Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

MATHEMATICS **0580/42**

Paper 4 (Extended) **May/June 2015**

2 hours 30 minutes

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 130.

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 **20** printed pages.

© UCLES 2015

CAMBRIDGE International Examinations

1 **(a)** Last year a golf club charged \$1650 for a family membership.
This year the cost increased by 12%.

View solution

Calculate the cost of a family membership this year.

Answer(a) \$ ..... [2]

(b) The golf club runs a competition.
The total prize money is shared in the ratio 1st prize : 2nd prize = 9 : 5.
The 1st prize is \$500 more than the 2nd prize.

View solution

(i) Calculate the total prize money for the competition.

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

(ii) What percentage of the total prize money is given as the 1st prize?

View solution

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

(c) For the members of the golf club the ratio men : children = 11 : 2.
The ratio women : children = 10 : 3.

View solution

(i) Find the ratio men : women.

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

© UCLES 2015

(ii) The golf club has 24 members who are children.

Find the total number of members.

View solution

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

(d) The club shop sold a box of golf balls for \$20.40 .
The shop made a profit of 20% on the cost price.

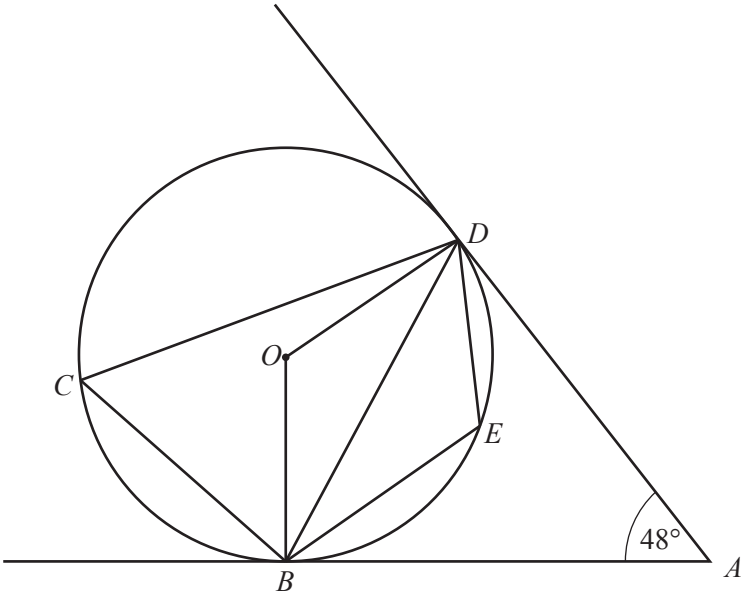
View solution

Calculate the cost price of the golf balls.

Answer(d) \$ ..... [3]

© UCLES 2015

2



NOT TO SCALE

In the diagram, B, C, D and E lie on the circle, centre O.
AB and AD are tangents to the circle.
Angle $BAD = 48°$.

View solution

(a) Find

(i) angle ABD,

Answer(a)(i) Angle ABD = ... [1]

(ii) angle OBD,

Answer(a)(ii) Angle OBD = ... [1]

(iii) angle BCD,

Answer(a)(iii) Angle BCD = ... [2]

(iv) angle BED.

Answer(a)(iv) Angle BED = ... [1]

View solution

(b) The radius of the circle is 15 cm.

Calculate the area of triangle BOD.

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

View solution

(c) Give a reason why $ABOD$ is a cyclic quadrilateral.

Answer(c) .....

..... [1]

3 On the first part of a journey, Alan drove a distance of x km and his car used 6 litres of fuel.

The rate of fuel used by his car was $\frac{600}{x}$ litres per 100 km.

(a) Alan then drove another $(x + 20)$ km and his car used another 6 litres of fuel.

View solution

(i) Write down an expression, in terms of x, for the rate of fuel used by his car on this part of the journey.
Give your answer in litres per 100 km.

