Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

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MATHEMATICS **0580/33**

Paper 3 (Core) **May/June 2017**

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.

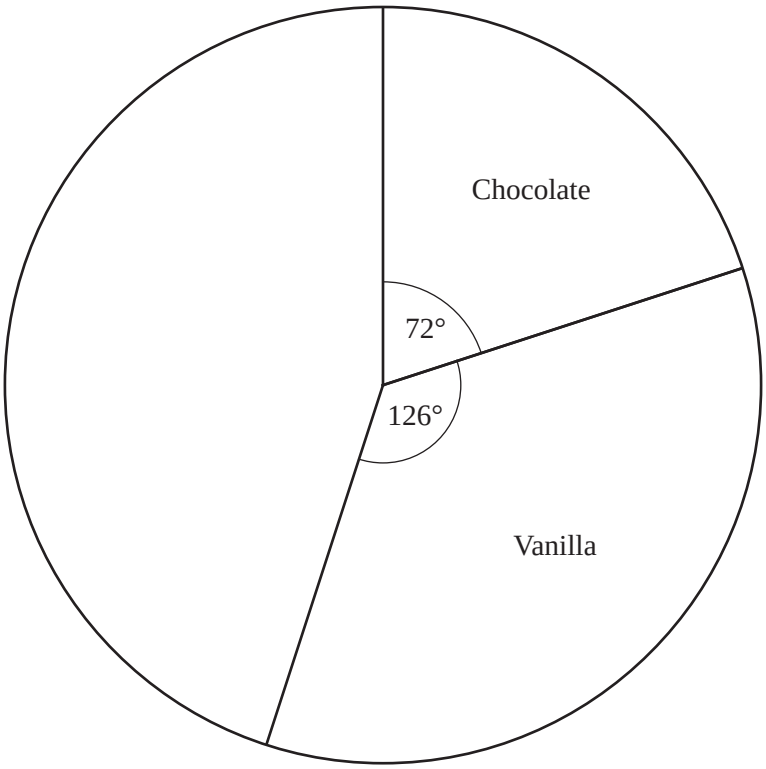
Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees 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.

This document consists of **16** printed pages.

CAMBRIDGE International Examinations

1 Some children chose their favourite ice-cream flavour from chocolate, vanilla, strawberry and banana.
Some of the results are shown in the pie chart below.



(a) 8 children chose chocolate.

Work out the total number of children.

..... [2]

(b) Work out how many children chose vanilla.

..... [2]

(c) The rest of the children chose strawberry or banana.
Twice as many children chose strawberry as chose banana.

Use this information to complete the pie chart.

[2]

(d) Write down the flavour of ice-cream that is the mode.

..... [1]

2 **(a)** The diameter of the Earth is 12 756 km.

Write 12 756 km in metres.

..... m [1]

(b) The distance from the Earth to the Moon is 384 000 km.

Work out the time it would take a car travelling at 100 km/h to travel 384 000 km.
Give your answer in days.

..... days [2]

(c) The distance from the Sun to the Earth is 149.6 million kilometres.

Write 149.6 million in standard form.

..... [2]

(d) The diameter of a grain of salt is 1×10^{-4} metres.

(i) Write 1×10^{-4} as an ordinary number.

..... [1]

(ii) Write 1×10^{-4} metres in millimetres.

..... mm [1]

3 The McVay family go to the cinema.

(a) The cinema has 510 seats.

(i) The first 6 rows each have 18 seats.
The next 8 rows each have 20 seats.
All the other rows each have 22 seats.

Work out the total number of **rows** of seats in the cinema.

..... [3]

(ii) 70% of the 510 seats are occupied.

Work out how many seats are occupied.

..... [1]

(b) The McVay family has 2 adults and 2 children.

Ticket Prices
Adult $7.95 Child $5.95 Family Ticket (2 Adults and 2 Children) $24

Work out how much they save by buying a family ticket rather than a ticket for each person.

