WELSH JOINT EDUCATION COMMITTEE

General Certificate of Secondary Education

CYD-BWYLLGOR ADDYSG CYMRU

Tystysgrif Gyffredinol Addysg Uwchradd

MATHEMATICS

INTERMEDIATE TIER PAPER 2

A.M. TUESDAY, 9 June 1998

(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.

Take π as 3·14 or use the π button on your calculator

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	3	
3	2	
4	3	
5	4	
6	4	
7	3	
8	3	
9	6	
10	4	
11	4	
12	4	
13	6	
14	4	
15	3	
16	6	
17	5	
18	3	
19	6	
20	4	
21	9	
22	5	
23	5	
TOTAL		

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1. *(a)* Calculate each of the following.

(i) $6 - (-1)$

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(ii) $(-4) \times (+5)$

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[2]

(b) Find the value of $4x + 2y$ when $x = -2$ and $y = 3$.

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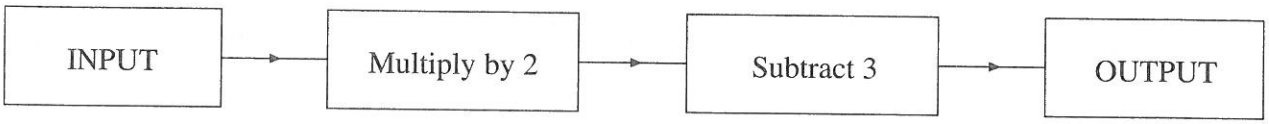
[2]

2. Look at this number machine.



(a) What is the OUTPUT when the INPUT is –5?

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[1]

(b) What is the OUTPUT when the INPUT is n?

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[2]

3. A bag contains 4 toffees, 6 mints and 5 chocolates. Jill takes a sweet at random from the bag.

What is the probability that the sweet she takes is **not** a mint?

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[2]

4. Jasmine has a cube, a prism, a pyramid which is not a tetrahedron, a cone and a tetrahedron. She labels them A, B, C, D and E, **but not in that order.**

One of the faces of shape A is a circle.
The six faces of shape B are all squares.
The four faces of shape C are all triangles.
One of the faces of shape D is a hexagon. The other six are triangles.
Two of the faces of shape E are pentagons. The other five are rectangles.

Which shape is labelled with which letter?

The cube is ..... The prism is ..... The pyramid is .....

The cone is ..... The tetrahedron is ..... [3]

5. When 56 is written as the product of its prime factors in index form, we obtain $56 = 2^3 \times 7$.

(a) Write 126 as the product of its prime factors in index form.

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[2]

(b) Write down 126×56 as a product of prime factors in index form. Simplify your answer as far as possible.

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[1]

(c) Write down the square root of your answer to *(b)* as a product of prime factors in index form.

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[1]

6. Louise and Colin go to Portugal for their holiday. Louise changes £250 into escudos and Colin changes £200 into escudos.
The exchange rate is £1 = 300 escudos.

(a) How many escudos do they each get?

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[2]

(b) At the end of their holiday Louise has 1500 escudos left and Colin has 1100 escudos left.
They put their escudos together and go to the bank to change them for pounds.
The bank changes escudos into pounds at the rate of 325 escudos = £1.
How many pounds do they get?

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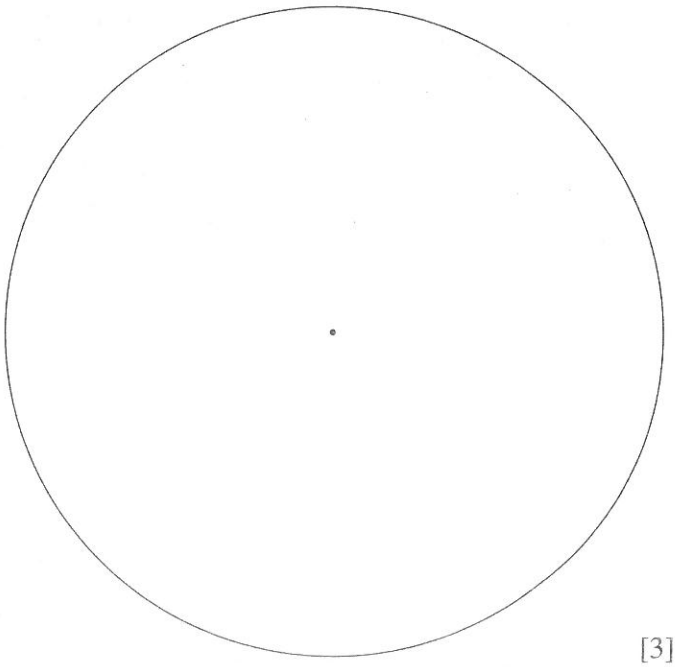
[2]

