Surname	Centre Number	Candidate Number
Other Names		0

WJEC CBAC

GCSE

4370/05

MATHEMATICS – LINEAR
PAPER 1
HIGHER TIER

A.M. TUESDAY, 11 June 2013

2 hours

CALCULATORS ARE NOT TO BE USED FOR THIS PAPER

ADDITIONAL MATERIALS

A ruler, a protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

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.

If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

Take π as 3·14.

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 **5**.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	**3**	
2	**7**	
3	**5**	
4	**3**	
5	**9**	
6	**5**	
7	**3**	
8	**7**	
9	**5**	
10	**6**	
11	**5**	
12	**9**	
13	**3**	
14	**8**	
15	**6**	
16	**4**	
17	**12**	
TOTAL MARK		

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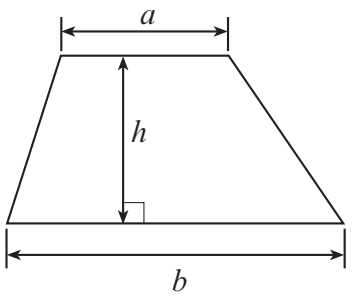
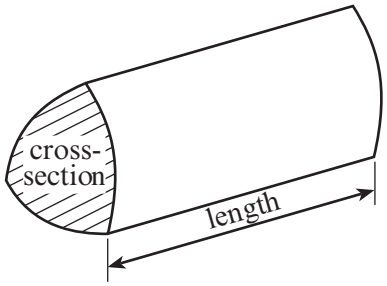
Formula List

Area of trapezium = $\frac{1}{2}(a + b)h$

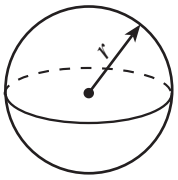


Volume of prism = area of cross-section × length



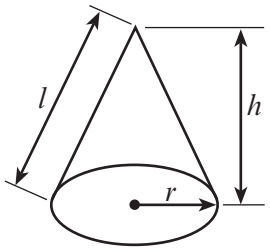
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$

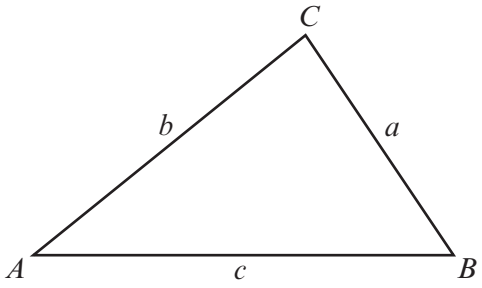


In any triangle ABC

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$ are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

Examiner only

1.

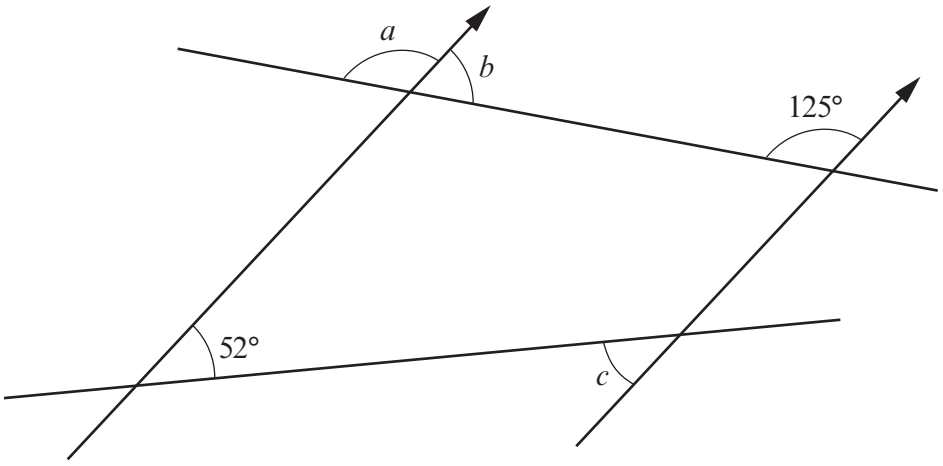


Diagram not drawn to scale

Find the size of each of the angles a, b and c.