Answer(a)(i) ..... litres per 100 km [1]

(ii) On this part of the journey the rate of fuel used by the car **decreased** by 1.5 litres per 100 km.

View solution

Show that $x^2 + 20x - 8000 = 0$.

Answer(a)(ii)

[4]

(b) Solve the equation $x^2 + 20x - 8000 = 0$.

View solution

Answer(b) x = ... or x = ... [3]

(c) Find the rate of fuel used by Alan's car for the complete journey.
Give your answer in litres per 100 km.

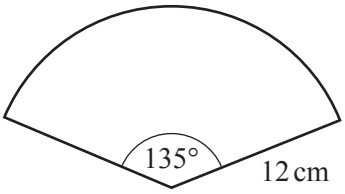
View solution

Answer(c) ..... litres per 100 km [2]

© UCLES 2015

4 **(a)** A sector of a circle has radius 12 cm and an angle of 135°.

(i) Calculate the length of the arc of this sector.
Give your answer as a multiple of π.



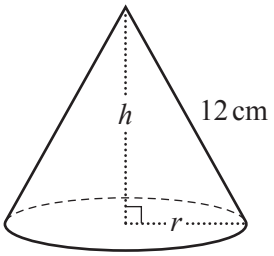
NOT TO SCALE

View solution

Answer(a)(i) ..... cm [2]

(ii) The sector is used to make a cone.

(a) Calculate the base radius, *r*.



NOT TO SCALE

View solution

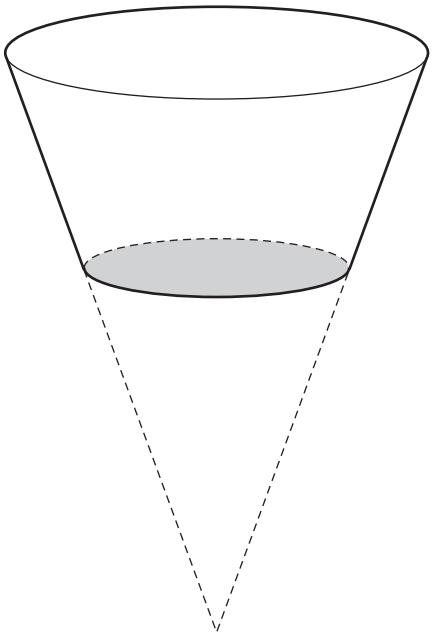
Answer(a)(ii)(a) *r* = ... cm [2]

(b) Calculate the height of the cone, *h*.

Answer(a)(ii)(b) *h* = ... cm [3]

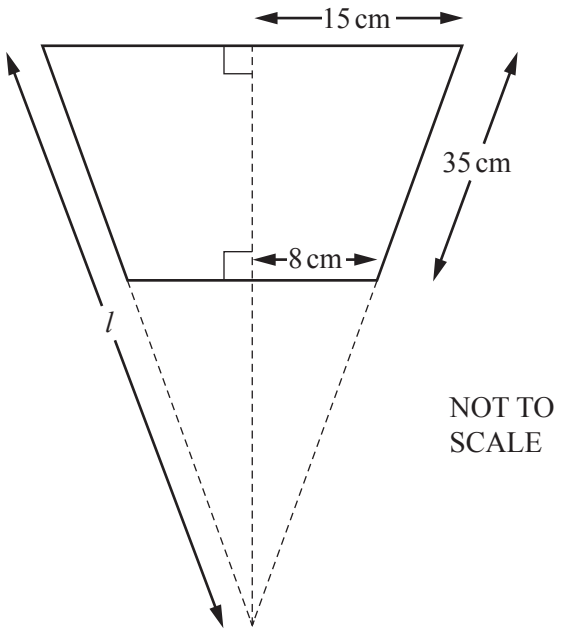
View solution

(b) The diagram shows a plant pot.
It is made by removing a small cone from a larger cone and adding a circular base.



