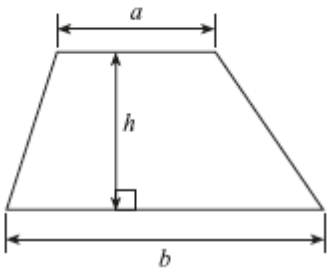
MATHEMATICS PRACTICE PAPERS
UNIT 2: CALCULATOR-ALLOWED
INTERMEDIATE TIER
1 hour 45 minutes

(Linear papers - November 2015)

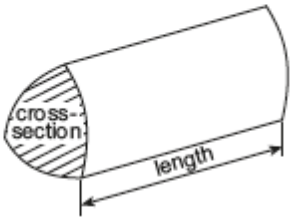
Question	Topic	Mark	Out of
1	Simplifying and solving a problem that includes scales		8
2	Solving a combinations problem		8
3	Expand, simplify and inequalities		7
4	Scatter diagram		5
5	Angles and parallel lines		4
6	Shape transformations		4
7	Straight line graphs		4
8	Exchange rates		7
9	Estimating the mean		7
10	Depreciation %		10
11	Pythagoras and trigonometry		6
12	Cumulative frequency		6
13	Area of a circle and a problem involving volume		4
Total			80

Formula List – Intermediate Tier

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



Volume of prism = area of cross-section × length



1.

(a) Simplify $a + 3b + a - 4b$. [2]

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(b) Rebecca thinks of a number.
She multiplies the number by 4 and subtracts 7 to get 41.
What was her number? [2]

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(c) An apple and a pear are placed on a scale, as shown in Diagram 1.
Another apple is added to the scale, as shown in Diagram 2.
Both apples have the same weight.
What is the weight of the pear? [4]

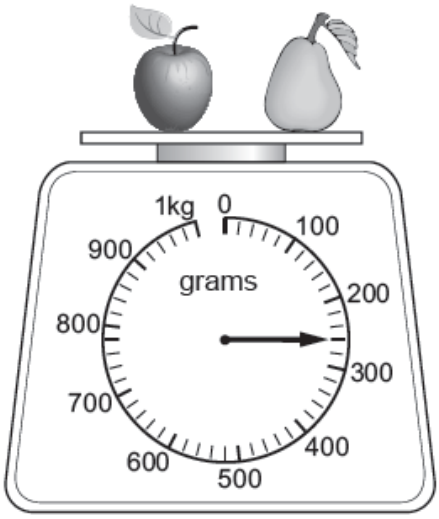

Diagram 1

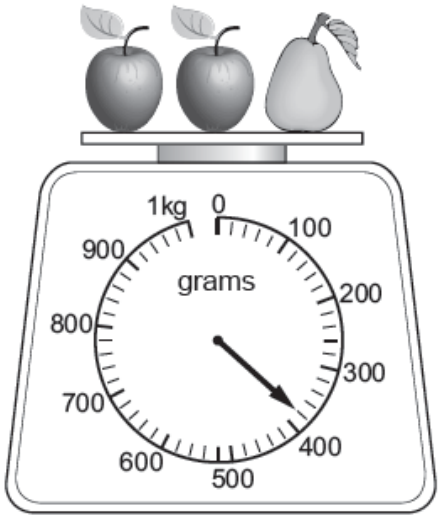

Diagram 2

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2.

Stephen and Gwen play a game using four discs with a positive whole number on each disc.
The discs are placed in a bag.
Stephen selects a disc from the bag at random.
He writes down the number on the disc and replaces the disc in the bag.
Gwen now does the same and they then add together the two numbers they obtained.
If the numbers add up to give an even number, then Stephen wins, otherwise Gwen wins.

(a) The numbers on the discs are

Who is more likely to win this game?
Give full details of your reasoning. [4]

(b) The numbers on the discs are changed, as shown below.

Is this game fair?
Give full details of your reasoning. [2]

(c) (i) Choose four numbers of your own so that the game is fair. [1]

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(ii) State the rule for your choice of numbers on the discs so that the game is fair. [1]

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3.

