Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

0224327052

MATHEMATICS **0580/31**

Paper 3 (Core) **May/June 2014**

2 hours

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 104.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **15** printed pages and **1** blank page.

1 **(a)** The angles in a triangle are in the ratio $3:4:8$.

(i) Show that the smallest angle of the triangle is 36°.

Answer(a)(i)

[2]

(ii) Work out the other two angles of the triangle.

Answer(a)(ii) ..... and ..... [2]

(b) Another triangle ABC has angle $BAC = 35°$ and angle $ABC = 65°$.

(i) **Using a protractor and straight edge** complete an accurate drawing of the triangle ABC.
The side AB has been drawn for you.

A B

[2]

(ii) Measure the length, in centimetres, of the shortest side of your triangle.

Answer(b)(ii) ..... cm [1]

(c) A different triangle has base 7.0 cm and height 5.6 cm.
Calculate the area of this triangle, giving the units of your answer.

Answer(c) .... [3]

2 **(a)** From the integers 50 to 100, find

(i) a multiple of 43,

Answer(a)(i) ..... [1]

(ii) a factor of 165,

Answer(a)(ii) ..... [1]

(iii) an odd number that is also a square number,

Answer(a)(iii) ..... [1]

(iv) a number which is a square number and also a cube number.

Answer(a)(iv)..... [1]

(b) **(i)** Find the square root of 5929.

Answer(b)(i) ..... [1]

(ii) Find the lowest common multiple of 24 and 30.

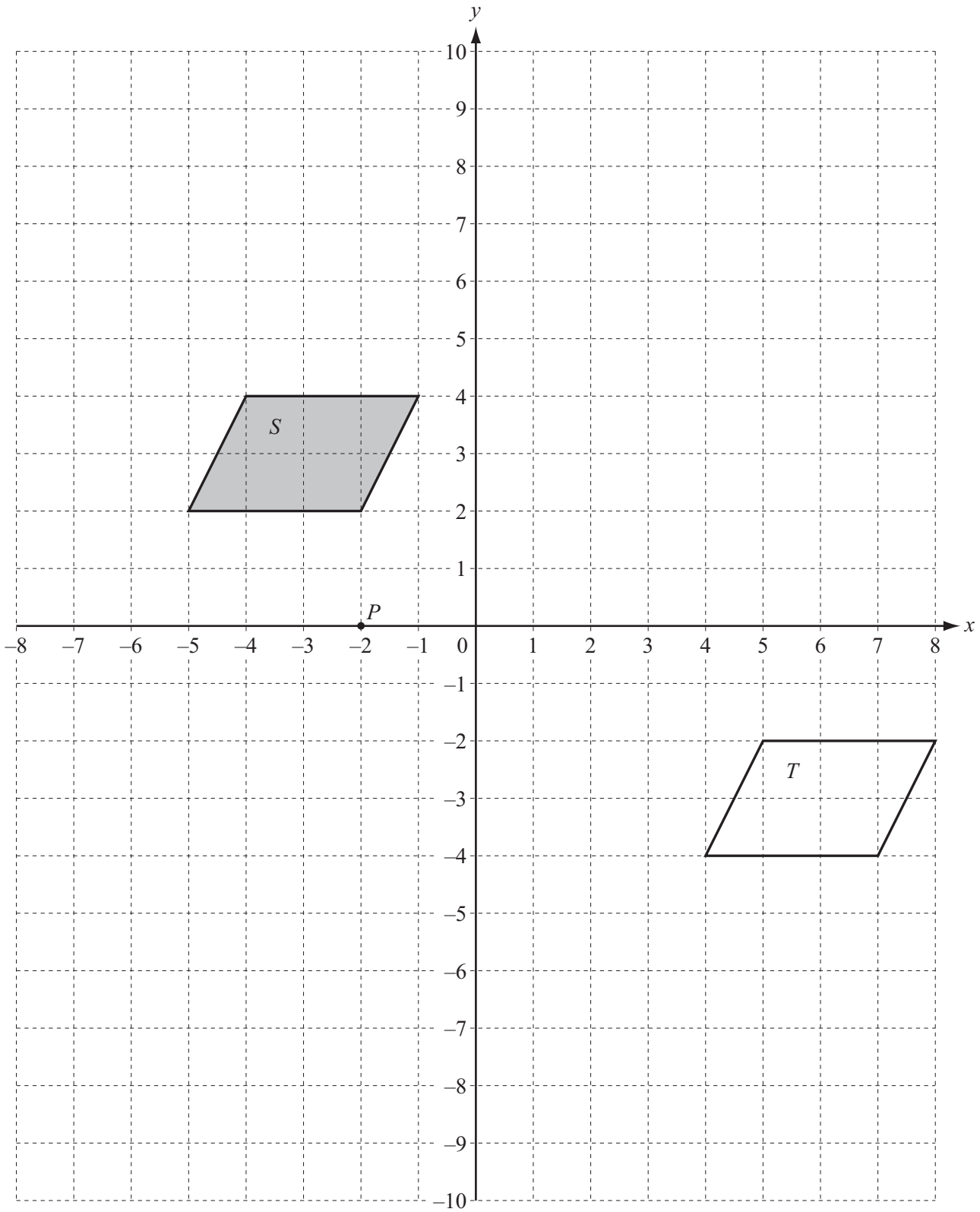
Answer(b)(ii) ..... [2]