7. This table shows the colours of some cars in a car park.

Colour	Silver	Red	Black	Green
Frequency	5	12	9	4

In the blank circle, draw a pie chart to show the distribution of these colours.

You must show how you calculate the angles of your pie chart.



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[3]

8. Find which of $\frac{5}{9}$, 0·7 and 63% is the least and which is the greatest. **You must show all your working.**

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[3]

9. This diagram shows the cross-section, *ABCDEF*, of a metal block.
AB and *ED* are parallel, with *AB* = 12·1cm and *ED* = 6·3cm.
AF and *BC* are perpendicular to *AB* and are each 5·3cm.
The perpendicular distance between *ED* and *AB* is 8·7cm.

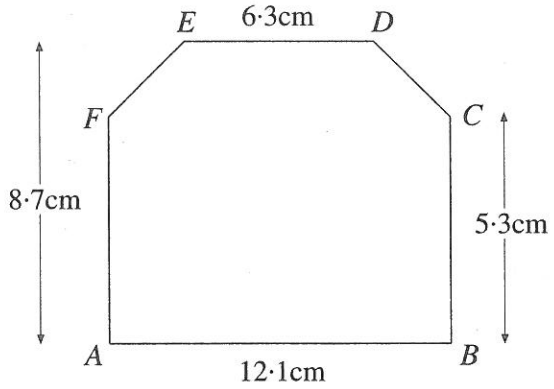

Diagram not drawn to scale

(a) Calculate the area of cross-section of the metal block.

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[3]

(b) The metal block is 10·5cm long and weights 2500g.
Calculate the density of the block, giving your answer in g/cm^3.

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[3]

10. Susan invests £1500 in an account for 3 years at 8% per annum **compound** interest. Calculate the total amount in the account at the end of the three years. Give your answer correct to the nearest penny.

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[4]

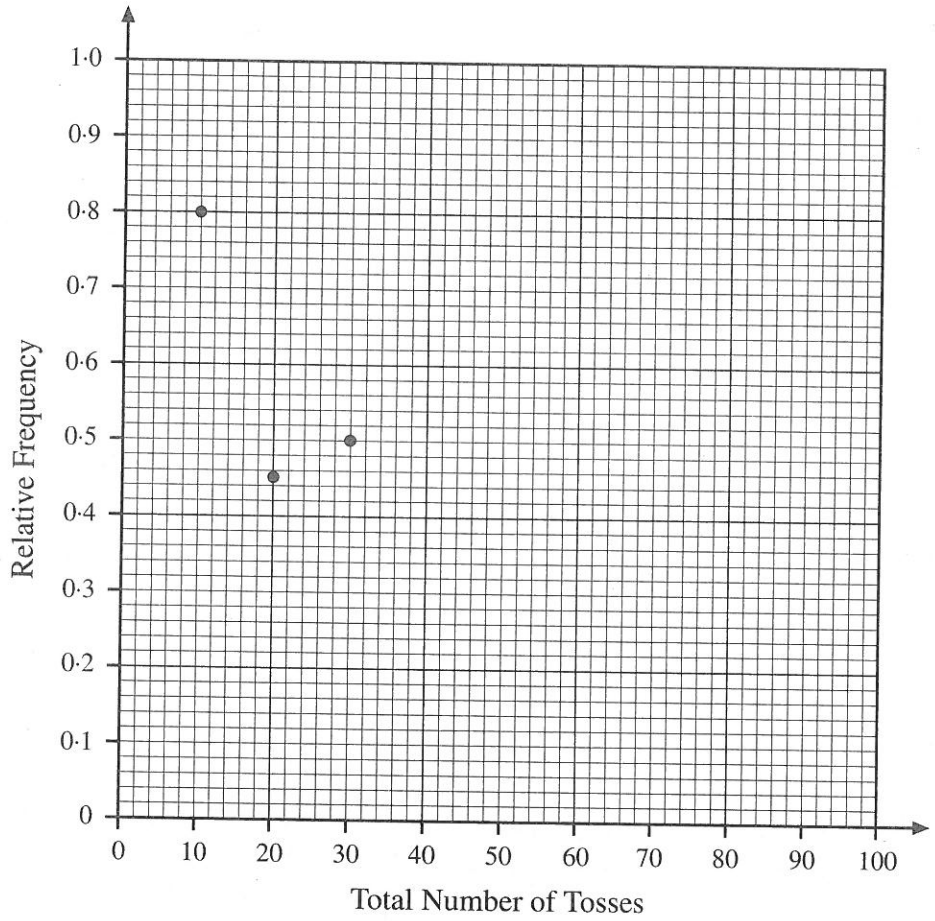
11. Gemma carries out a series of tests with a coin which she believes is biased. In each test she tosses the coin ten times and records the number of heads obtained. She repeats the test ten times. Her results are as follows.