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a = ... ° b = ... ° c = ... °

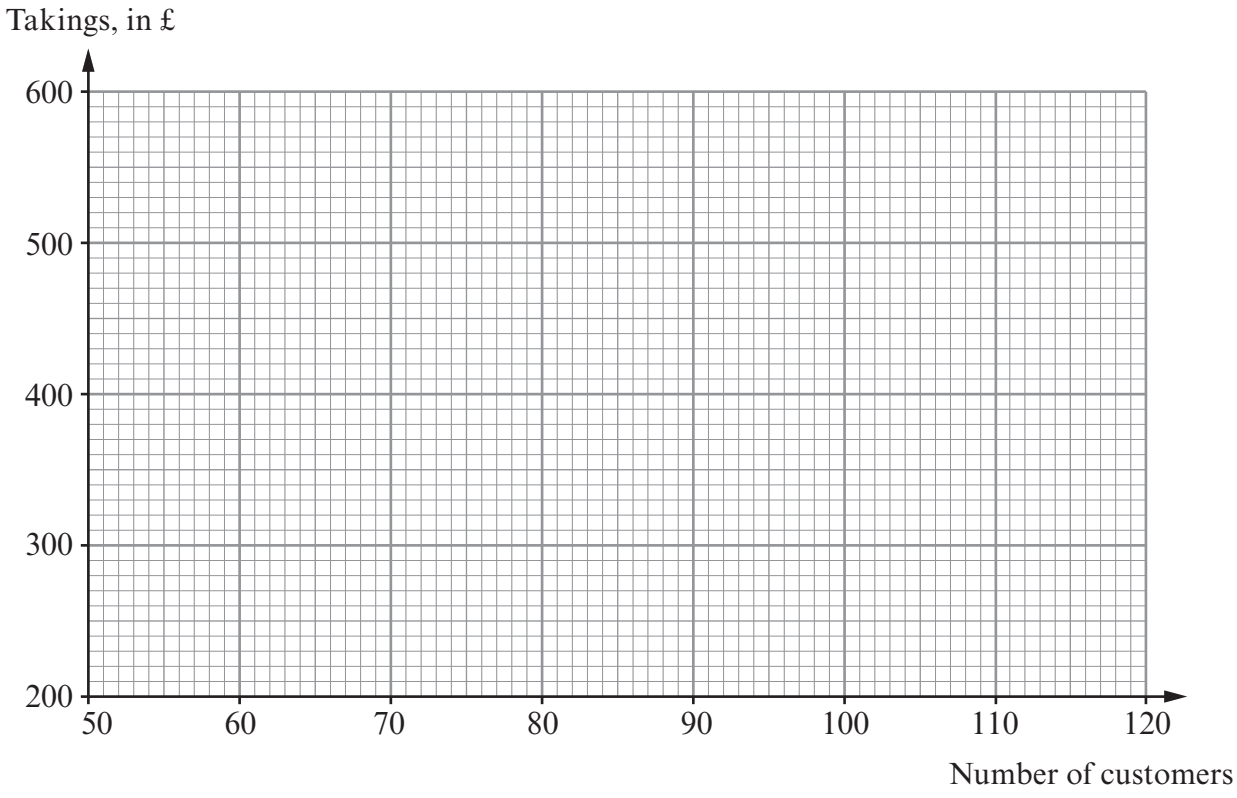
[3]

Examiner only

2. Every Friday for 6 weeks, the number of customers entering a sandwich shop and the takings of the shop were recorded.
The takings were recorded correct to the nearest £10.
The table below shows the results.

Number of customers	104	82	120	64	70	118
Takings, in £	510	420	590	320	340	560

(a) On the graph paper below, draw a scatter diagram of these results.



[2]

(b) Write down the type of correlation that is shown by the scatter diagram.

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[1]

(c) Draw, by eye, a line of best fit on your scatter diagram.

[1]

(d) Estimate the takings for a Friday when there are 90 customers.

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[1]

Examiner only

(e) Approximately how much does a customer spend, on average, in the sandwich shop on a Friday?

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[2]

Examiner only

3. Two types of banana are available to buy, Fairtrade and non-Fairtrade.
Each type of banana costs 30p.
The table below shows how the 30p is shared for each type of banana.

	Non-Fairtrade	Fairtrade
Grower	2p	15p
Plantation owner	5p	2p
Wholesale importer	3p	2p
Shipper	4p	3p
Ripener	4p	2p
Seller	12p	6p
Total	30p	30p

(a) Calculate the percentage of the cost of a banana that goes to the seller under

(i) non-Fairtrade,

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[2]

(ii) Fairtrade.

