1. Solve the following equations.

(a) $6x + 13 = 43 - 4x$. [3]

(b) $\frac{2x}{5} = 40$ [1]

(c) $2(30 - x) = 44$. [3]

2. The stars shown below are similar.

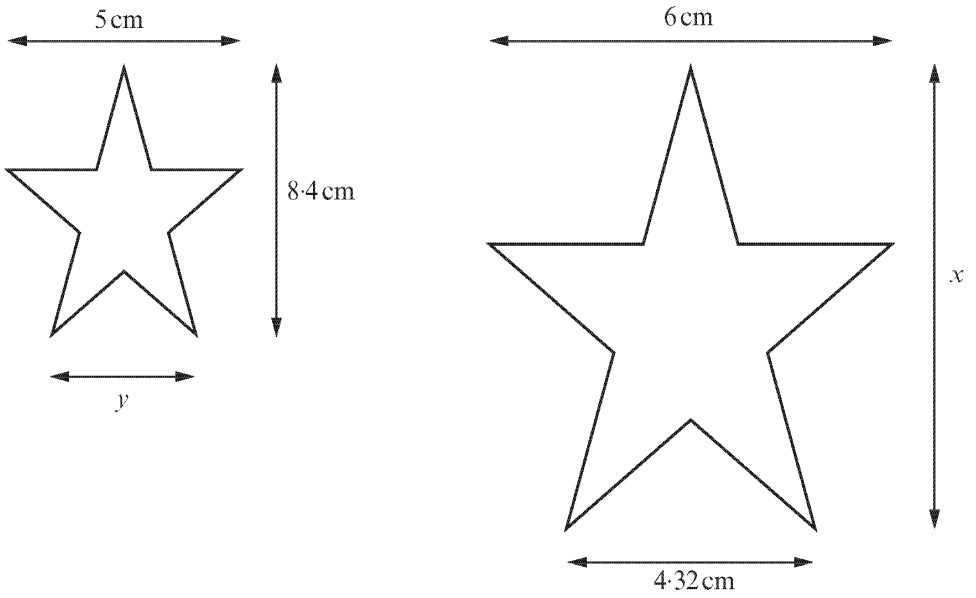

Diagram not drawn to scale

Showing all of your working, find the lengths x and y.

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.....

x = ... cm

y = ... cm

[4]

3.

A solution to the equation $x^3 - x - 5 = 0$ lies between 1 and 2.
Find this solution correct to 1 decimal place.

