 \leq t < 40$	29	
$40 \leq t < 50$	22	
$50 \leq t < 60$	12	
$60 \leq t < 80$	9	
$80 \leq t \leq 120$	4	

- (a) Complete the frequency density column. [1]
- (b) On the graph paper below, draw a histogram of the distribution of the rescue waiting times.



- (c) On the same day, there were 8 calls between 9 a.m. and 10 a.m., and the rescue waiting times for these calls, in minutes, were:

47 55 100 59 66 92 85 48.

The mean of these eight rescue waiting times is 69 minutes. Find the standard deviation of the rescue waiting time for these eight calls.

[2]

- (d) The estimated mean and standard deviation of the rescue waiting times given in the table were 44.2 minutes and 18.4 minutes respectively. By comparing these with the values in (c), comment on how the rescue waiting times differ for the two time periods.

[2]

- (e) Calculate an estimate of the mean waiting time per call for the period 9 a.m. to 4 p.m.

[2]

20. The head of a school computer centre has £170 to spend on computer paper for a whole school year. She wants to buy some packets of high quality paper and some packets of lower quality paper. The cost of the high quality paper is £3.50 per packet and the cost of the lower quality paper is £2.50 per packet.

Let the number of packets of the high quality paper that she buys be x , and the number of packets of the lower quality paper be y .

- (a) Show that x and y satisfy the inequality

$$7x + 5y \leq 340.$$

[1]

- (b) She also wants to make sure that the number of packets of the lower quality paper is no more than twice the number of packets of the high quality paper. She decides that this must mean that $y \leq 2x$.

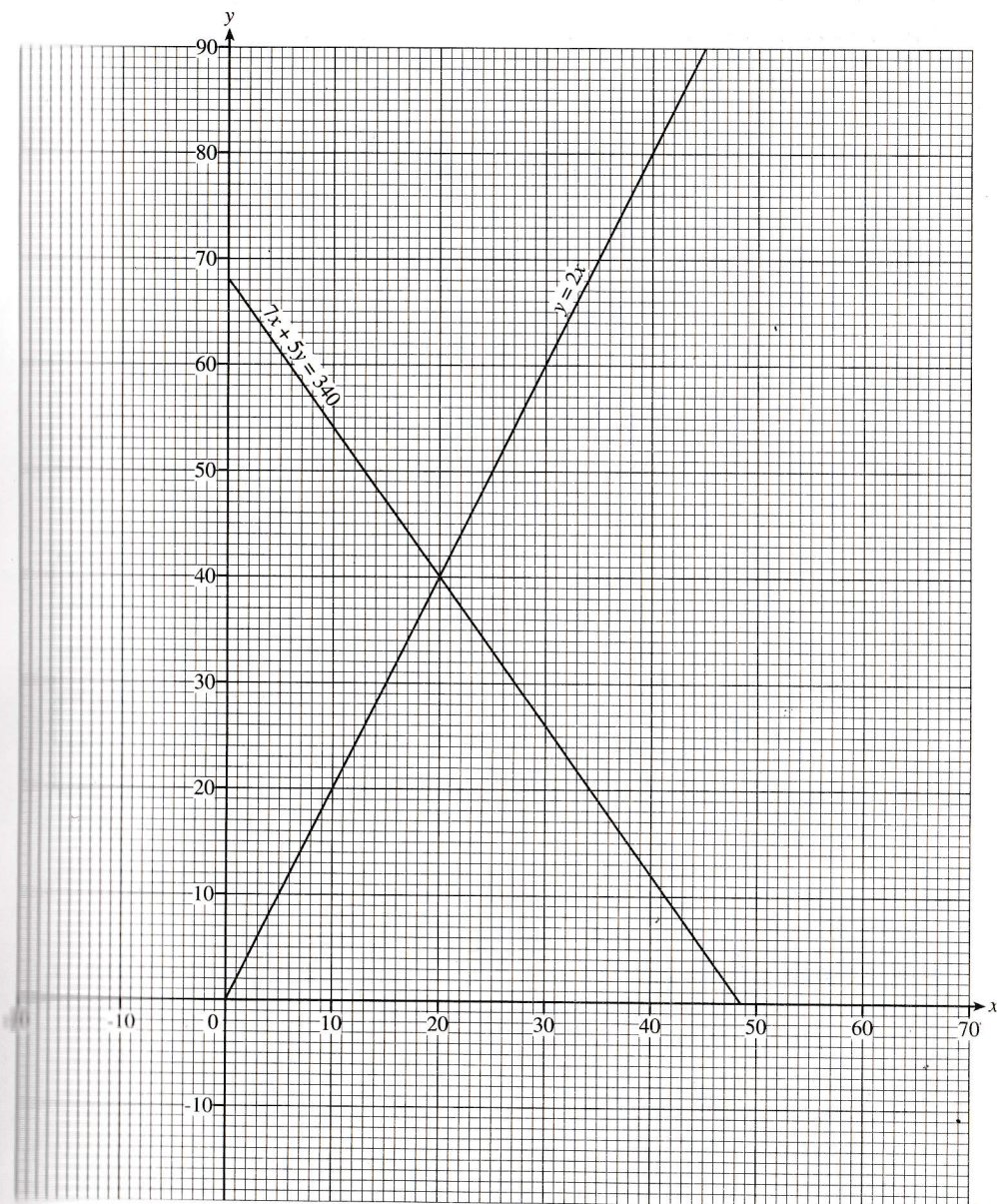
- (i) The equations $7x + 5y = 340$ and $y = 2x$ have been drawn on the graph paper opposite. Indicate clearly the region for which the inequalities are satisfied. Write 'R' inside this region. [2]

- (ii) She wants to buy as many packets of paper as possible subject to these conditions. Write down an expression in terms of x and y which she needs to maximise.

[1]

- (iii) Find the number of packets of high quality paper and the number of packets of lower quality paper that she should buy.

[2]



MATHEMATICS

TIER A PAPER 3

A.M. WEDNESDAY, 12 June 1996

(2 hours)

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	6	
2	6	
3	3	
4	10	
5	13	
6	12	
TOTAL		

Centre Number

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A formula booklet is available and may be used.

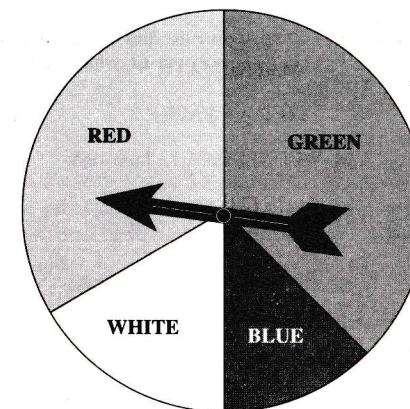
You should give details of your method of solution, especially when a calculator is used.

Unless stated, diagrams are not drawn to scale.

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The diagram shows a spinner which can be used to choose one of the colours on the circle. The spinner rests horizontally, and the arrow turns freely about the centre of the circle. The colour that the arrow points to, after being spun, is the chosen colour.

Describe, in detail, **two** different ways of estimating the probability that red will be chosen. [6]

1. "A number x is greater than $\frac{1}{x}$."

Find all the values of x for which

- (a) the statement is true,
- (b) the statement is false.

[6]

2. Investigate the truth of the statement:

"Half a number is always less than the number itself."

[3]

4. Halsal sell salt in packages of 300 cm^3 in supermarkets nationwide. As a company, Halsal have decided to use cardboard to package the salt, but **not** to have packages in the shape of cuboids.

Design a package for Halsal salt. You must give the dimensions of your package and your reasons for choosing its dimensions. Give a clear account of your work and state any advantages or disadvantages of your chosen design.

5. A tiler is asked to tile a number of walls for Sally according to her instructions.

Sally's instructions

1. Tiling always starts with a plain tile at the bottom left corner of the wall.
2. The first patterned tile is placed, as shown in the diagram, so that it meets the first tile at a corner only.
3. Plain tiles are used to surround each patterned tile.
4. There are exactly two plain tiles horizontally, vertically and diagonally between any two patterned tiles.

- (a) Find how many patterned tiles are needed for a wall that requires 324 tiles horizontally and 312 tiles vertically.

- (b) Find, in terms of x and y , how many patterned tiles are needed for a wall that requires x tiles horizontally and y tiles vertically, where x and y are multiples of 3.

- (c) Find, in terms of x and y , how many patterned tiles are needed for a wall that requires x tiles horizontally and y tiles vertically, where x is one more than a multiple of 3 and y is one less than a multiple of 3.

- (d) Find, in terms of x and y , the number of patterned tiles needed for a wall that requires x tiles horizontally and y tiles vertically, where x is a multiple of 3 and y is not a multiple of 3.

6. The operation $*$ is defined by

$$a * b = ab - b^2.$$

For example: $2 * 5 = 2 \times 5 - 5^2$
 $= 10 - 25$
 $= -15.$

- (a) Prove that, for all values of a and b ,

$$a * b - b * a = (a + b)(a - b).$$

- (b) Find values of x which satisfy the equation

$$(2x) * x = 169.$$

- (c) Find values of x which satisfy the equation

$$8x - \left(\frac{20}{x} * x\right) = 0.$$

- (d) Show that $y * \left(\frac{1}{y} * y\right) = (1 - y)(1 + y)(y^2 + y - 1).$

[12]

MATHEMATICS

TIER B PAPER 1

A.M. TUESDAY, 4 June 1996

(2 hours)

Centre Number

Candidate's Name (in full)

Candidate's Examination Number

INSTRUCTIONS TO CANDIDATES

Write your centre number, name and candidate number in the spaces provided above.

Answer **all** the questions in the spaces provided.

INFORMATION FOR CANDIDATES

An electronic calculator will be required.

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The number of marks is given in brackets at the end of each question or part-question.

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For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	4	
2	4	
3	3	
4	2	
5	3	
6	3	
7	6	
8	4	
9	2	
10	3	
11	3	
12	3	
13	5	
14	2	
15	3	
16	5	
17	4	
18	4	
19	5	
20	7	
21	3	
22	5	
23	5	
24	5	
25	3	
26	4	
TOTAL		

1. (a) Calculate 34% of £860.

.....

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.....

[2]

- (b) Water makes up $\frac{3}{5}$ of a drink. How much water is there in 560 ml of the drink ?

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[2]

2. Terry is making a doll's house as a model of his own house to a scale of 1:30.

- (a) He measures the height of the front door in his own house and finds it is 210 cm. Calculate the height of the front door in the doll's house.

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[2]

- (b) The height of the doll's house is 29 cm. Calculate the height, in metres, of Terry's house.

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.....

.....

[2]



3. Do not use a calculator when answering this question. All working must be shown.

Kay and Tansy are tour guides at a famous castle. They share the work equally and each of them takes at most 28 people at a time on a tour of the castle. One day 952 people want to see the castle. Find the least number of tours each guide must lead on that day.

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[3]

4. (a) Write down 52.3762 correct to 1 decimal place.

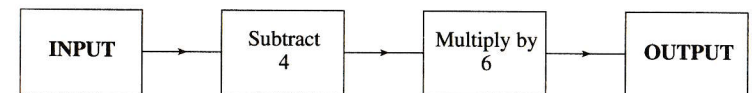
.....

[1]

- (b) Write down 2.0347 correct to 3 significant figures.

.....

[1]



- (a) When the **INPUT** is 11, what is the **OUTPUT** ?

.....

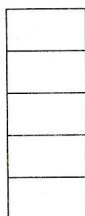
[1]

- (b) Let the number **INPUT** be x . Write down the **OUTPUT** in terms of x .

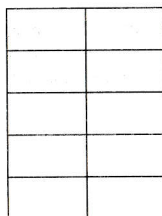
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[2]

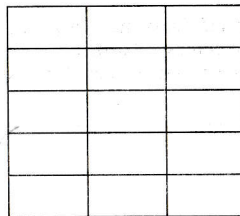
6. A storekeeper stores boxes in piles of five.



1 pile
5 boxes



2 piles
10 boxes



3 piles
15 boxes

- (a) How many boxes are there when there are 13 piles ?

[1]

- (b) How many boxes are there when there are d piles ?

[1]

- (c) When the storekeeper has made d piles of boxes, someone removes 3 boxes. How many boxes are left ?

[1]

7. Richard takes t minutes to cycle to school.

- (a) It takes him twice as long to walk to school. Write down, in terms of t , how long it takes him to walk to school.

[1]

- (b) One week he walks to school on 5 days. Write down, in terms of t , the total time he spends walking to school that week.

[1]

- (c) When Richard goes to school by bus, it takes him 15 minutes longer than when he cycles. Write down, in terms of t , how long it takes him to go to school by bus.

[1]

- (d) In another week, Richard cycles to school on 3 days and goes by bus on 2 days. Write down, in terms of t , the total time he spends travelling to school that week. Simplify your answer as far as possible.

[3]

8. (a) The Government stated that the cost of living rose by 4% during the past year. Leah earned £15 400 last year. By how much should her salary increase in order to keep up with this rise in the cost of living ?

[2]

- (b) A 2 kg piece of beef contains 320 g of fat. What percentage of the beef is fat ?

[2]

9. Do not use a calculator when answering this question.
All working must be shown.

Obtain an ESTIMATE for $\frac{314 \times 18}{62}$

[2]

10. Showing all your working, find which of the quantities 0.4, 33% and $\frac{3}{8}$

is (i) the smallest, (ii) the largest.

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.....

.....

(i) Smallest = (ii) Largest = [3]

11. In a TV game show, the winners share the prize money, £2400, in proportion to their scores. Lee, Siân and Heulwen are the winners with scores of 24, 28 and 12 respectively. Calculate how much money each person wins.

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[3]

12. Solve the equation

$$6x - 7 = 4(x + 1).$$

.....

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.....