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[1]

Examiner only

(b) A newspaper report states that the Grower gets too small a proportion of the price of a non-Fairtrade banana. Explain, using fractions, how this has improved with the move to producing Fairtrade bananas.

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[2]

Examiner only

4. In answering this question, you must show all your construction arcs.
Use a ruler and a pair of compasses to construct an angle of 45° at the mid-point of the straight line below.
Label your angle 45°.

[3]

Examiner only

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

Pedro has just moved to live on an island in Europe.
There is a choice of two different water companies.

Manana Water

No Standing Charge

Pay €0.06 per m^3 of water used

Channel Water

Standing Charge: €30 every 3 months
+
€0.02 per m^3 of water used

Special offer: 20% off your **first** bill

Pedro estimates that he uses 700 m^3 of water every three months.
He wants to spend as little as possible on water.
Which company should Pedro buy his water from?
You must justify your answer by showing all possible costs.

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[9]

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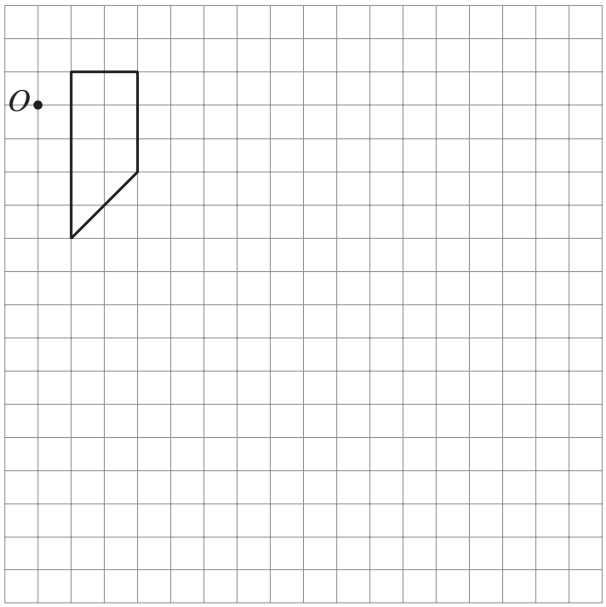
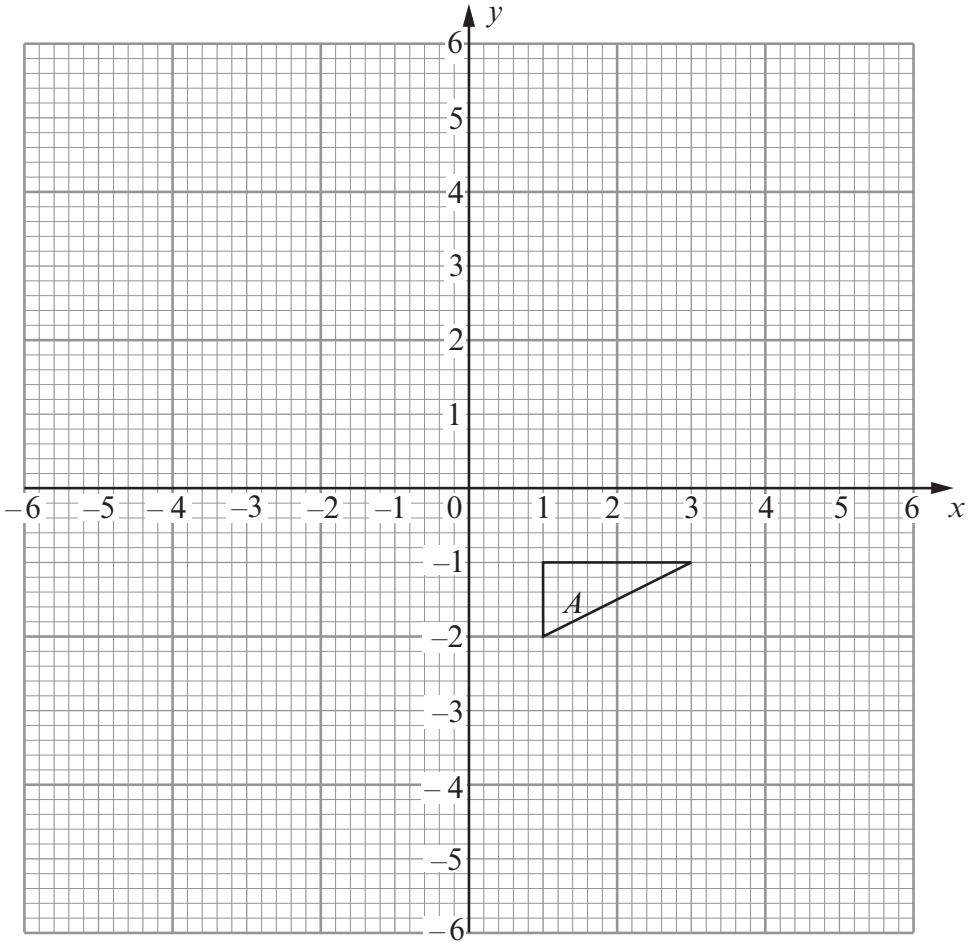
Examiner only