Test	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Number of Heads	8	1	6	8	10	4	7	6	7	6

(a) Complete the following table. [2]

After Test	1	2	3	4	5	6	7	8	9	10
Total Number of Tosses	10	20	30	40	50	60	70	80	90	100
Total Number of Heads	8	9	15	23	33	37				
Relative Frequency of Number of Heads as a Fraction	$\frac{8}{10}$	$\frac{9}{20}$	$\frac{15}{30}$	$\frac{23}{40}$	$\frac{33}{50}$					
Relative Frequency of Number of Heads as a Decimal	0·8	0·45	0·5	0·575						

(b) Complete the following graph of "Relative Frequency" against "Total Number of Tosses". [1]



(c) Write down an estimate of the probability of obtaining a head when the coin is tossed once.

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[1]

12. A solution of the equation $x^3 - 4x = 30$ lies between 3 and 4.
Use the method of trial and improvement to find this solution correct to one decimal place.

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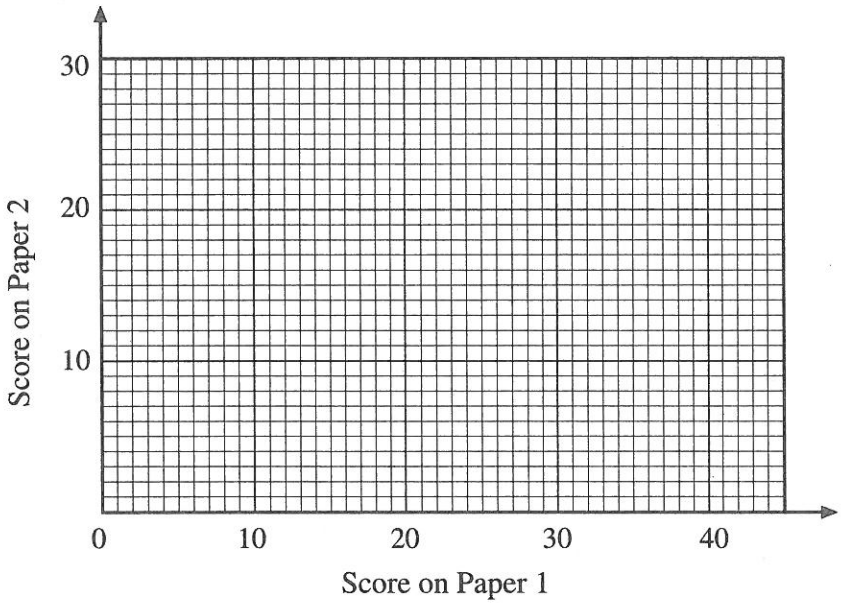
[4]

13. The table below shows the scores of six pupils in Paper 1 and Paper 2 of a mathematics examination.

Score in Paper 1	20	32	15	6	25	16
Score in Paper 2	14	21	11	4	15	13

(a) On the graph paper below, draw a scatter diagram to show these scores. [2]



(b) Calculate the mean score of these six pupils in Paper 1.