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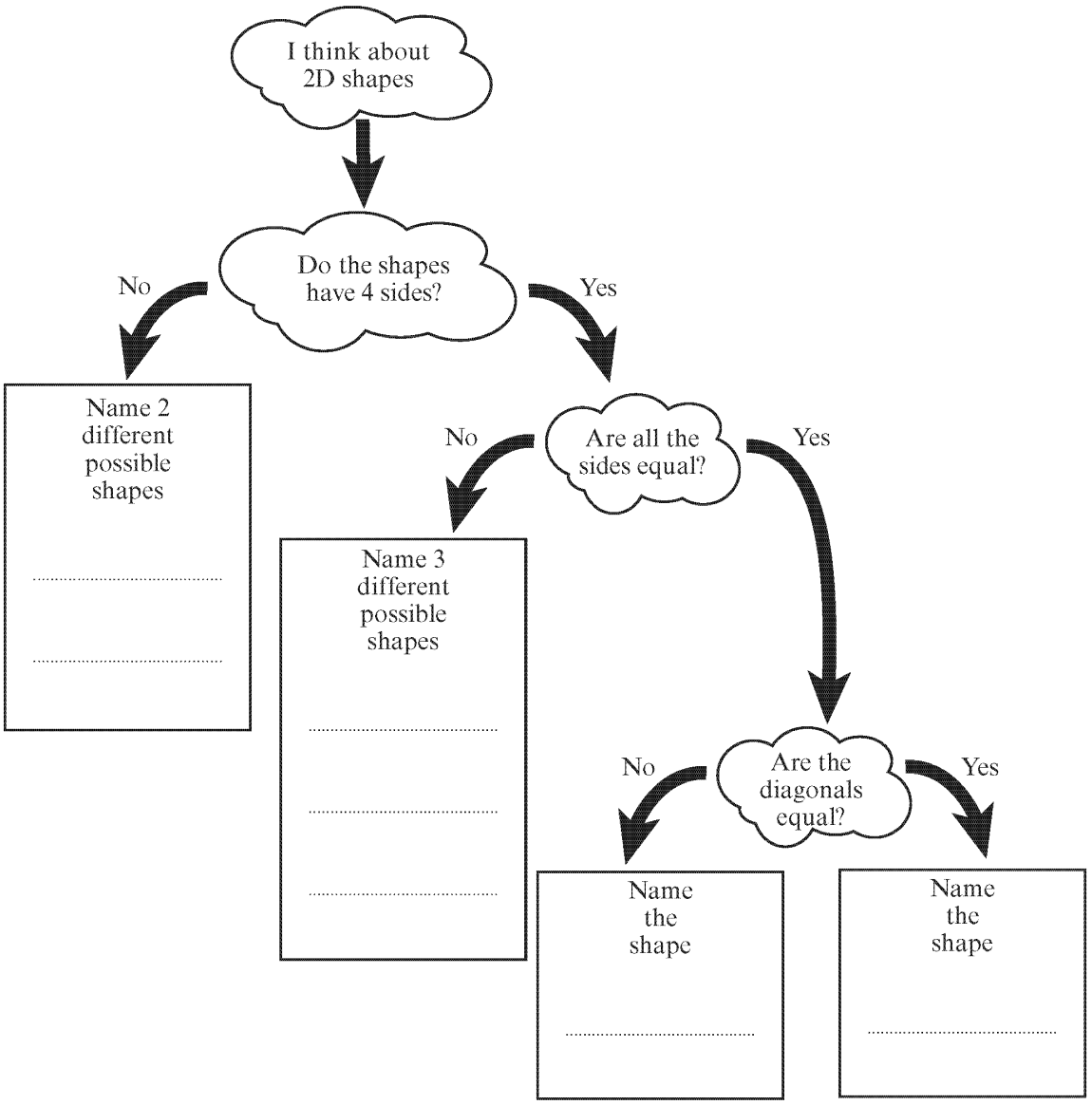
[4]

4.

Fill in the answers in the shape sorter below.



[5]

5. Write down expressions for each of the following.

(a)

(i) The total cost of 4 bananas at t pence each and 6 apples at w pence each. [2]

.....

.....

(ii) The total cost of these bananas and apples in a half price sale.
Give your answer in its simplest form. [2]

.....

.....

(b) The mean length of the four twigs listed below. [2]

Twig	Length in cm
	e
	f
	g
	h

.....

.....

(c) The perimeter of a rectangle with length $3a$ cm and width $2a$ cm.
Give your answer in its simplest form. [2]

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.....

(d) The smaller share when £h is shared in the ratio 1 : 5. [1]

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.....

9

6.

Line	Equation
A	$y = 3x + 4$
B	$y = -3x + 3$
C	$y = -2x - 4$
D	$y = 3x - 5$
E	$y = 4x + 4$

(a) Which two of the above lines are parallel?
You must give a clear reason for your answer.

.....

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.....

.....

[2]

(b) Which two of the above lines intersect each other on the y-axis?

.....

.....

[1]

7.

Siwan has an online business, *'e-buy-your-veg'*.

The business buys vegetables and sells them through a website on the Internet.
The only costs to the business are for paying the suppliers and for package and delivery.

The table below is the summary *'e-buy-your-veg'* keeps, showing financial data for each of three months.

Month	Costs		Payment from Customers, £	Profit, £
	Suppliers' bill, £	Package and delivery, £		
June	34400	3100	56725	19225
July	26850	2760	42150	12540
August	23560	2610	25680	–490

(a) In which month did *'e-buy-your-veg'* make the greatest profit as a percentage of costs?
Your must show all your working to justify your answer. [3]

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(b) Siwan's business plan has a target of making a profit of fifty thousand pounds for the next three months.
Her business *'e-buy-your-veg'* makes a profit of £3.2×10^4 for this period.
By how much is Siwan's profit short of meeting the target?
Give your answer in standard form. [3]

.....