NOT TO SCALE

This is the cross section of the plant pot.



(i) Find l.

Answer(b)(i) l = ... cm [3]

(ii) Calculate the total surface area of the outside of the plant pot.
[The curved surface area, A, of a cone with radius r and slant height l is $A = \pi rl$.]

View solution

Answer(b)(ii) ..... cm^2 [3]

View solution

(c) Some cones are mathematically similar.
For these cones, the mass, M grams, is proportional to the cube of the base radius, r cm.
One of the cones has mass 1458 grams and base radius 4.5 cm.

(i) Find an expression for M in terms of r.

Answer(c)(i) M = ... [2]

View solution

(ii) Two of the cones have radii in the ratio 2 : 3.

Write down the ratio of their masses.

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

© UCLES 2015

5 $y = x^2 - 2x + \frac{12}{x}, \ x \neq 0$

View solution

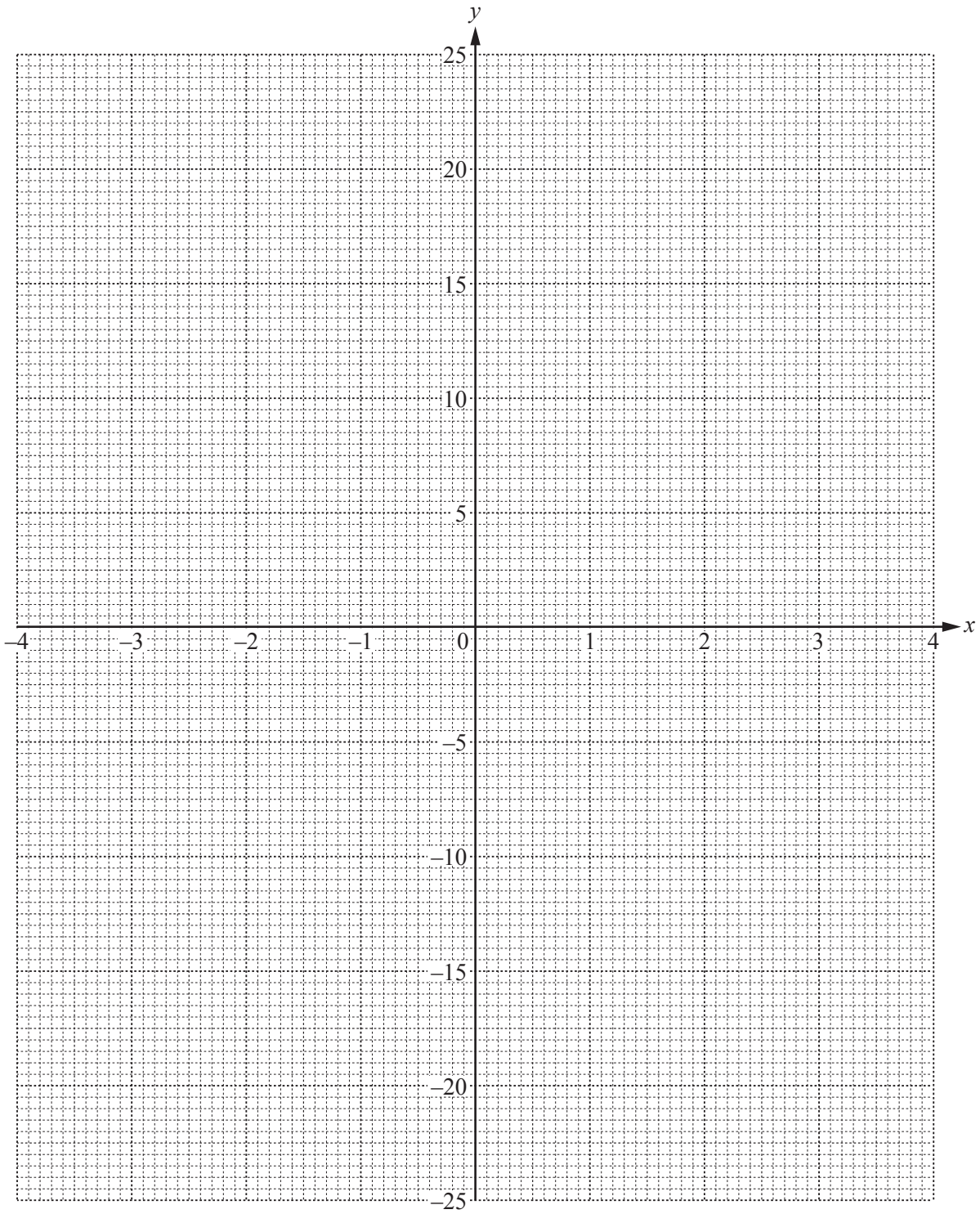
(a) Complete the table of values.

