

Surname		Centre Number	Candidate Number
Other Names			0



GCSE

4370/04



A14-4370-04

MATHEMATICS – LINEAR

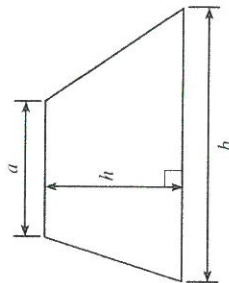
PAPER 2

FOUNDATION TIER

A.M. MONDAY, 10 November 2014

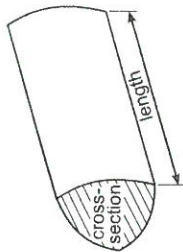
1 hour 45 minutes

Formula List



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

C D E F G
61 49 38 26 15



$$\text{Volume of prism} = \text{area of cross-section} \times \text{length}$$

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	6	6
2.	4	10
3.	6	16
4.	8	24
5.	3	27
6.	4	31
7.	8	39
8.	8	47
9.	7	54
10.	4	58
11.	4	62
12.	4	66
13.	5	71
14.	8	79
15.	5	84
16.	3	87
17.	4	91
18.	5	96
19.	4	100
Total	100	

4370 040001

ADDITIONAL MATERIALS

A calculator will be required for this paper.

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

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

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.

Take π as 3.14 or use the π button on your calculator.

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 8.

1. Toby buys

- 2 jars of coffee at £4.46 each,
3 packets of tea at £3.87 each,
4 packets of sandwiches at £2.32 each.

(a) How much does he spend altogether?

$$\begin{aligned} 2 \times 4.46 &= 8.92 \\ 3 \times 3.87 &= 11.61 \\ 4 \times 2.32 &= 9.28 + \\ &\underline{\underline{£29.81}} \end{aligned}$$

B1
B1
B1
B1(b) Toby pays with two £20 notes.
How much change does he receive?

$$40 - 29.81 = £10.19$$

M1
A1

040003

[2]

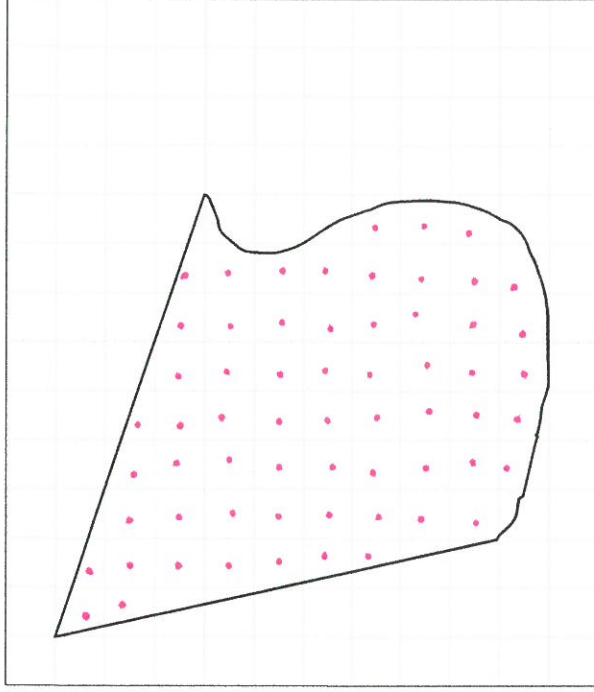
2. Circle the quantity that is the appropriate estimate for each of the following.

Weight of a male Year 11 pupil	65 kg	65 g	65 mg	65 km
Capacity of a tea cup	250 cm ²	250 cm ³	250 litres	250 mm ³
Distance from Dover to Calais	41 m	41 cm	41 km	41 mm
Width of an ordinary house window	210 m	210 cm	210 mm	210 km

Volume →

B1
B1
B1
B1

3. (a)



The above shape has been drawn on a centimetre squared grid.
Estimate the area of the above shape.

