WJEC CBAC

GCSE LINKED PAIR PILOT

4361/01

APPLICATIONS OF MATHEMATICS
UNIT 1: Applications 1
FOUNDATION TIER

P.M. TUESDAY, 15 January 2013

$1\frac{1}{2}$ hours

ADDITIONAL MATERIALS

A calculator will be required for this paper.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

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

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

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

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.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **9**.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	**3**	
2	**5**	
3	**4**	
4	**5**	
5	**5**	
6	**5**	
7	**4**	
8	**7**	
9	**8**	
10	**5**	
11	**6**	
12	**4**	
13	**3**	
14	**8**	
15	**8**	
TOTAL MARK		

Formula List

Area of trapezium = $\frac{1}{2}(a + b)h$
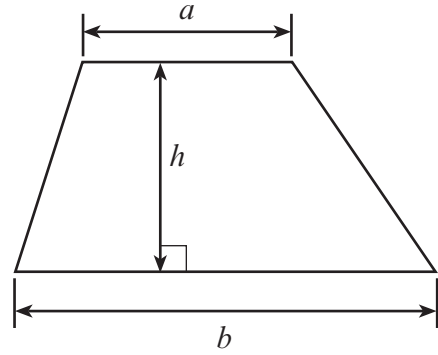
Volume of prism = area of cross-section × length
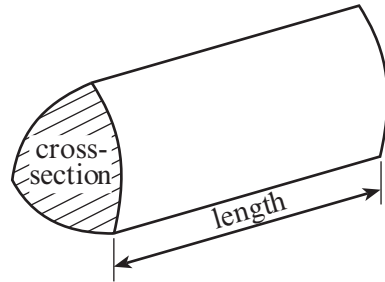
1. An airport displays the daily midday temperatures of cities around the world.
On a particular day in January, the midday temperature in Moscow was –8°C and in Los Angeles was 13°C.

(a) Mark clearly the temperature of each city on the scales below.

[2]

Moscow   Los Angeles

20°C   20°C

10°C   10°C

0°C   0°C

–10°C   –10°C
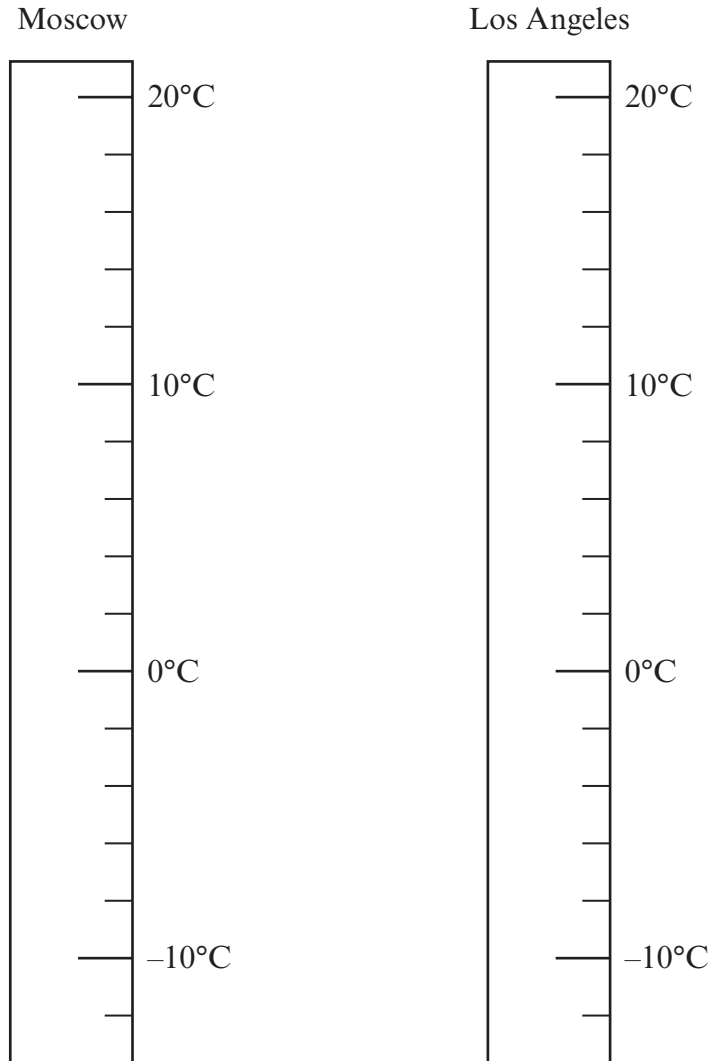
(b) Work out the difference in temperature between the two cities.