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[3]

13. When you look into a glass of water, the depth of the water appears to be less than the real depth. The depth that the water appears to have is called the apparent depth. The real depth of water in the glass is denoted by r cm and the apparent depth is denoted by a cm. The table below gives five values of r and the corresponding values of a .

r	2	4	7	9	12
a	1.5	3	5.25	6.75	9

- (a) Plot the points represented in the table and draw the graph of a against r . [3]

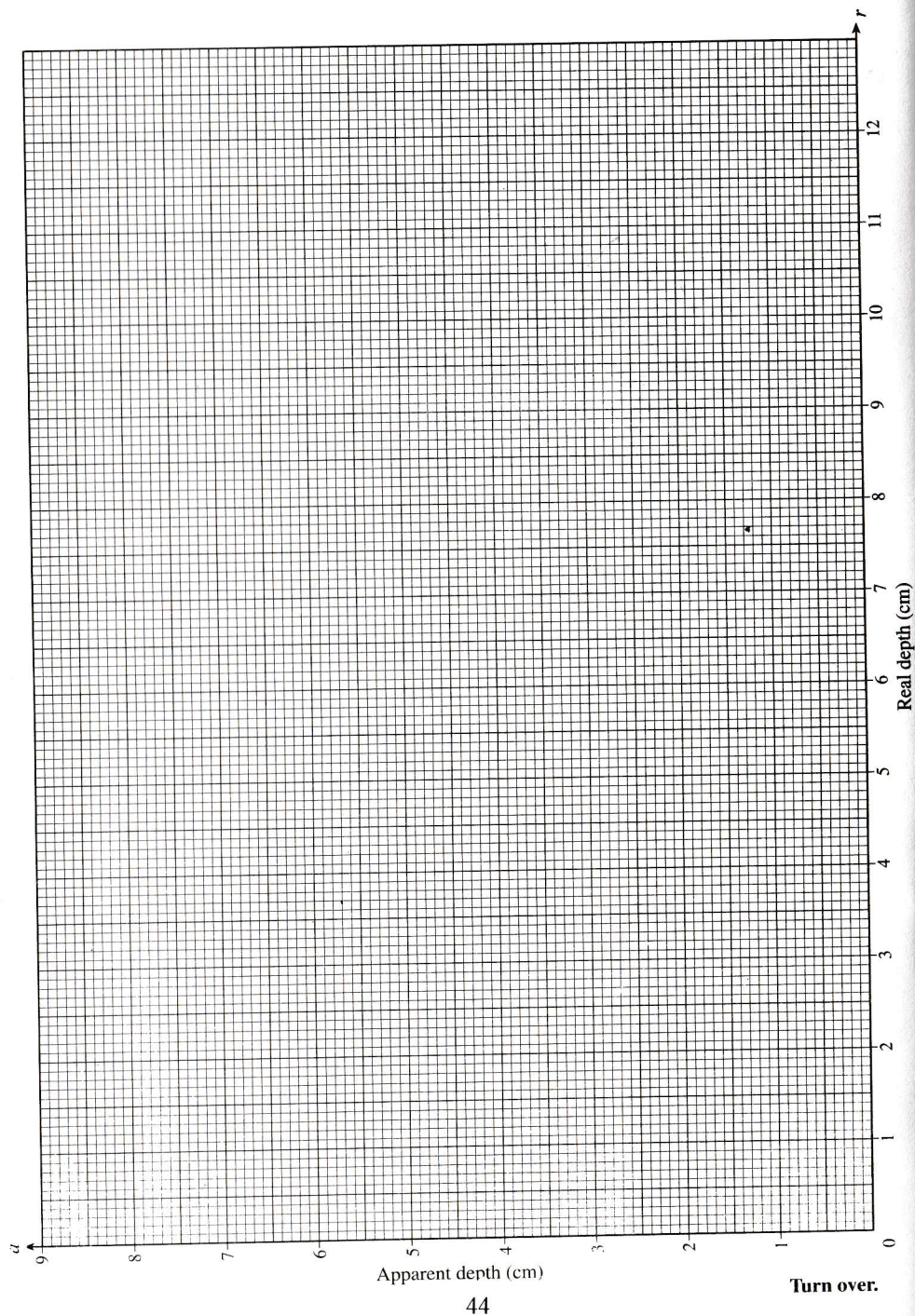
You must show on your graph how you obtain your answers to (b) and (c).

- (b) Use your graph to find the apparent depth of water when the real depth is 5 cm.

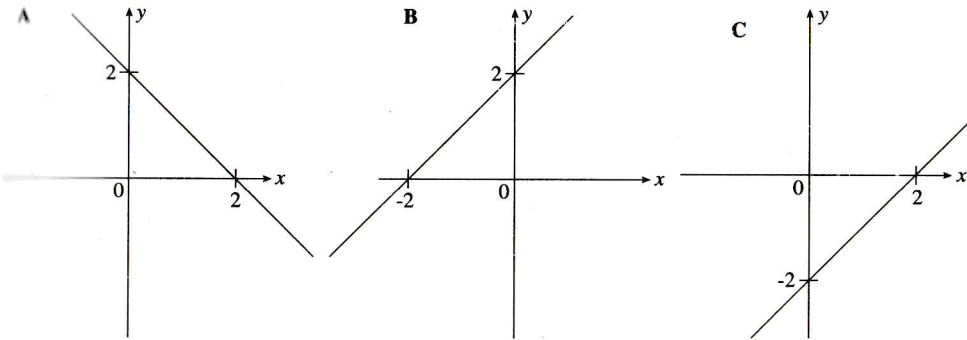
..... [1]

- (c) Use your graph to find the real depth of water when the apparent depth is 8.5 cm.

..... [1]



14. The diagrams below show 3 graphs. The diagrams are labelled A, B and C.



For **each** of the following, write down A, B or C to indicate the diagram which shows the graph of the function.

- (i) $y = x + 2$
- (ii) $y = 2 - x$
- (iii) $y = x - 2$

[2]

15. (a) In the following pattern, write down the next number

$$\frac{1}{2}, \frac{3}{4}, \frac{5}{6}, \frac{7}{8}, \frac{9}{10}, \dots$$

[1]

(b) In the following pattern, write down the next number and explain in words what you think is the rule for finding the next number.

$$2, 7, 13, 20, 28, \dots$$

[2]

16. Solve the following simultaneous equations by an algebraic (not graphical) method.

$$5x + 4y = 2$$

$$2x + 3y = 5$$

.....

.....

.....

.....

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[5]

17. For **each** of the following sequences, find an expression, in terms of n , for the n th term.

(a) $\frac{1}{2}, \frac{1}{4}, \frac{1}{6}, \frac{1}{8}, \frac{1}{10}, \dots$

.....

.....

.....

n th term = [2]

(b) 2, 5, 8, 11, 14,

.....

.....

.....

n th term = [2]

18. This question is about finding a solution to the equation

$$x^3 + 3x = 48$$

by a 'trial and improvement method'.

(a) Complete the entries in the following table:

x	$x^3 + 3x$
3.2	42.368
3.3	
3.4	
3.5	53.375

[1]

(b) Between which two consecutive values of x used in the table in (a) would you say the solution to the equation lies ?

[1]

(c) Using a value for x with 2 decimal places, show how to decide which of your two values in (b) is the solution to the equation correct to 1 decimal place.

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Solution correct to 1 decimal place is $x = \dots\dots\dots$ [2]

19. (a) Show how you would use your calculator to calculate the value of:

$$\frac{26.3 \times 17.52}{33.9 + 40.7}$$

Write each key you would use in a separate box.

Answer =

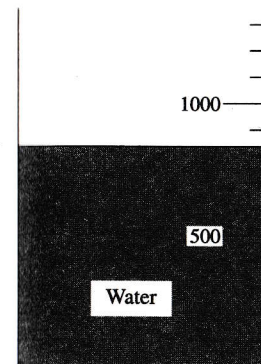
[3]

- (b) Evaluate $6.283 \times \sqrt{\frac{78.6}{981}}$ correct to 3 decimal places.

Answer = (correct to 3 decimal places.)

[2]

20. (a)



The diagram represents a cylinder that can be used to measure volumes of liquids in cm^3 .

There is some water in the measuring cylinder. The following statement refers to the measurement of the volume of the water in the cylinder.

Complete the statement by entering a number in **each** of the two places marked by a dotted line.

The volume of the water represented in the diagram is cm^3 , measured correct to the nearest cm^3 . [2]

- (b) A rectangular card measures 128 mm long by 73 mm wide, each measurement being made correct to the nearest mm.

- (i) Write down the least and greatest possible values for the length of the card.

Least = Greatest = [1]

- (ii) Write down the least and greatest possible values for the width of the card.

Least = Greatest = [1]

- (iii) Seven of these cards are placed end to end to form a continuous rectangular strip. What is the greatest possible length of this rectangular strip?

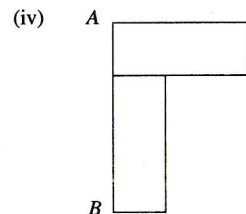
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[1]



Two of the cards are placed as shown in the diagram.
What is the least possible value of the distance AB ?

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[2]



21. Do not use a calculator when answering this question.
All working must be shown.

Show clearly how you would obtain an **ESTIMATE** for the following:

$$\frac{5118 \times 0.09}{96 \times (4.8)^2}$$

.....

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[3]

22. (a) Write **each** of the following numbers in standard form.

(i) 240 000

.....

[1]

(ii) 0.00038

.....

[1]

(b) Find, in standard form, the value of:

(i) $(2.34 \times 10^9) \times (7.86 \times 10^{-4})$

.....

.....

[1]

(ii) $\frac{(4.29 \times 10^{-3})}{(7.80 \times 10^4)}$

.....

.....

[2]

23. (a) Calculate, in fractional form, the value of

$$y = \frac{a - b}{c + d}$$

when $a = \frac{5}{6}$, $b = \frac{1}{3}$, $c = \frac{2}{3}$, and $d = \frac{1}{2}$.

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.....

.....

[3]

Turn over.

(b) Calculate the value of $\left(\frac{w}{3} + ut\right)^{n+3}$

when $w = 45$, $u = -3$, $t = 4$ and $n = -1$.

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[2]

24. (a) Expand the following expression, simplifying your answer as far as possible.

$$(x - 3)(2x + 5)$$

.....

.....

.....

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[2]

(b) Make w the subject of the following.

$$3w + 6a = 2(c - w)$$

.....

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.....

.....

[3]

25. (a) The inequality

$$3n + 13 < 5n - 6$$

can be rearranged into **one** of the following forms:

EITHER the form $n < \text{a number}$;

OR the form $n > \text{a number}$.

Rearrange the inequality into whichever form is correct.

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[2]

(b) Write down the least or greatest whole number value of n that satisfies your inequality, stating whether it is the least or the greatest.

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[1]

26. The variable y varies as the square of x . When $x = 3$, $y = 36$.

(a) Find a formula for y in terms of x .

.....

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.....

.....

[3]

(b) Use your answer in (a) to find the value of y when $x = 5$.

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[1]

Turn over

MATHEMATICS

TIER B PAPER 2

A.M. FRIDAY, 7 June 1996

(2 hours)

Centre Number

Candidate's Name (in full)

Candidate's Examination Number

INSTRUCTIONS TO CANDIDATES

Write your centre number, name and candidate number in the spaces provided above.

Answer **all** the questions in the spaces provided.

INFORMATION FOR CANDIDATES

An electronic calculator will be required.

A formula booklet is available and may be used.

You should give details of your method of solution, especially when a calculator is used.

Unless stated, diagrams are not drawn to scale.

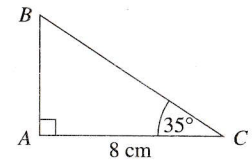
Scale drawing solutions will not be acceptable where you are asked to calculate.

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For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	5	
2	5	
3	1	
4	6	
5	3	
6	5	
7	3	
8	4	
9	4	
10	4	
11	1	
12	3	
13	4	
14	2	
15	4	
16	5	
17	9	
18	4	
19	2	
20	2	
21	5	
22	6	
23	5	
24	2	
25	6	
TOTAL		

1. This diagram is not drawn to scale. It shows a triangle ABC . AC is 8 cm long. Angle ACB is 35° .



- (a) Draw triangle ABC accurately, full sized, below. The line AC is drawn for you.

A C [2]

- (b) By taking a suitable measurement, calculate the area of the triangle you have drawn.

..... [3]

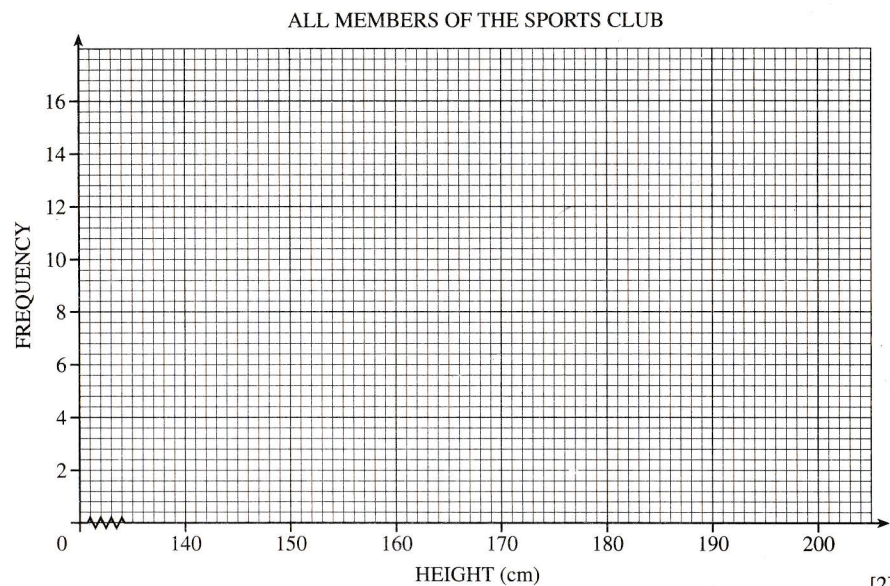
2. This table shows the grouped frequency distribution of the heights, measured to the nearest centimetre, of all the members of a sports club.

Height (to nearest cm)	140 to 149	150 to 159	160 to 169	170 to 179	180 to 189	190 to 199
Number of people	4	10	16	12	6	2

- (a) How many people are there in the sports club ?

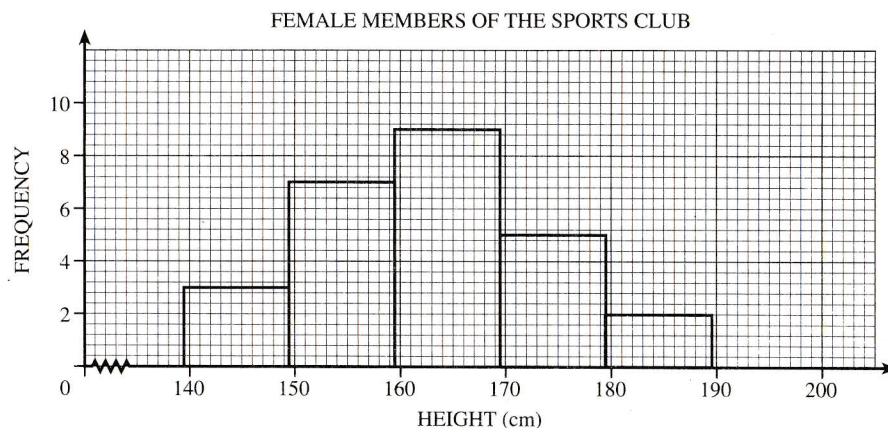
..... [1]

- (b) On the grid at the top of the next page, draw a grouped frequency diagram to show the distribution of the heights of the members of the sports club.



[2]

- (c) The grouped frequency diagram below shows the distribution of the heights, measured to the nearest centimetre, of the female members of the sports club.



Find the number of **male** members of the sports club whose heights, measured to the nearest centimetre, are 170 cm or more.

[2]

Turn over.

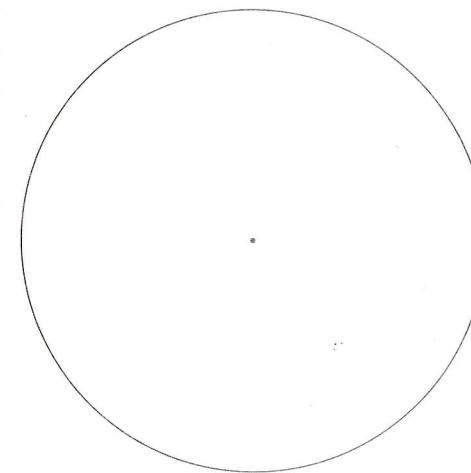
3. A football team can win, draw or lose any game. Julian says that the probability that his team wins its next game is therefore $\frac{1}{3}$. Comment on this statement.

