

Guidance on the use of codes for this mark scheme	
M	Method mark
A	Accuracy mark
B	Mark awarded independent of method
C	Communication mark
P	Proof, process or justification mark
cao	Correct answer only
oe	Or equivalent
ft	Follow through

Question	Working	Answer	Mark	AO	Notes	Grade	
1	2 kg = 2000 g $2000 \div 400 = 5$ $5 \times 30 = 150$ min 150 min = 2 hours 30 mins Plus 20 mins rest give 2 hours 50 min So if it is put on at 6:30 pm it will be ready at 9:20 pm.	No, she needs to put it on earlier.	P1	3	P1 for method of finding how many lots of 30 minutes are needed A1 cao P1 for method of finding total time A1 cao	B	
			B1 C1				6
2	$2 + 1 = 3$ $60 \div 3 = 20$ $2 \times 20 = 40$ She spends £40 on clothes	£40	M1		M1 for adding ratios to 3 P1 for process of finding the 2 share	B	
			A1 C1				3
3	<b>a</b> $\frac{25}{150} = 0.17$ (to 2 dp) $1 - 0.17 = 0.83 = 83\%$ Or $150 - 25 = 125$ $\frac{125}{150} = 0.83 = 83\%$ (to 2 dp)	83%	P1	2	M1 for process of finding part of a ratio A1 answer correct to 2 sf or more	B	
			A1				3
			<b>b</b> $\frac{150}{4} = 37.5$ = 38 to nearest car are red	Yes	M1 C1		M1 for diving by 4 C1 showing nearest whole number is more than 25
			<b>c</b> 17% green + 25% red Total 42%	No, she is not right.	P1 C1		P1 adding both together in some way C1 for no with justification
<b>d</b> Less than half the cars are accounted for, so there could be one third silver. $150 \div 3 = 50$ which is a whole number.	Yes, he could be right.	P1 C1	P1 for process looking at how many available to be silver C1 for yes with suitable justification				
			8				
4	One day is $60 \times 24 = 1440$ minutes $1440 \div 5 = 288$ minutes This is less than 360 minutes.	360 minutes is longer.	P1	2	P1 finding a day in minutes. M1 dividing total minutes by 5 A1 cao	B	
			M1 A1 C1				3

5	a	1%, by dividing by 100 Then multiply that figure by the percentage needed. E.g. find 8% of £32 $32 \div 100 = 0.32$ $0.32 \times 8 = 2.56$ So 8% of £32 is £2.56	M1 C2	2	P1 for process of finding a percentage  C1 for first example C1 for second example	B
	b	20% is $2 \times 10\%$ or $\frac{2}{10}$ so need to divide by 10 then multiply by 2 Or divide by 5.	C1			
			<b>4</b>			
6	a	Look for common factors. When there are no common factors, it's in its simplest form.	C1 C1	2	C1 for clear explanation C1 for clear explanation	B
	b	e.g. start with the ratio 12 : 18 Common factors are 2, 3 and 6 Dividing the ratio by 6 gives 2 : 3 2 and 3 have no common factors, so you know that it is in its simplest form.	P1 C1			
			<b>4</b>			
7		7 - 4 = 3 So 3 parts = £120 $120 \div 3 = 40$ So one part = £40 So Peter got $2 \times £40 = £80$	P1 B1 M1 A1 A1	3	P1 for process of sorting the ratios B1 for finding 3 parts = 120 M1 dividing by 3 A1 cao A1 cao	B
			£80			

8	a	Correct $\frac{2}{3} = 0.66666$	B1 C1	2	B1 for correct C1 for clear explanation	B
	b	$\frac{3}{5} = 0.6$ $0.6666 > 0.6$				
	c	Correct $\frac{3}{5} \times 100\% = 60\%$ Not correct $\frac{70}{100} \times 150 = 105$ $0.75 \times 150 = 112.5$	B1 P1  B1 C1			
9	a	$48 \div 3 = 16$ pupils liked football best $48 \div 4 = 12$ liked tennis $48 \div 8 \times 3 = 18$ liked athletics Total $16 + 12 + 18 = 46$ Balance = $48 - 46 = 2$	P1 A3  P1	3	P1 for process of finding each part A1 for each correct sport found  P1 for correct process leading to 2	M
	b	$\frac{1}{4} + \frac{1}{2} = \frac{3}{4}$ So $\frac{3}{4}$ of total = 150 $\frac{1}{4}$ of total = $150 \div 3 = 50$ So total = $4 \times 50 = 200$	P1 B1  P1 C1			
10		$15 \text{ mm} \times 1.25 = 18.75 \text{ mm}$ = 19 mm to next whole number $19 \text{ mm} \times 1.25 = 23.75 \text{ mm}$ = 24 mm to next whole number $24 \text{ mm} \times 1.25 = 30 \text{ mm}$ $30 \text{ mm} \times 1.25 = 37.5 \text{ mm}$ = 38 mm to next whole number $38 \text{ mm} \times 1.25 = 47.5 \text{ mm}$ = 48 mm to next whole number	M1 A1 P1 A1 A1  A1  A1 C1	3	M1 for method of increasing by 25% A1 for 19 P1 for method of continuing in same way A1 for 24 A1 for 30  A1 for 38  A1 for 48 C1 for complete correct solution	M