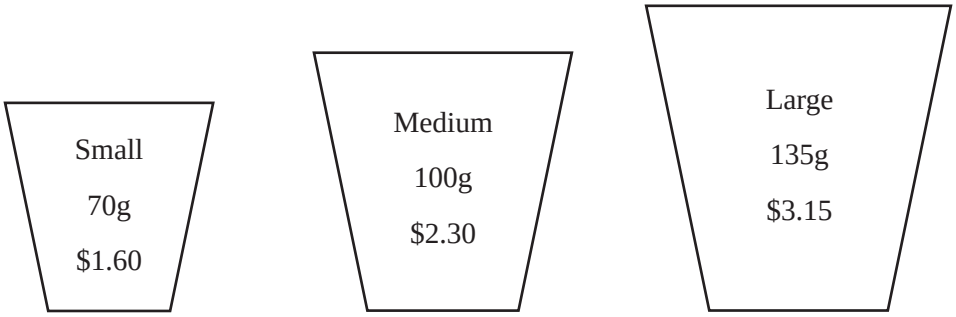
$..... [2]

(c) The film starts at 1415 and lasts for 116 minutes.

Work out the time that the film ends.

..... [2]

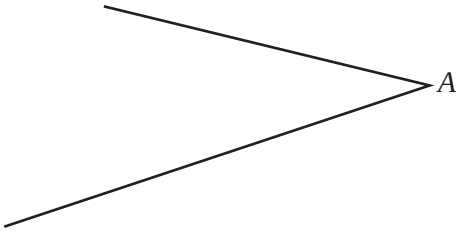
(d) Popcorn is sold in tubs.



Work out which tub of popcorn is the best value for money.
You must show your working.

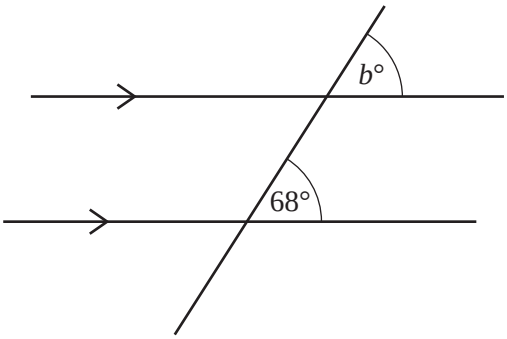
..... [3]

4 **(a)** Measure the reflex angle at *A*.



..... [1]

(b)

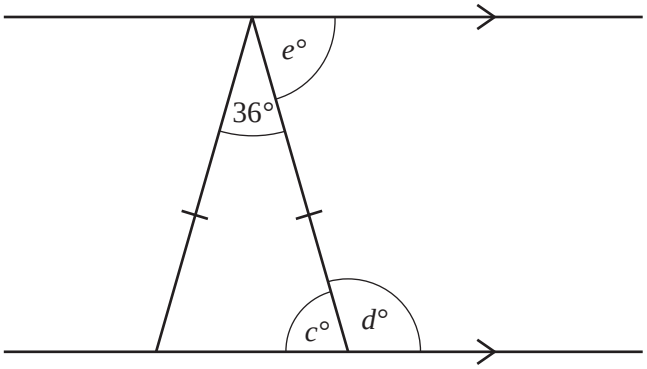


NOT TO SCALE

Find the value of *b*.
Give a reason for your answer.

b = ... because ..... [2]

(c)



NOT TO SCALE

Find the values of *c*, *d* and *e*.

c = ...

d = ...

e = ... [3]

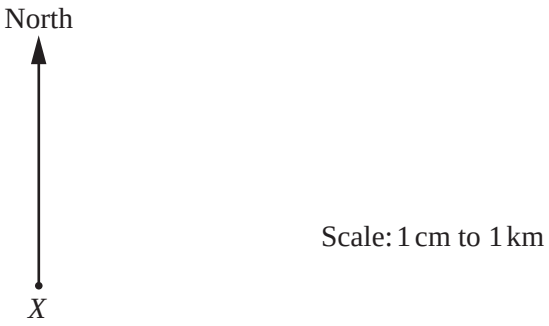
(d) A regular polygon has 24 sides.