[1]

4. A survey of the types of fuel used to heat the homes of people living in a town was carried out. The results are shown in this table.

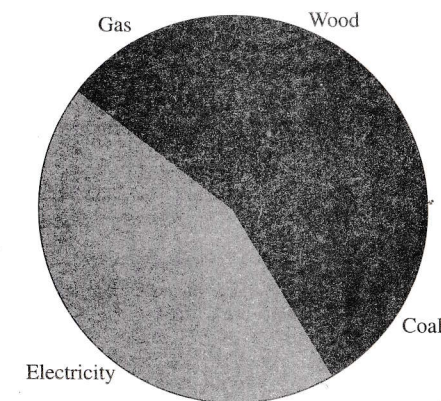
Fuel	Gas	Electricity	Coal	Wood
Number of homes	20	10	5	1

- (a) In the blank circle, draw a pie chart to show this information.
You must show how you calculate the angles of your pie chart.



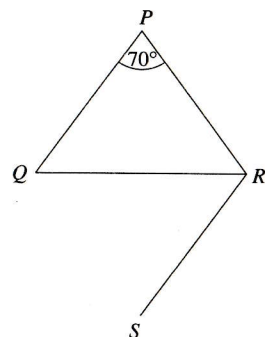
[3]

- (b) This pie chart shows the results of a similar survey for 80 homes in the country.
How many of the 80 homes in the country used wood for their heating?



[3]

5.



This diagram is not drawn to scale.
It shows an isosceles triangle PQR and a line RS .
 PQ is equal to PR .
Angle QPR is 70° .
 PQ is parallel to RS .

- (a) Calculate the size of angle PQR . You must show your working.

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

[2]

- (b) State the size of angle QRS . Give a reason for your answer.

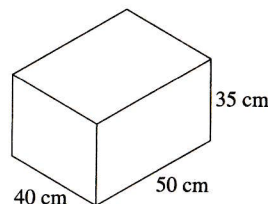
.....
.....

[1]

6. A firm buys coffee powder in boxes 50 cm long, 40 cm wide and 35 cm high. The boxes are full.

- (a) Calculate the volume of coffee in a box.

.....
.....



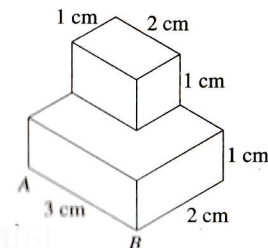
[2]

- (b) The firm uses the coffee to fill smaller boxes which are cubes of side 10 cm. How many smaller boxes can be filled from one of the large boxes?

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

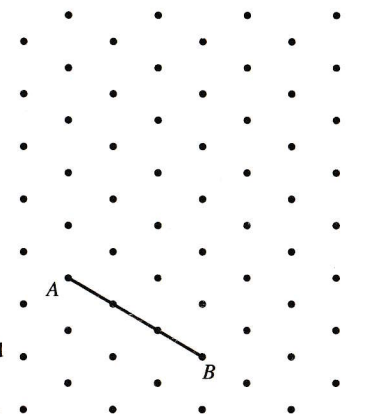
[3]

7.



Draw this shape accurately on the isometric grid given.
The line AB has been drawn for you.

[3]



8. A bag contains 6 red counters, 3 blue counters and 2 yellow counters. Howell takes a counter from the bag without looking.

- (a) What is the probability that he takes a blue counter?

.....

[2]

- (b) Some green and some orange counters are put into the bag so that the probability of taking an orange counter is $\frac{1}{16}$. What is the probability of not taking an orange counter?

.....

[2]

9. (a) Jahal has three cardboard shapes: a parallelogram, a kite and a rhombus. He labels them A , B , and C but not in that order.
Shape A has one line of symmetry and no rotational symmetry.
Shape B has two lines of symmetry and rotational symmetry order two.
Shape C has rotational symmetry order two but no lines of symmetry.

Which letter refers to which shape?

A is the B is the C is the [2]

- (b) Complete the following sentence.

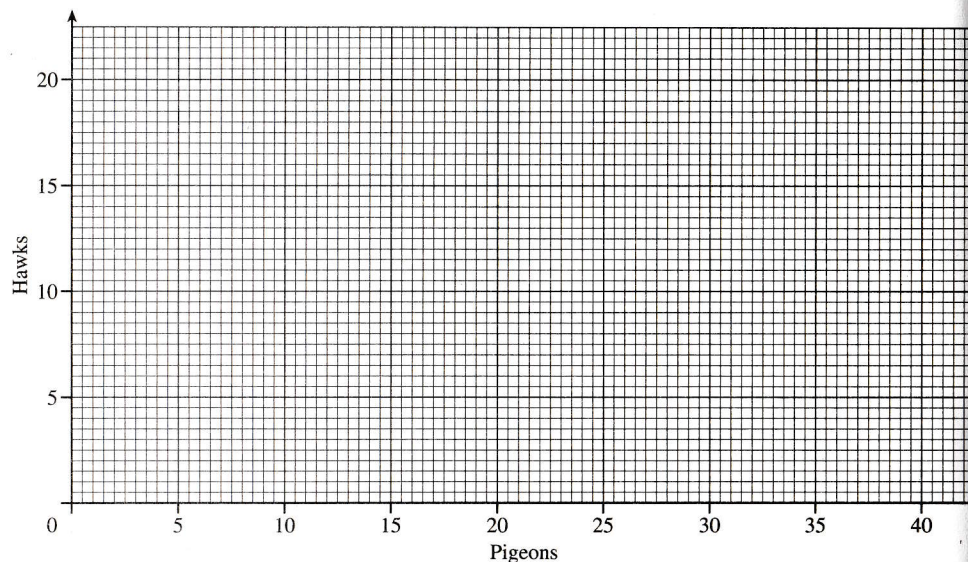
A square has lines of symmetry and rotational symmetry order

[2]

10. A bird watcher counts the number of pigeons and the number of hawks he sees each day. This table shows his results.

Pigeons	5	32	18	29	33	12	21	15	35	8	22	22
Hawks	20	5	11	8	4	16	9	14	3	17	10	11

- (a) Draw a scatter diagram to show this information.



[2]

- (b) Does your scatter diagram show positive correlation, negative correlation or no correlation?

[1]

- (c) About how many pigeons would the bird watcher expect to see if he sees 15 hawks?

[1]

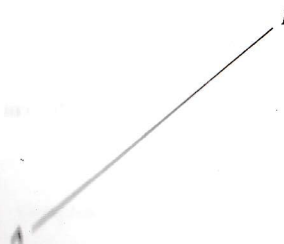
11. For a piece of coursework, Huw wants to find out which is the most popular newspaper in Wales. He conducts a survey by asking all the boys in his class which newspaper they like best. Give a reason why his survey is likely to be biased.

[1]

12. This diagram is drawn using a scale 1 cm to 1 km. It shows the route taken by a ship from A to B.



Scale: 1 cm to 1 km



- (a) What bearing does the ship take on its journey from A to B?

[1]

- (b) The ship then sails from B to a point C, 8 km from B on a bearing 120° . Show the journey from B to C on the diagram.

[2]

13. In a game two fair 6 sided dice are thrown. The score is determined by finding the difference between the two numbers appearing on the dice.

- (a) Complete this table to show the possible scores.

[2]

	-	-	-	-	-	-
	-	-	-	-	-	-
4	-	-	-	-	-	-
3	2	1	0	1	2	3
2	1	0	1	2	3	4
1	0	1	2	3	4	5
	1	2	3	4	5	6

- (b) What is the probability of obtaining a score of 1?

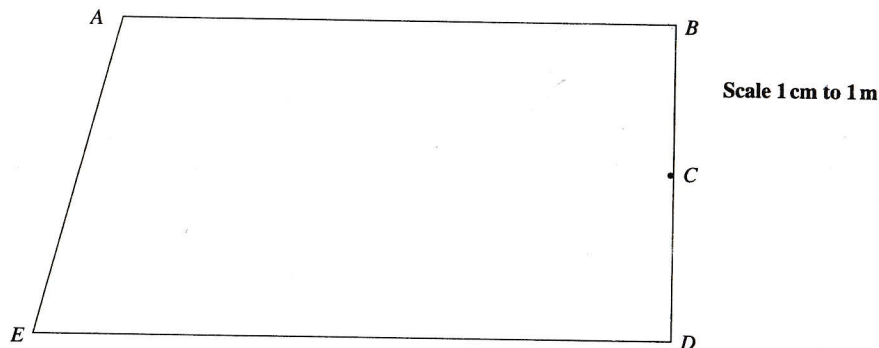
[2]

14. In this question take π as 3.14 or use the π button on your calculator. Calculate the area of a circle with radius 8 cm.

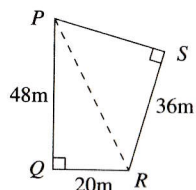
[2]

15. The diagram below is drawn on a scale of 1 cm to 1 m. It shows a security compound $ABCDE$. A light has to be placed so that it is not more than 4 m from DE and closer to A than to B . It must also be less than 6 m from C .

Shade the region where the light can be placed.



16.



This diagram shows a park $PQRS$.
 PQ is 48 m long.
 QR is 20 m long.
 RS is 36 m long.
Angles PQR and RSP are right angles.
There is a path PR running across the park.

- (a) Calculate the length of the path, PR .

.....

.....

.....

.....

[3]

- (b) Calculate the length of the side of the park, PS .

.....

.....

.....

.....

[2]

Turn over.

17. A shopkeeper keeps a record of the amount spent, correct to the nearest pound, by the first 40 customers she serves on a Wednesday. Her results are recorded in this table.

Amount (£)	Frequency f	Mid-point x	fx
1 to 5	10		
6 to 10	13		
11 to 15	6		
16 to 20	6		
21 to 25	3		
26 to 30	2		

- (a) Which is the modal class?

..... [1]

- (b) Complete the mid-point column of the table.

[1]

- (c) Calculate an estimate of the mean amount spent per customer for the first 40 customers on the Wednesday.

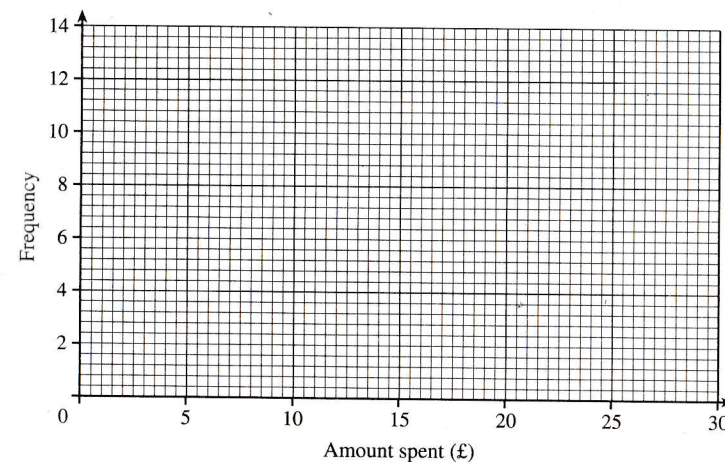
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.....

[3]

- (d) On the grid below, draw a frequency polygon for the information in the table.



[2]

- (e) The shopkeeper also keeps a record for the first 40 customers she serves on a Saturday. The modal class is £1 to £5. The mean amount spent per customer is £16.30. Does the shopkeeper take a greater amount of money from the first 40 people on Wednesday or Saturday? Explain how you obtain your answer.

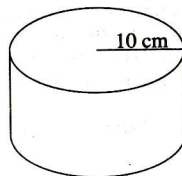
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[2]

18. In this question take π as 3.14 or use the π button on your calculator.
The volume of a cylinder is 1885 cm^3 .
The radius of the cylinder is 10 cm.
Calculate the height of the cylinder.



.....

.....

.....

.....

[4]

19. A fair 6 sided dice is rolled 300 times. Approximately how many times would you expect it to show the number 4?

.....

.....

[2]

20. The table below shows the probabilities that the age (in complete years) of the winner of a snooker championship will lie within various ranges.

Age range	15 to 19	20 to 29	30 to 39	40 to 49	over 49
Probability	0.12	0.68	0.11	0.07	0.02

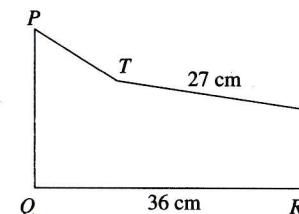
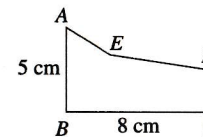
What is the probability that the winner will be less than 30 years old?

.....

.....

[2]

21. A firm has a small logo, labelled $ABCDE$, on its letter headings and a larger, **similar** logo, labelled $PQRST$, on its boxes.
The length of AB is 5 cm.
The length of BC is 8 cm.
The length of QR is 36 cm.
The length of ST is 27 cm.



- (a) Calculate the length of PQ .

.....

.....

[3]

- (b) Calculate the length of DE .

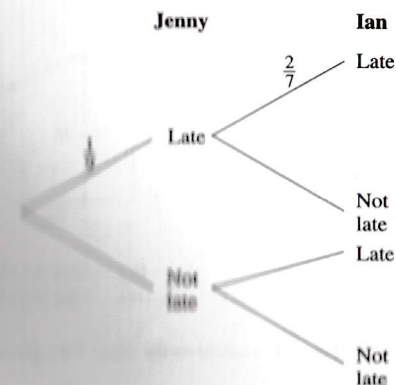
.....

.....

[2]

22. The probability that Jenny is late for school is $\frac{1}{9}$.
Independently, the probability that Ian is late for school is $\frac{2}{7}$.

- (a) Complete this tree diagram.



- (b) Calculate the probability that just one of the two pupils is late for school.

.....

.....

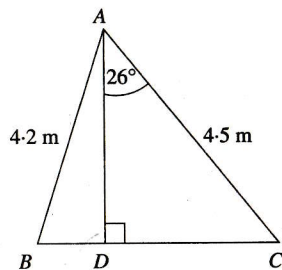
[3]

[3]

Turn over.

23. This diagram shows a sail $ABDC$.

AC is 4.5 m long.
 AB is 4.2 m long.
 Angle DAC is 26° .
 AD is perpendicular to BC .



(a) Calculate the height, AD , of the sail.

.....

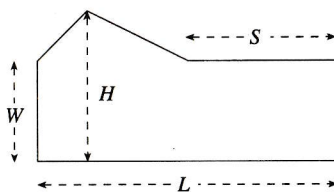
 [3]

(b) Calculate angle ABD .

.....

 [2]

24. A borough surveyor wants to calculate the area of a piece of ground with lengths W , H , L and S , as shown in the diagram.



Only one of the following formulae can be used to calculate the area of the ground.