(a) Expand $5y(2y^2 - 3)$. [2]

(b) Simplify $4h^3 \times 5h^2$. [1]

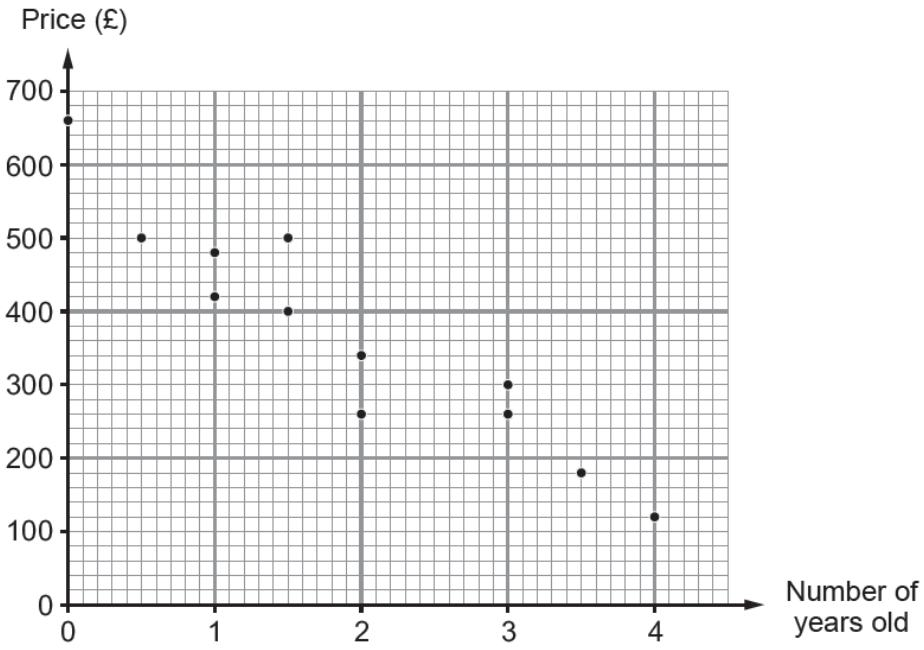
(c) Find all integers n that satisfy the inequality $6 < 2n < 13$. [3]

(d)

Simplify $4h^3 \times 5h^2$. [1]

4.

The scatter diagram shows the price and age for each of 12 scooters of the same make and model.



(a) Write down the price of the new scooter. [1]

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(b) Write down the price of the oldest scooter. [1]

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(c) Draw, by eye, a line of best fit on the scatter diagram. [1]

(d) Write down the type of correlation shown by the scatter diagram. [1]

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(e) Estimate the price of a $2\frac{1}{2}$ year old scooter of the same make and model. [1]

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5.

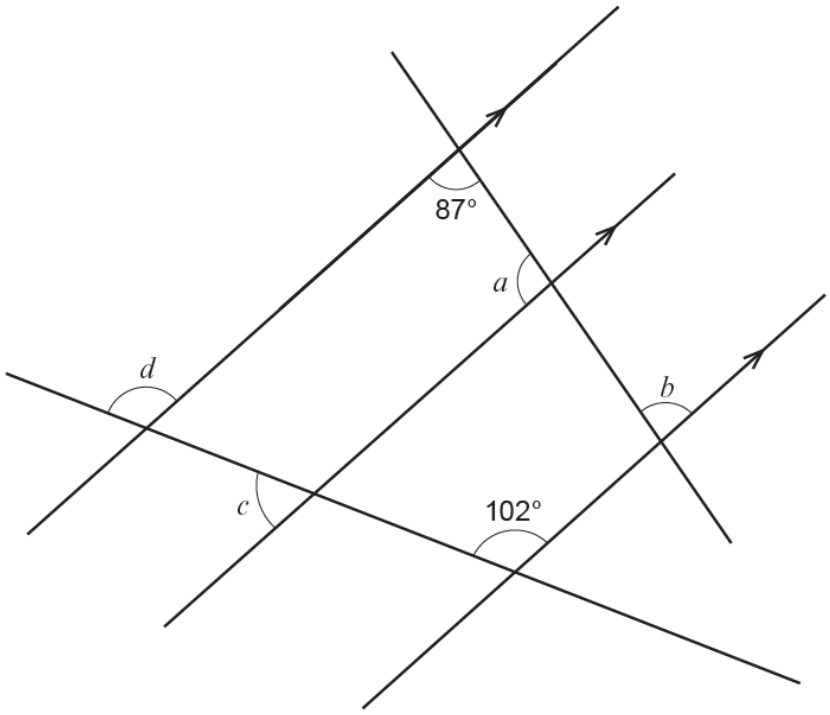

Diagram not drawn to scale

Find the sizes of the angles a, b, c and d. [4]