.....

.....

.....

(c) Siwan is considering the initial cost of some parsnips.

The initial cost of an order is the price paid to the supplier plus the amount paid for package and delivery.

Siwan charged £24.30 for an order of parsnips.
Siwan made a 35% profit on the order.
Calculate the initial cost of the order. [2]

(d) Siwan's friend, Tim, started his own Internet sales business.
Tim made a profit of £1.7×10^4 in the first month.
The profit doubled every month for the next three months.
Calculate the **total** profit Tim made in the first four months.
Give your answer in standard form. [4]

8. One Saturday, Ben and Sara each record the distance and time of their cycle rides.

In 2 hours, Ben cycles 44 km, measured correct to the nearest 2 km.
In 3 hours, Sara cycles 40 km, measured correct to the nearest 2 km.

Calculate, in km/h, the greatest possible difference between Ben's average speed and Sara's average speed. [4]

9.

Barney has two tiles.
One tile is in the shape of a regular 10-sided polygon, the other tile is a regular hexagon.

He decides to try to fit the tiles together so that one vertex of each tile meet at the point *A* as shown in the diagram below.

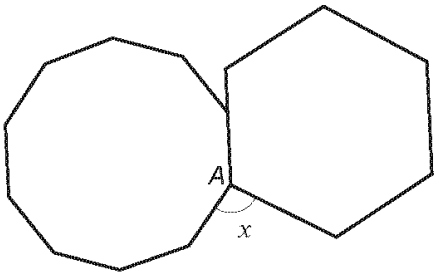

Diagram not drawn to scale

Show, by calculation, that the angle x will be greater than 90°.
You must show all your working. [4]

10. *(a)* Find the value of $\frac{7{\cdot}77^2 - 6{\cdot}22}{2{\cdot}4^2 + 3 \times 2{\cdot}2}$, giving your answer correct to one decimal place.

[2]

(b) Find the product of the values of $(2\frac{1}{3}$ of 273) and $(4\frac{1}{5}$ of 760).

[3]

11.

(a) Express $0\dot{3}8\dot{1}$ as a fraction. [2]

(b) Evaluate [2]

$$10000^{-\frac{1}{4}}$$

(c) Evaluate $\dfrac{(7-\sqrt{3})(7+\sqrt{3})}{2}$.

State clearly whether your answer is rational or irrational. [2]

12.

(c) *BuildGen* makes similar-shaped turrets, by enlarging the lengths of the rods in the frame by the same scale factor.

Diagram not drawn to scale

The diagram shows an example where *BuildGen* have enlarged all the lengths of the rods in the smaller frame by a scale factor of 1·6.
The area of each of the panels in the smaller frame is 4·6 m^2.
The internal volume of the larger frame is 76·2 m^3.

Calculate

(i) the area of each of the panels in the larger frame, [2]

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(ii) the internal volume of the smaller frame. [2]

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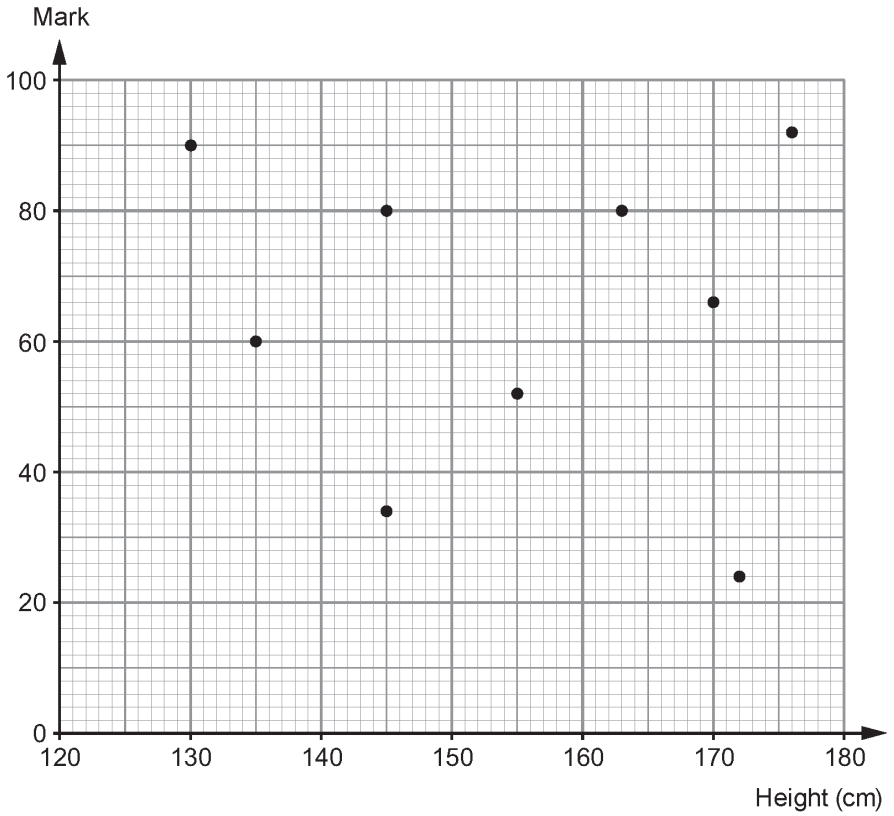
4