[2]

Can't squares more than half covered

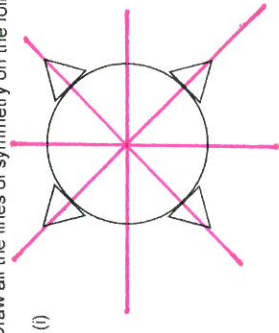
M1

A1

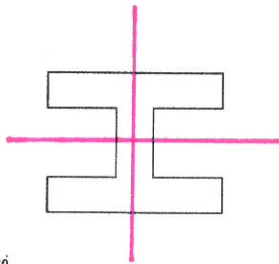
Area of the shape = 62 cm²

62 (57 → 64)

(b) Draw all the lines of symmetry on the following shapes.



(i)



(ii)

(c) Write down the order of rotational symmetry of the two shapes in part (b).

(i) 4 (ii) 2

Examiner only

[2]

B1

B1

B1

B1

4370 040005

Examiner only

4. (a) Write down the special name of the shape shown in each of the following diagrams. [2]

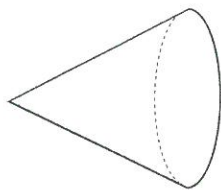
(i)



cylinder

B1

(ii)

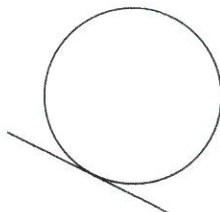


cone

B1

(b) Write down the special name of the straight line shown in each of the following diagrams. [2]

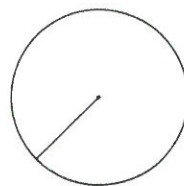
(i)



tangent

B1

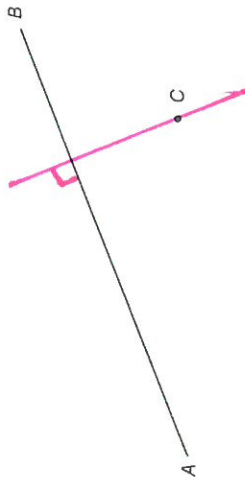
(ii)



radius

B1

- (c) Draw a line perpendicular to AB that passes through C.

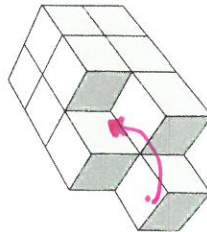


- (d) Write down the special name for the angle shown below.



obtuse.

- (e) The following solid shape is made up of cubes with sides of 1 cm. What is the volume of the shape? Give the units of your answer. (There are no hidden gaps.)



Volume = 26 cm³

Examiner only

[1]

B1

5. Choose the best word from those given below to describe the chance of each of the following events occurring.

impossible

unlikely

an even chance

likely

certain

- (a) Choosing a day of the week with the letter 'b' in it.

impossible

[1]

B1

- (b) No rain falling in Wales during April next year.

unlikely

[1]

B1

- (c) Getting an odd number score when a fair dice is rolled once.

an even chance

[1]

B1

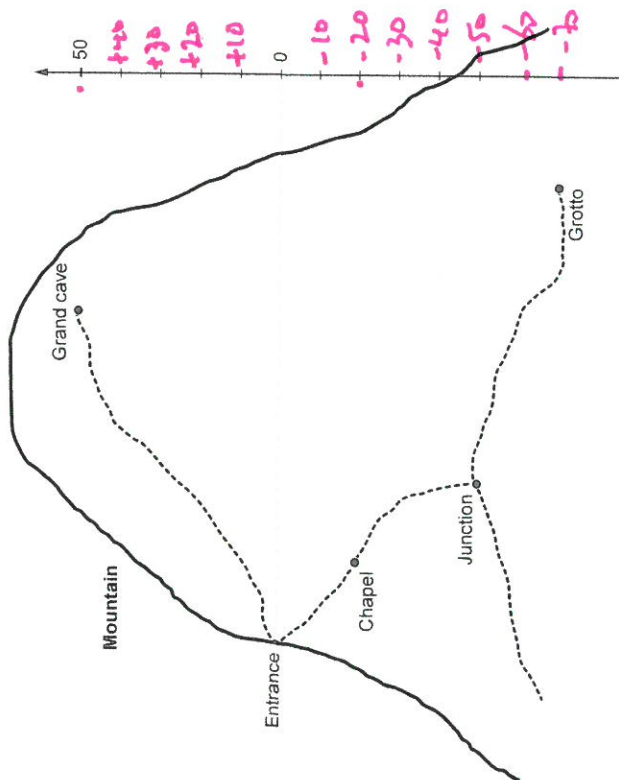
040007

[2]