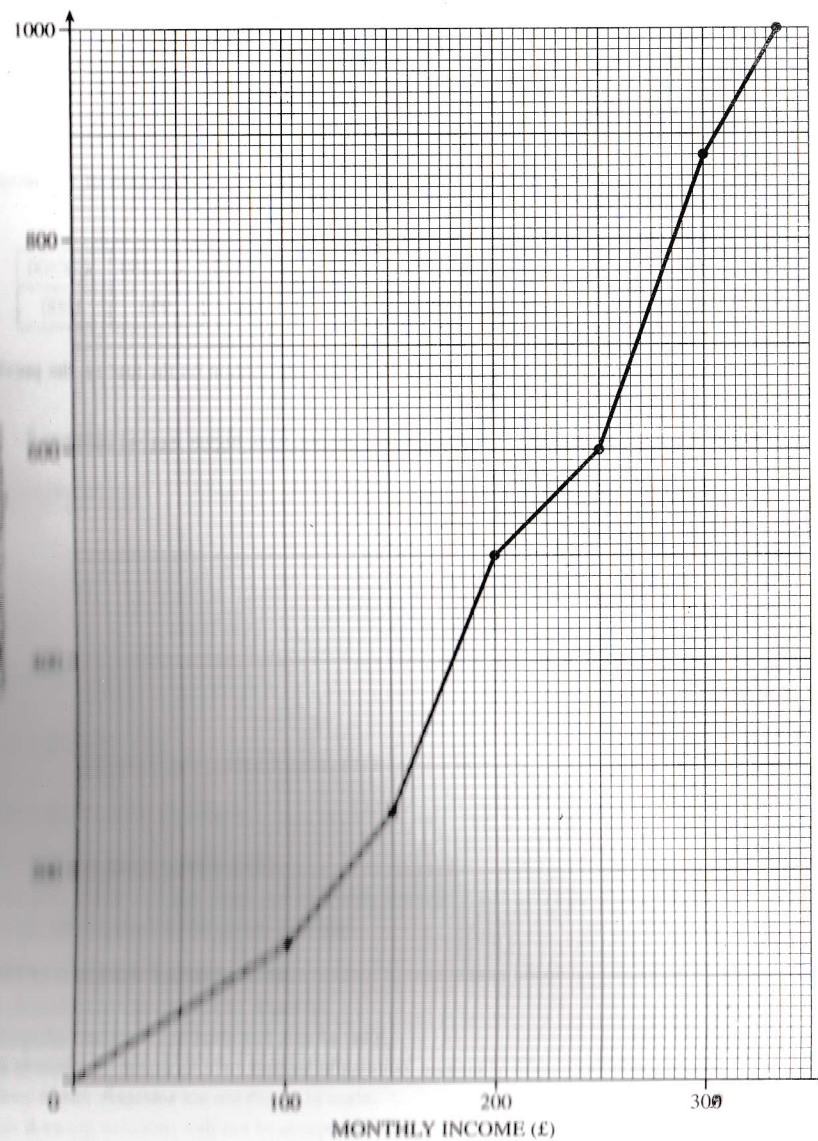
- (i) $\text{Area} = \frac{1}{2}(WHL + HLS)$
 (iii) $\text{Area} = \frac{1}{2}(HL + WS + WL - HS)$

- (ii) $\text{Area} = \frac{1}{2}(H + L + W - S)$
 (iv) $\text{Area} = \frac{1}{2}(WL + HS + H - S)$

Which of the four formulae can be used to calculate the area of the piece of ground? Give a reason for your answer.

.....
 [2]

25. The diagram below shows the cumulative grouped frequency distribution of the monthly incomes of the 1000 workers in a factory near the village of Ranja.



Turn over.

- (a) Estimate the median of the monthly incomes.

[1]

- (b) Estimate how many of the workers earn more than £260 per month.

[2]

- (c) The table below shows the **cumulative** grouped frequency distribution of the monthly incomes of the 1000 workers in a factory near the village of Janpur.

Income	≤ £100	≤ £150	≤ £200	≤ £250	≤ £300
Cumulative frequency	200	450	800	950	1000

Draw a cumulative frequency diagram to show this information on the grid on the previous page. [2]

- (d) Which workers, those near Ranja or those near Janpur, have higher median earnings?

[1]

MATHEMATICS

TIER B PAPER 3

A.M. WEDNESDAY, 12 June 1996

(2 hours)

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	13	
2	12	
3	6	
4	6	
5	3	
6	10	
TOTAL		

Centre Number

Candidate's Name (in full)

Candidate's Examination Number

INSTRUCTIONS TO CANDIDATES

Write your centre number, name and candidate number in the spaces provided above.

Answer all questions in the spaces provided.

INFORMATION FOR CANDIDATES

An electronic calculator will be required.

A formula booklet is available and may be used.

You should give details of your method of solution, especially when a calculator is used.

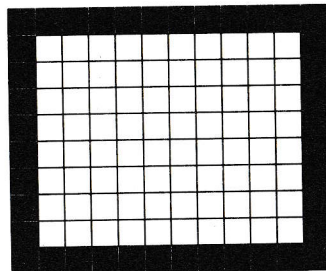
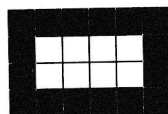
Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

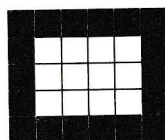
No certificate will be awarded to a candidate detected in any unfair practice during the examination.

1.

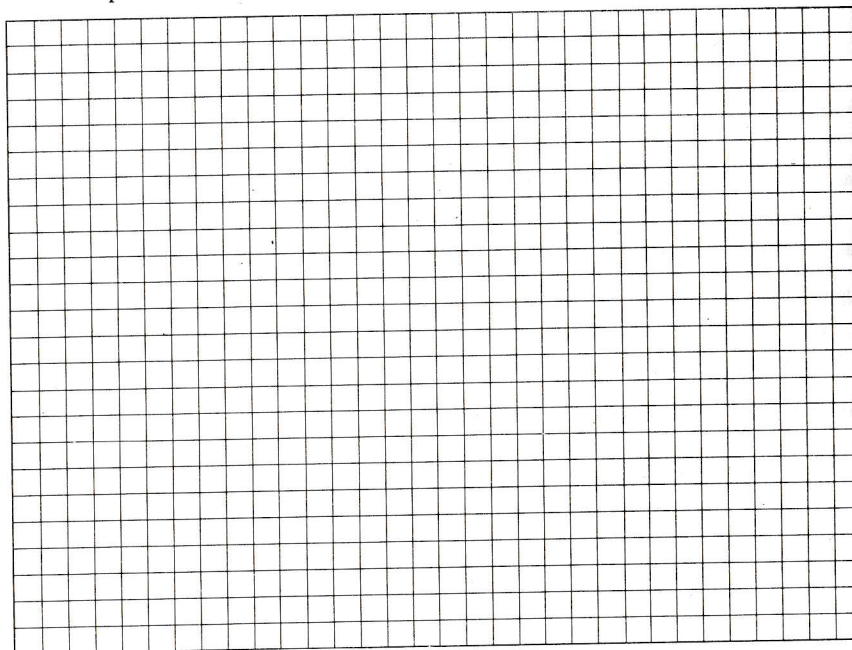


In this question, black and white tiles are used to form rectangular patterns like those shown above. In these patterns white tiles are first arranged as a rectangle, then black tiles are used to surround the white ones.

The following rectangular pattern uses 12 white tiles and 18 black tiles. It has a perimeter of 22 units.



- (a) Find all the possible rectangular patterns which use 20 white tiles. Draw a table to show, for each rectangular pattern, the length and width of the white rectangle, the number of black tiles, and the perimeter of the rectangular pattern.



- (b) To make a rectangular pattern, some white tiles are arranged to form a rectangle x tiles long and y tiles wide.

- (i) Find the number of black tiles needed to surround these white tiles to complete the rectangular pattern. You must explain and **test** your answer.

- (ii) Find the perimeter of the completed rectangular pattern. You must explain and **test** your answer.

[13]

2. In this question, square grids of numbers are made by writing the counting numbers in rows, in order, in the shape of a square.

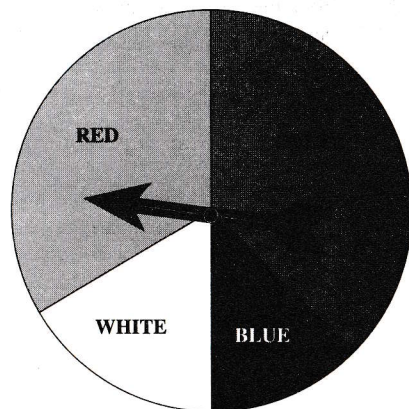
For example

5	6	7
8	9	10
11	12	13

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

Investigate any patterns you can find within square grids of numbers.

3.



The diagram shows a spinner which can be used to choose one of the colours on the circle. The spinner rests horizontally, and the arrow turns freely about the centre of the circle. The colour that the arrow points to, after being spun, is the chosen colour.

Describe, in detail, **two** different ways of estimating the probability that red will be chosen.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

4. "A number x is greater than $\frac{1}{x}$."

Find all the values of x for which

- (a) the statement is true,
(b) the statement is false.

[6]

8. Investigate the truth of the statement:

"Half a number is always less than the number itself."

[3]

8. Halsal sell salt in packages of 300 cm^3 in supermarkets nationwide. As a company, Halsal have decided to use cardboard to package the salt, but **not** to have packages in the shape of cuboids.

Design a package for Halsal salt. You must give the dimensions of your package and your reasons for choosing its dimensions. Give a clear account of your work and state any advantages or disadvantages of your chosen design.

[illegible]

MATHEMATICS

TIER C PAPER 1

A.M. TUESDAY, 4 June 1996

(1½ hours)

Centre Number

Candidate's Name (in full)

Candidate's Examination Number

INSTRUCTIONS TO CANDIDATES

Write your centre number, name and candidate number in the spaces provided above.

Answer **all** the questions in the spaces provided.

INFORMATION FOR CANDIDATES

An electronic calculator will be required.

A formula booklet is available and may be used.

You should give details of your method of solution, especially when a calculator is used.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	8	
2	3	
3	3	
4	4	
5	4	
6	3	
7	4	
8	4	
9	3	
10	4	
11	5	
12	5	
13	4	
14	4	
15	3	
16	2	
17	3	
18	3	
19	2	
20	6	
21	4	
22	3	
23	3	
24	3	
25	5	
26	2	
27	3	
TOTAL		



1. Do not use a calculator when answering this question.
All working must be shown.

- (a) John replaced the roof tiles on his garage and house.
He used 243 tiles on the garage and 678 tiles on the house.

(i) How many tiles did he use altogether ?

- (ii) To repair his roof John bought 1000 tiles. Fifty tiles were broken while the roof was being repaired.
How many unbroken tiles were left over after John repaired his roof ?

[2]

- (b) Mary sells records and books in a jumble sale.

(i) She sold 26 books at 6p each.
How much money did she receive for the books ?

- (ii) The money received for the sale of records was 224p.
Each record was sold for 8p. How many records were sold ?

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.....
.....

[4]

- (c) The total number of children at a football match is 407. The total number of adults at the same football match is 623. Without adding these two numbers together, write down a simple calculation you could do to show that the total number attending the football match is greater than 1000.

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

[1]

- (d) A length of tape was cut into sections of lengths 4.2 cm, 3.6 cm and 7.9 cm. What was the original length of the tape ?

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

[1]



2. Do not use a calculator when answering this question.
All working must be shown.

Alison wants to buy as many golf balls as she can for £15. The golf balls cost 70p each.

- (a) How many golf balls can she buy ?

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

[2]

- (b) How much change should she be given ?

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

[1]

3. (a) Write in figures the number seven thousand two hundred and six.

.....

[1]

- (b) How many hundreds are there in 936 ?

.....

[1]

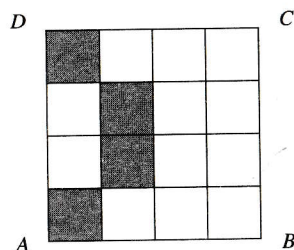
- (c) Write down the largest four digit number that can be made using each of the four figures 4, 8, 3, 6 once only.

.....

[1]

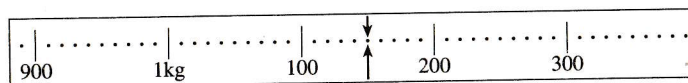
Turn over.

4. (a) What fraction of the square $ABCD$ is shaded?



[1]

- (b) Sian uses a kitchen weighing scale to measure the amount of flour required to make a cake. The scale is marked in 100 gram divisions with 10 gram subdivisions, as shown in the diagram below. The arrows indicate the weight of flour. Using the diagram, write down the weight, **in kilograms**, of flour on the kitchen scale.



[1]

- (c) Find $\frac{2}{7}$ of £35.

[1]

- (d) An aeroplane can seat 300 passengers. What percentage of the seats are occupied when the aeroplane has 150 passengers who are all seated?

[1]

5. The thickness of 300 sheets of paper is 5.16 cm.

- (a) Find the thickness, in cm, of one sheet of paper.

[2]

- (b) Calculate the thickness of 500 sheets of the same paper.

[2]

6. For **each** of the following items, place a tick (✓) in the appropriate box to show your estimate for its weight.

ITEM	weight between		
	10 g & 500 g	0.5 kg & 1.5 kg	1.5 kg & 5 kg
a teacup			
a light bulb			
1 litre of water			

[3]

Turn over.

7.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

From the numbers shown above, write down

- (a) the square numbers which lie between 1 and 50,

..... [2]

- (b) the multiples of 9 which lie between 1 and 50,

..... [1]

- (c) the next two numbers in the sequence

2, 7, 12, 17,, [1]

8. The following formula can be used to find the cost, in pounds, of repairing a television set.

$$\text{Cost} = 40 + 20 \times \text{number of hours worked}$$

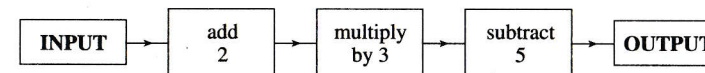
- (a) Calculate the cost of repairing a television set when the work takes half an hour.

..... [2]

- (b) How long does it take to repair a television set when the work costs £80 ?

..... [2]

9.



Use the instructions above to complete the following table.

Space for working

.....

INPUT	OUTPUT
10	31
7	
	4

[3]

10. (a) When a number is multiplied by 3 and then 7 is added to the result, the answer is 22.
What is the number ?

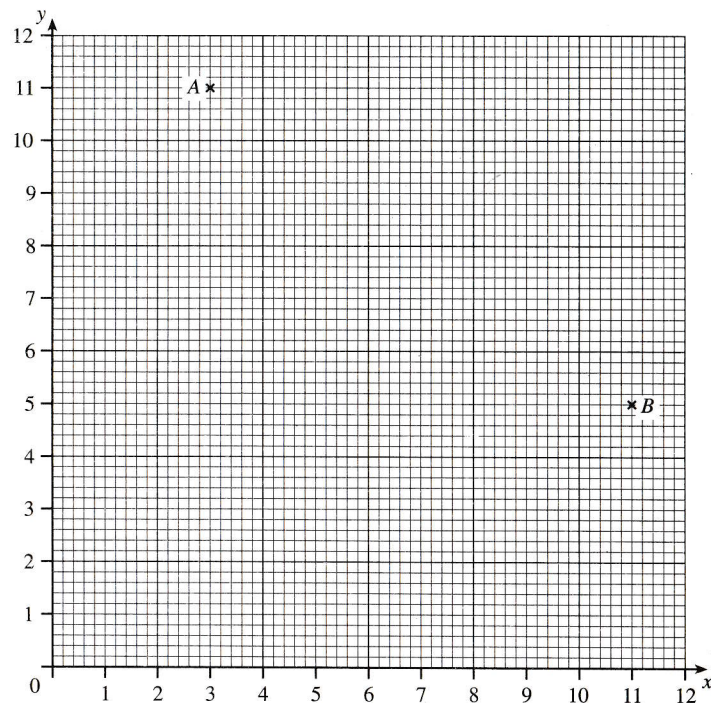
..... [2]

- (b) When a number is divided by 8 and then 3 is taken away from the result, the answer is 4.
What is the number ?