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[1]

2. In a class, pupils were having a discussion about factors, multiples, square numbers, prime numbers and powers.

(a) The first discussion was between Siân and David.
Siân said, "5 is a factor of 10."
David said, "5 is a multiple of 10."

Who is correct? Explain your answer.

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Who is incorrect? Explain your answer.

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[2]

(b) (i) The second discussion was between Sioned and Lewys.
Sioned said, "When you square a whole number, you always get an even number."
Is Sioned correct? Explain your answer.

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[1]

(ii) Lewys said, "15 is a prime number."
Is Lewys correct? Explain your answer.

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[1]

(c) Osian said, "2 to the power of 3 is 6."
Explain why Osian is incorrect.

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[1]

3.

A rock band holds a concert at 5 different venues.
The table below shows the number of tickets sold for each concert.

Concert Venue	Number of tickets sold
Freedom Arena	18 535
Eastpoint Arena	26 750
Gate Park	19 125
Greenfields Arena	15 400
City Stadium	28 960

Each ticket costs £24.

Showing all of your working, calculate the total amount of money from the ticket sales.
Round your answer to the nearest £100.

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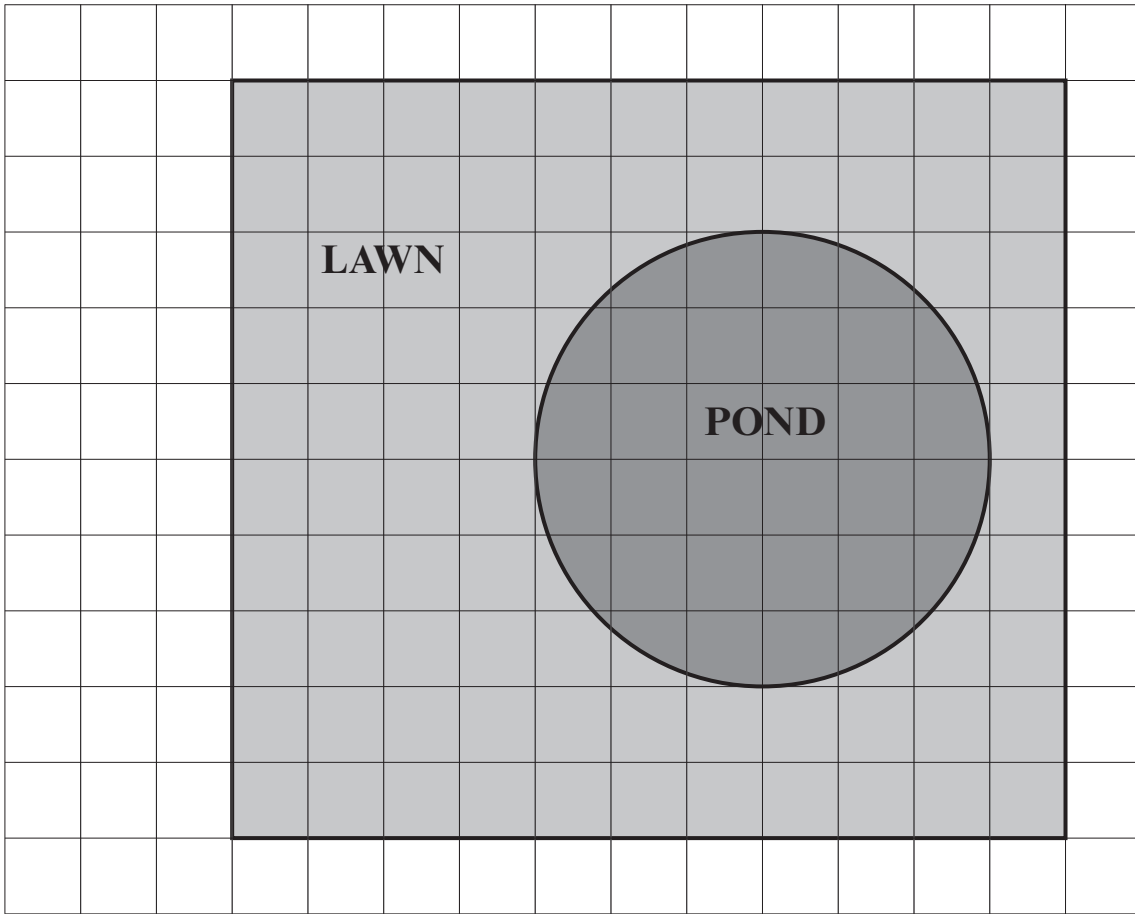
[4]