B1

ul

6. The diagram shows the cross-section plan of underground caves in a mountain. Taking the 'Entrance' level as 0, the 'Grand cave' is 50 m above the entrance level, or it is at height of +50 m. The 'Chapel' is at a height of -20 m.



- (a) Estimate the height of 'Junction'. -50 [1]
- (b) Estimate the height of 'Grotto'. -70 [1]
- (c) What is the difference in height [1]
- (i) between the 'Grand cave' and the 'Chapel'? 70
- (ii) between the 'Junction' and the 'Grotto'? 20 [1]

7. The table shows the first class and second class postal charges for large and small letters.

	1st Class		2nd Class	
	Small Letters	Large letters	Small Letters	Large letters
0-100 g	60p	90p	50p	69p
101-250 g	-	£1.20	-	£1.10
251-500 g	-	£1.60	-	£1.40
501-750 g	-	£2.30	-	£1.90
Letters	Size (up to) Length: 24 cm, Width: 16.5 cm, Thickness: 0.5 cm Weight (up to) 100 g			
Large letters	Size (up to) Length: 35.3 cm, Width: 25 cm, Thickness: 2.5 cm Weight (up to) 750 g			

- (a) Mark is going to post two large letters each weighing 230 g. He buys two 1st class stamps. How much does Mark pay altogether?

$$2 \times 1.20 = £2.40$$

- (b) Camille posts three large letters.

The weights of the letters are 75 g, 400 g and 650 g.

How much cheaper is it for her to use 2nd class stamps rather than 1st class stamps?

75g	1 st class	2 nd class
400g	90p	69p
650g	1.60	1.40
	2.30	1.90
Total	£4.80	£3.99

So it will be $4.80 - 3.99 = 81 \text{ pence}$ cheaper

- (c) Rebecca has a letter that weighs 550g. It has length 23cm, width 18cm and thickness 0.7cm. She only has two £1 coins.

Does Rebecca have enough money to post her letter? You must show all your working and give a reason for your answer.

too big to be a small letter
weighs 550g, so will cost £2.30 1st class
or £1.69 2nd class.
She has £2.15 so she can afford to send it
2nd class.

[3]

Examiner only

Turn over.

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

Helen works in a shop. Her normal working week is 35 hours. She is paid £8.74 per hour. When she works for more than 35 hours she is paid a higher amount for each extra hour she works.

Here is her time-sheet for one week when she was paid a total of £358.34.

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Number of hours worked	8	7	9	8	7

Work out the amount she is paid for each extra hour. You must show all your working.

[8]

hours worked this week = $8+7+9+8+7 = 39$ hours. B1
overtime = $39 - 35 = 4$ hours.
total pay for 35 hours = $35 \times 8.74 = £305.90$ M1 A1
pay for 4 hours overtime = $358.34 - 305.90$ B1
 $= £52.44$
pay for each extra hour = $52.44 \div 4$ M1
 $= £13.11$ A1

Q2

(11)

9. (a) Describe in words the rule for continuing the following sequences.

(i) 48 12 3 0.75 [1]

Rule: *divide previous number by four*

(ii) 3 9 27 81 [1]

Rule: *Multiply previous number by three*

- (b) Write down the next 2 terms of the following sequence.