..... [2]

Turn over.

11.



- (a) Write down the coordinates of the points A and B.

Coordinates of A are (,)

Coordinates of B are (,)

[2]

- (b) Mark the point C (5, 4) on the diagram.

[1]

- (c) Mark a point T on the diagram whose y coordinate is 8 and is such that T lies on the line AB.

Write down the x coordinate of T.

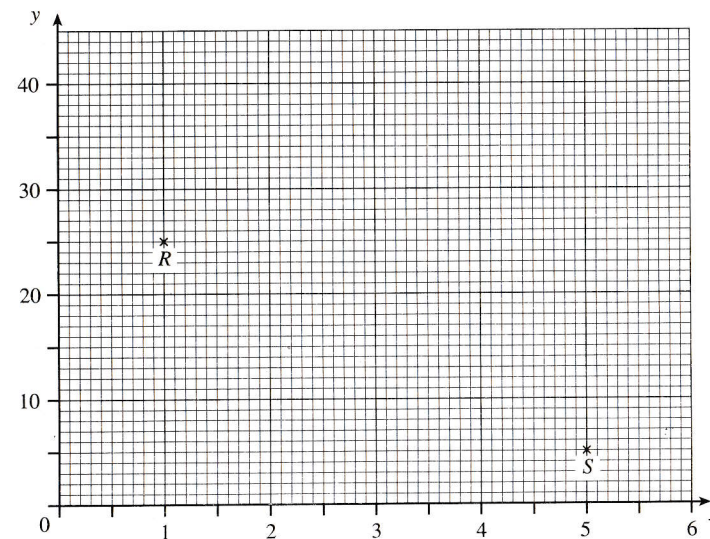
The x coordinate of T is

[2]

12. The graph of $y = x^2 - 1$ is drawn by plotting the points given in the following table and joining these points with a smooth curve.

x	1	2	3	4	5	6
y	1	3	8	15	24	35

- (a) Using the graph paper given below, draw the graph of $y = x^2 - 1$.



[3]

- (b) On the graph draw the straight line joining the points R and S. This line meets the curve $y = x^2 - 1$ at T.

- (i) Mark the position of T on the diagram.

- (ii) Write down the coordinates of T. (,)

[2]

13. (a) Calculate 34% of £860.

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.....

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[2]

- (b) Water makes up $\frac{3}{5}$ of a drink. How much water is there in 560 ml of the drink ?

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[2]

14. Terry is making a doll's house as a model of his own house to a scale of 1 : 30.

- (a) He measures the height of the front door in his own house and finds it is 210 cm. Calculate the height of the front door in the doll's house.

.....

.....

.....

[2]

- (b) The height of the doll's house is 29 cm. Calculate the height, in metres, of Terry's house.

.....

.....

.....

[2]



15. Do not use a calculator when answering this question. All working must be shown.

Kay and Tansy are tour guides at a famous castle. They share the work equally and each of them takes at most 28 people at a time on a tour of the castle. One day 952 people want to see the castle. Find the least number of tours each guide must lead on that day.

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.....

[3]

16. (a) Write down 52.3762 correct to 1 decimal place.

.....

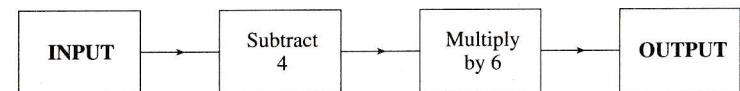
[1]

- (b) Write down 2.0347 correct to 3 significant figures.

.....

[1]

- 17.



- (a) When the **INPUT** is 11, what is the **OUTPUT** ?

.....

[1]

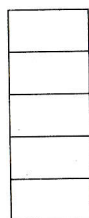
- (b) Let the number **INPUT** be x . Write down the **OUTPUT** in terms of x .

.....

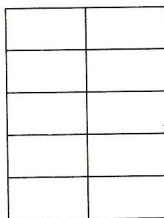
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[2]

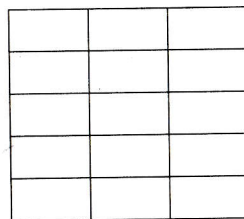
18. A storekeeper stores boxes in piles of five.



1 pile
5 boxes



2 piles
10 boxes



3 piles
15 boxes

- (a) How many boxes are there when there are 13 piles ?

[1]

- (b) How many boxes are there when there are d piles ?

[1]

- (c) When the storekeeper has made d piles of boxes, someone removes 3 boxes. How many boxes are left ?

[1]



19. Do not use a calculator when answering this question.
All working must be shown.

Obtain an ESTIMATE for $\frac{314 \times 18}{62}$

[2]

20. Richard takes t minutes to cycle to school.

- (a) It takes him twice as long to walk to school. Write down, in terms of t , how long it takes him to walk to school.

[1]

- (b) One week he walks to school on 5 days. Write down, in terms of t , the total time he spends walking to school that week.

[1]

- (c) When Richard goes to school by bus, it takes him 15 minutes longer than when he cycles. Write down, in terms of t , how long it takes him to go to school by bus.

[1]

- (d) In another week, Richard cycles to school on 3 days and goes by bus on 2 days. Write down, in terms of t , the total time he spends travelling to school that week. Simplify your answer as far as possible.

[3]

21. (a) The Government stated that the cost of living rose by 4% during the past year. Leah earned £15 400 last year. By how much should her salary increase in order to keep up with this rise in the cost of living ?

[2]

- (b) A 2 kg piece of beef contains 320 g of fat. What percentage of the beef is fat ?

[2]

Turn over.

22. Showing all your working, find which of the quantities 0.4, 33% and $\frac{3}{8}$

is (i) the smallest, (ii) the largest.

.....

.....

.....

.....

(i) Smallest = (ii) Largest = [3]

23. In a TV game show, the winners share the prize money, £2400, in proportion to their scores. Lee, Siân and Heulwen are the winners with scores of 24, 28 and 12 respectively. Calculate how much money **each** person wins.

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[3]

24. Solve the equation

$$6x - 7 = 4(x + 1).$$

.....

.....

.....

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.....

.....

.....

[3]

Turn over.

25. When you look into a glass of water, the depth of the water appears to be less than the real depth. The depth that the water appears to have is called the apparent depth. The real depth of water in the glass is denoted by r cm and the apparent depth is denoted by a cm. The table below gives five values of r and the corresponding values of a .

r	2	4	7	9	12
a	1.5	3	5.25	6.75	9

(a) Plot the points represented in the table and draw the graph of a against r . [3]

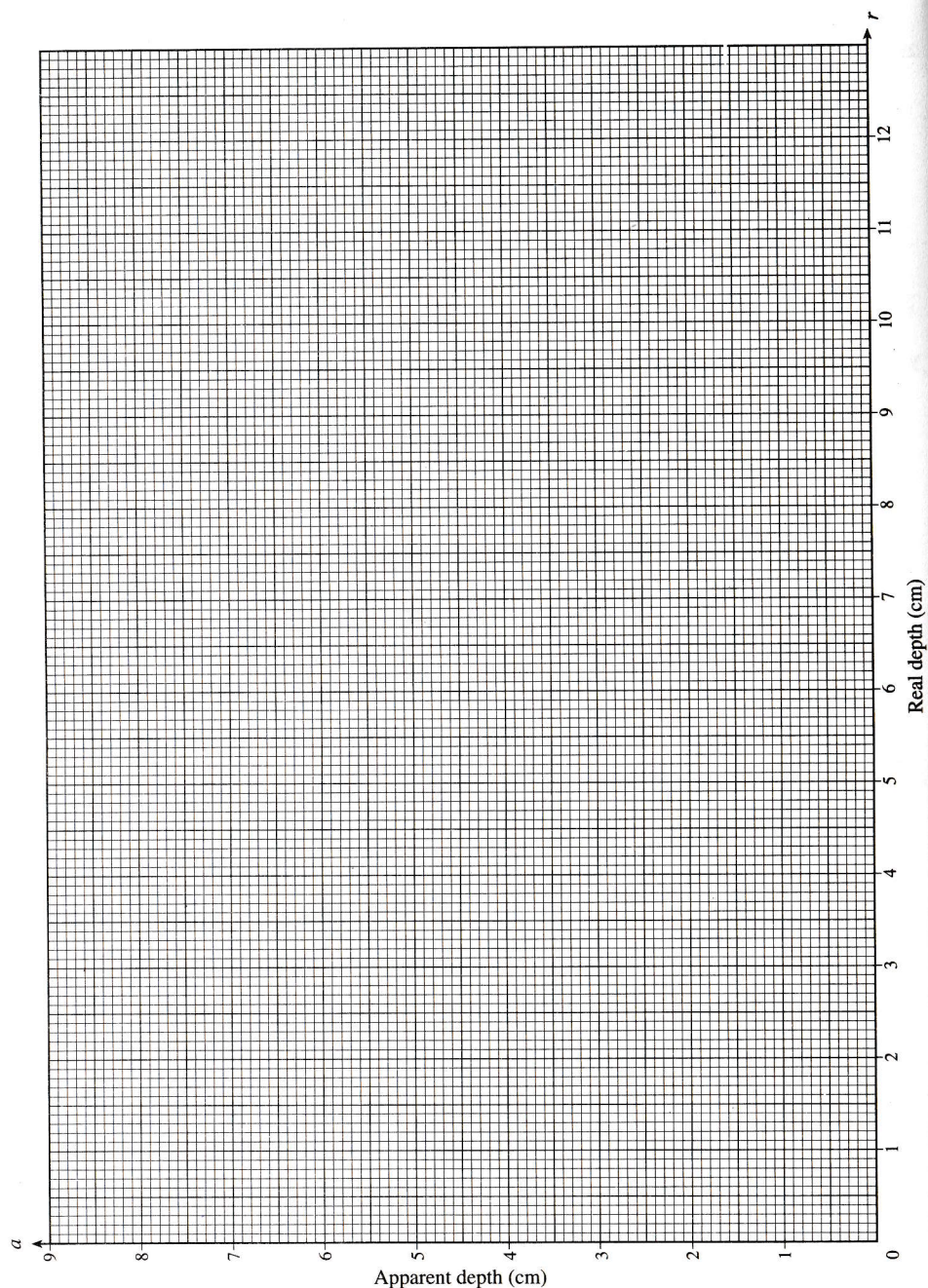
You must show on your graph how you obtain your answers to (b) and (c).

(b) Use your graph to find the apparent depth of water when the real depth is 5 cm.

..... [1]

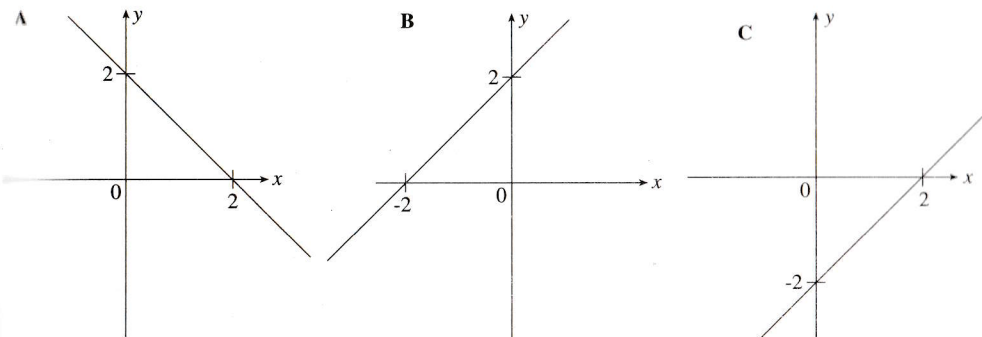
(c) Use your graph to find the real depth of water when the apparent depth is 8.5 cm.

..... [1]



Turn over.

26. The diagrams below show 3 graphs. The diagrams are labelled **A**, **B** and **C**.



For **each** of the following, write down **A**, **B** or **C** to indicate the diagram which shows the graph of the function.

(i) $y = x + 2$

(ii) $y = 2 - x$

(iii) $y = x - 2$

[2]

27. (a) In the following pattern, write down the next number

$\frac{1}{2}, \frac{3}{4}, \frac{5}{6}, \frac{7}{8}, \frac{9}{10},$

[1]

(b) In the following pattern, write down the next number and explain in words what you think is the rule for finding the next number.

2, 7, 13, 20, 28,

.....

[2]

MATHEMATICS

TIER C PAPER 2

A.M. FRIDAY, 7 June 1996

(1½ hours)

Centre Number

Candidate's Name (in full)

Candidate's Examination Number

INSTRUCTIONS TO CANDIDATES

Write your centre number, name and candidate number in the spaces provided above.

Answer **all** questions in the spaces provided.

INFORMATION FOR CANDIDATES

An electronic calculator will be required.

A formula booklet is available and may be used.

You should give details of your method of solution, especially when a calculator is used.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	4	
2	2	
3	2	
4	2	
5	5	
6	2	
7	2	
8	4	
9	2	
10	3	
11	4	
12	2	
13	13	
14	3	
15	5	
16	5	
17	1	
18	6	
19	3	
20	5	
21	3	
22	4	
23	4	
24	4	
25	1	
26	3	
27	4	
28	2	
TOTAL		

1. (a) Draw a square with sides equal to the length of AB .

[1]

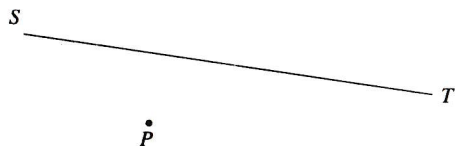
A _____ B

(b) Draw a circle with **diameter** RS .



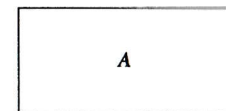
(c) On the diagram given below,

- (i) draw a line through P which is parallel to ST ,
- (ii) draw a line through S which is perpendicular to ST .



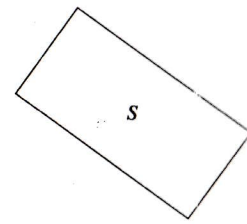
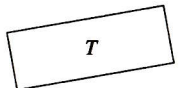
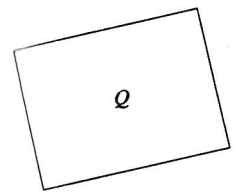
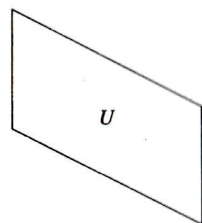
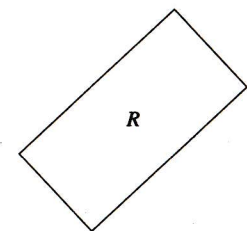
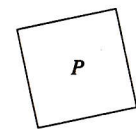
[1]

2.