4. The following diagram, drawn on a centimetre square grid, represents a design of a rectangular garden with a circular pond.

(a) Estimate the surface area of the pond drawn on the grid.

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[2]

(b) Once the circular pond has been completed, the rest of the garden is to be made into a lawn.
Every square on the grid represents an area of 5 m^2.
Estimate the actual area of the lawn.

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[3]

8

Examiner
only

5. A jewellery shop wishes to create boxes, in the shape of cubes, to use for packaging gifts.

(a) Which one of the following patterns **cannot** be used to form a box in the shape of a cube? Circle your answer.

[1]
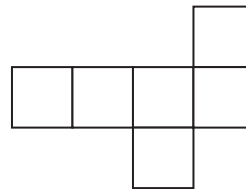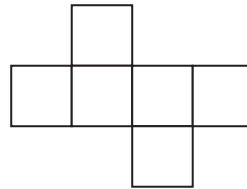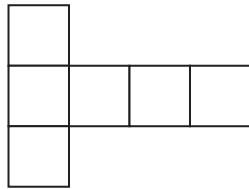
(b) The jewellery shop wants to cover all the sides of a box with paper.
The box is a cube with sides 7 cm.

7 cm

7 cm
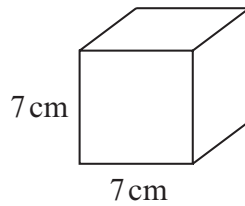
Diagram not drawn to scale

What is the total area of all the faces of this box?
State the units of your answer.

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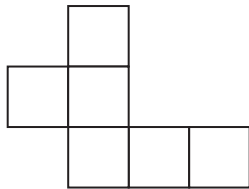
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[4]

6. Jim and Andy play for their local cricket team.
They scored the following runs in their last six matches.

Jim	42	71	39	62	70	40
Andy	115	6	84	36	10	85

(a) Calculate the mean of Andy's scores.

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Mean is ....

[3]

(b) Find the median of Jim's scores.

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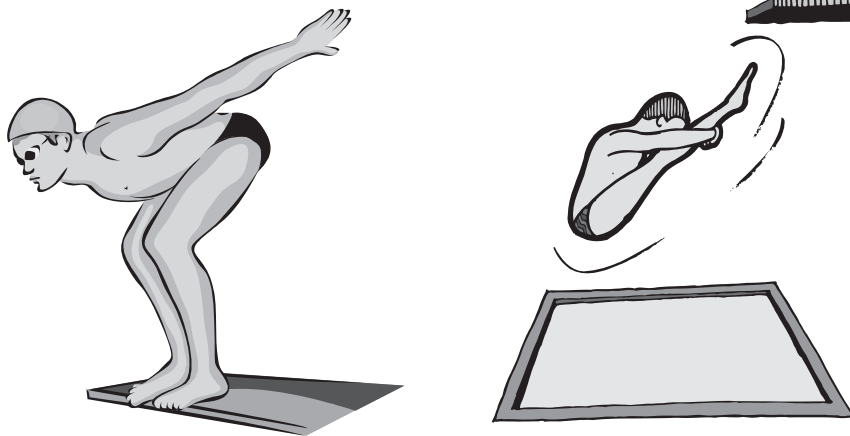
[2]

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7.

In a diving competition, the final score for a dive depends on:
- the degree of difficulty of the dive;
- the total of the marks awarded by 5 judges.

The formula for working out the final score is shown below.