25 24 21 16 9 0 -11

(c) Simplify $3a + 6a - a$. [1]

8a

- (d) Jean rolls a dice many times.
She gets a score of 3 on 7 occasions and a score of 4 on n occasions.
Write down the total score of these threes and fours in terms of n . [2]

*$3 \times 7 + 4n$
 $21 + 4n$*

10. Lazslo came on holiday to Wales from Italy.

(a) Lazslo changed 1550€ (euros) into pounds (£).
The rate of exchange was 1€ = £0.84.
How many pounds did he get? [2]

$1550 \times 0.84 = £1302$

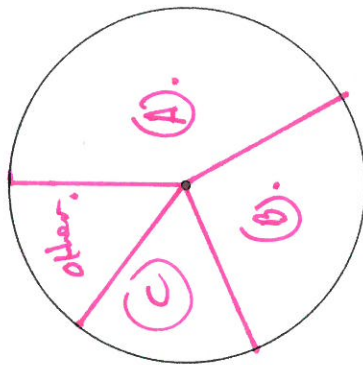
(b) During his stay, Lazslo spent £798 on his accommodation.
Use the same exchange rate to convert this amount into euros. [2]

$798 \div 0.84 = €950$

11. The type of mobile phone owned by each of 240 pupils was recorded. The results are summarised in the table below.

Type of mobile phone	Number of pupils
A	100 $\times 1.5 = 150^\circ$
B	64 $\times 1.5 = 96^\circ$
C	40 $\times 1.5 = 60^\circ$
Other	36 $\times 1.5 = 54^\circ$

Draw a pie chart to illustrate these results. You should show how you calculate the angles of your pie chart.



Each pupil = $360 \div 240 = 1.5^\circ$

(C)

12. Each girl in Year 8 chose her one favourite sport.

$\frac{1}{7}$ of the girls chose football.

$\frac{4}{7}$ of the girls chose volleyball.

The rest of the girls, 30 of them, chose hockey.
How many girls are there in Year 8?

[4]

$$\frac{1}{7} + \frac{4}{7} + \frac{2}{7} = 1$$

F V H

$$50 \times \frac{2}{7} = 30 \text{ girls.}$$

$$\frac{1}{7} = 15 \text{ girls.}$$

$$\frac{2}{7} = 45 \times 7 = 105 \text{ girls.}$$

(8)

13. Ms Owen received an electricity bill from Gower Electricity Company. The bill, with some of the entries missing, is shown below.

Use the information given on the bill to complete all of the missing entries and calculate the total amount that Ms Owen has to pay. [5]

Gower Electricity Company			
Bill period 1st July 2014 to 30th September 2014			
Ms Owen 3 Sea View Road Aber AB31 9ZZ			
INVOICE			
Meter reading last time	Meter reading this time	Units used	Price of each unit in pence
1514	2878	1364	£0.133
			13.3p
		Units used	Amount
		V.A.T. at 5%	£
			181.41
			9.07
		Total charge including V.A.T.	190.48
		Amount owing from previous bill	21.15
		Amount to pay	211.63

Working:

$$\text{Units used} = 2878 - 1514 = 1364$$

$$\text{Cost per unit in pounds} = £0.133$$

$$\text{Cost of units used} = 1364 \times 0.133 = £181.41$$

$$\text{VAT} = 0.05 \times 181.41 = £9.07$$

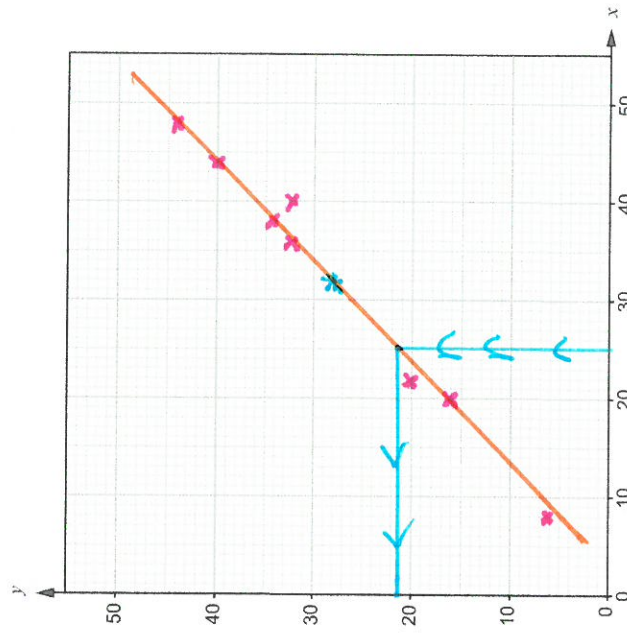
$$\text{Total inc VAT} = 181.41 + 9.07 = 190.48$$