13. A number of students took an examination.
The heights of these students and the mark they each scored is shown in the scatter diagram below.



(a) Describe the correlation shown by the scatter diagram. [1]

.....

(b) Charlotte scored the same mark as Dewi.
Charlotte is taller than Dewi.
Henri is the tallest student in the class.
Dewi and Gareth are both the same height.

Complete the table. [3]

Name	Height (cm)	Mark
Dewi		
Charlotte		
Henri		
Gareth		

14.

Use the exchange rate **£1 = 1.52 US dollars** to answer the following questions.

(a) Gareth exchanges £300 into US dollars.
How many US dollars will he receive? [2]

(b) Adrienne wants to exchange 585 US dollars into pounds (£).
Estimate how many pounds Adrienne is likely to receive.
You must show your working. [3]

15. Raul has been asked to look at some data.
He is asked to write the data in the form 2^n, where n is a whole number or a decimal.
Write the following numbers in the form 2^n.

(a) $\dfrac{1}{2^3}$

.....

.....

[1]

(b) $(2^{0\cdot3})^{0\cdot4}$

.....

.....

[1]

(c) $\left(\sqrt[4]{8}\right)^{12}$

.....

.....

.....

.....

[2]

Marking Scheme

1.

2015 Summer Linear Paper 2 Higher Tier		Comments
1(a) $6x + 4x = 43 - 13$ $10x = 30$ or $x = 30/10$ $x = 3$	B1 B1 B1	FT until 2nd error Must be simplified *Accept an embedded answer for B3*
1(b) $(x =) 100$	B1	Accept embedded answer
1(c) $30 - x = 44 \div 2$ or $60 - 2x = 44$ $30 - x = 22$ or $-2x = 44 - 60$ or $60 - 44 = 2x$ or $-x = -8$ $x = 8$	B1 B1 B1	FT until 2nd error FT equivalent level of difficulty *Accept an embedded answer for B3* *Note:* *Writing $2x = -16$ or $-2x = 16$ leading to $x = -8$ is generally from 1 error.* *Sight of $2x = 44 - 60$ is regarded as 1 error* *$60 - x = 44$ leading to $x = 16$ is awarded B0, B1, B0 (as level of difficulty is eased)*

2.

9. $(x =) 8.4 \times 6/5$ $= 10(.08$ cm) or 10.1(cm) $(y =) 4.32 / 6/5$ or $(y =) 4.32 \times 5/6$ $= 3.6$ (cm)	M1 A1 M1 A1 4	Or equivalent calculation that could lead to correct answer Or equivalent calculation that could lead to correct answer

3.

6. One correct evaluation, $1 \le x \le 2$ 2 correct evaluations, $1.85 \le x \le 2$, one either side of 0 2 correct evaluations, $1.85 \le x \le 1.95$, one either side of 0 OR correct evaluation of 1.95 if previous B1 awarded 1.9 *No calculations shown: accept "too high", ">", etc.*	B1 B1 M1 A1	x 1 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 **1.9** 2	$x^3 - x - 5$ -5 -4.769 -4.472 -4.103 -3.656 -3.125 -2.504 -1.787 -0.968 **-0.041** 1	1.85 1.91 1.92 1.93 1.94 **1.95**	-0.518375 0.057871 0.157888 0.259057 0.361384 **0.464875**

4.