Write down which of these shapes are congruent to shape A .

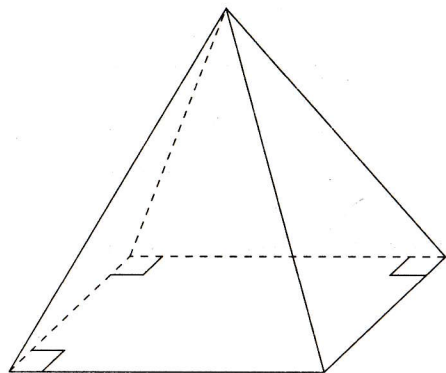
[2]



The shapes congruent to A are

[2]

3.

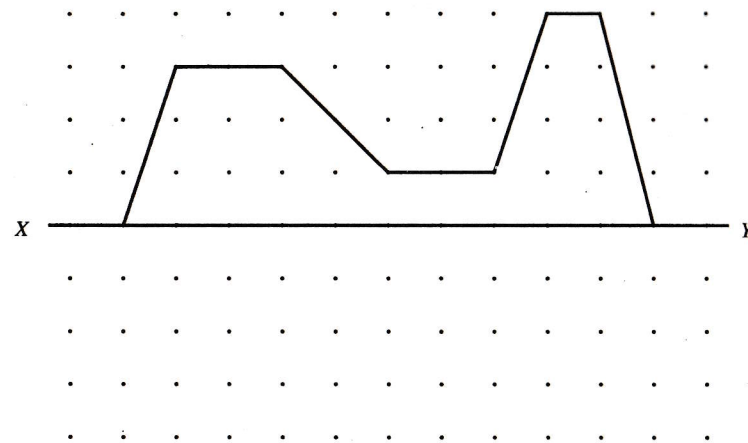


What name is given to the object shown above ?

Draw a sketch of the net of this object.

[2]

4. Complete the figure below so that it is symmetrical about the line XY .

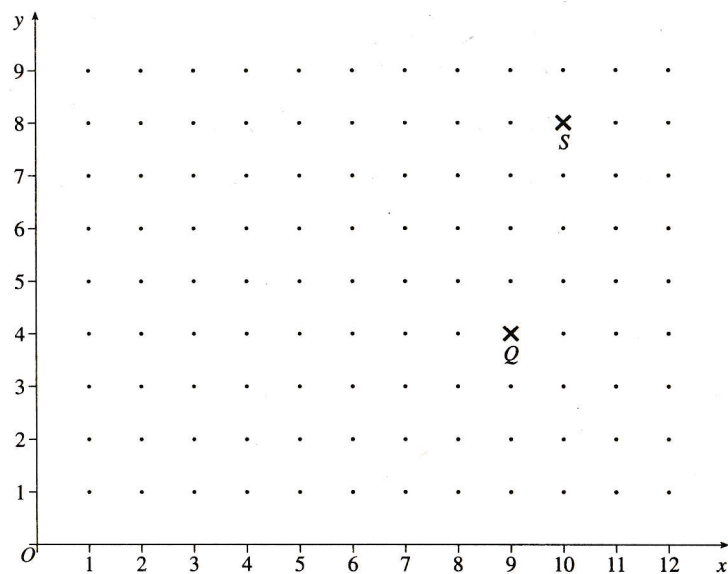


[2]

5. (a) On the diagram below plot the point T , such that OT is of length 10 cm and OT makes an angle of 53° with the x -axis.

M is the mid-point of the line joining T to S .

Mark the position of M on the diagram.



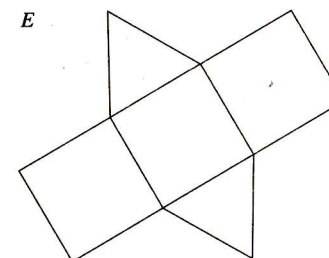
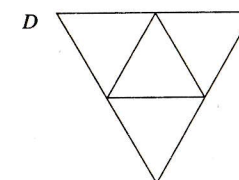
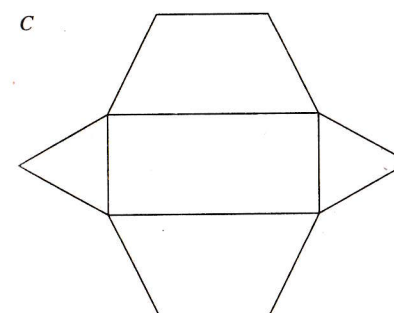
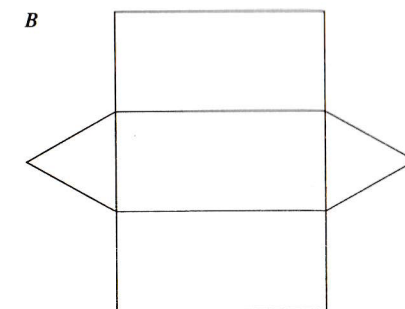
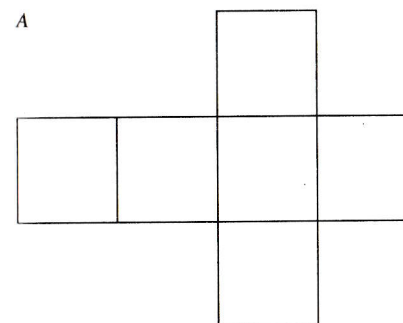
[3]

- (b) Specify the position of the point Q by finding the distance of Q from O and the angle that OQ makes with the x -axis.

Distance Angle [2]

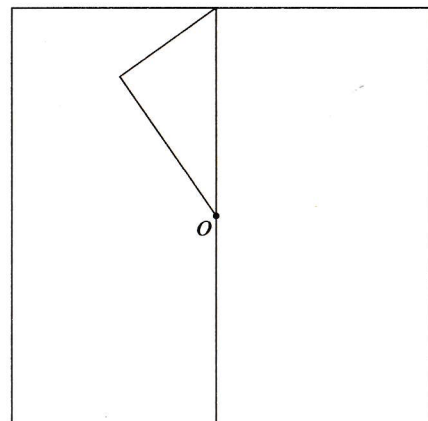
6. Write down which of the following are nets of triangular prisms.

[2]

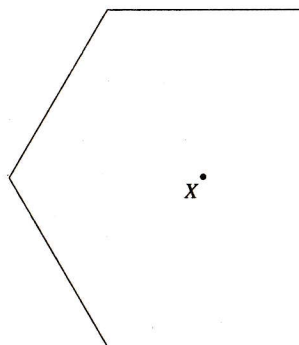


..... are nets of triangular prisms.

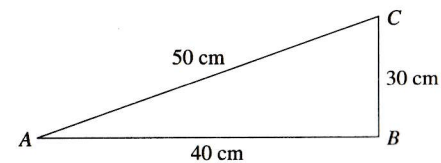
7. (a) Complete the following figure so that it will look the same when rotated through a HALF-TURN about the point O . [1]



- (b) Complete the following figure so that it will have rotational symmetry about the point marked X . [1]



8. (a)



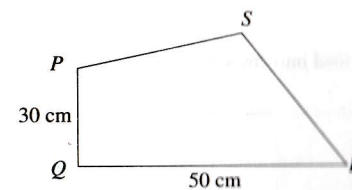
Find the perimeter of triangle ABC .

.....

.....

[1]

- (b) The perimeter of the quadrilateral $PQRS$ is 150 cm.
 $PQ = 30$ cm, $QR = 50$ cm and $RS = SP$.
 Find the length of RS .



.....

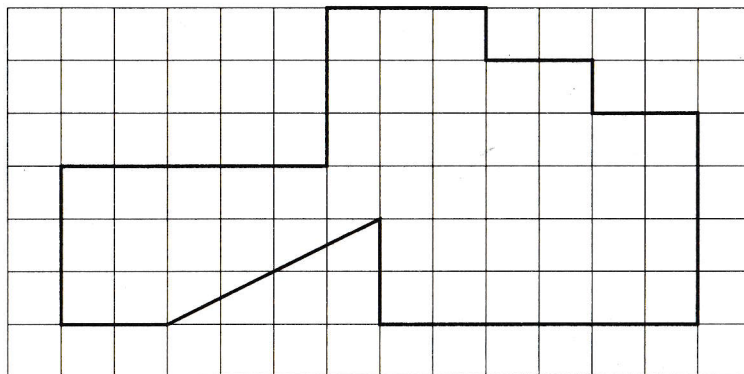
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[3]

9.



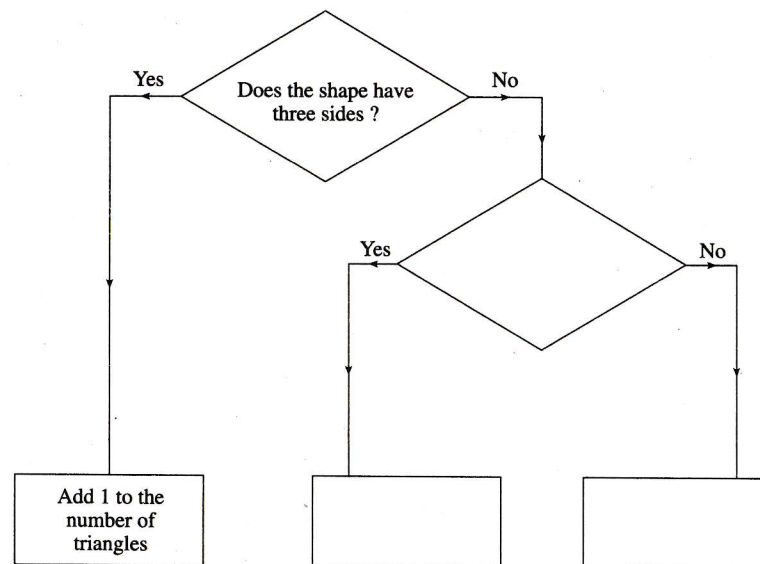
The above grid is divided into cm squares. Estimate the area of the shape shown.

.....

 [2]

10. The following diagram is part of a decision diagram which can be used to sort and count shapes which are either triangles, circles or squares.

Complete the section of the decision diagram given below.



[3]

11. Giving a reason for your answer, write down an estimate for the probability that

(a) there will be snow at the north pole tomorrow,

Probability

Reason

[2]

(b) it will rain in the Sahara desert tomorrow.

Probability

Reason

[2]

12. The events *A* and *B* are described below.

A: Seven is scored when a fair dice is rolled once.

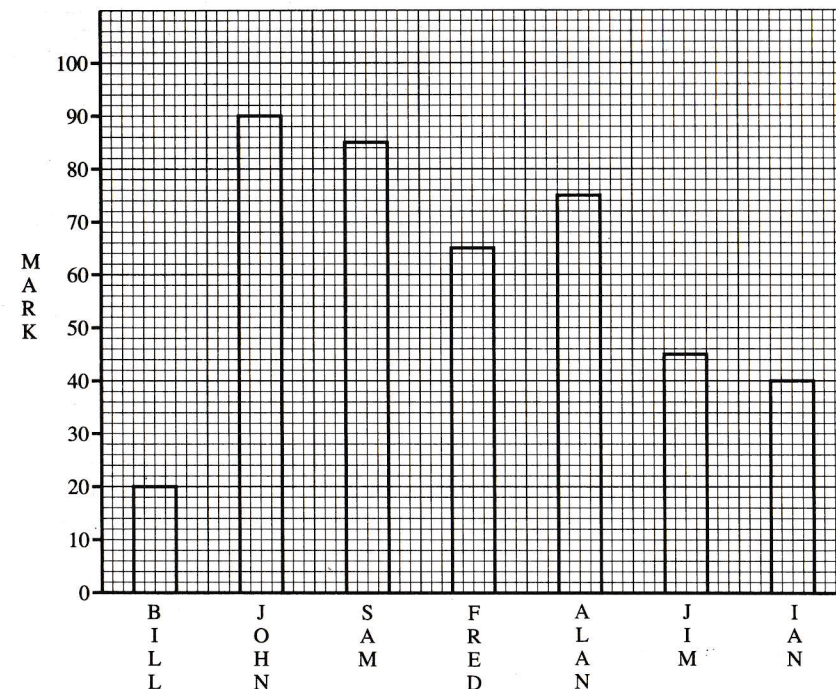
B: Lemonade will overflow when 1.2 litres of lemonade is poured, without stopping, into a 1 litre glass.

Write *A* and *B* at approximate positions of their probabilities on the probability scale given below.



[2]

13. (a) The bar chart below shows the marks obtained by seven boys in an examination.



(i) Write down the name of the boy who had the highest mark.

(ii) What was the lowest mark obtained by a boy?

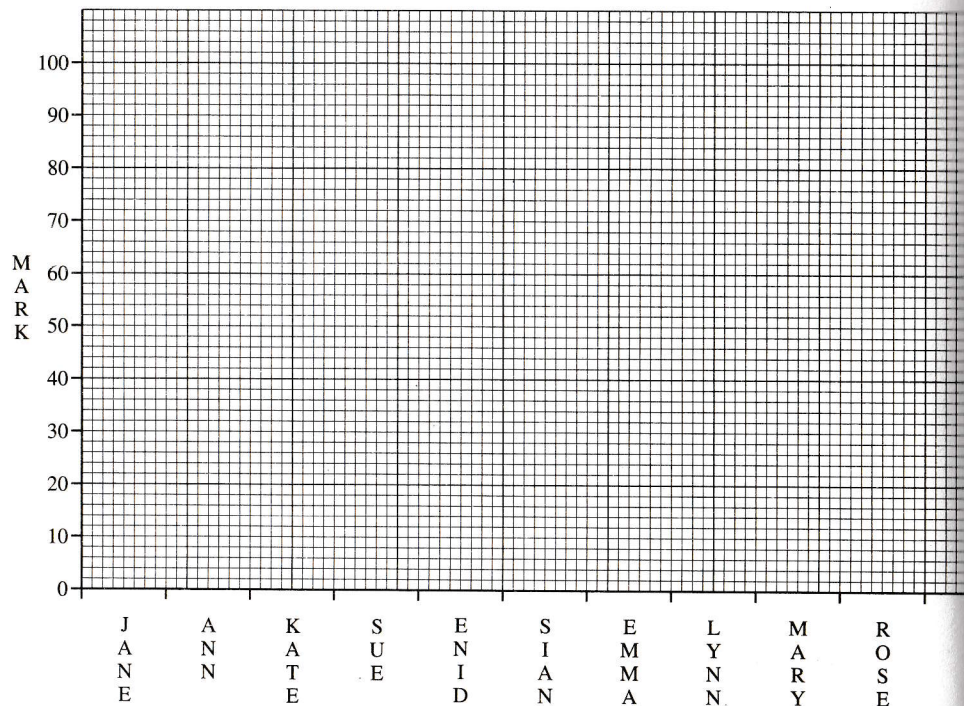
(iii) Sam had more marks than Jim. How many more?

[3]

(b) The marks obtained by ten girls taking the same examination are given below.