$$\text{Amount to pay} = 190.48 + 21.15 = £211.63$$

14. In an experiment, values of x and y are recorded to look for a possible relationship. The table below shows the results.

x	20	36	44	22	38	40	48	8
y	16	32	40	20	34	32	44	6

- (a) On the grid below, draw a scatter diagram to show the results. [2]



B2

- (b) The mean of the x values is 32.
Calculate the mean of the y values and then draw a line of best fit on your scatter diagram. [4]

$$\text{Total } y = 224$$

$$\text{Mean } y = 224 \div 8 = 28.$$

- (c) What type of correlation does your scatter diagram show? [1]

positive

- (d) Using your line of best fit, find an approximate value of y when x is 25. [1]

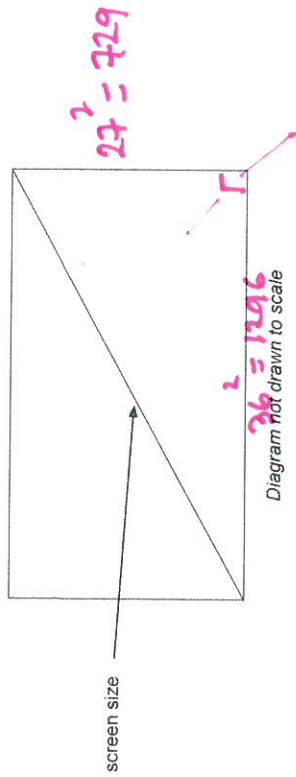
21

15. (a) The length and width of rectangular television screens are often in the ratio 4 : 3.
Calculate the length of the shorter side of such a television screen when the longer side is 36 inches long. [2]

$$\begin{array}{l} \times 9 \quad 4:3 \rightarrow \times 9 \\ 36:27 \end{array}$$

27 inches.

- (b) The 'size' of a television screen, given in inches, is the length of the diagonal, as shown in the diagram below



- Calculate the screen size of the television described in part (a). [3]

Pythag

$$1296 + 729 = 2025$$

$$\sqrt{2025} = 45 \text{ inch}$$

16. The diagram shows 4 identical large square tiles and 6 identical small square tiles.

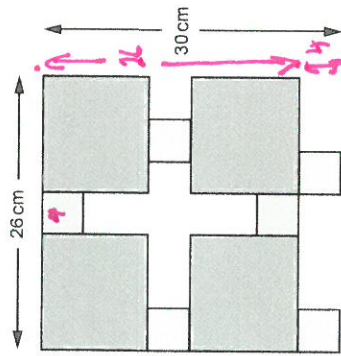


Diagram not drawn to scale

Find the length of one of the large square tiles.
You must show all your working.

Small square has side 4 cm

2 large squares have side $26 - 4 = 22 \text{ cm}$

1 large square $= 22 \div 2 = 11 \text{ cm}$

[3]

51

M1

A1

- 17.

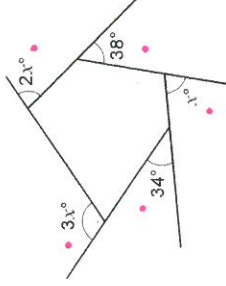


Diagram not drawn to scale

Calculate the value of x .