Final score = 0·6 x degree of difficulty x total of the judges' marks

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(a) Tim does a dive with a degree of difficulty of 3·8.
The judges' marks have a total of 32·5.
What is the final score for Tim's dive?

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[2]

(b) For Tim to win the competition he will need a score of 100·8 from his final dive.
Tim's final dive has a degree of difficulty of 4·2.
For Tim to score 100·8, what does the total of the judges' marks need to be?

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[2]

8.
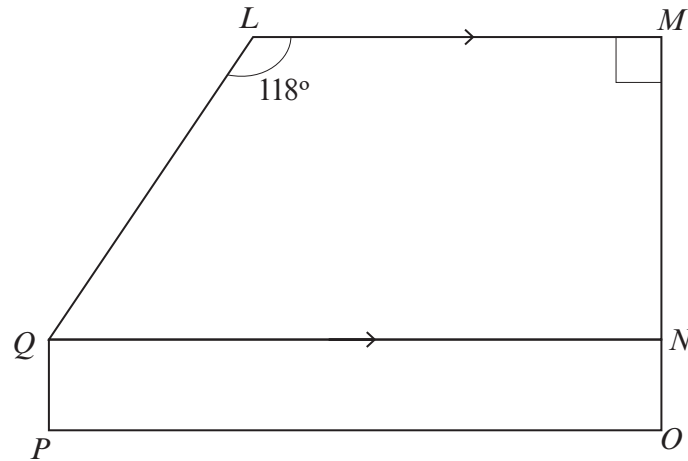
Diagram not drawn to scale

The diagram shows the side of a rabbit's hutch.
LM is parallel to *QN*.
PQNO is a rectangle.
The angle $Q\hat{L}M$ between the top of the hutch and the front is 118º.

(a) Calculate the size of the angle $L\hat{Q}P$.

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[4]

(b)   The rabbit's hutch needs a circular hole, of radius 4 cm, cut out to create space for a water bottle.
Draw a circle with a radius of 4 cm below.

[1]

(c)   On the roof of the hutch, a small opening is used to place food inside for the rabbit.
The opening is in the shape of a trapezium, as shown in the sketch below.
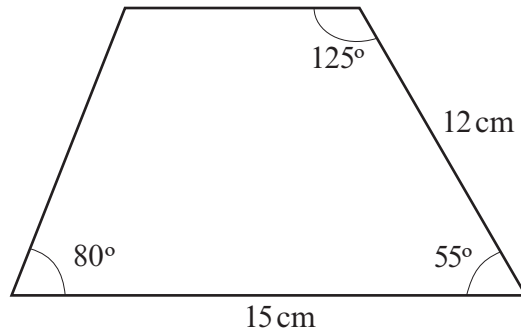
Diagram not drawn to scale

Complete an accurate drawing of the trapezium.
Two of the sides have already been drawn for you.

[2]

Turn over.

9. *You will be assessed on the quality of your written communication in this question.*

Three friends Andrea, Ravinder and Erika visit a restaurant for lunch.
Part of the menu is shown below.