x	–4	–3	–2	–1	–0.5		0.5	1	2	3	4
y	21	11		–9	–22.75		23.25	11	6		11

[2]

View solution

(b) On the grid, draw the graph of $y = x^2 - 2x + \frac{12}{x}$ for $-4 \leqslant x \leqslant -0.5$ and $0.5 \leqslant x \leqslant 4$.



[5]

© UCLES 2015

(c) By drawing a suitable tangent, find an estimate of the gradient of the graph at the point (1, 11).

View solution

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

(d) The equation $x^2 - 2x + \frac{12}{x} = k$ has exactly two distinct solutions.

View solution

Use the graph to find

(i) the value of k,

Answer(d)(i) k = ... [1]

(ii) the solutions of $x^2 - 2x + \frac{12}{x} = k$.

View solution

Answer(d)(ii) x = ... or x = ... [2]

(e) The equation $x^3 + ax^2 + bx + c = 0$ can be solved by drawing the line $y = 3x + 1$ on the grid.

View solution

Find the value of a, the value of b and the value of c.

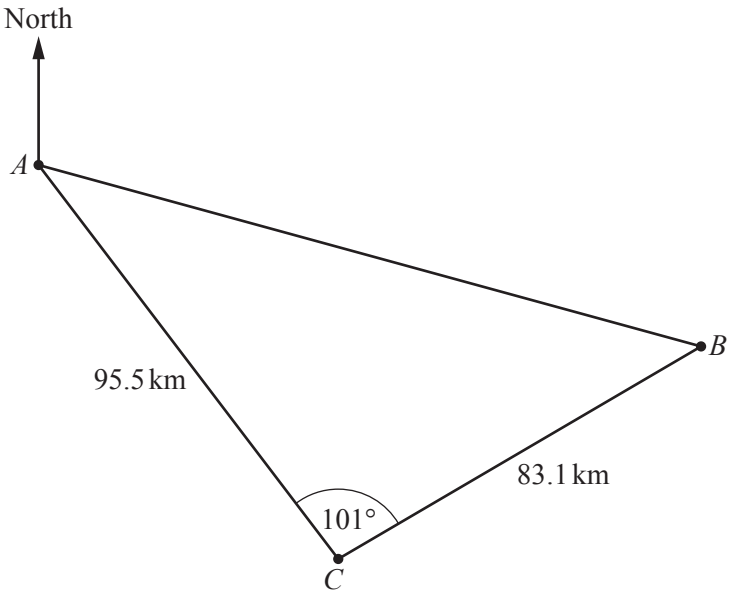
Answer(e) a = ...

b = ...

c = ... [3]

© UCLES 2015

6 The diagram shows the positions of two ships, A and B, and a coastguard station, C.



NOT TO SCALE

(a) Calculate the distance, AB, between the two ships.
Show that it rounds to 138 km, correct to the nearest kilometre.

View solution

Answer(a)

[4]

(b) The bearing of the coastguard station C from ship A is 146°.