(c) Elena goes on a journey to the North Pole.
She leaves home at 7 am on 15 July and arrives at the North Pole at 10 pm on 27 July.

How long, in days and hours, did her journey take?

Answer(c) ..... days ..... hours [2]

3



The diagram shows two shapes, S and T, on a 1 cm^2 grid.
P is the point (–2, 0).

(a) **(i)** Write down the mathematical name of shape *S*.

Answer(a)(i) ..... [1]

(ii) How many lines of symmetry does shape *S* have?

Answer(a)(ii) ..... [1]

(b) Describe the **single** transformation that maps shape *S* onto shape *T*.

Answer(b) .....

..... [2]

(c) On the grid,

(i) draw the reflection of shape *S* in the *y*-axis, [2]

(ii) draw the rotation of shape *S* about (0, 0) through 90° anti-clockwise. [2]

(d) On the grid, draw the enlargement of shape *S* with scale factor 2 and centre *P* (–2, 0). Label the image *E*. [2]

(e) **(i)** Work out the area of shape *S*.

Answer(e)(i) ..... cm^2 [2]

(ii) How many shapes, identical to shape *S*, will fill shape *E* completely?

Answer(e)(ii) ..... [1]

(iii) Work out the area of shape *E*.

Answer(e)(iii) ..... cm^2 [1]

4 Denzil grows tomatoes. He selects a random sample of 25 tomatoes.
The mass of each tomato, to the nearest 5 grams, is shown below.

55	65	50	75	65
80	70	70	55	60
70	60	65	50	75
65	70	75	80	70
55	65	70	80	55

(a) (i) Complete the frequency table.
You may use the tally column to help you.

Mass (grams)	Tally	Frequency
50		
55		
60		
65		
70		
75		
80		

[2]

(ii) Write down the mode.

Answer(a)(ii) ..... g [1]

(iii) Find the range.

Answer(a)(iii) ..... g [1]

(iv) Show that the mean mass is 66 g.

Answer(a)(iv)

[2]

(b) Denzil picks 800 tomatoes.
4% of the 800 tomatoes are damaged.

How many of these tomatoes are **not** damaged?

Answer(b) ..... [2]

(c) Denzil sells 750 of his tomatoes.

(i) The mean mass of a tomato is 66 g.

Calculate the mass of the 750 tomatoes in kilograms.

Answer(c)(i) ..... kg [3]

(ii) Denzil sells his tomatoes at $1.40 per kilogram.

Calculate the total amount he receives from selling all the 750 tomatoes.