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[1]

(c) The mean score of these pupils in Paper 2 is 13. Draw a line of best fit on your scatter diagram. [2]

(d) Judith scored 10 on Paper 1. She was absent for Paper 2. Estimate her score for Paper 2.

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[1]

14. Write down, in terms of n, the nth term in each of the following sequences.

(a) 2, 8, 14, 20, 26, . . .

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[2]

(b) 1, 4, 9, 16, 25, . . .

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[1]

(c) 4, 16, 36, 64, 100, . . .

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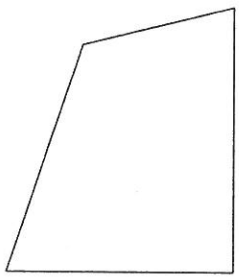
[1]

15. Draw the enlargement of the shape below using scale factor 2 and centre A.

A •



[3]

16. The diagram shows a tile.
The width of the tile is x cm. The length of the tile is 15 cm more than its width.

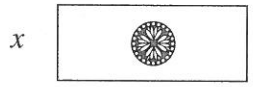


Diagram not drawn to scale

(a) Write down, in terms of x, the length of the tile.

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[1]

When 10 of the tiles are put together as shown in the diagram below they form a square, *ABCD*.

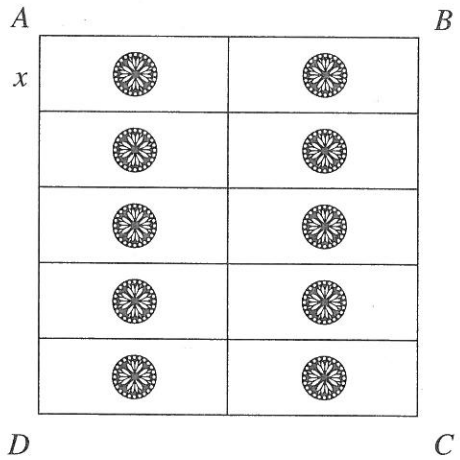

Diagram not drawn to scale

(b) Write down, in terms of x, the length of *AD*.

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[1]

(c) Write down, in terms of x, the length of *AB*.

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[1]

(d) Use the fact that *ABCD* is a square to write down an equation that is satisfied by x.

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[1]

(e) Solve your equation to find the width of each tile.

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[2]

17. *(a)* **Do not use a calculator when answering this part of the question. Show all your working.**

Show clearly how you would obtain an ESTIMATE for the following calculation.

$$\frac{610 \times 4{\cdot}98}{0{\cdot}213}$$

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[3]

(b) **Use your calculator** to find, correct to 3 significant figures, the value of

$$\sqrt{54{\cdot}6^2 - 9{\cdot}37^3}\ .$$

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[2]

18. A circular mirror is mounted on a square wooden frame of side 12 cm so that it touches the sides of the frame as shown in the diagram. Calculate the area of the wooden frame not covered by the mirror (the shaded part of the diagram).
Give your answer to an appropriate degree of accuracy.