Work out the size of one of the interior angles of the polygon.

..... [3]

(e) Town *Y* is 6.7 km from town *X*.
The bearing of town *Y* from town *X* is 113°.

On the scale drawing, draw a line from *X* and mark the position of *Y*.
The scale is 1 centimetre represents 1 kilometre.



[2]

(f) Give the correct mathematical name for each of the shapes described below.

(i) I am a quadrilateral.
I have two pairs of parallel sides but no right angles.
I have two lines of symmetry.

..... [1]

(ii) I am a quadrilateral.
I have one pair of opposite angles that are equal.
I have one line of symmetry.

..... [1]

5 Simone makes a fruit cake.

(a) **(i)** The recipe needs 175 g sugar, 200 g butter and 225 g flour.

Write the ratio sugar : butter : flour in its simplest form.

..... : ..... : ..... [2]

(ii) The recipe needs a total of 600 g of fruit.
The ratio sultanas : currants : raisins = 4 : 3 : 1.

Work out the mass of each type of fruit.

Sultanas = ... g

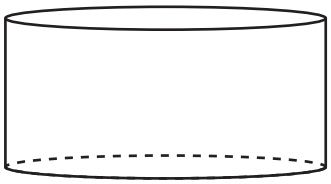
Currants = ... g

Raisins = ... g [3]

(b) The cake can be made in either a cylindrical tin or a square-based tin.

(i) The cylindrical tin has radius 10 cm.
In this tin the cake is 5 cm high.

Show that the volume of the cake is 1600 cm^3,
correct to 2 significant figures.

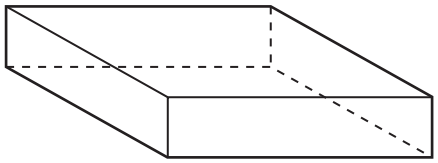


NOT TO SCALE

[2]

(ii) In the square-based tin, the cake is 4 cm high. The volume of the cake is 1600 cm^3.

Work out the length of a side of the base of this tin.



NOT TO SCALE

..... cm [2]

(c) The mass, m grams, of the cake is 1340 g, correct to the nearest 20 g.

Complete the statement about the value of m.

..... $\leqslant m <$ ..... [2]

(d) The number of kilocalories (kcal) in **one quarter** of the cake is 1290 kcal.
The **whole cake** is cut into 12 equal pieces.

(i) Calculate the number of kilocalories in one piece of cake.

..... kcal [2]

(ii) The daily recommended number of kilocalories for Simone is 2000 kcal.

Work out the number of kilocalories in one piece of cake as a percentage of 2000 kcal.