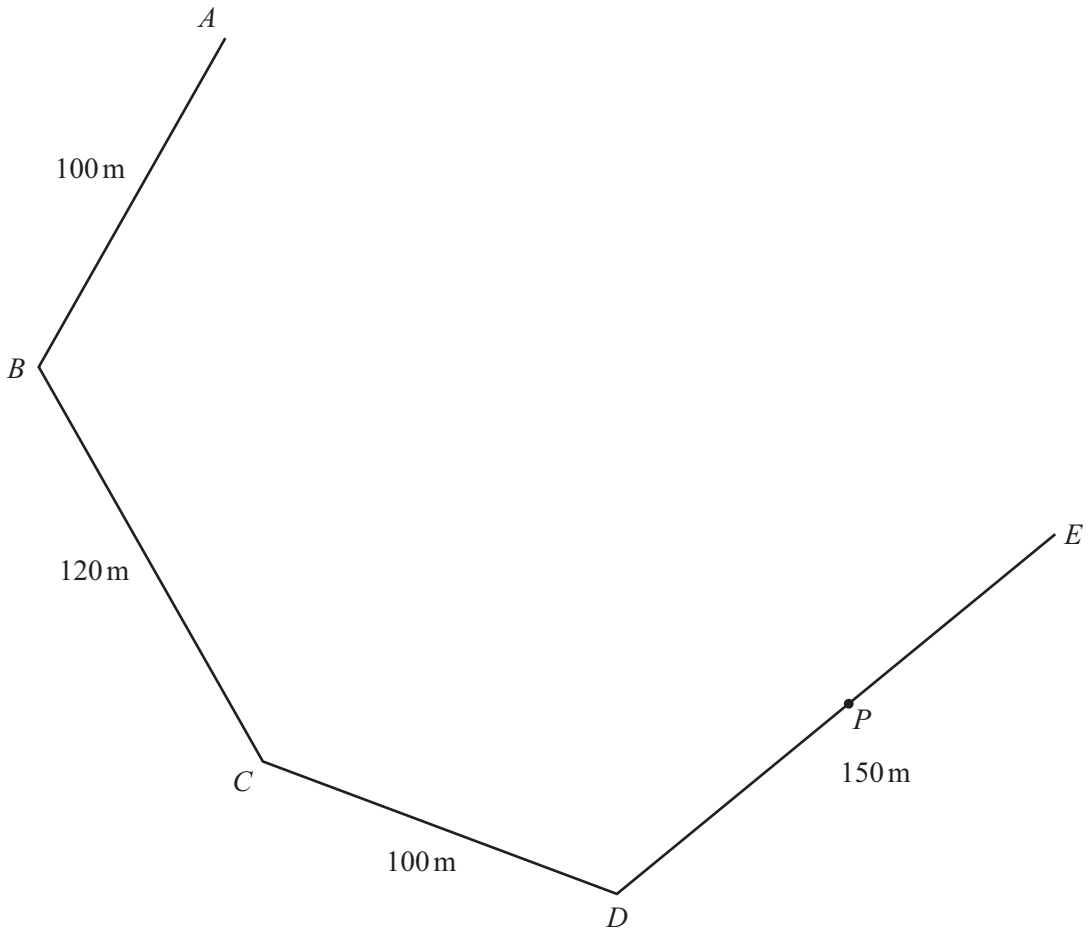
Answer(c)(ii) $ ..... [1]

(iii) The cost of growing these tomatoes was $33.

Calculate his percentage profit.

Answer(c)(iii) ..... % [3]

5 Use a ruler and compasses only in parts (a), (c) and (d) of this question.
Show all your construction arcs.



Scale: 1 cm to 20 m

Maria owns a farm.
The scale drawing shows part of the boundary of the farm.
The scale is 1 centimetre represents 20 metres.

(a) The point F is such that $AF = 140$ m and $EF = 160$ m.
Angle BAF and angle DEF are both **obtuse** angles.

Complete the scale drawing of the farm boundary $ABCDEF$. [2]

(b) Write down the name of the polygon $ABCDEF$.

Answer(b) ..... [1]

(c) **(i)** Construct the perpendicular bisector of the side CD. [2]

(ii) Construct the bisector of angle ABC. [2]

(iii) All the farm buildings are within a region that is

- nearer to C than to D

and

- nearer to BC than to BA.

Shade the region containing the farm buildings. [1]

(d) A fence post, P, is shown on the boundary DE.

(i) Construct the locus of points that are 50 m from P and also inside the farm boundary. [2]

(ii) A region for keeping pigs is within 50 m of P and inside the farm boundary.

Calculate the actual area for keeping pigs.