View solution

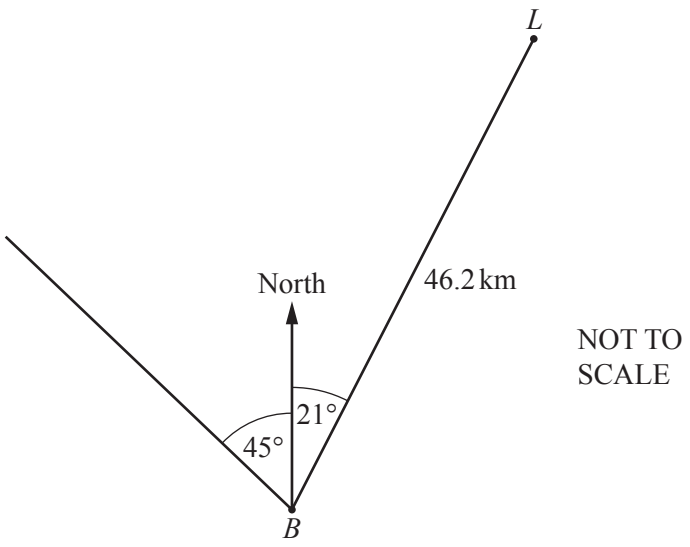
Calculate the bearing of ship B from ship A.

Answer(b) ..... [4]

© UCLES 2015

(c)

View solution



At noon, a lighthouse, L, is 46.2 km from ship B on the bearing 021°.
Ship B sails north west.

Calculate the distance ship B must sail from its position at noon to be at its closest distance to the lighthouse.

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

7 **(a)** A group of 50 students estimated the mass, M grams, of sweets in a jar.
The results are shown in the table.

View solution

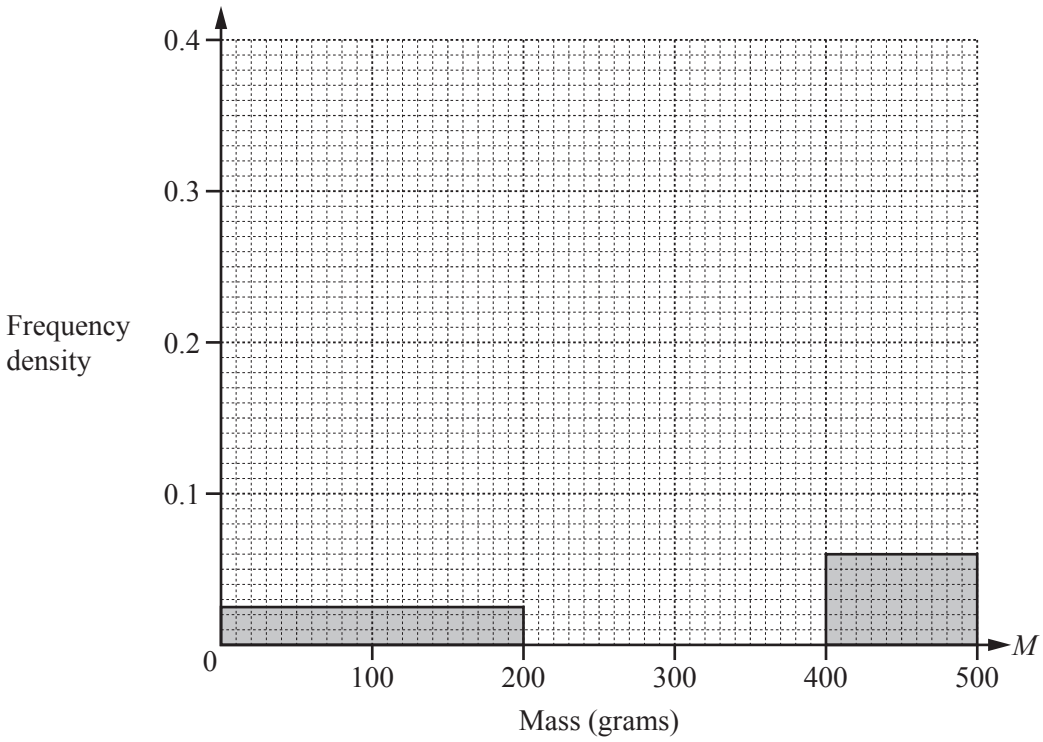
Mass (M grams)	Number of students
$0 < M \leqslant 200$	5
$200 < M \leqslant 300$	9
$300 < M \leqslant 350$	18
$350 < M \leqslant 400$	12
$400 < M \leqslant 500$	6