6. *(a)* On the grid below, draw an enlargement of the trapezium using a scale factor of 2 and centre *O*.



[3]

(b) Rotate the triangle *A* through 90° anticlockwise about the point (–1, –2).



[2]

Examiner only

7.

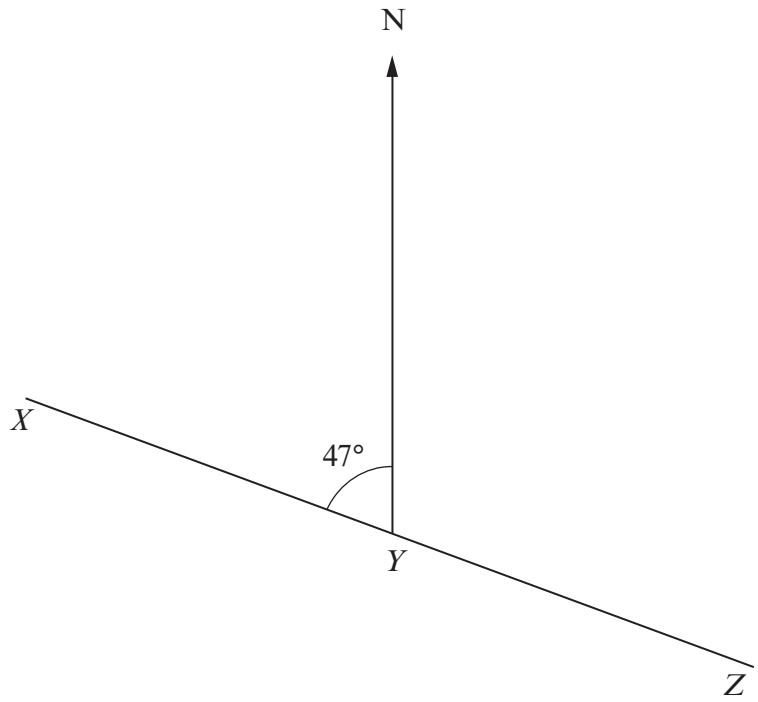


Diagram not drawn to scale

The above diagram shows three points X, Y and Z which lie on a straight line.

Calculate the bearing of

(a) Z from Y,

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[1]

(b) X from Y.

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[2]

Examiner only

8. *(a)* Find the highest common factor of 90 and 105.

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[2]

(b) Find the lowest common multiple of 90 and 105.

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[2]

(c) Express 936 as a product of prime numbers in index form.

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[3]

Examiner only

9. A company is making cylinders to package plastic rods.
Each cylinder is made using a rectangular piece of card and two circular pieces of metal.
The net of one of these cylinders is shown below.