[4]

Exterior angles of polygon add up to 360°

$$3x + 2x + 38 + x + 34 = 360$$

$$6x + 72 = 360$$

$$6x = 360 - 72$$

$$6x = 288$$

$$x = \frac{288}{6} = 48^\circ$$

B1

B1

B1

B1

(7)

18. (a) Factorise
- $6x^2 - 8$
- .

$$2(3x^2 - 4)$$

- (b) The
- n
- th term of a sequence is
- $3n^2 - 25$
- .
-
- Evaluate the 40th term of the sequence.

$$\begin{aligned} & 3 \times 40^2 - 25 \\ &= 3 \times 1600 - 25 = 4775 \\ &= 4800 - 25 = 4775 \end{aligned}$$

- (c) Write down the
- n
- th term of the following sequence.

7, 19, 31, 43, 55, 67, ...

$$+12 \text{ each time}$$

$$12n - 5$$

Examiner only

[1]

B1

[2]

M1

A1

[2]

B1

B1

Examiner only

19. A solution to the equation
- $x^3 - x - 10 = 0$
- lies between 2 and 3.
-
- Use a trial and improvement method to find this solution correct to 1 decimal place.

[4]

$$\text{try } x = 2.5 \quad (2.5)^3 - (2.5) - 10 = 3.125 \text{ too big B1}$$

$$x = 2.3 \quad (2.3)^3 - (2.3) - 10 = -0.133 \text{ too small M1}$$

$$x = 2.4 \quad (2.4)^3 - (2.4) - 10 = 1.424 \text{ too big. B1}$$

$$\text{So } x \text{ is either } 2.3 \text{ or } 2.4 \text{ to 1 dp.}$$

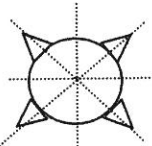
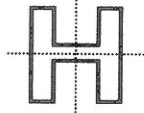
$$\text{test } x = 2.35$$

$$(2.35)^3 - (2.35) - 10 = 0.627 \dots \text{ too big M1}$$

$$\text{So } x = 2.3 \text{ to 1 dp. A1}$$

END OF PAPER

PAPER 2 - FOUNDATION TIER

GCSE Mathematics - Linear Paper 2 (Calculator allowed) Foundation Tier November 2014	Marks	Final Mark Scheme Comments
1. (a) (Coffee) (£) 8.92 (Tea) (£)11.61 (Sandwiches) (£) 9.28 Total (£)29.81 (b) (£)40 – (£)29.81 = (£) 10.19	B1 B1 B1 B1 M1 A1 6	(£) 29.81 implies B4. <u>F.T. if at least B1 awarded.</u> FT their total <u>– (£) 10.19 gets M1, A0</u>
2. Weight 65kg 65g 65mg 65km Capacity 250cm ² 250cm ³ 250litres 250mm ³ Dover/Calais 41m 41cm 41km 41mm Window 210m 210cm 210mm 210km	B1 B1 B1 B1 4	
3. (a) Evidence of square counting 57 – 64 <u>inclusive</u> (b) (i)  (ii)  (c) (i) 4 (ii) 2	M1 A1 B2 B2 6	 B1 for each Lines must be at least drawn within the shapes. B1 for each
4. (a) (i) cylinder (ii) cone (b) (i) tangent (ii) radius (c) Perpendicular (d) Obtuse (Aflem) (e) 12 cm ³	B1 B1 B1 B1 B1 B1 U1 8	Do not accept 'circular prism'. <u>Allow from right of the 'p' in passes' to the left of the 'r' in 'through' inclusive.</u> <u>Welsh: from the right of 'n' in 'mynd' to the left of 'B' in 'AB'</u> Independent
5. (a) impossible (b) unlikely (c) (an) even(s) (chance)	B1 B1 B1 3	
6. (a) Value -50 ± 2 (m) (b) Value -70 ± 2 (m) (c) (i) 70 (m) (ii) Their (a) – their (b) <u>OR 20 ± 2 (m)</u>	B1 B1 B1 B1 4	<u>Units not required, but penalise incorrect units –1 once only.</u> <u>–70 gets B0.</u> <u>Difference is positive. –20 gets B0.</u>