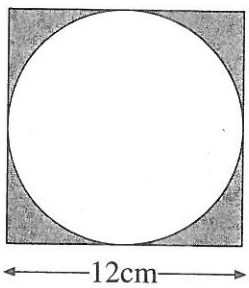

Diagram not drawn to scale

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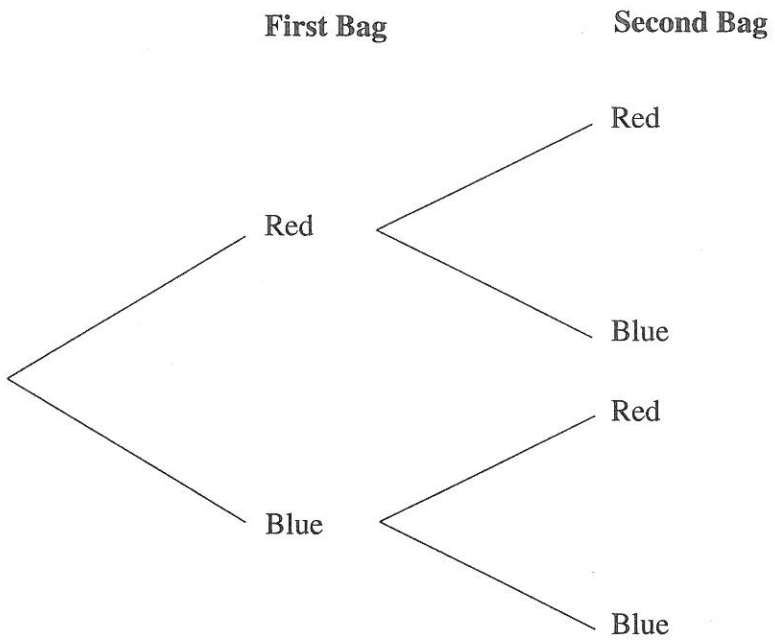
[3]

19. A bag contains 4 red beads and 3 blue beads.
A second bag contains 2 red beads and 8 blue beads.
Jahal takes one bead at random from each bag.

(a) Complete the following probability tree diagram.



[2]

(b) Find the probability that Jahal takes

(i) two red beads,

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[2]

(ii) one bead of each colour.

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[2]

20. Solve the following simultaneous equations by an algebraic (not graphical) method. **Show all your working.**

$$6x + y = 37$$
$$2x + 2y = 19$$

[4]

21. The table below shows a grouped frequency distribution of the ages, in complete years, of the 80 people taking part in a carnival in 1997.

Age in years	0 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 89
Frequency	2	18	27	18	12	3

(a) Complete this cumulative frequency table.

Age (less than)	30	40	50	60	70	90
Cumulative frequency						

[2]

(b) On the graph paper below, draw a cumulative frequency diagram to show these results.

[2]

(c) The table below shows the median, lower quartile, upper quartile and inter-quartile range for the ages of the people taking part in the carnival for the years 1995 and 1996.
Use your graph to complete the table for 1997.

Year	Median	Lower quartile	Upper quartile	Inter-quartile range
1995	60	50	75	25
1996	52	46	60	15
1997				

[3]

(d) One year the local newspaper stated:

"Twenty-five percent of the people taking part in the carnival this year are aged 60 or more."
Which of the three years was it? Give a reason for your answer.

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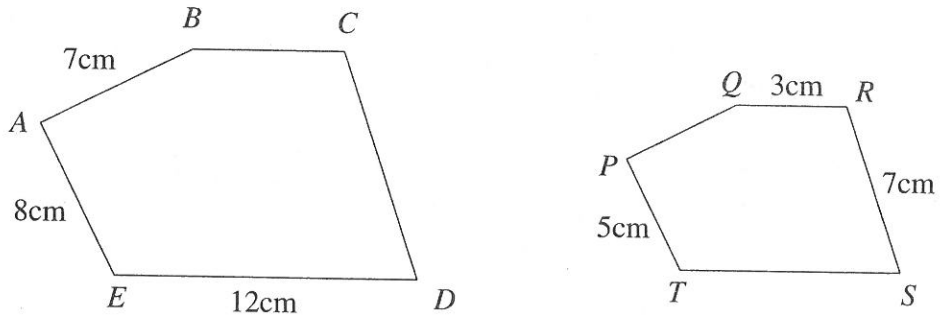
[2]

22.



Diagrams not drawn to scale

The diagram above shows two **similar** figures *ABCDE* and *PQRST*.
AB = 7 cm, *DE* = 12 cm, *EA* = 8 cm, *QR* = 3 cm, *RS* = 7 cm and *TP* = 5 cm.

(a) Calculate the length of *TS*.

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[3]

(b) Calculate the length of *CD*.