(i) Calculate an estimate of the mean.

Answer(a)(i) ..... grams [4]

(ii) Complete this histogram to show the information in the table.

View solution

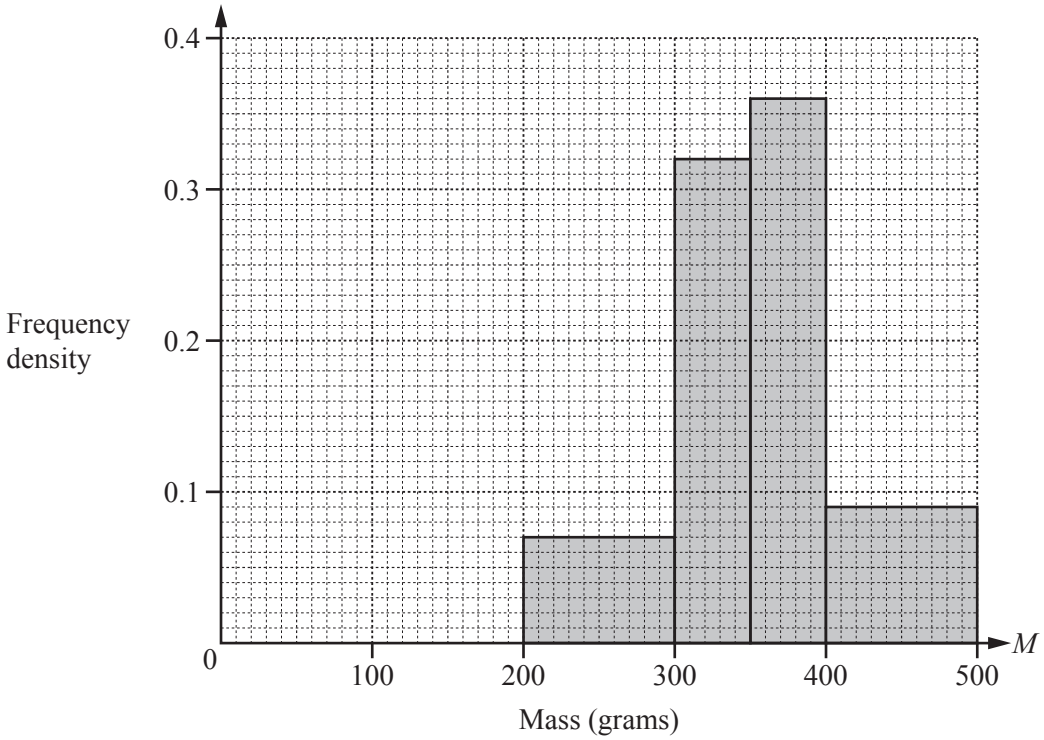


[3]

(b) A group of 50 adults also estimated the mass, M grams, of the sweets in the jar.
The histogram below shows information about their estimates.

Use the histograms to make two comparisons between the distributions of the estimates of the students and the adults.

View solution



Answer(b)

1 .....

.....

2 .....

..... [2]

8 Sima sells x biscuits and y cakes.

(a) (i) She sells at least 100 biscuits.

View solution

Write down an inequality in x.

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

(ii) She sells at least 120 cakes.

View solution

Write down an inequality in y.