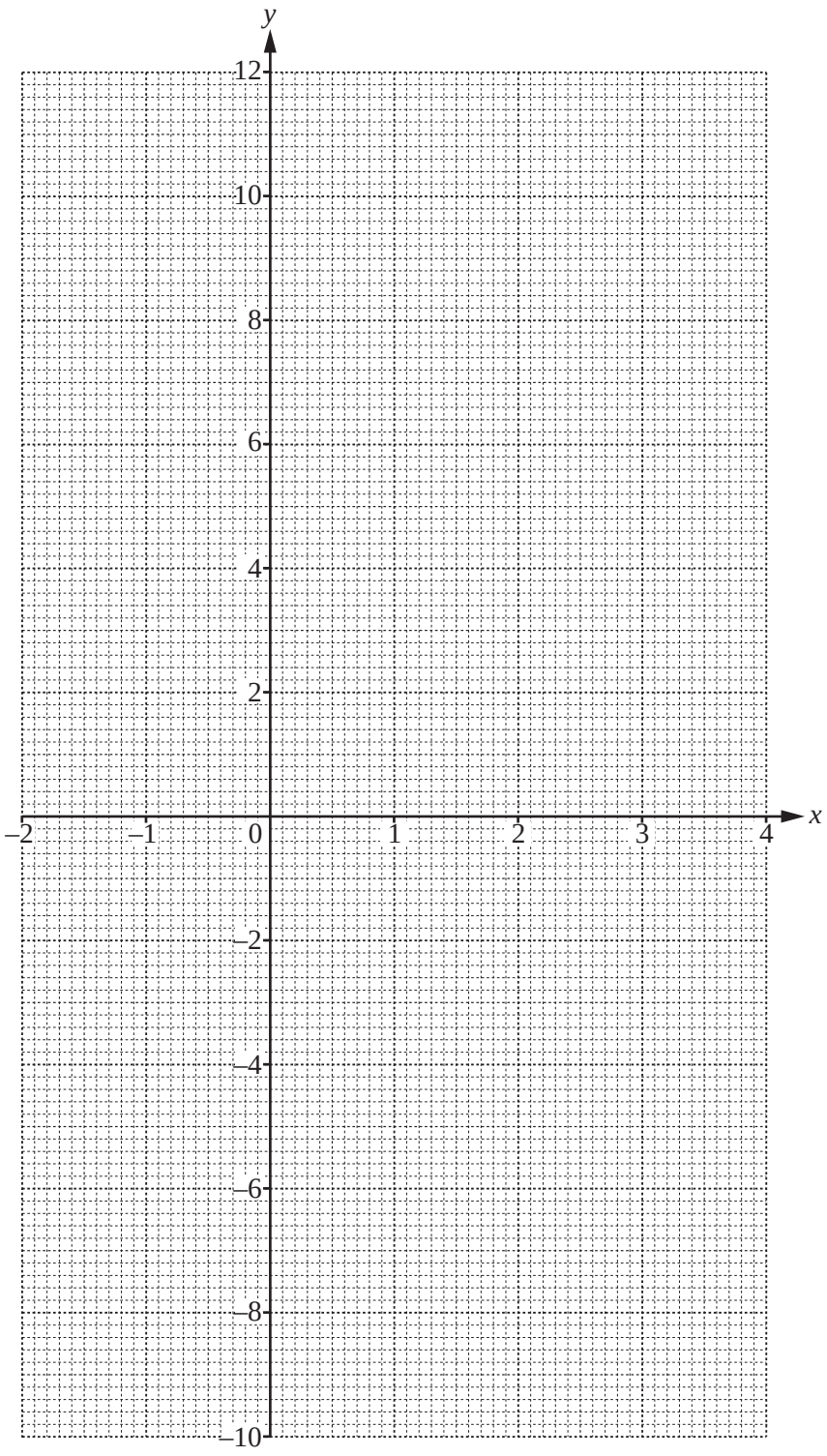
..... % [1]

6 **(a)** **(i)** Complete the table of values for $y = 2x^2 - 4x - 6$.

x	–2	–1	0	1	2	3	4
y			–6		–6	0	

[2]

(ii) On the grid, draw the graph of $y = 2x^2 - 4x - 6$ for $-2 \leqslant x \leqslant 4$.



[4]

(b) **(i)** On the grid, draw the line $y = 5$. [1]

(ii) Use your graph to solve the equation $2x^2 - 4x - 6 = 5$.

$x =$ ..... or $x =$ ..... [2]

(c) Explain why the equation $2x^2 - 4x - 6 = -9$ has no solutions.

.....