11	<p>One years interest is  <math>\pounds 2500 \times 0.02 = \pounds 50</math>            Number of years needed to get <math>\pounds 160</math> in interest  <math>\pounds 160 \div \pounds 50 = 3.2</math>            4 years' interest is <math>\pounds 50 \times 4 = \pounds 200</math>            Next whole year above is 4.</p>	4 years	P1 A1 P1  A1 A1 <b>5</b>	3	P1 for finding one years interest A1 cao P1 for setting up equation for number of years  A1 for 3.2 A1 cao	M
12	<p>Ratio of areas of small to large is 1 : 2  <math>\frac{3}{7}</math> of small square is shaded.            As a fraction of the larger square, this is  <math>\frac{3}{7} \times \frac{1}{2} = \frac{3}{14}</math>            Total shaded is <math>\frac{1}{7} + \frac{3}{14}</math>  <math>= \frac{2+3}{14} = \frac{5}{14}</math></p>	$\frac{5}{14}$	P1  C1  M1 A1  M1  A1 <b>6</b>	3	M1 process of sorting ratio  C1 for explanation of each part $\frac{1}{7}$ M1 finding fraction in small square A1 cao  M1 adding the two fractions  A1 cao	M
13	<p>If Anna starts with fare of <math>\pounds x</math>            New fare is <math>x \times 1.15</math>  <math>= 1.15x</math>            A reduction of 15% on that will give negotiated fare as  <math>1.15x \times 0.85</math>  <math>= 0.9775x</math></p>	No, she is better off.	P1 M1 A1 P1  M1 A1 C1 <b>7</b>	2 3	P1 process of stating a starting fare, say $\pounds x$ M1 finding 15% increase A1 cao P1 method of reducing new fare by 15%  M1 finding 15% reduction. A1 cao C1 No with clear justification	M
14	<p>Pens-R-Us            Pay for 20 get 10 free            Cost <math>\pounds 1.50 \times 20 = \pounds 30</math>            Budget Stationery            Number of pens <math>4 \times (5 + 3) = 32</math>            So pay for 20 and get 12 free.            Cost is the same.</p>	Budget Stationery has the better deal as Sian will get 32 pens for the same price as 30 at Pens-R-Us	P1  A1  P1 A1 C1 <b>5</b>	2 3	P1 for process for cost at Pens-R-Us  A1 cao  P1 for method at Budget Stationery A1 cao C1 correct final statement .	M

15	Pay for 1000 ml and get 1500 ml Ratio in ml, pay : free 1000: 500 2 : 1 Buy one get one free Ratio in ml, pay : free 300 : 300 1 : 1 So buy one get one free is the better deal.	Buy one get one free is the better deal as you get a higher ratio of shampoo free.	P1  A1 P1  A1 C1 <b>5</b>	2 3	P1 for process of finding ratio  A1 for usable ratio P1 for process of finding ratio  A1 answer in a suitable form to compare C1 for buy one get one free with explanation	M
16	<b>a</b> 1 : 6 ≠ 6 : 1 Because 1 : 6 = 6 : 36 (× 6) Or 6 : 1 = 1 : $\frac{1}{6}$ (÷ 6)  <b>b</b>  19 : 95 (÷19) 1 : 5  <b>c</b> 1 × 19 : 5 × 19  <b>d</b>  B : G 2 : 5 4 : 10 6 : 15 (21 pupils) 7 : 17.5 (not possible!) 8 : 20 (28 pupils)	No  19 : 95 (÷19) 1 : 5  No, because the units must be the same in order to compare.  No, to retain this ratio requires 2 boys and 5 girls each time, so 7 pupils. This means that there can only be multiples of 7 pupils in the club. 24 is not a multiple of 7	P1  B1  C1  C1  <b>4</b>	2	P1 for process of finding each ratio in its unitary form as a method of comparison, oe  B1 for calculation showing a multiplicative cancelling down  C1 for an understanding of scale and equivalence of units  C1 for reference to multiples of 7	M
17	<b>a</b> Packs of 3: 90 ÷ 3 = 30 30 packs × £1.50 = £45 Packs of 15: 90 ÷ 15 = 6 6 packs × £5 = £30 Packs of 25: 90 is not divisible by 25.  <b>b</b> Buy 2 get one free on packs of 15. 15 + 15 = £10 15 = free 15 + 15 = £10 15 = free So new cost = £20 Or (3 × 15) + (3 × 15) = 90 £10 + £10 = £20	6 packs of 15  No, still select 6 packs of 15 but it now costs less !	B1 A1  B1 C1  <b>4</b>	2	B1 for correct combination to 90 A1 for correct cost  B1 for a method for calculating $\frac{2}{3}$ of the cost C1 for correct justification of choice	M