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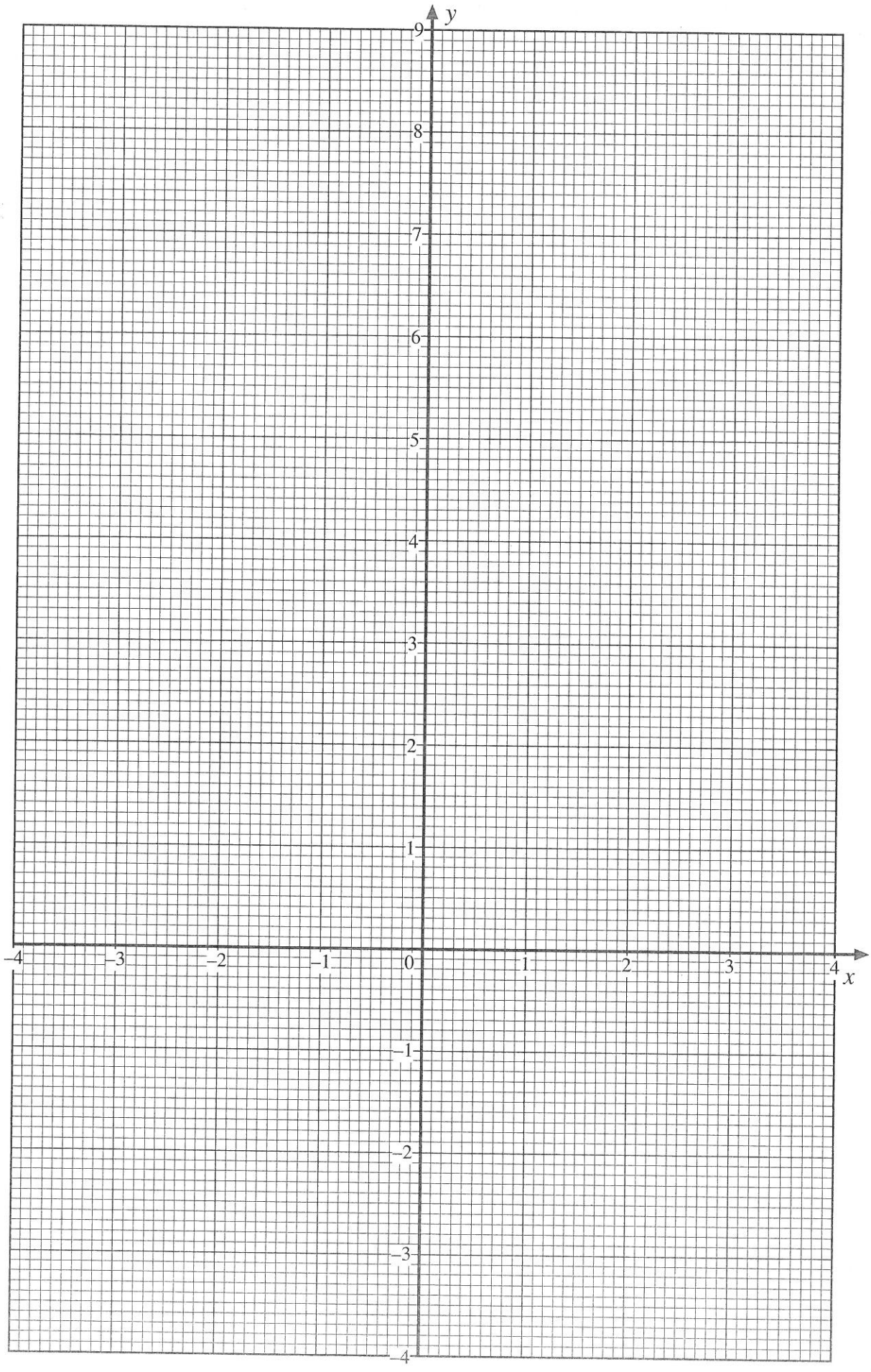
[2]

23. On the graph paper opposite, draw the region which satisfies all of the following inequalities.

$$x \leqslant 2,$$
$$y \geqslant -3,$$
and $$y \leqslant 2x + 3$$

Make sure that you clearly indicate the region that is your answer.

[5]


y
9
8
7
6
5
4
3
2
1
−4
−3
−2
−1
0
1
2
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4
x
−1
−2
−3
−4