Jane	Ann	Kate	Sue	Enid	Sian	Emma	Lynn	Mary	Rose
70	85	55	95	60	40	70	75	65	55

(i) On the graph paper given below draw a bar chart to show these marks.



(ii) Calculate the mean mark obtained by the girls

(c) The mean mark obtained in the examination by the boys was 60. Sue claims that the girls had better results, on average, than the boys. Is she correct in making this claim? Give a reason for your answer.

(d) Fred claims that the marks obtained by the girls are more 'spread out' than the marks obtained by the boys. Carry out a calculation to show that Fred is wrong.

14. Powys United played 42 games of football in a season. The frequency distribution of the number of goals scored per game during the season is shown in the following table.

Number of goals per game	Number of games
0	4
1	12
2	
3	8
4	5
5	3
6 or more	0

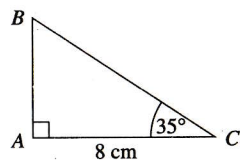
(a) Complete the table. [1]

(b) What is the modal number of goals per game? [1]

(c) What is the median number of goals per game? [1]

Turn over.

15. This diagram is not drawn to scale. It shows a triangle ABC . AC is 8 cm long. Angle ACB is 35° .



- (a) Draw triangle ABC accurately, full sized, below. The line AC is drawn for you.

A ————— C [2]

- (b) By taking a suitable measurement, calculate the area of the triangle you have drawn.

.....

 [3]

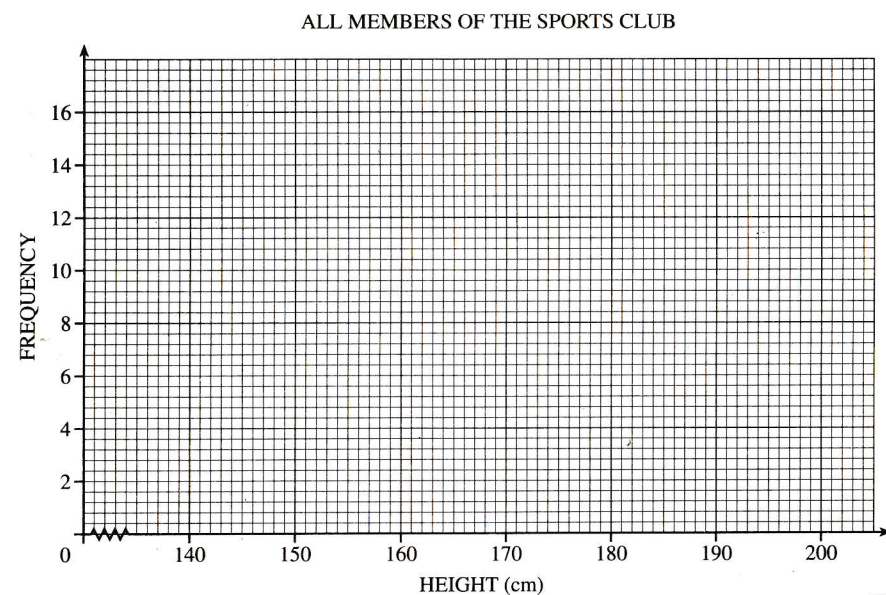
16. This table shows the grouped frequency distribution of the heights, measured to the nearest centimetre, of all the members of a sports club.

Height (to nearest cm)	140 to 149	150 to 159	160 to 169	170 to 179	180 to 189	190 to 199
Number of people	4	10	16	12	6	2

- (a) How many people are there in the sports club ?

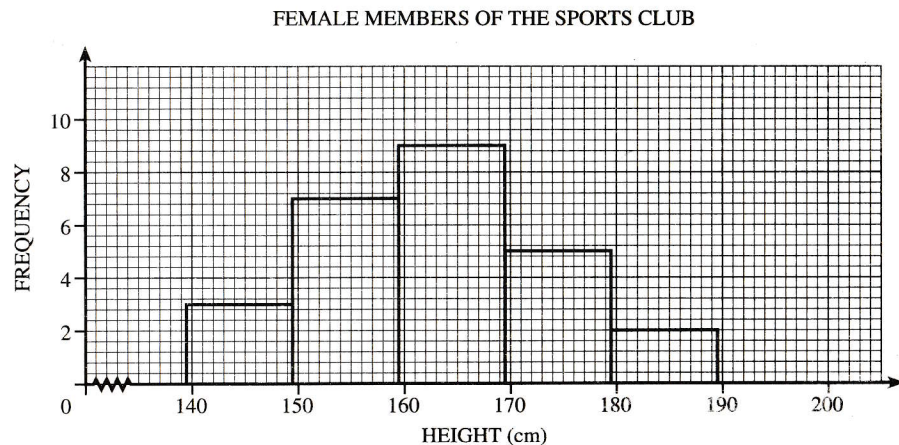
..... [1]

- (b) On the grid given below, draw a grouped frequency diagram to show the distribution of the heights of the members of the sports club.



[2]

- (c) The grouped frequency diagram below shows the distribution of the heights, measured to the nearest centimetre, of the female members of the sports club.



Find the number of **male** members of the sports club whose heights, measured to the nearest centimetre, are 170 cm or more.

[2]

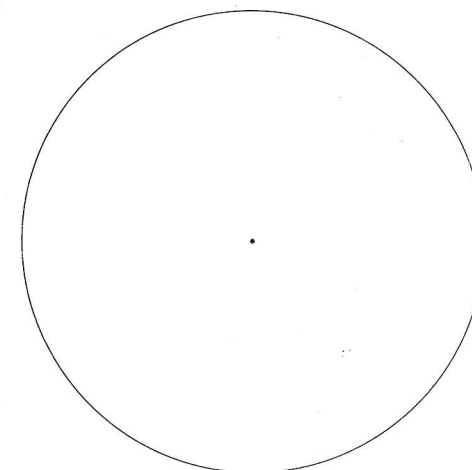
17. A football team can win, draw or lose any game. Julian says that the probability that his team wins its next game is therefore $\frac{1}{3}$. Comment on this statement.

[1]

18. A survey of the types of fuel used to heat the homes of people living in a town was carried out. The results are shown in this table.

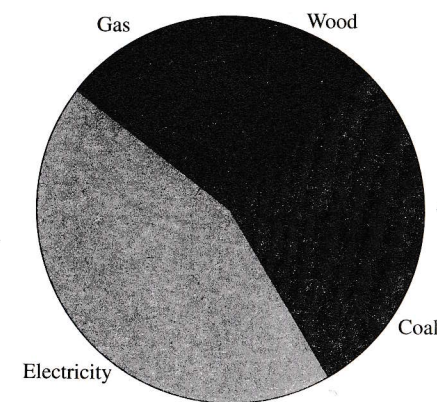
Fuel	Gas	Electricity	Coal	Wood
Number of homes	20	10	5	1

- (a) In the blank circle, draw a pie chart to show this information. You must show how you calculate the angles of your pie chart.



[3]

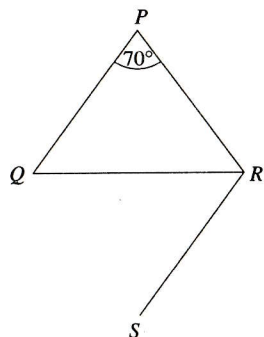
- (b) This pie chart shows the results of a similar survey for 80 homes in the country. How many of the 80 homes in the country used wood for their heating?



[3]

Turn over.

19.



This diagram is not drawn to scale.
It shows an isosceles triangle PQR and a line RS .
 PQ is equal to PR .
Angle QPR is 70° .
 PQ is parallel to RS .

- (a) Calculate the size of angle PQR . You must show your working.

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

[2]

- (b) State the size of angle QRS . Give a reason for your answer.

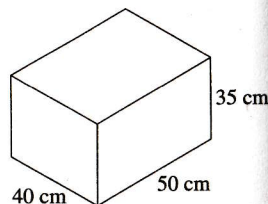
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[1]

20. A firm buys coffee powder in boxes 50 cm long, 40 cm wide and 35 cm high. The boxes are full.

- (a) Calculate the volume of coffee in a box.

.....
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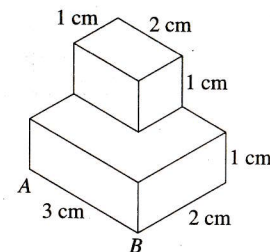
[2]

- (b) The firm uses the coffee to fill smaller boxes which are cubes of side 10 cm. How many smaller boxes can be filled from one of the large boxes?

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[3]

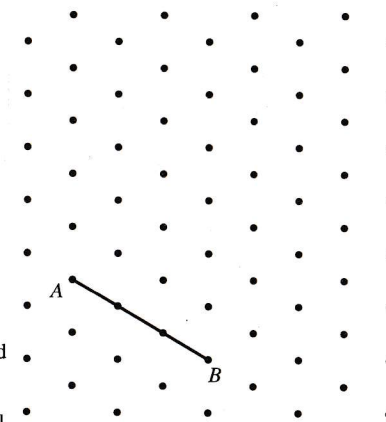
21.



Draw this shape accurately on the isometric grid given.

The line AB has been drawn for you.

[3]



22. A bag contains 6 red counters, 3 blue counters and 2 yellow counters. Howell takes a counter from the bag without looking.

- (a) What is the probability that he takes a blue counter?

.....

[2]

- (b) Some green and some orange counters are put into the bag so that the probability of taking an orange counter is $\frac{3}{16}$. What is the probability of not taking an orange counter?

.....

[2]

23. (a) Jahal has three cardboard shapes: a parallelogram, a kite and a rhombus. He labels them A , B , and C but not in that order.
Shape A has one line of symmetry and no rotational symmetry.
Shape B has two lines of symmetry and rotational symmetry order two.
Shape C has rotational symmetry order two but no lines of symmetry.

Which letter refers to which shape?

A is the B is the C is the

[2]

- (b) Complete the following sentence.

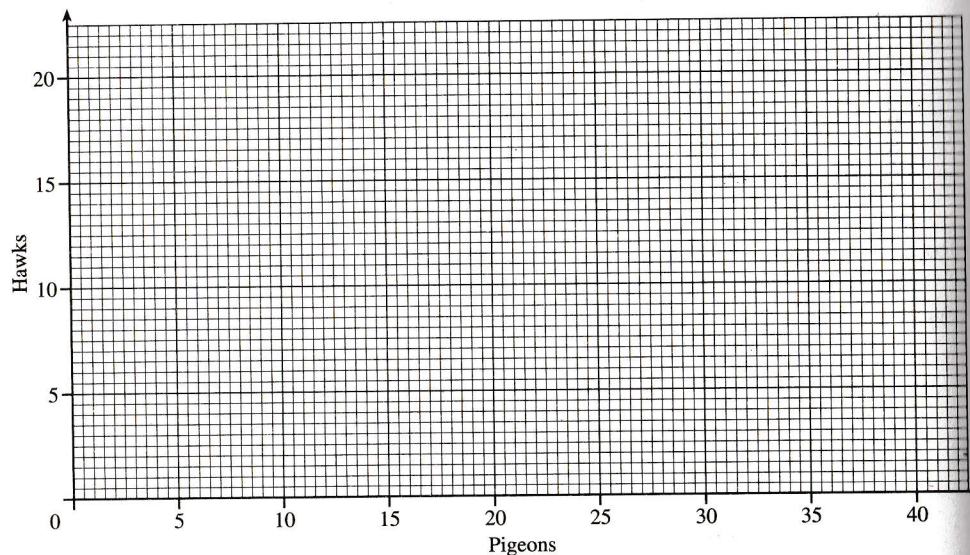
A square has lines of symmetry and rotational symmetry order

[2]

24. A bird watcher counts the number of pigeons and the number of hawks he sees each day. This table shows his results.

Pigeons	5	32	18	29	33	12	21	15	35	8	22	22
Hawks	20	5	11	8	4	16	9	14	3	17	10	11

- (a) Draw a scatter diagram to show this information.

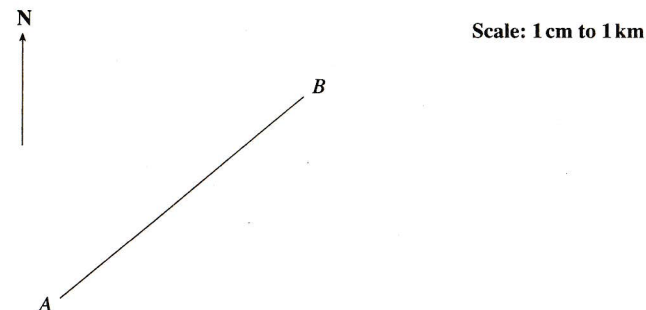


- (b) Does your scatter diagram show positive correlation, negative correlation or no correlation?

- (c) About how many pigeons would the bird watcher expect to see if he sees 15 hawks?

25. For a piece of coursework, Huw wants to find out which is the most popular newspaper in Wales. He conducts a survey by asking all the boys in his class which newspaper they like best. Give a reason why his survey is likely to be biased.

26. This diagram is drawn using a scale 1 cm to 1 km. It shows the route taken by a ship from A to B.



- (a) What bearing does the ship take on its journey from A to B?

- (b) The ship then sails from B to a point C, 8 km from B on a bearing 120° . Show the journey from B to C on the diagram.

27. In a game two fair 6 sided dice are thrown. The score is determined by finding the **difference** between the two numbers uppermost on the dice.

- (a) Complete this table to show the possible scores.

	-	-	-	-	-	-
	-	-	-	-	-	-
4	-	-	-	-	-	-
3	2	1	0	1	2	3
2	1	0	1	2	3	4
1	0	1	2	3	4	5
	1	2	3	4	5	6

- (b) What is the probability of obtaining a score of 1?

28. In this question take π as 3.14 or use the π button on your calculator. Calculate the area of a circle with radius 8 cm.

Turn over.

MATHEMATICS

TIER C PAPER 3

A.M. WEDNESDAY, 12 June 1996

(2 hours)

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	9	
2	5	
3	11	
4	13	
5	12	
TOTAL		

Centre Number

Candidate's Name (in full)

Candidate's Examination Number

INSTRUCTIONS TO CANDIDATES

Write your centre number, name and candidate number in the spaces provided above.
Answer **all** questions in the spaces provided.

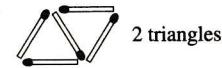
INFORMATION FOR CANDIDATES

An electronic calculator will be required.
A formula booklet is available and may be used.
You should give details of your method of solution, especially when a calculator is used.
Unless stated, diagrams are not drawn to scale.
Scale drawing solutions will not be acceptable where you are asked to calculate.
The number of marks is given in brackets at the end of each question or part-question.
No certificate will be awarded to a candidate detected in any unfair practice during the examination.

1. (a) June makes rows of triangles using matchsticks.



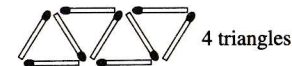
1 triangle



2 triangles



3 triangles



4 triangles

- (i) Complete the table.

Number of triangles	Number of matchsticks
1	
2	5
3	
4	9
5	
6	

- (ii) What do you notice about the numbers of matchsticks used to make the rows of triangles in this way ?

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- (iii) Explain how to work out the number of matchsticks needed to make a row of 20 triangles in this way.