1. Left box: any triangles or polygons with ≥ 5 sides (including a circle) Next box: any 3 quadrilaterals, not rhombus or square Next: Rhombus Far right: Square	B1 B2 B1 B1 5	Needs 2 answers for B1. (Accept e.g. isosceles triangle & right-angled triangle as different). All boxes - do not accept 'polygon' or 'quadrilateral' B1 for any 2 correct answers CAO. Do not accept 'diamond' CAO

5.

(a)(i) $4t + 6w$ (pence)	B2	Mark final answer B1 for either $4t$ (or $4\times t$) or $6w$ (or $6\times w$), or B1 for 4 bananas $\times$ t + 6 apples $\times$ w
(ii) $2t + 3w$ (pence)	B2	FT their two term expression from (i) B1 for correct unsimplified expression
(b) $\frac{e+f+g+h}{4}$ (cm) or equivalent	B2	B1 for sight of $e+f+g+h$
(c) $10a$ (cm)	B2	B1 correct but unsimplified response
(d) (£) $h/6$ or equivalent	B1 9	

6.

10.(a) A and D selected Gradients are both 3 or gradients are the same	B1 E1	Depends on B1 being awarded. Accept 'slope' or similar. m = 3 or 'both 3x' is insufficient, needs interpretation
(b) A and E selected	B1 3	

7.

7(a) 19225/(34400+3100) OR 12540/(26850+2760) 19225/(34400+3100) × 100 AND 12540/(26850+2760) × 100 June stated or implied AND With sight of 51(.2666… %) AND 42(.35… %)	M1 m1 A1	
(b) $50000 - 3.2 \times 10^4$ or equivalent 1.8×10^4	M1 A2	A1 for 18000
(c) 24.3(0)×100/135 or 24.3(0)÷1.35 (£)18	M1 A1	
(d) $1.7\times10^4 + 1.7\times10^4\times2 + 1.7\times10^4\times2\times2 + 1.7\times10^4\times2\times2\times2$ Or equivalent (£) 2.55×10^5	B2 B2 12	OR $15 \times 1.7 \times 10^4$ B1 for sight of $1.7\times10^4\times2\times2\times2$ or equivalent for the 4th month B1 for 255000 or 25.5×10^4 or 2.5×10^5 from correct working

8.

Linear GCSE Mathematics Higher Tier November 2015 Paper 1		**FINAL MARK SCHEME Comments**
17. Sight of (Ben) 45/2 OR (Sara) 39/3 Select and use correct average speeds: greatest (Ben) 22.5 AND least (Sara) 13 9.5 (km/h)	B2 B1 B1 4	B1 for sight of (greatest distance) 45 or (least distance) 39 CAO

9.

Linear GCSE Mathematics Higher Tier November 2015 Paper 1		FINAL MARK SCHEME Comments
6.		**Do not accept working with other polygons, no misread** Accept angles written on the diagram
(Exterior angle method) 360÷10 or 360÷6	M1	
36(°) AND 60(°) without contradiction	A2	Award only A1 if these angles are marked as interior angles on the diagram A1 for either angle (irrespective of indication)
Gap 96(°) (which is >90°) without contradiction	A1	Do not award if 264° is indicated as the gap on the diagram, or implied as the gap FT their '360÷10' and their '360÷6'
		Alternative: *Full method, interior angle for 10-sided or hexagon M1* *(10-2)× 180÷10 OR 180 - 360÷10* *(6-2)× 180÷6 OR 180 - 360÷6* *Interior angles 144(°) AND 120(°) A2* *(A1 only if marked as exterior angles on the diagram)* *(Accept sight of 264(°) for M1, A2)* *(A1 for either angle irrespective of indication)* *(360 – 144 – 120) Gap 96(°) (which is >90°) without contradiction A1* *(FT from correct method but with errors in calculations)*
		Further alternative: *Exterior angle of hexagon = 60(°) M1, A1* *If x = 90(°), then the exterior angle of the decagon would be 90(°) – 60(°) = 30(°) AND* *the number of sides of the decagon would be 360(°) ÷ 30(°) = 12 A1* *But the decagon has only 10 sides, so x must be greater than 90(°), since regular polygons with fewer sides have greater exterior angles. A1*
		Note: Maximum of 2 marks available if angles are marked incorrectly interior when exterior and vice versa, M1, A1, A0, A0
	4	

10.