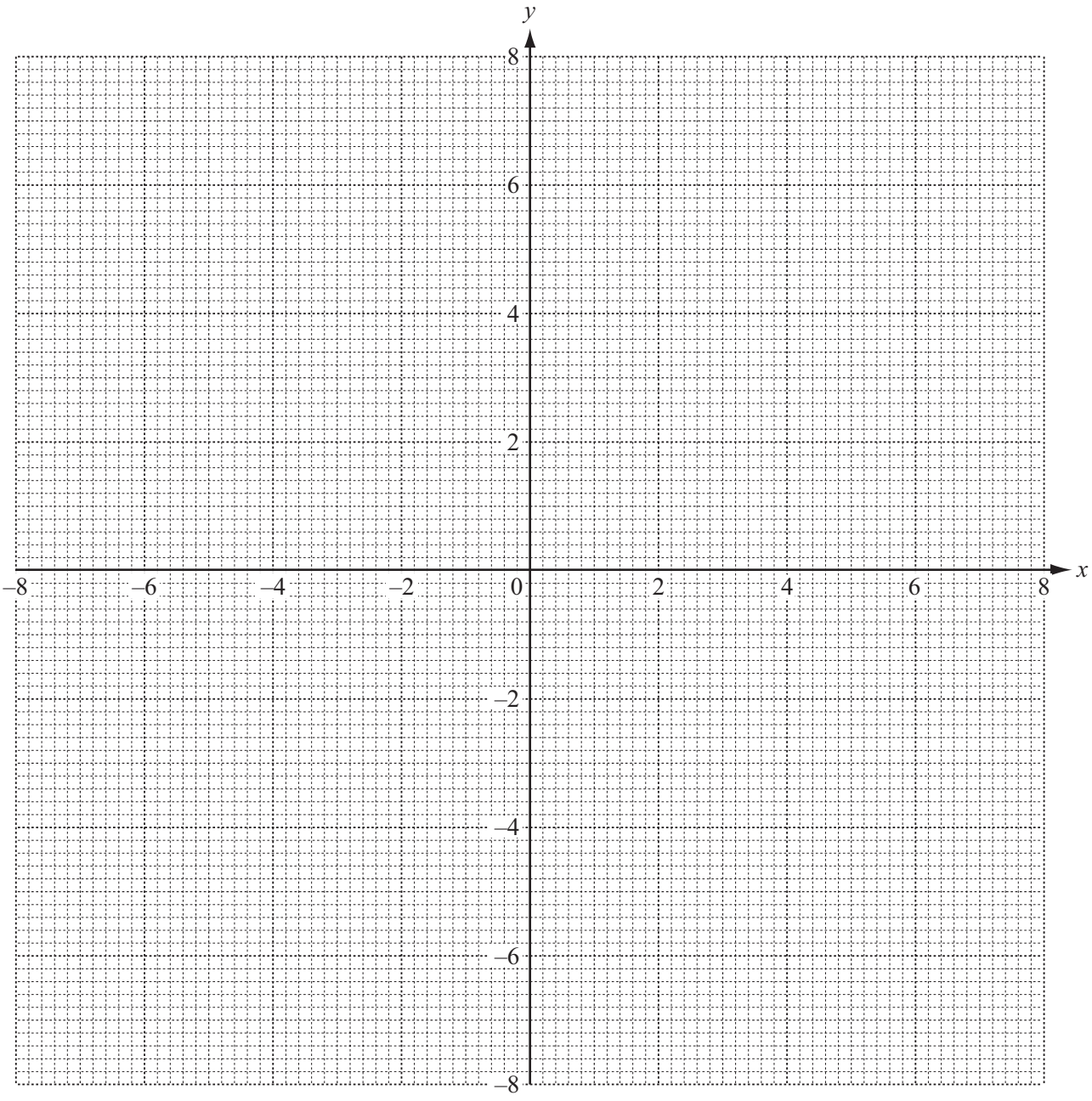
Answer(d)(ii) ..... m^2 [2]

6 **(a)** **(i)** Complete the table of values for $y = \frac{8}{x}$, $x \neq 0$.

x	–8	–4	–2	–1	1	2	4	8
y		–2					2	

[3]

(ii) On the grid, draw the graph of $y = \frac{8}{x}$ for $-8 \leqslant x \leqslant -1$ and $1 \leqslant x \leqslant 8$.



[4]

(iii) Write down the order of rotational symmetry of your graph.