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┌─────────────────────────────────────────────────┐
│                    PRICES                          │
│                                                    │
│   Tea/Coffee/Soft drinks          small £1.45     │
│                                   large £1.90     │
│                                                    │
│   Soup & a sandwich               £5.95           │
│   Chicken pie, mash & vegetables  £8.75           │
│   Vegetable lasagne, salad & garlic bread £7.50   │
│   Cod in batter, mushy peas & chips  £9.30        │
│   Beef chilli, sour cream & nachos   £8.70        │
└─────────────────────────────────────────────────┘
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Andrea has cod in batter, mushy peas and chips and a small coffee.
Ravinder has a large soft drink, soup and a sandwich.
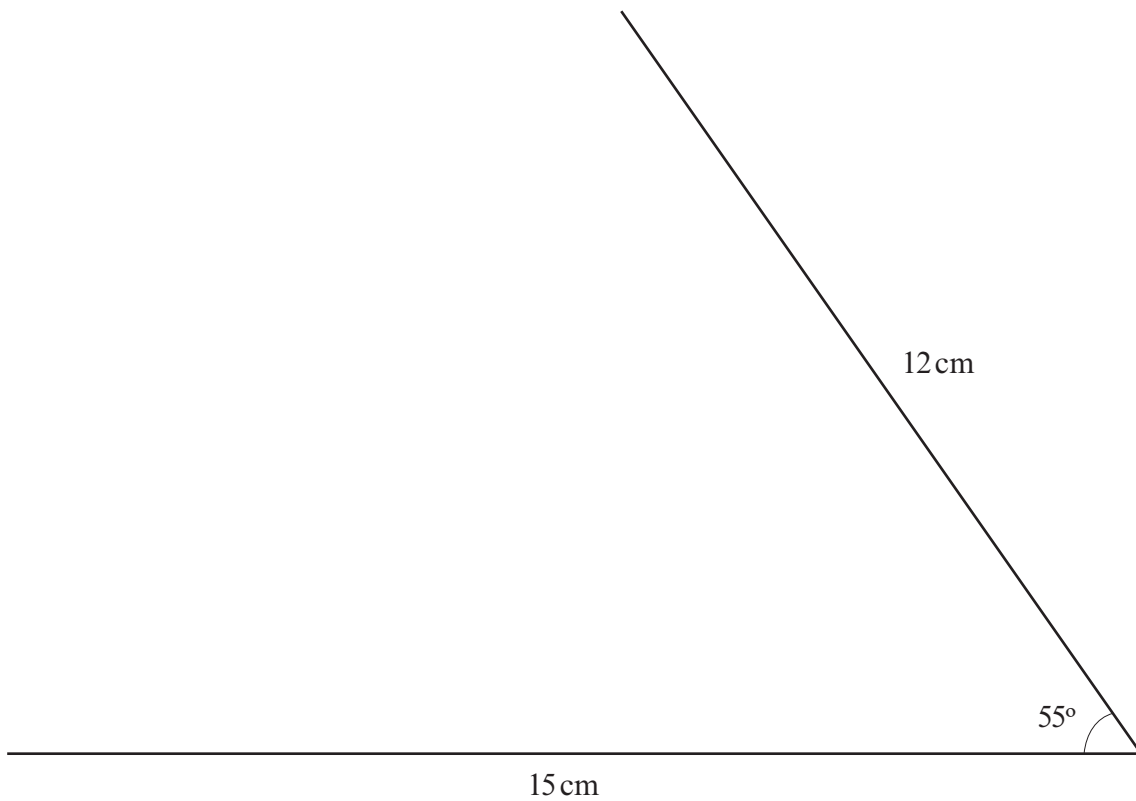Erika has a large tea, chicken pie, mash and vegetables.

They share the total bill equally between them.

Showing all your working, explain clearly who benefits the most from not paying their own individual bill and how much she will save.