GCSE Mathematics - Linear Paper 2 (Calculator allowed) Foundation Tier November 2014	Marks	FINAL MARK SCHEME Comments		
7. (a) $2 \times (\pounds)1.20$ $= (\pounds)2.4(0)$ OR 240(p) (b) (1st $90 + 1.60 + 2.30 = (\pounds)4.8(0)$ OR 480(p) (2nd $69 + 1.40 + 1.90 = (\pounds)3.99$ OR 399(p) Difference $= (\pounds)0.81$ or 81p SC2 for 70(p) (based on small, large, large letters) (c) Since width > 16.5 OR since thickness > 0.5 OR since weight $> 100g$ it is a large letter. Letter weighs 550g which is 1st $(\pounds)2.30$ 2nd $(\pounds)1.90$ Yes, but only if posted 2nd class.	M1 A1 B1 B1 B1 B1 B1 B1 8	Mark final answer Accept $(\pounds)1.90$ only OR 10p change <i>Alternative:</i> B2 for sight of 21p, 20p and 40p OR B1 for any two of these. B0 for (0).81p FT their totals provided at least B1 awarded and 1st class > 2nd class. Accept 'large letter' only. Can be implied by $(\pounds)1.90$ STOP PRESS! - Award B3 for sight of $\pounds 1.90$ AND 'yes' OR 'got $\pounds 2$' OR '10p change'. (No need for mention of 1st Class). Award B2 only for a statement that claims she can post the letter 2nd class but does not mention $\pounds 1.90$. OR 'She has enough to post 2nd class (but not 1st').		
8. (Number of hours worked $=$) 39 (Pay for first 35 hours $=$) $35 \times (\pounds)8.74$ $= (\pounds)305.9(0)$ (Pay for extra 4 hours $=$) $(\pounds)52.44$ (Rate for these extra hours $=$) $(\pounds)52.44/4$ $= (\pounds)13.11$ I.S.W.	B1 M1 A1 B1 M1 A1	FT 358.34 – their 305.90 FT 358.34 – their 305.90 FT '(their 52.44)' (their 39'-35)	Alternative method 39 $39 \times (\pounds)8.74$ $(\pounds)340.86$ $358.34 - \text{'their } 340.86'$ $= (\pounds)17.48$ $17.48/4 = (\pounds)4.37$ AND $(\pounds)4.37 + (\pounds)8.74$ $= (\pounds)13.11$ I.S.W.	B1 M1 A1 B1 M1 A1
QWC Look for - Spelling - Clarity of text explanations - The use of notation – watch for '=', '£', 'p' being used appropriately. QWC2: Candidates will be expected to - present work clearly, with words explaining their processes or steps AND - make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to - present work clearly, with words explaining their processes or steps OR - make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer	QWC 2 8	QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar. OR Evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling		
9. (a) (i) Divide the previous term by 4 (ii) Multiply the previous term by 3 (b) 0, -11 (c) $8a$ (d) $21 + 4n$ Mark final answer.	B1 B1 B2 B1 B2 7	Accept $\div 4$ OR $\times \frac{1}{4}$. B0 for $n/4$ OR 'shared by 4' OR 'halved and halved again'. B0 for $n/4$. Accept $\times 3$ B0 for $n \times 3$ B1 for each. F.T. for 'their 0 -11' if negative. B0 for '9a - a' B1 for sight of $4 \times n$ OR $4n$ if in an expression of the form '$4n + \text{constant (could be 0)}$' In parts (c) and (d) penalise -1 once only for change of letter $3 \times 7 + 4n$ gets B1 only. In (d) allow N for n		