Answer(a)(iii) ..... [1]

(b) (i) Complete this table of values for $y = 1.5x + 3$.

x	–6	–4	–2	0	2
y	–6			3	

[2]

(ii) On the grid, draw the graph of $y = 1.5x + 3$. [1]

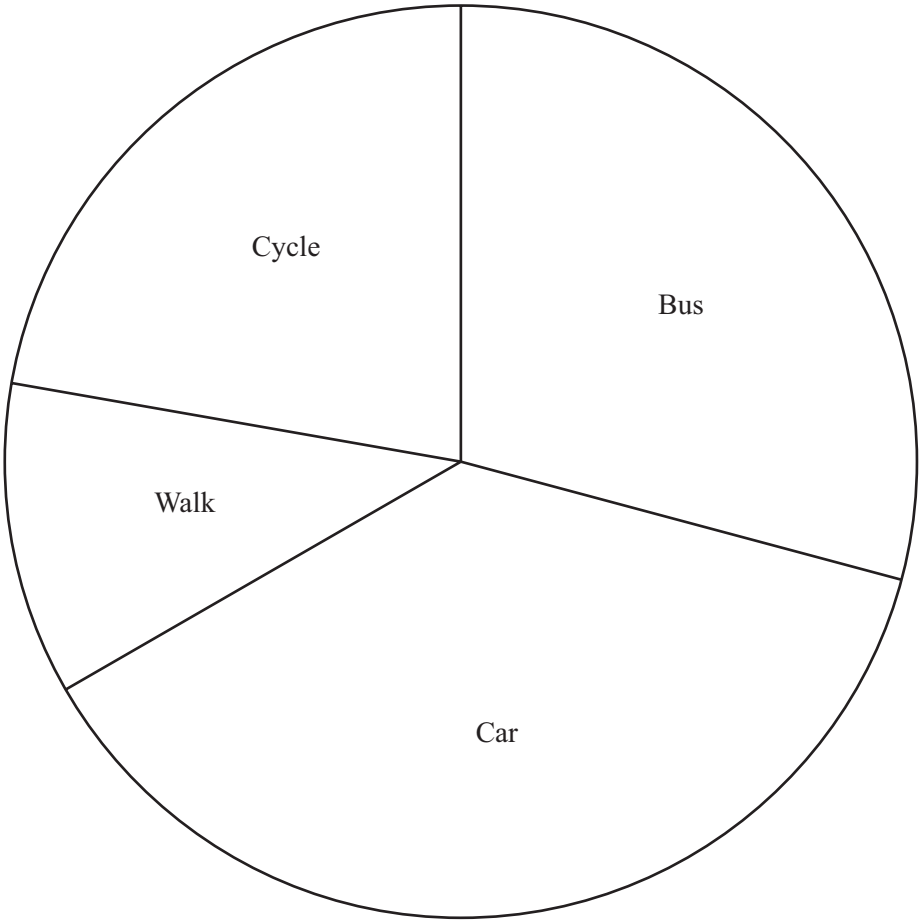
(c) Use your graphs to solve the equation $\frac{8}{x} = 1.5x + 3$.

Answer(c) x = ... or x = ... [2]

(d) Write down the gradient of the graph of $y = 1.5x + 3$.

Answer(d) ..... [1]

7 120 people are asked how they travel to work.
The pie chart shows the results.



(a) (i) Show that 45 people travel by car.

Answer(a)(i)

[2]

(ii) A person is chosen at random from the 120 people.

Find the probability that this person travels to work by bus or by car.

Answer(a)(ii) ..... [2]

(b) One year later, the same 120 people were again asked how they travel to work.

Here is the information.

	Number of people
Walk	x
Cycle	31
Bus	17 more than the number of people who walk
Car	2 times the number of people who walk

(i) Use this information to complete the following equation, in terms of x.

..... = 120 [3]

(ii) Solve the equation to find the number of people who walk to work.

Answer(b)(ii) ..... [3]

8 **(a)** Write down an expression for the total mass of c cricket balls, each weighing 160 grams, and f footballs, each weighing 400 grams.

Answer(a) ..... grams [2]

(b) Expand and simplify.

$$3(2x - 5y) - 4(x - 2y)$$

Answer(b) ..... [2]

(c) Factorise completely.

$$5x^2y - 20x$$

Answer(c) ..... [2]

(d) Solve the simultaneous equations.

$$3x + 4y = 7$$
$$4x - 3y = 26$$

Answer(d) x = ...

y = ... [4]

9 **(a)** For these sequences, write down the next two terms and the rule for finding the next term.

(i) 84, 75, 66, 57, ...

Answer(a)(i) ..... , ... rule ..... [3]

(ii) 2, 6, 18, 54, ...

Answer(a)(ii) ..... , ... rule ..... [3]

(b) For the sequence in **part (a)(i)**,

(i) write down an expression, in terms of n, for the nth term,

Answer(b)(i) ..... [2]

(ii) find the 21st term.

Answer(b)(ii) ..... [2]

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