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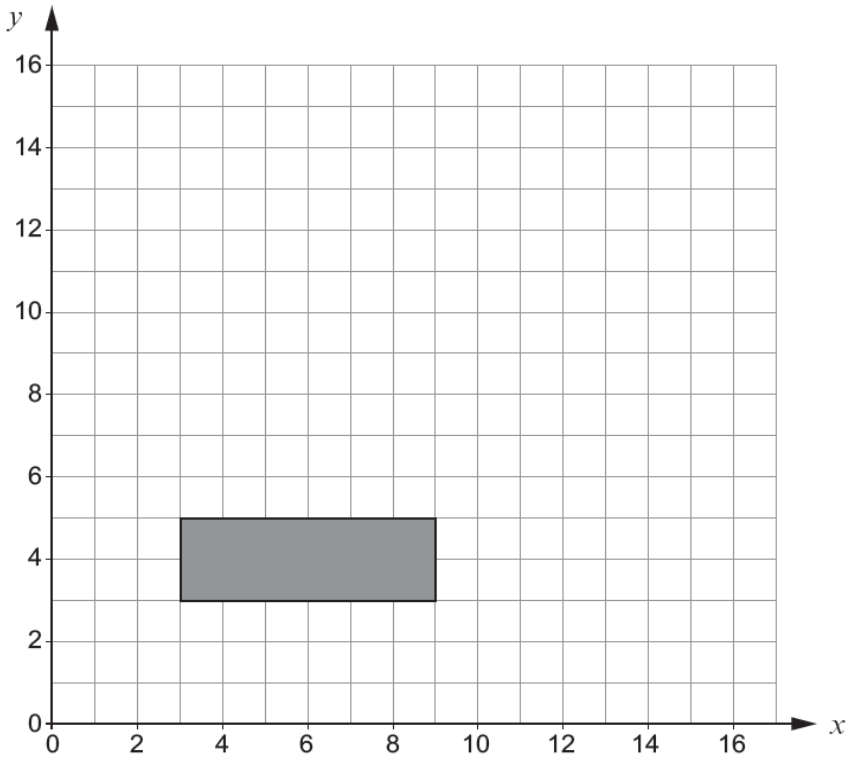
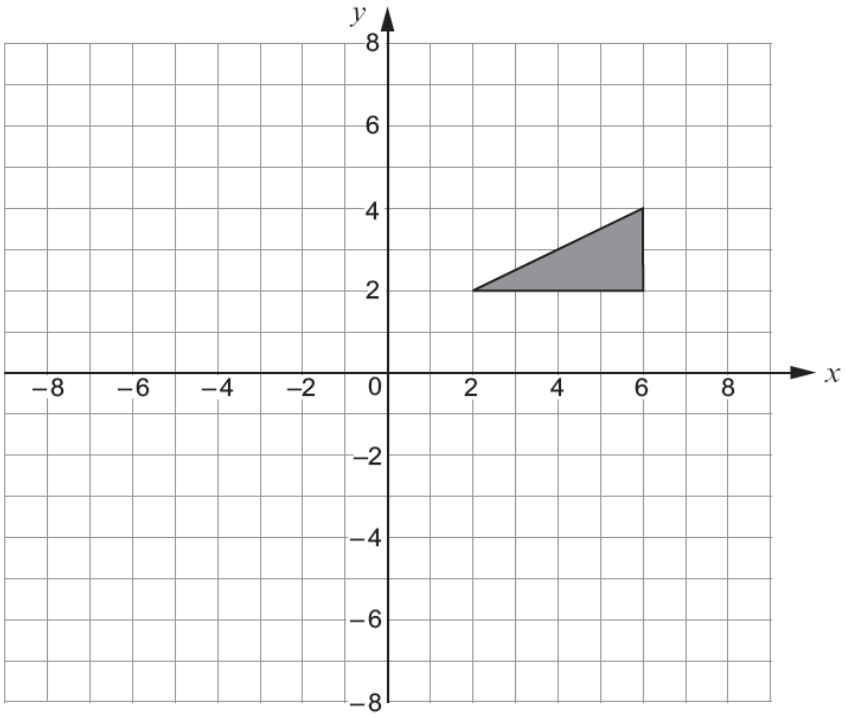
a = ... ° b = ... ° c = ... ° d = ... °

6.