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

(iii) She sells a maximum of 300 biscuits and cakes altogether.

View solution

Write down an inequality in x and y.

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

(iv) Sima makes a profit of 40 cents on each biscuit and 80 cents on each cake.
Her total profit is at least \$160.

View solution

Show that $x + 2y \geqslant 400$.

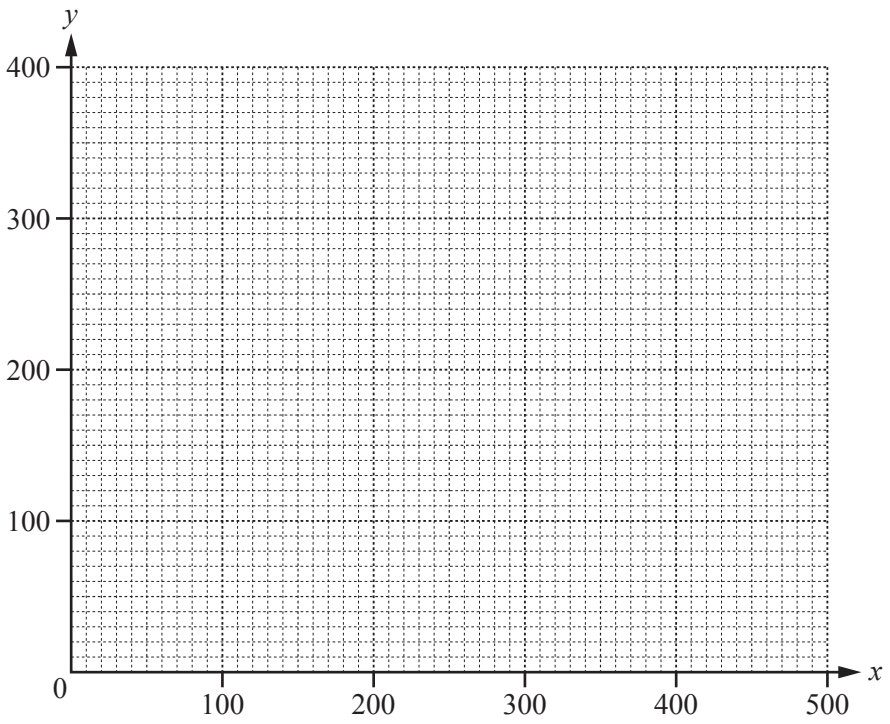
Answer(a)(iv)

[1]

© UCLES 2015

(b) On the grid, draw four lines to show the four inequalities and shade the unwanted regions.

View solution



[6]

(c) Calculate Sima's maximum profit.
Give your answer in dollars.

View solution

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

9 **(a)** Expand and simplify.

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

View solution

Answer(a) ..... [3]

(b) Factorise the following completely.

View solution

(i) $6w + 3wy - 4x - 2xy$

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

(ii) $4x^2 - 25y^2$

View solution

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

(c) Simplify.

$$\left(\frac{16}{9x^4}\right)^{-\frac{3}{2}}$$

View solution

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

© UCLES 2015

(d) n is an integer.

View solution

(i) Explain why $2n - 1$ is an odd number.

Answer(d)(i) .....

..... [1]

View solution

(ii) Write down, in terms of n, the next odd number after $2n - 1$.

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

(iii) Show that the difference between the squares of two consecutive odd numbers is a multiple of 8.

View solution

Answer(d)(iii)

[3]

10 **(a)** $\overrightarrow{PQ} = \begin{pmatrix} 5 \\ -8 \end{pmatrix}$

View solution

(i) Find the value of $|\overrightarrow{PQ}|$.