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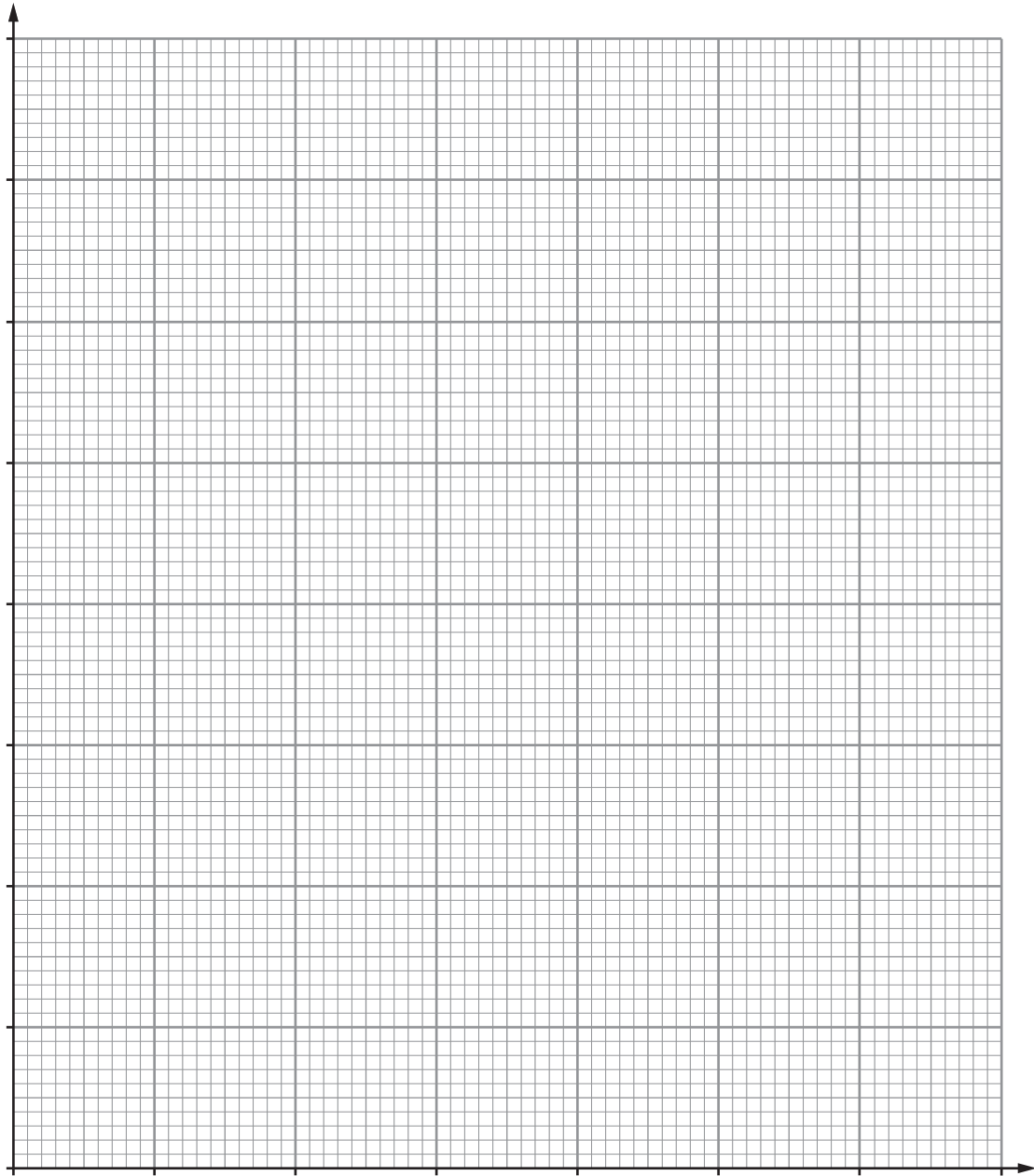
[8]

10. In a hospital clinic the following information is used to convert between kilograms (kg) and pounds (lb).

Kilograms (kg)	0	39	68
Pounds (lb)	0	86	150

(a) Use the information in the table to draw a conversion graph.
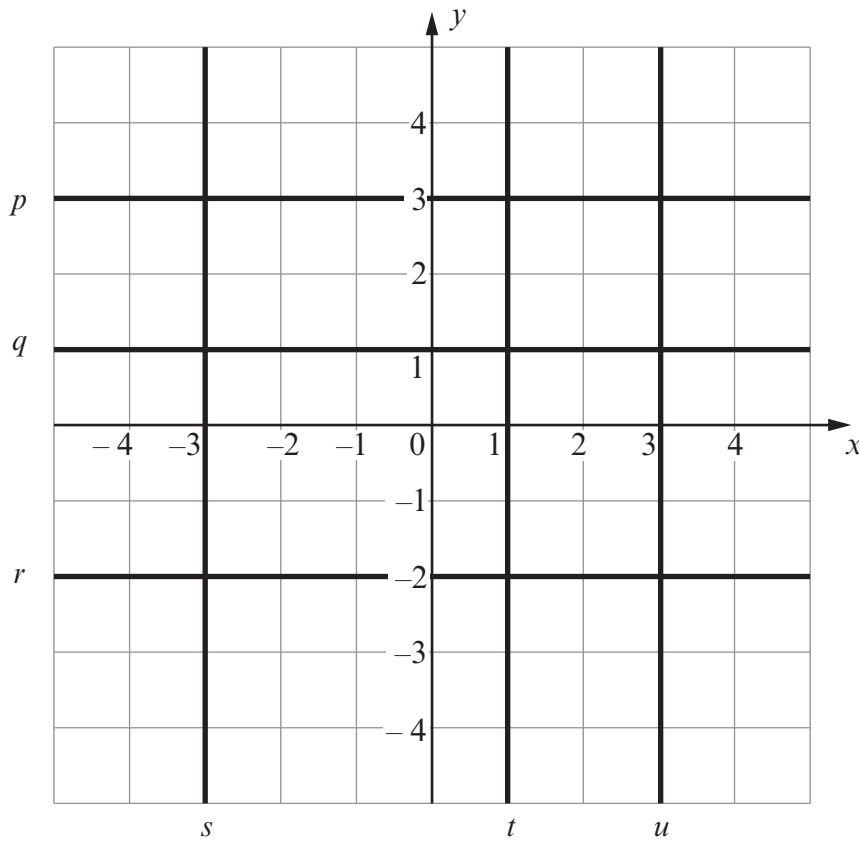
[2]