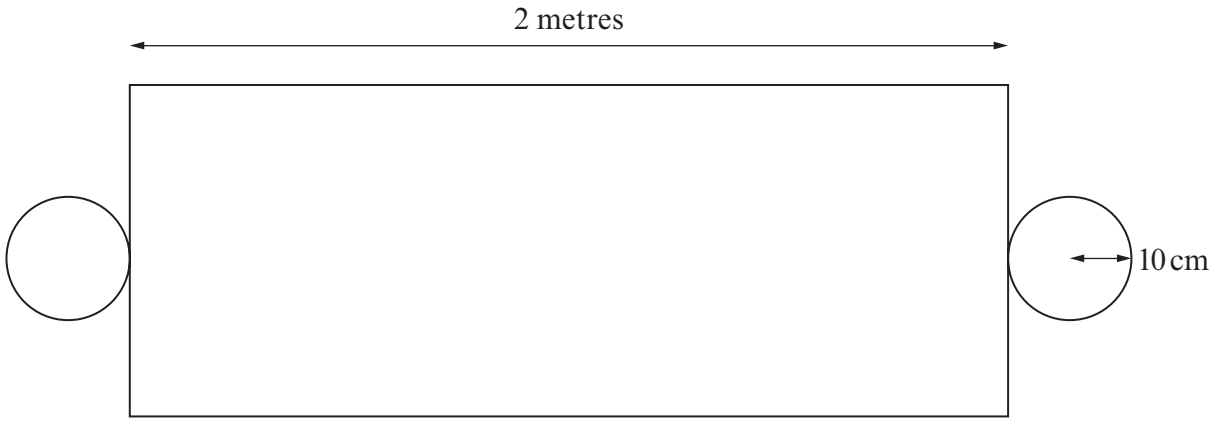

Diagram not drawn to scale

The radius of each circular end is 10 cm.
The cylinder is of length 2 metres.
Taking $\pi = 3{\cdot}14$, calculate the **area of the rectangular piece of card**.
State the units of your answer.

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[5]

Examiner only

10. Rearrange the following formulae to make y the subject.

(a) $y^2 - t = g$

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[2]

(b) $\dfrac{3y + w}{2y + 3} = 5$

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[4]

Examiner only

11. The diagrams show how 12 small identical rectangles can be placed to form a larger rectangle in two different ways.

Diagram 1

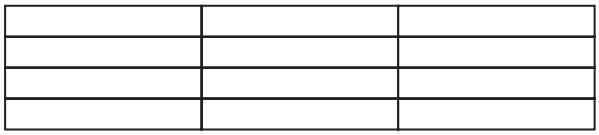
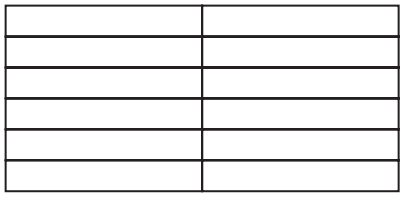


Diagram 2



Diagrams not drawn to scale

The perimeter of each of these diagrams is measured.
The perimeter of diagram 1 is 55 cm.
The perimeter of diagram 2 is 50 cm.

Find the dimensions of one of the 12 small identical rectangles.

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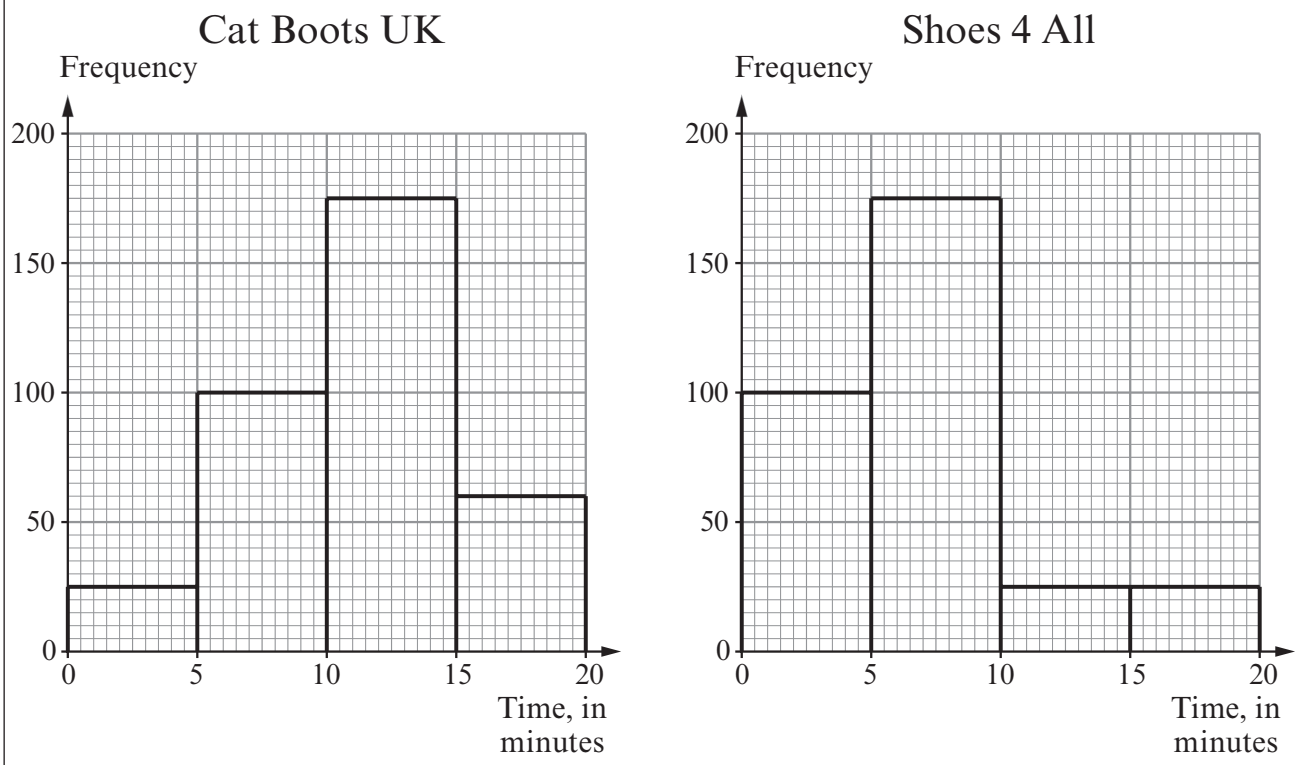
[5]