..... [1]

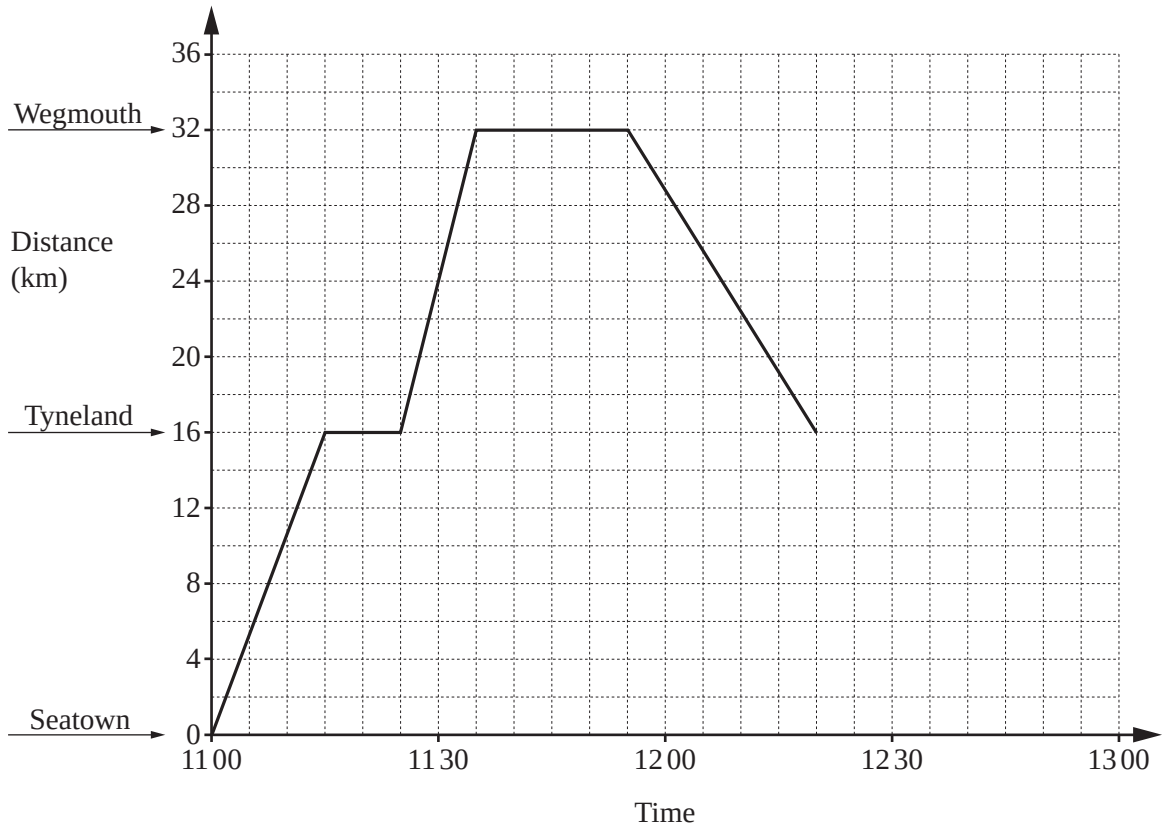
(d) **(i)** Write down the equation of the line of symmetry of $y = 2x^2 - 4x - 6$.

..... [1]

(ii) Use the symmetry of the graph to complete this statement.

When $2x^2 - 4x - 6 = 64$, there are two solutions for x, $x = 7$ or $x =$ ..... [1]

7



The diagram shows the travel graph for a bus travelling between three towns.

(a) (i) For how many minutes does the bus stop at Wegmouth?

..... minutes [1]

(ii) Write down the time the bus leaves Wegmouth.

..... [1]

(iii) The speed of the bus from Tyneland to Wegmouth is 96 km/h.

Change 96 km/h to metres per second.

..... m/s [2]

(b) On the journey back from Wegmouth, the bus stops for 15 minutes in Tyneland.
It then travels at a constant speed of 64 km/h to Seatown.

Complete the travel graph.

[3]

(c) A cyclist leaves Seatown at 11 15 and travels at a constant speed to Wegmouth.
She arrives in Wegmouth at 12 30.

(i) On the travel graph, draw this journey. [1]

(ii) Write down the time when the cyclist meets the bus.

..... [1]

(iii) How far is the cyclist from Wegmouth when she meets the bus?

..... km [1]

(d) Mrs Jones travels on the bus to Wegmouth.
The probability that she stands on the bus is 0.4 .