6(a) 4.4	B2	B1 for 4.38(13…) or 4.3
(b) 637 (× …)	B1	
(… ×) 3192	B1	
= 2033304	B1	FT correct evaluation of product from 1 correct value *If no marks then SC1 for interpretation of 'product' and 'of' e.g. by sight of 2 1/3 × 273 × 4 1/5 × 760*
	5	

11.

Unit 2 GCSE Maths November 2015 HigherTier	MARK	FINAL MARK SCHEME Comment
14.(a) $x = 0{\cdot}3818181.....$ and $100x = 38{\cdot}181818....$ with an attempt to subtract 378/990 or 21/55 or equivalent.	M1 A1	Or $10x$ and $1000x$, or equivalent. Or a complete alternative method. An answer of 37·8/99 gains M1 only. Mark final answer. Do not ignore incorrect cancelling.
(b) (±) 1/10 or (±) 0.1	B2	B1 for 10^{-1} or $1/_4\sqrt{10000}$ or $1/10000^{1/4}$ or $(1/10000)^{1/4}$
(c) $[49 + 7\sqrt{3} – 7\sqrt{3} – \sqrt{3}\sqrt{3}]$ (/2) or equivalent = 23 AND rational.	M1 A1	Mark final answer. FT from 1 incorrect term or from $[49 + a – a – 3]$ (/ 2) for SC1.
	6	

12.

11(c)(i) 4.6×1.6^2 $11.776(m^2)$ or $11.78(m^2)$ or $11.8(m^2)$ or $12(m^2)$ (ii) $76.2 \div 1.6^3$ $18.6(035\ldots m^3)$	M1 A1 M1 A1 4	From correct working.

13.

(a) Descriptions of no correlation, e.g. 'no relationship', 'no correlation', 'none', 'no connection'	B1	Do not accept '(all) scattered (about)', or 'random', or 'neutral', 'no pattern' Allow if a correct response is given with one of the phrases listed above. Do not allow a correct response with an incorrect response, e.g. 'none but slightly positive'
(b)	B3	All entries correct Accept mark entries as a fraction of 100, or written as a percentage B2 for any 5, 6 or 7 entries correct, or if the correct entries in the table but they are in reversed columns, OR B1 for any 3 or 4 entries correct, or for any 5, 6 or 7 reversed entries in the table

Name	Height (cm)	Mark
Dewi	145	80
Charlotte	163	80
Henri	176	92
Gareth	145	34

14.

2015 Summer Linear Paper 1 Higher Tier		**Comments**
1(a) 300×1.52 or equivalent calculation 456 (US dollars)	M1 A1	
1(b) $600 \div 1.5$ or $600 \times 2 \div 3$ or $585 \times 2 \div 3$ or $585 \div 1.5$ or other suitable estimation calculation Estimate in the range (£)360 to (£)410 or (£)300, from at least 1 appropriately estimated value	M2 A1	Allow $600 \div 2$ (as both values are rounded to1 sig. fig.) Do not accept $585 \div 2$ M1 for $600 \div 1.52$ or $590 \div 1.52$ or $585 \div 1.52$ (original question) or trial as far as '£100 is approximately \$150' without further refinement *If no working, SC1 for a suitable estimate within tolerance given*

15.

10(a) 2^{-3} (b) $2^{0.12}$ (c) 2^9	B1 B1 B2 4	 Accept $2^{12/100}$ or equivalent B1 for sight of $8^{12/4}$ or $8^{1/4 \times 12}$ or 8^3 or $(2^3)^3$ or $(2^3)^{1/4 \times 12}$ or equivalent *If a candidate writes only the index, penalise -1 once only on the first occasion*