Examiner only

12. The frequency diagrams show the lengths of telephone calls taken by two online shopping companies one day in November.



(a) How many calls to Cat Boots UK lasted between 5 minutes and 15 minutes?

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[1]

(b) Which company had longer calls on average on this day?
Give a reason for your answer.

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[1]

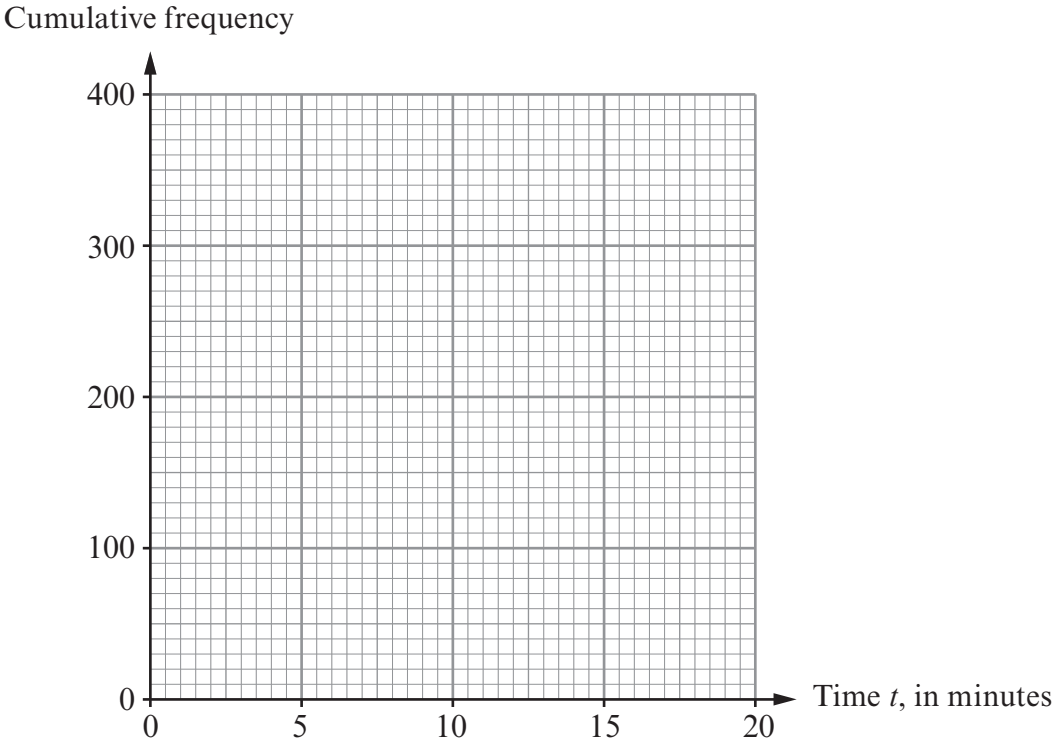
(c) Complete the cumulative frequency table for Cat Boots UK times.

Time t, in minutes	$t \leqslant 5$	$t \leqslant 10$	$t \leqslant 15$	$t \leqslant 20$
Cumulative frequency				

[2]

Examiner only

(d) Use the graph paper below to draw a cumulative frequency diagram for the Cat Boots UK information.



[2]

(e) Use your cumulative frequency diagram to find

(i) an estimate for the median time of calls to Cat Boots UK,

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[1]

(ii) an estimate for the inter-quartile range of the times for calls to Cat Boots UK.