(a) Enlarge the rectangle shown by a scale factor of 2, using (2, 1) as the centre of the enlargement. [2]



(b) Rotate the triangle shown below through 180° about the point (1, 2). [2]



7.

(a) Does the point (4, –2) lie on the straight line $2x - 3y = 14$?
Put a tick (✓) in the appropriate box.
You **must** show working to justify your answer. [1]

Yes ☐ No ☐

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(b) Does the point (4, 4) lie on the curve $2y = x^2$?
Put a tick (✓) in the appropriate box.
You **must** show working to justify your answer. [1]

Yes ☐ No ☐

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(c) Write down the coordinates of any **two** points that lie on the straight line $x + y = -4$. [2]

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(.....) and (.....)

8.

Buy your holiday money here	
£1 buys	192.45 Icelandic krona
	100.32 Indian rupees
	53.67 Russian rubles

Use the exchange rates in the table to answer the following questions.

(a) Exchange £350 into Icelandic krona. [2]

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..... Icelandic krona

(b) How much money, in £, would be needed to buy 2608.32 Indian rupees? [2]

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(c) Complete the sentence below. [3]

'100 Russian rubles are worth the same amount as ..... Icelandic krona.'

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9.

(a) In the mountains of Aplengrub, the snowfall on each of 28 days was measured.
The results are summarised in the table below.

Daily snowfall, s (cm)	Number of days
$5 \leqslant s < 15$	5
$15 \leqslant s < 25$	10
$25 \leqslant s < 35$	12
$35 \leqslant s < 45$	1

(i) Calculate an estimate for the mean daily snowfall for the 28 days. [4]

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(ii) State the modal class. [1]

Modal class .....

(iii) Write down the class in which the median lies. [1]

Median class .....

(b) In the mountains of Terragal, the data collected on snowfall, over the same 28 days, was as follows.

Terragal

Mean daily snowfall 20 cm
Median daily snowfall 9 cm

Ralph was on holiday in Terragal for these 28 days.
He does not understand how the mean snowfall could be as high as 20 cm.
Ralph says,
'On about half of the days there was less than 10 cm of snowfall each day.'
Write a brief explanation to help Ralph understand how it is possible to have a mean of 20 cm with a median of 9 cm. [1]

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10.

Rowena owns a car that Dafydd is planning to buy in 3 years' time.

Rowena's car is currently worth £3500.
Rowena estimates that her car will repeatedly depreciate by 24% of its value each year.

Dafydd has already saved £100.
Dafydd wants to set up a savings account to save a fixed amount of money each month to buy Rowena's car in 3 years' time.

(a) *You will be assessed on the quality of your written communication in this part of the question.*

What would be the minimum amount of money, to the nearest pound, that Dafydd should pay into his savings account each month?
You must show all your working. [9]

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(b) Do you think that this amount saved each month will guarantee that Dafydd will have enough money to buy Rowena's car?
You must give a reason for your answer. [1]

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11.

Calculate the lengths of the sides x and y in the right-angled triangles shown below.

(a) [3]

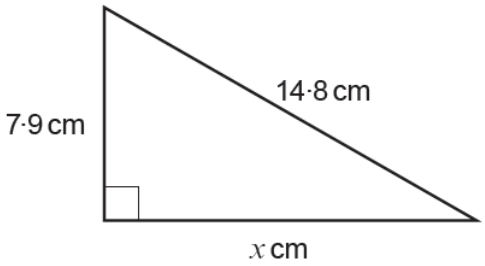

Diagram not drawn to scale

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x = ... cm

(b) [3]