Answer(a)(i) $|\overrightarrow{PQ}|$ = ... [2]

View solution

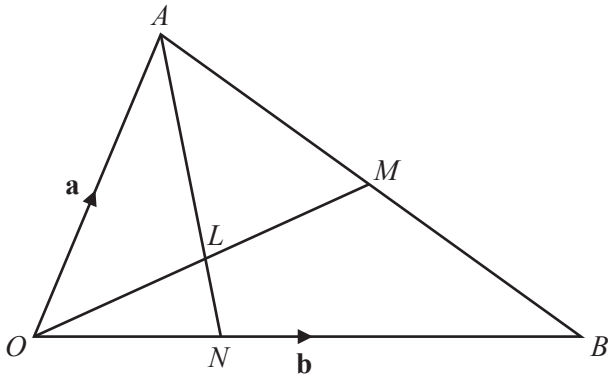
(ii) Q is the point (2, –3).

Find the co-ordinates of the point P.

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

View solution

(b)



NOT TO SCALE

In the diagram, M is the midpoint of AB and L is the midpoint of OM.
The lines OM and AN intersect at L and $ON = \frac{1}{3}OB$.
$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.

(i) Find, in terms of **a** and **b**, in its simplest form,

(a) $\overrightarrow{OM}$,

Answer(b)(i)(a) $\overrightarrow{OM}$ = ... [2]

(b) $\overrightarrow{OL}$,

Answer(b)(i)(b) $\overrightarrow{OL}$ = ... [1]

(c) $\overrightarrow{AL}$.

Answer(b)(i)(c) $\overrightarrow{AL}$ = ... [2]

© UCLES 2015

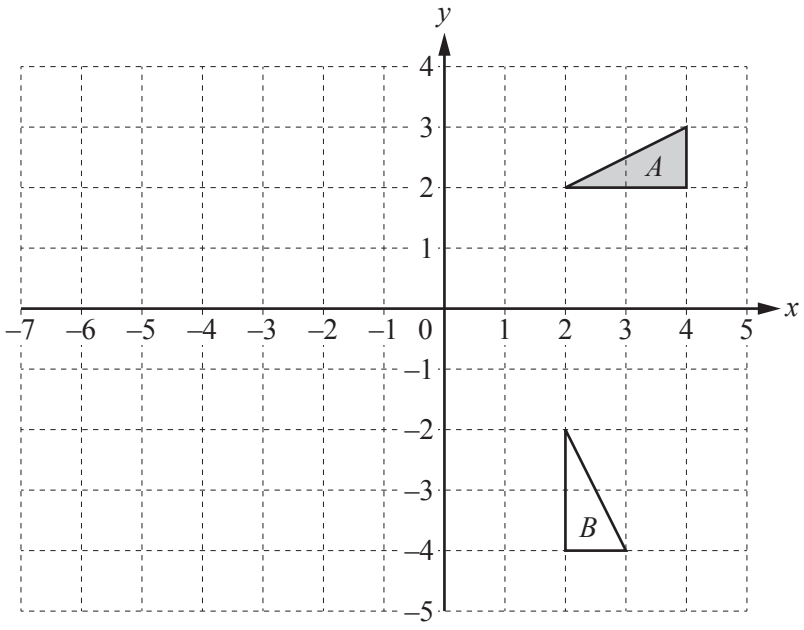
(ii) Find the ratio $AL : AN$ in its simplest form.

View solution

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

(c)

View solution



(i) On the grid, draw the image of triangle A after the transformation represented by the matrix $\begin{pmatrix} -1.5 & 0 \\ 0 & -1.5 \end{pmatrix}$. [3]

(ii) Find the 2×2 matrix which represents the transformation that maps triangle A onto triangle B.

View solution

Answer(c)(ii) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

Question 11 is printed on the next page.

11 Gareth has 8 sweets in a bag.
4 sweets are orange flavoured, 3 are lemon flavoured and 1 is strawberry flavoured.

View solution

(a) He chooses two of the sweets at random.

Find the probability that the two sweets have different flavours.

Answer(a) ..... [4]

View solution

(b) Gareth now chooses a third sweet.

Find the probability that **none** of the three sweets is lemon flavoured.

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

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.