(i) Write down the probability that she does not stand on the bus.

..... [1]

(ii) Mrs Jones travels on the bus 85 times.

Work out the expected number of times that she stands on the bus.

..... [1]

(e) In one week, a bus driver works five days.
On four days he works from 9 am to 5 pm.
On one day he works from 3 pm to 10 pm.

(i) Find the total number of hours he works in this week.

..... hours [2]

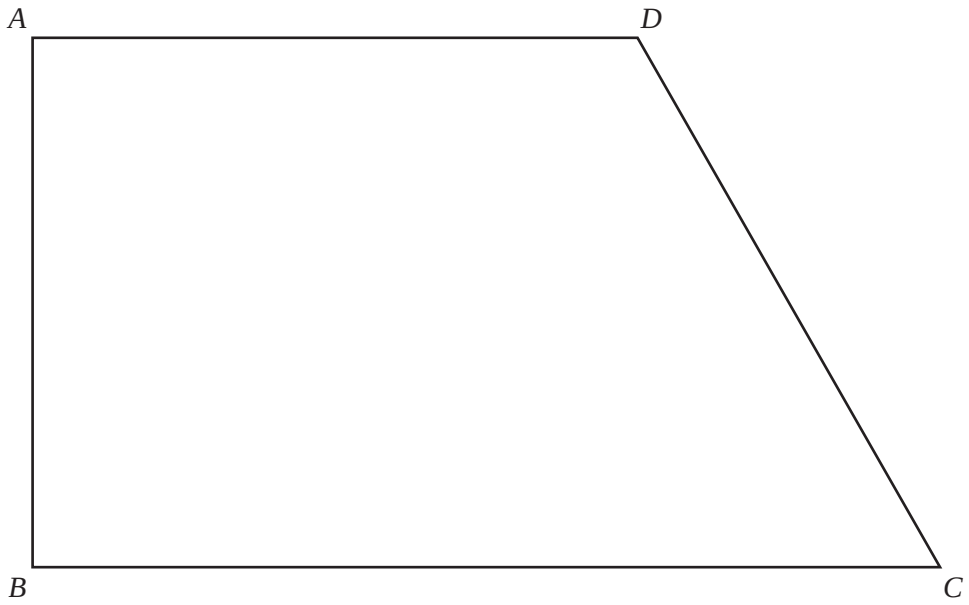
(ii) Each day he is paid $18 per hour before 7 pm.
After 7 pm he is paid 25% extra per hour.

Calculate how much the bus driver is paid for this week.

$ ..... [3]

8 The quadrilateral *ABCD* is a scale drawing of a farmer's field.

Side *AD* and side *BC* are parallel.
Angle *DAB* and angle *ABC* are right angles.



(a) Write down the mathematical name of the quadrilateral.

..... [1]

(b) The side of the field, *AB*, is 28 m.

(i) Complete this statement.

The scale of the diagram is 1 centimetre represents ..... metres.

[2]

(ii) Work out the actual area of the field in m^2.

..... m^2 [3]

(c) The field has two fences.
Each fence extends across the field until it meets another side.

- Fence 1 is the perpendicular bisector of *CD*.
- Fence 2 is the bisector of angle *ABC*.

Using a straight edge and compasses only, construct the two fences on the diagram.
Show all your construction arcs. [4]

(d) The region of the field that is 16 m or less from *A* is planted with wheat.