Pounds (lb)

Kilograms (kg)

(b) Use your graph to find an estimate for 50 kilograms in pounds.

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[1]

(c) Find an estimate for 200 pounds in kilograms.

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[2]

11. As part of her homework, Nia was asked to identify straight lines drawn on the coordinate grid shown below.

(a) Which of the lines *p, q, r, s, t* or *u* shown on the grid represent the following equations?

$y = 1$ is line ....

$x = -3$ is line ....

[2]

(b) Nia was also asked to draw the line $y = 2x - 1$.

(i) Complete the table below for this line.

x	–2	–1	0	1	2	3
$y = 2x - 1$	–5		–1	1		5

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[2]

(ii) On the graph paper on the opposite page, draw the graph of $y = 2x - 1$.

[2]
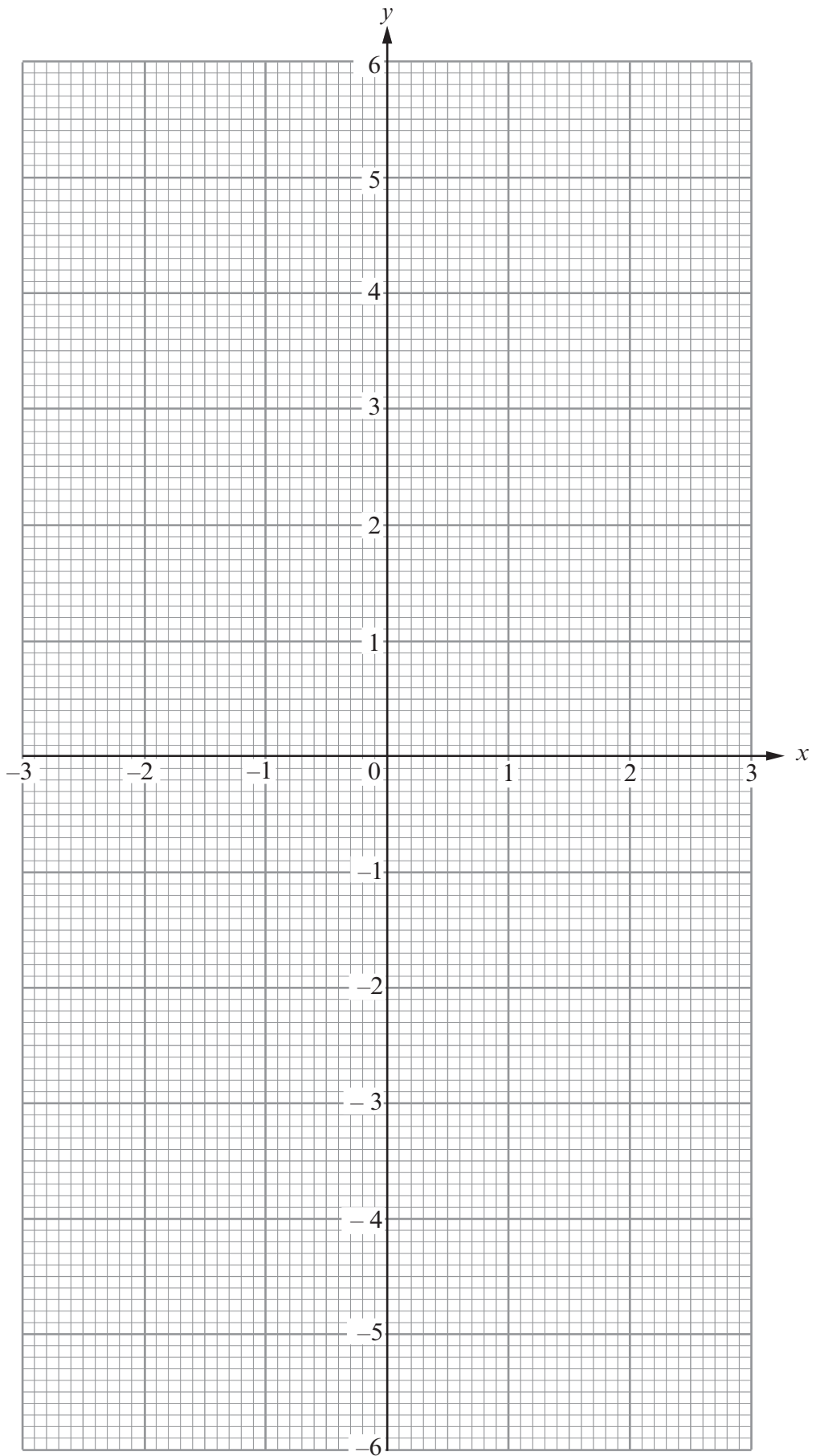
12. Owen works in a DIY warehouse.
He is asked to sort some tiles.
He has the following shapes of tiles to sort.