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[2]

Examiner only

13. A farmer has just enough food to feed x pigs for y days.

(a) Write down an expression for the number of days the farmer could feed z pigs with the same amount of food.

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[2]

(b) Write down an assumption you have made in answering part *(a)*.

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[1]

Examiner only

14. *(a)* Express $\frac{x}{x-3} - \frac{x}{x+6}$ as a single fraction in its simplest form.

[3]

(b) Simplify $\frac{49x^2 - 100}{14x + 20}$.

[4]

(c) Simplify $\frac{(2x-5)^8}{(2x-5)^6}$.

[1]

Examiner only

15. *(a)* Express $0\cdot4\dot{3}\dot{5}$ as a fraction.

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[2]

(b) Express $100^{-\frac{1}{2}}$ as a fraction.

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[1]

(c) Given that $f = \sqrt{2}$, $g = \sqrt{5}$ and $h = \sqrt{10}$, find, in its simplest form,

(i) $\frac{fg}{h}$,

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[1]

(ii) $fg + h$,

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[1]

(iii) fh.

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[1]

Examiner only

16. The points A and B lie on the circumference of a circle with centre O.
The straight lines PAQ and RBQ are tangents to the circle.

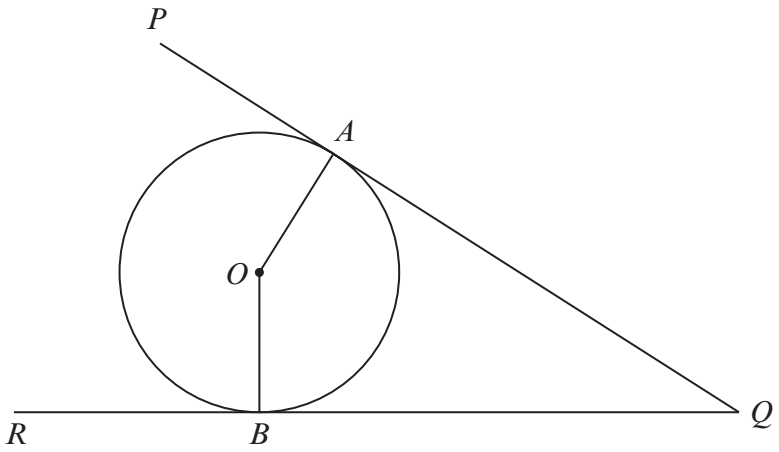

Diagram not drawn to scale

You are given that $A\hat{Q}B = 2x$, where x is measured in degrees.

Write down the size of $A\hat{O}Q$ in terms of x.
Give reasons in your answer.

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[4]

Examiner only

17. *(a)* In an experiment, it was found that the velocity, v m/s, of a particle at time t seconds was given by the equation $v = 5t - t^2$.

Draw the graph of $v = 5t - t^2$ for values of t from 0 to 5.