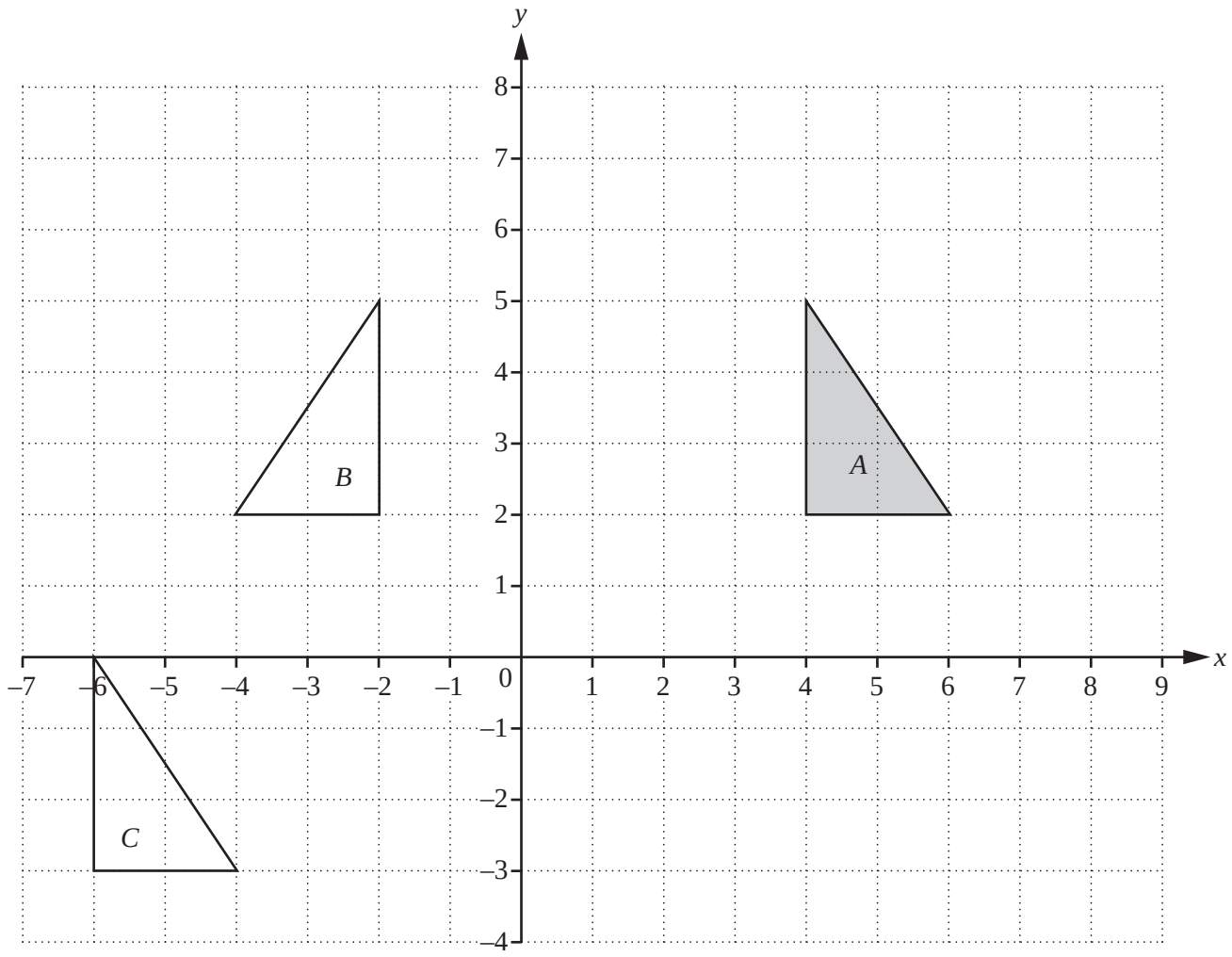
(i) **Using a ruler and compasses only**, construct and shade the region planted with wheat. [3]

(ii) Work out the actual area of the region that is planted with wheat.

..... m^2 [2]

Question 9 is printed on the next page.

9



(a) **(i)** Describe fully the **single** transformation that maps triangle *A* onto triangle *B*.

.....

..... [2]

(ii) Describe fully the **single** transformation that maps triangle *A* onto triangle *C*.

.....

..... [2]

(b) On the grid, draw the image of

(i) triangle *A* after a rotation of 270° clockwise about (4, 5), [2]

(ii) triangle *A* after an enlargement with scale factor 2, centre (4, 7). [2]