<div align="center">Square   Kite   Rhombus   Parallelogram</div>

(a) He is asked to sort the tiles using the table shown below.
Complete the table.

Tiles with equal diagonals	All other tiles

[2]

(b) Owen is then asked to sort the tiles differently using the table shown below.
Complete the table.

Tiles with opposite sides parallel	All other tiles

[2]

13. Write down expressions for each of the following.

(a) The total cost, in pence, of 3 buttons at *e* pence each and 2 sewing needles at *f* pence each.

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[2]

(b) The total cost of these buttons and needles in pounds.

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[1]

14. Danny is setting out a treasure hunt.
The first clue is found 300 m from the start on a bearing of 120°.
The second clue is found 360 m from the position of the first clue on a bearing of 040°.
The third clue is found 100 m from the position of the second clue on a bearing of 280°.

(a) Using a scale of 1 cm to represent 40 m, complete an accurate scale drawing of the treasure hunt route, showing the positions of the three clues.

[5]

North

↑

Start

(b) Write down the bearing of the start from the position of the first clue.

....

[1]

(c) Write down the distance and the bearing of the start from the position of the third clue.

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Distance .... m

Bearing .... °

[2]

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 Turn over.

15. A survey is to be carried out to find out how popular MP3 players are across the various age groups of the general population.
The survey is carried out by asking people questions as they come out of a cinema.
Two questions from the survey questionnaire are shown below.

---

1. How old are you?

Put a tick in the box   under 10 ☐

10 to 20 ☐

20 to 30 ☐

older than 30 ☐

2. Do you own an MP3 player?

Put a tick in the box   Yes ☐

No ☐

(a) Is this a biased survey? Give a reason for your answer.

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[1]

(b) State a criticism about the design of question 1 in the survey.

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[1]

(c) Write a question, with a selection of answer boxes, to find out how much people are prepared to pay for MP3 players.

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[2]

(d) If you were to use your question to carry out a survey by asking 100 people today and again tomorrow, would you expect to get exactly the same results? Give a reason for your answer.

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[1]

(e) A different survey was carried out to find the favourite colour of MP3 players. The results are shown in the table below.

Favourite colour of MP3 player	Number of people		
	The first 20 people asked	The second 20 people asked	The third 20 people asked
Red	2	5	8
Black	5	4	3
Silver	13	11	9

(i) Did any person answering the survey have a favourite colour of MP3 player other than red, black or silver? Give a reason for your answer.

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[1]

(ii) Calculate the best estimate for the probability that one of the people answering the survey, selected at random, says that their favourite colour of MP3 player is black.

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[2]

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