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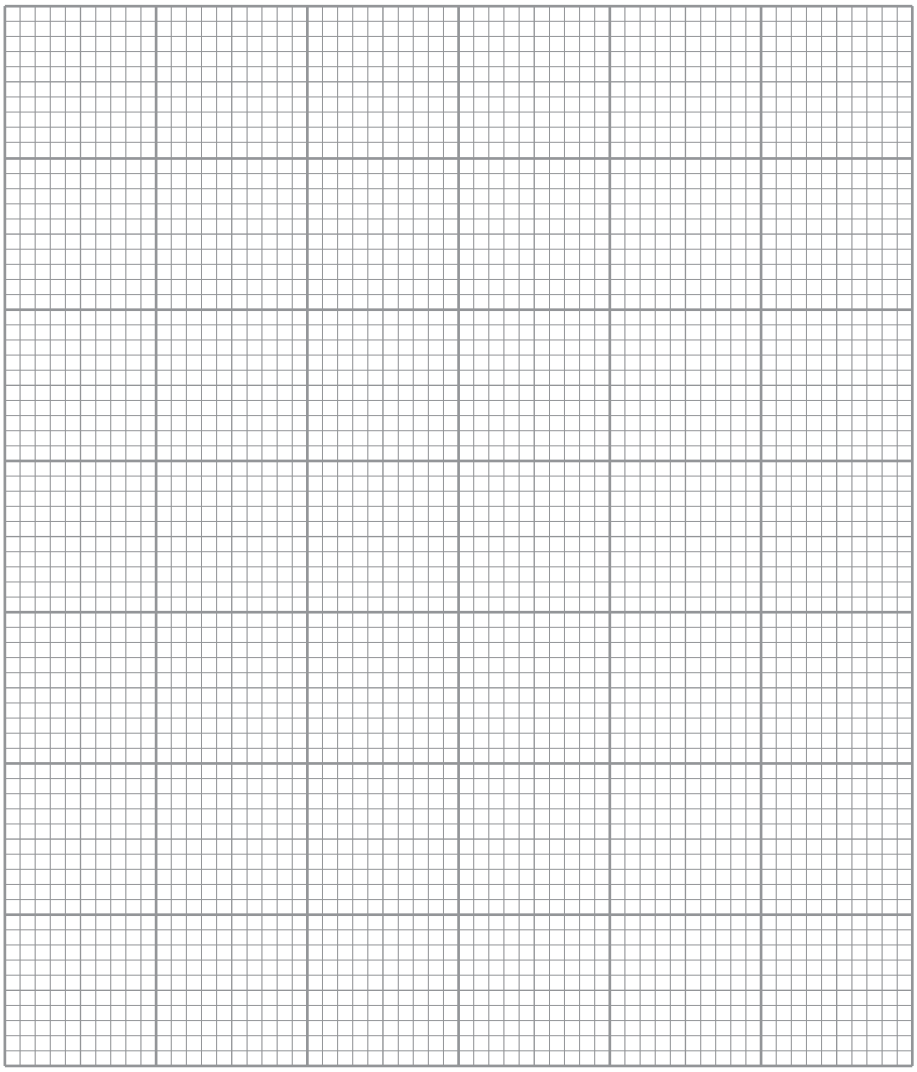
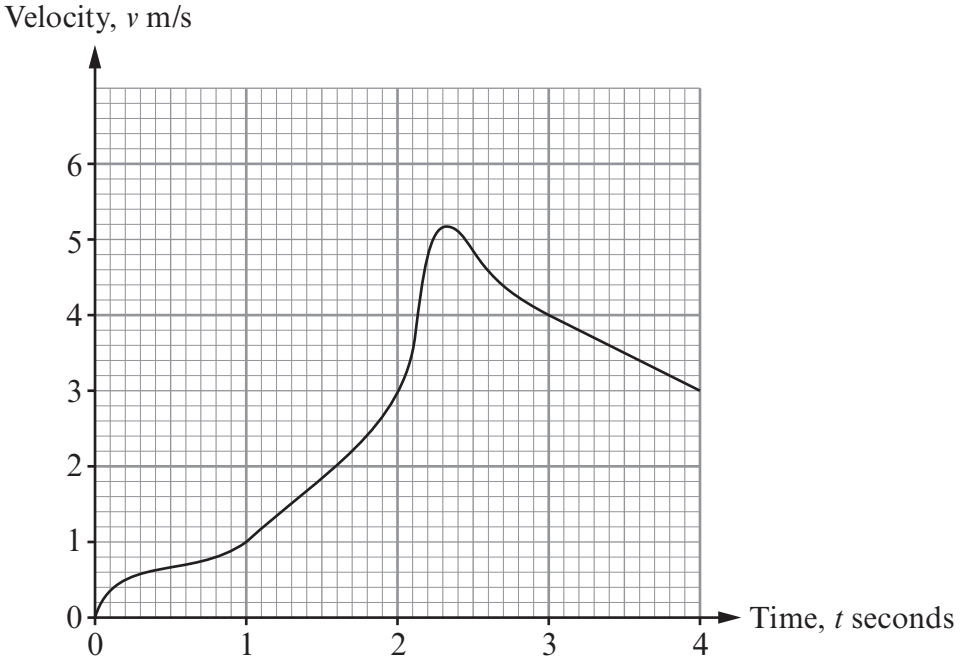


[4]

Examiner only

(b) A velocity-time graph for a different experiment is shown below.



(i) Based on this experiment, complete the following sentence. [1]

"The acceleration of this particle is zero when t = ..."

(ii) Find an approximation for the acceleration of the particle in this experiment when $t = 1$. Give the units of your answer. [4]

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(iii) Find an approximation for the distance travelled by the particle between $t = 0$ and $t = 4$. [3]

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Question number	Additional page, if required. Write the question numbers in the left-hand margin.

Examiner only