GCSE Mathematics - Linear Paper 2 (Calculator allowed) Foundation Tier November 2014	Marks	FINAL MARK SCHEME Comments			
10. (a) 1550×0.84 = (£)1302 (b) $798/0.84$ = 950 (euros)	M1 A1 M1 A1 4	£s not required but A0 for euros. euros not required but A0 for £s.	Alternative method $1.19 \text{ €} = \text{£}1$ $\frac{1550}{1.19}$ M1 $= 1302.52$ If not 1302 then A0.		
11. 3 or 4 angles correct and all 4 sectors correctly labelled. 3 or 4 angles correct, labels not fully correct. 2 angles correct and these 2 sectors correctly labelled. 2 angles correct and these 2 sectors not corr. labelled 1 angle correct and correctly labelled. OR <u>If 0 OR 1 for their diagram or no diagram,</u> 360/240 Angles are 150°, 96°, 60° and 54°	B4 B3 B3 B2 B1 OR M1 A1 4	Use the overlay and allow $\pm 2^\circ$. Correct labels (Letter/word NOT the frequency OR angle). Accept labels in the form of a key. If B0 OR B1 scored for the diagram, check the angles and the method to see if the M1 and the A1 can be awarded instead of B1. 1 is $1\frac{1}{2}^\circ$ gets the M1. If only B1 is scored for the diagram, and all the angles given correctly, then cancel the B1 and award M1, A1 for 2 marks. OR SC1 for all percentages: 41·7, 26·7, 16·7, 15 Or rounded OR truncated.			
12. $1/7 + 4/7 = 5/7$ $2/7 = 30$ $1/7 = 15$ No. of girls = 105	B1 B1 B1 B1 4	F.T. 'their 5/7' F.T. F.T.	Decimals $.14 + .57 = .71$ $.29 = 30$ $.29$ $= 103.4$	B1 B1 B1 B1 4	Percentages $14\% + 57\% = 71\%$ <u>etc as for decimals,</u> If not 105 then B0.
13. 1364 181.41(2) 9.07(...) 190.48(26) 211.63(26)	B1 B1 B1 B1 B1 5	C.A.O. F.T. F.T. F.T. F.T. Final answer must be 2 decimal places			
14. (a) All points plotted correctly (b) $(16+32+40+20+34+32+44+6)/8$ 28 Line of best fit through mean point , (32, 'their 28') (c) Positive (d) From their line of best fit (reading to 1 small square) OR y in the range 21 to 22 inclusive H2	B2 M1 A1 B2 B1 B1 8	B1 for 5 correct, or reverse correct for 7 or 8 points For intention to add y-values and divide by 8 224/8. Allow slip in y-values used CAO. <i>Accept unsupported 28</i> Only award B2 provided at least M1 previously awarded Tolerance within half square if mean point plotted, otherwise intention must be clear. FT 'their 28' provided M1 awarded and their line of best fit has an appropriate skew (but may not have points above and below) B1 for a straight line of best fit, with points above and below, OR for straight line of best fit through the mean point but skewed (If M0, A0 maximum possible is B1) FT from straight lines or curves.			
15. (a) $36 \div 4 \times 3$ = 27 (inches) (b) $s^2 = 36^2 + 27^2$ $s^2 = 1296 + 729 = 2025$ $s = 45$ (inches) Mark final answer.	M1 A1 M1 A1 A1 5	F.T. $s^2 = 36^2 + (\text{their } (a))^2$ Penalise -1 once only for incorrect units Unsupported 45 gets all 3 marks.			

GCSE Mathematics - Linear Paper 2 (Calculator allowed) Foundation Tier November 2014	Marks	FINAL MARK SCHEME Comments
16. Difference between length and height = Length of one small square = 4 Length of large square = $(26 - 4)/2$ = 11 (cm) OR $15 - 4 = 11$ OR $(30 - 8)/2 = 11$	S1 M1 A1 3	Also look at their diagram This is the key step for solving the problem Must signify that 4 is the length of the SMALL square. This could be implied by using the '4' in their further working. F.T. 'their 4' if it is clearly 'their length of a small square'. Watch out for embedded answers, e.g. $11+4+11=26$ OR $11+4+11+4=30$. Unsupported 11 gets all 3 marks.
17. Idea that exterior angle sum is 360° Idea to sum angles, sight of $3x + 2x + x + 38 + 34$ 		