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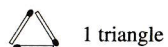
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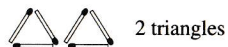
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- (b) Max also makes rows of triangles using matchsticks, but in a different way.



1 triangle



2 triangles



3 triangles



4 triangles

- (i) Complete the table.

Number of triangles	Number of matchsticks
1	
2	6
3	
4	12
5	
6	

- (ii) What do you notice about the numbers of matchsticks used to make the rows of triangles in this way?

.....

.....

- (iii) Explain how to work out the number of matchsticks needed to make a row of 20 triangles in this way.

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- (c) June makes a long row of triangles. Max makes a row of the same number of triangles as June. Explain why June's row of triangles uses fewer matchsticks than Max's row.

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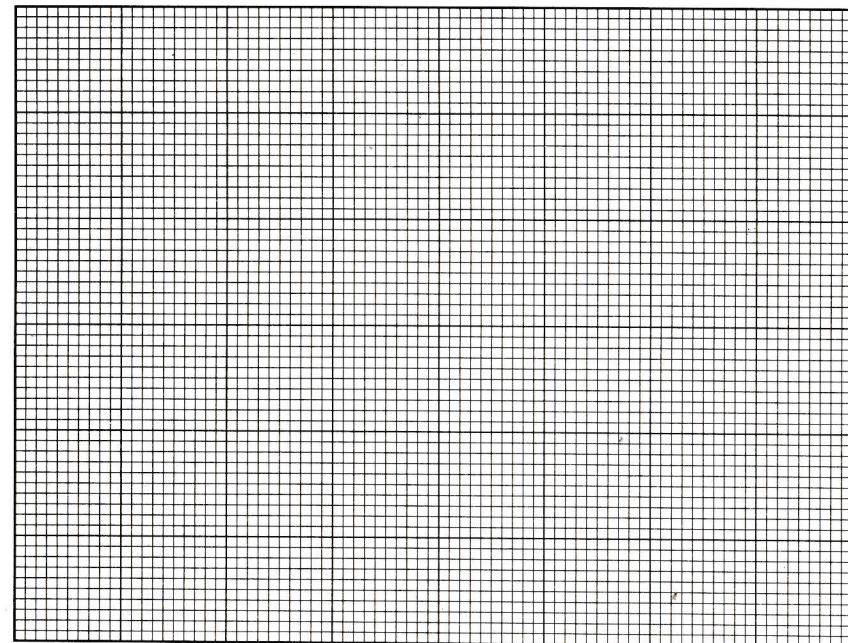
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2. George has carried out a survey about favourite colours. He asked 50 teenagers to state their favourite colour. Here are the results of George's survey.

Colour	Tally	Frequency
Red	/// //	
Blue	///	
Yellow	///	
Pink		
Black	/// //	
Brown		
Green		

- (a) Display the results of George's survey using a diagram of your own choice.



(b) Write **two** sentences about the results of George's survey.

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[5]

3. (a) The numbers 2 and 8 are one of the pairs of numbers which add up to 10.

(i) List all the pairs of positive whole numbers which add up to 10.

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(ii) For each pair of numbers, multiply the numbers together and write down the answer.
For example $2 \times 8 = 16$.

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(iii) Which pair, when multiplied together, gives the largest answer ?

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(b) (i) List all the pairs of positive whole numbers which add together to give 14.

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- (ii) Which pair, when multiplied together, gives the largest answer ?

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- (c) Look at your answers to (a) and (b). What do you notice about the pairs of numbers which give the largest answer ?

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- (d) There are pairs of positive whole numbers which add up to 60. Write down the pair which when multiplied together will give the largest answer.

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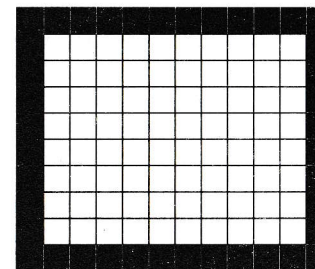
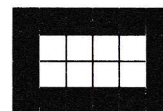
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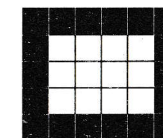
[11]

4.

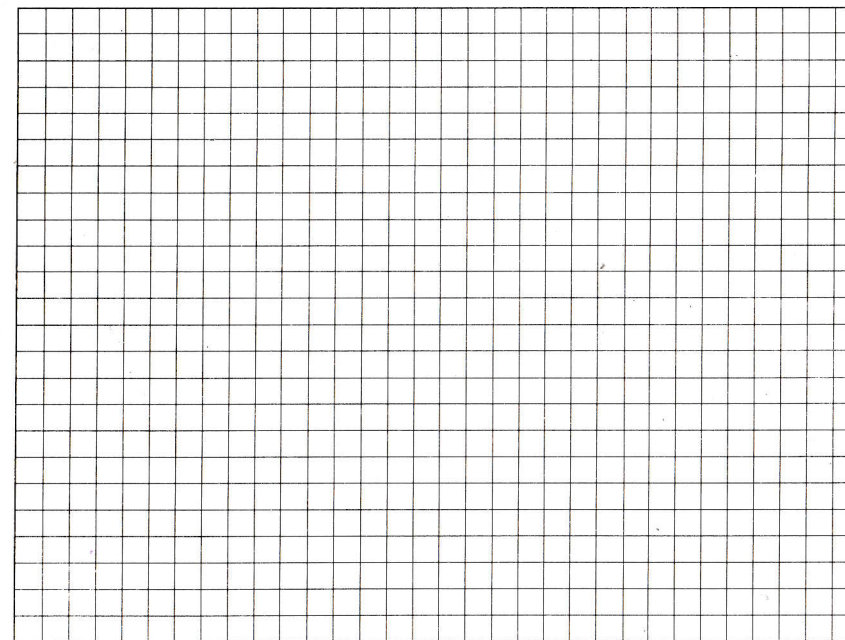


In this question, black and white tiles are used to form rectangular patterns like those shown above. In these patterns white tiles are first arranged as a rectangle, then black tiles are used to surround the white ones.

The following rectangular pattern uses 12 white tiles and 18 black tiles. It has a perimeter of 22 units.



- (a) Find all the possible rectangular patterns which use 20 white tiles. Draw a table to show, for each rectangular pattern
the length and width of the white rectangle,
the number of black tiles, and
the perimeter of the rectangular pattern.



- (b) To make a rectangular pattern, some white tiles are arranged to form a rectangle x tiles long and y tiles wide.
- (i) Find the number of black tiles needed to surround these white tiles to complete the rectangular pattern. You must explain and **test** your answer.

[illegible]

- (ii) Find the perimeter of the completed rectangular pattern. You must explain and **test** your answer.

This image shows a full page of blank primary-ruled paper. It features multiple sets of horizontal lines designed to guide young learners' handwriting. Each set consists of three lines: a solid top line, a dashed middle line, and a solid bottom line. These sets are repeated vertically down the entire page, providing ample space for practicing letter formation and alignment. The paper is otherwise completely blank, with no text or other markings.

[13]

Turn over.

5. In this question, square grids of numbers are made by writing the counting numbers in rows, in order, in the shape of a square.

For example

5	6	7
8	9	10
11	12	13

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

Investigate any patterns you can find within square grids of numbers.

This image shows a single sheet of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page. There are no markings, text, or illustrations on the paper.

GCSE Mathematics Numerical Answers June 1996

Tier A

Paper 1

- 1 $x = -2, y = 3$
- 2 (a) $\frac{1}{2n}$ (b) $3n - 1$
- 3 (a) 45.837, 49.504 (b) 3.3 and 3.4 (c) 3.4
- 4 (a) 6.176622 (b) 1.778
- 5 (a) 850, 50 (b)(i) 127.5, 128.5 (ii) 72.5, 73.5 (iii) 899.5 (iv) 200
- 6 $\frac{6}{25}$ or 0.24
- 7 (a)(i) 2.4×10^5 (ii) 3.8×10^{-4} (b)(i) 1.8×10^6 (ii) 5.5×10^{-8}
- 8 (a) $\frac{3}{7}$ (b) 9
- 9 (a) $y = 4x^2$ (b) $y = 100$
- 10 (a) $2x^2 - x - 15$ (b) $w = \frac{2c - 6a}{5}$
- 11 (a) $n > 19/2$ (b) least is 10
- 12 (b) $2 + 3\sqrt{2}$, irrational
- 13 (i) 18.75, 18.65 (ii) 275, 273 (iii) 14.74
- 14 (i) 30.48 cm^3 (ii) 15.25 cm^2 (iii) $15.5\sqrt{3} \text{ cm}$
- 15 (i) $6x^5$ (ii) $2a^5b$
- 16 1.93 or -0.26
- 17 (a)(i) 0.9 or 3.8 (ii) 7.8 (b) $x = 0.55$
- 18 (ii) $x = -5$ or $x = 3$ (b)(i) $\frac{1}{x(x+1)}$ (ii) $x = 8$

Paper 2

- 2 (a) $PR = 52 \text{ m}$ (b) $PS = 37.5 \text{ m}$
- 3 (a) 6 - 10 (b) 3, 8, 13, 18, 23, 28 (c) mean = £11.13 (e) Saturday
- 4 6 cm
- 5 50
- 6 0.80
- 7 (a) $PQ = 22.5 \text{ cm}$ (b) $DE = 6 \text{ cm}$
- 8 (b) $\frac{21}{63}$
- 9 (a) $AD = 4.0 \text{ m}$ (b) 74°
- 10 (iii)
- 11 (a) £200 (b) 350 (d) Ranja
- 12 $x = 37^\circ, -37^\circ$
- 13 18 cm
- 14 (a) 13.52 m^2 (b) 77.23 m^2
- 15 (i) 15° (ii) 90° (iii) 35°
- 17 (a) $\frac{2}{9}$ (b) $\frac{2}{3}$
- 18 7.7 cm (b) 7.0 cm (c) 47°
- 19 (a) 0.7, 2.9, 2.2, 1.2, 0.45, 0.1 (c) s.d. = 19.3 secs (e) 46 mins
- 20 (b)(ii) $x + y$ (iii) $x = 20, y = 40$

Tier B

Paper 1

- 1 (a) £292.40 (b) 336 ml 2 (a) 7 cm (b) 8.7 m
- 3 17 4 (a) 52.4 (b) 2.03
- 5 (a) 42 (b) $6(x - 4)$
- 6 (a) 65 (b) $5d$ (c) $5d - 3$
- 7 (a) $2t$ (b) $10t$ (c) $t + 15$ (d) $5t + 30$
- 8 (a) £616 (b) 16% 9 $70 - 110$
- 10 (i) 33% (ii) 0.4
- 11 £900, £1050, £450 12 5.5
- 14 (i) B (ii) A (iii) C 15 (a) $\frac{11}{12}$ (b) 37
- 16 $x = -2, y = 3$ 17 (a) $\frac{1}{2n}$ (b) $3n - 1$
- 18 (a) 45.837 49.504 (b) 3.3 and 3.4 (c) 3.4
- 19 (a) 6.176622 (b) 1.778
- 20 (a) 850, 50 (b)(i) 127.5, 128.5 (ii) 72.5, 73.5 (iii) 899.5 (iv) 200
- 21 $\frac{1}{5}$ or 0.2
- 22 (a)(i) 2.4×10^5 (ii) 3.8×10^{-4} (b)(i) 1.8×10^6 (ii) 5.5×10^{-8}
- 23 (a) $\frac{3}{7}$ (b) 9
- 24 (a) $2x^2 - x - 15$ (b) $\frac{2c - 6a}{5}$
- 25 (a) $n > 19/2$ (b) least is 10
- 26 (a) $y = 4x^2$ (b) $y = 100$

Paper 2

- 1 (b) 22.4 cm^2 2 (a) 50 (c) 13
- 4 (b) 10 5 (a) 55° (b) 55°
- 6 (a) 70000 cm^3 (b) 70 8 (a) $\frac{3}{11}$ (b) $\frac{13}{16}$
- 9 A - kite, B - rhombus, C - parallelogram (b) 4, 4
- 10 (b) negative (c) 11 - 15
- 12 (a) N50°E
- 13 (a) 6 4 5 3 2 1 0 (b) $\frac{10}{36}$
5 4 3 2 1 0 1
3 2 1 0 1 2
- 14 201.06 cm^2
- 16 (a) $PR = 52 \text{ m}$ (b) $PS = 37.5 \text{ m}$
- 17 (a) 6 - 10 (b) 3, 8, 13, 18, 23, 28 (c) mean = £11.13 (e) Saturday
- 18 6 cm 19 50
- 20 0.80
- 21 (a) $PQ = 22.5 \text{ cm}$ (b) $DE = 6 \text{ cm}$
- 22 (b) $\frac{21}{63}$
- 23 (a) $AD = 4.0 \text{ m}$ (b) 74°
- 24 (iii)
- 25 (a) £200 (b) 350 (d) Ranja

Tier C**Paper 1**

- 1 (a)(i) 921 (ii) 29 (b)(i) £1.56 (ii) 28 (c) 400<407, 600<623 (d) 15.7 cm
 2 (a) 21 (b) 30p
 3 (a) 7206 (b) 9 (c) 8643
 4 (a) $\frac{1}{4}$ (b) 1.15 kg (c) £10 (d) 50%
 5 (a) 0.0172 cm (b) 8.6 cm
 6 10g-500g, 10g-500g, 0.5 kg-1.5kg
 7 (a) 4 9 16 25 36 49 (b) 9 18 27 36 45 (c) 22 27
 8 (a) £50 (b) 2 hrs 9 22 1
 10 (a) 5 (b) 56 11 (a) (3, 11), (11, 5) (c) 7
 13 (a) £292.40 (b) 336 ml
 14 (a) 7 cm (b) 8.7 m 15 17
 16 (a) 52.4 (b) 2.03
 17 (a) 42 (b) $6(x-4)$
 18 (a) 65 (b) $5d$ (c) $5d-3$
 19 (a) $2t$ (b) $10t$ (c) $t+15$ (d) $5t+30$
 20 (a) £616 (b) 16%
 21 70 - 110
 22 (i) 33% (ii) 0.4 23 £900, £1050, £450
 24 5.5 26 (i) B (ii) A (iii) C
 27 (a) 11/12 (b) 37

Paper 2

- 2 R, S 3 Pyramid
 5 (b) 9.8 cm, 24° 6 B, E
 8 (a) 120 cm (b) 35 cm 9 47 cm²
 11 (a) 1 (b) near 0 12 A 0, B 1
 13 (a) John (ii) 20 (iii) 40 (b) 67 (c) yes
 14 (a) 10 (b) 1 (c) 2
 15 (b) 22.4 cm²
 16 (a) 50 (c) 13
 18 (b) 10
 19 (a) 55° (b) 55°
 20 (a) 70000 cm³ (b) 70
 22 (a) $\frac{3}{11}$ (b) $\frac{13}{16}$
 23 A - kite, B - rhombus, C - parallelogram (b) 4, 4
 24 (b) negative (c) 11 - 15
 26 (a) N50°E
 27 (a) 6 4 5 3 2 1 0 (b) 10/36
 5 4 3 2 1 0 1
 3 2 1 0 1 2
 28 201.06 cm²

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