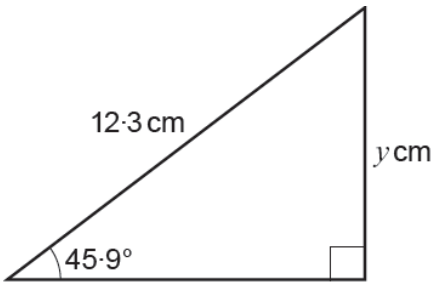

Diagram not drawn to scale

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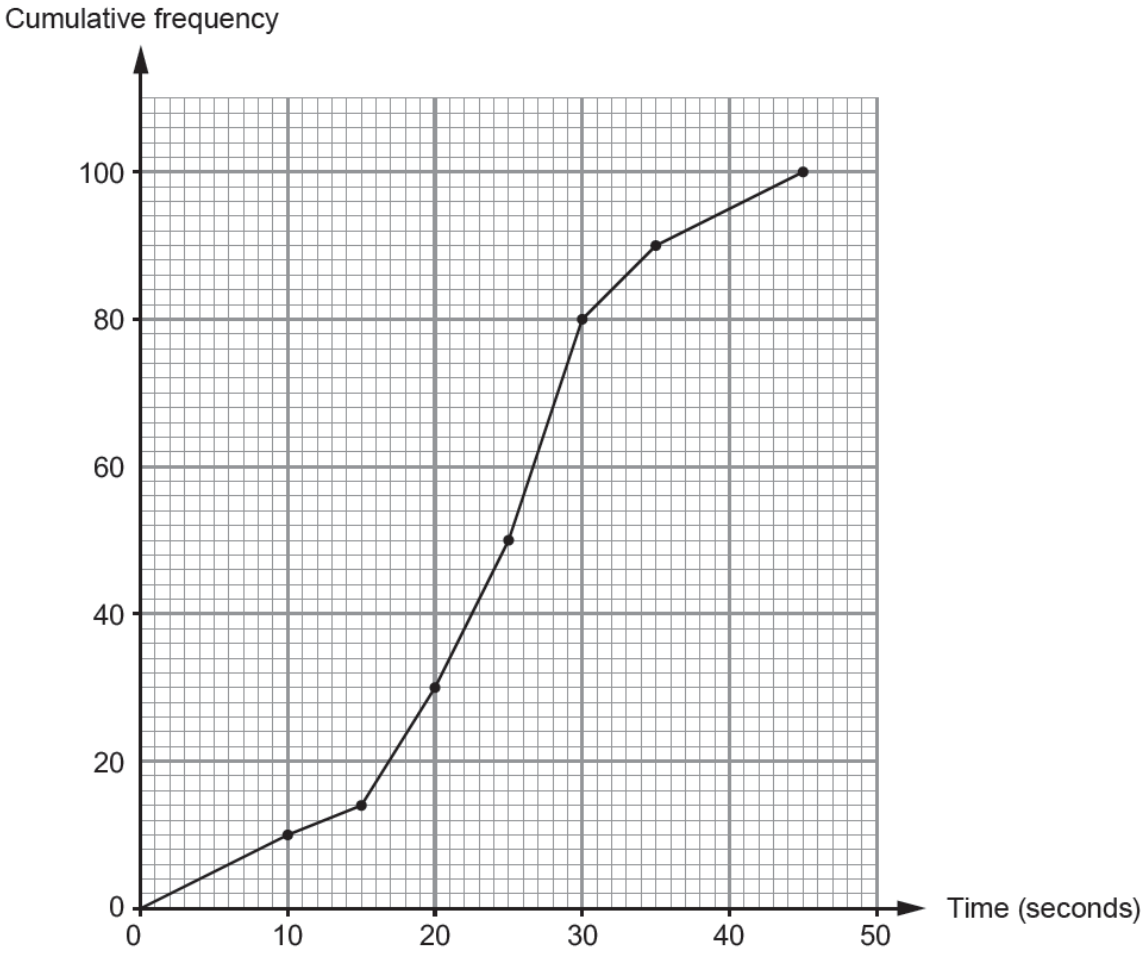
y = ... cm

12.

An exercise was carried out to time a group of 100 passengers leaving an aeroplane using the emergency exits.
The results are illustrated in the cumulative frequency diagram shown below.



(a) How many passengers took between 20 seconds and 35 seconds to leave the plane? [2]

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(b) How many passengers took more than 40 seconds to leave the plane? [2]

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(c) The regulations state that 85% of the passengers should be able to leave the plane in less than 30 seconds.
Complete the following statement. You must show your working. [2]

'In this exercise, the target time for passengers leaving the plane in an emergency was missed by ..... seconds.'

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13.

The surface area of a circular pond is $35\,m^2$.
Calculate the diameter of the pond. [4]