<b>18</b>	Appropriate workings related to their question.	e.g. A shop increased its prices by 10%. When an item costs £100, how much more does it cost after the price increase? £10	C1	2 3	C1 for clarity of question	M
			<b>1</b>			
<b>19 a</b>	M : W 5 : 2 24 women so the total membership is: $5 \times 12 : 2 \times 12$ 60 : 24 Total membership = $60 + 24 = 84$	84	M1	3	M1 for multiplying by 12 oe	H
<b>b</b>	R : S : J = 2 : 3 : 5 $2 + 3 + 5 = 10$ $£85 \div 10 = £8.50$ Shaun pays $3 \times £8.50 = £25.50$	£25.50	A1 M1		A1 for 84 members in total M1 for division of 85 by 10	
<b>c</b>		Own question like the one in part a For example: a tennis club has 30 male members. The ratio of women to men is 6 : 5. How many female members are there? 36	A1 C1		A1 for correct multiplication $3 \times £8.50$ oe C1 for correct type of question	
			<b>5</b>			
<b>20 a</b>	$b_2 = \frac{5}{4} \times b_1$ $= \frac{5}{4} \times 8$ $= \frac{40}{4} = 10$ hours	10 hours	P1	3	M1 for process of setting up equation	H
<b>b</b>	$b_2$ costs £198 $b_1$ costs £118 $198 \div 118 = 1.68$ to 2 dp $5 \div 4 = 1.25$	The increase in cost is proportionally more than the increase in battery life.	A1 B1 C1		A1 cao B1 for division of more expensive cost by cheaper cost C1 for use of comparison to justify	
<b>c</b>	$\frac{b_2}{118} = \frac{5}{4}$ $b_2 = \frac{5 \times 118}{4}$ $= \frac{590}{4} = £147.50$ Reduction is: $£198 - £147.50 = £50.50$	£50.50	M1 A1		M1 for multiplying cheaper cost by 5 and dividing by 4 A1 cao	
			<b>6</b>			

21	a	$5 \times 90 = 450$ minutes $\pounds 6.50 \div 450 = 1.44\text{p}$ per minute $5 \times 80 = 400$ minutes $\pounds 6.50 \div 400 = 1.625\text{p}$ per minute $5 \times 80 = 400$ minutes $\pounds 4.00 \div 400 = 1\text{p}$ per min <b>cheapest</b> Or $450 \div 6.50 = 69$ minutes per $\pounds 1$ $400 \div 6.50 = 62$ minutes per $\pounds 1$ $400 \div 4.00 = 100$ minutes per $\pounds 1$ <b>best value</b>	Best buy is 5 pack for 80 minutes each @ $\pounds 4.00$	P1	3	P1 for method of multiplying up for total minutes and then division to identify either cost per minute or time per $\pounds$  B1 for correct workings in first of the three cases B1 for the correct working in the second two cases	H	
	b		80 minutes is not long enough.	B2				C1
				4				
22	$800 \times 1.19 = \pounds 952$ $800 \times 1.22 = \pounds 976$ $\pounds 976 - \pounds 952 = \pounds 24$		They will get $\pounds 24$ more.	M1	2	M1 for multiplications B1 for subtraction ft A1 cao	H	
								3



<b>23 a</b>	8 kg = 8000 g 8000 ÷ 250 = 32 3 kg = 3000 g 3000 ÷ 85 = 35 (to nearest whole number) 2 kg = 2000 g 2000 ÷ 20 = 100 7 kg = 7000 g 7000 ÷ 250 = 28		P1 B1	2 3	P1 for process of division to see how many batches of 15 biscuits can be made with each ingredients B1 for 32, 35 100 and 28	H
	So the limiting value is the amount of icing sugar. Therefore she can make 24 × 28 = 672 biscuits. Number of packets = 672 ÷ 15 = 44.8	So she can make 44 complete packs of 15 biscuits.	P1 B1 M1 A1 M1 A1		P1 for correct identification of limiting value B1 for correct cost of three-quarters of biscuits M1 for use of 0.85 multiplier A1 cao M1 for division of total sales by total cost (ft) A1 for correct % with rounding	
<b>b</b>	44 × 0.75 = 33 33 × £2.99 = £98.67 44 – 33 = 11 discounted £2.99 × 0.85 = £2.54 to 2 dp 11 × 2.54 = £27.94 Total sales = £98.67 + £27.94 = £126.61 Total costs = £59 + £26 = £85 % profit = (£126.61 – £85)/£85 0.489529412 × 100% = 48.95%	49% profit to the nearest integer.	<b>8</b>			
<b>24</b>	£595 × 1.20 = £714 20% discount £714 × 0.8 = £571.20 £571.20 – £595 = £23.80 Or £595 × 0.8 = £476 £476 × 1.2 = £571.20	He is overpaying by £23.80 Disagree; he would pay the shop more than he needs to.	P1 M1 B1 C1 <b>4</b>	2	P1 for process: multiplying by 1.2 to find cost with VAT M1 for multiplying by 0.8 to find 20% reduced price (ft) B1 for subtracting to find overpayment C1 for demonstrating over-payment with explanation	H
<b>25 a</b>		$A \times 0.85 = B$	M1	2	M1 for correct formula	H
<b>b</b>		$A = B \div 0.85$	P1 <b>2</b>		P1 for correct rearrangement of ÷ by 0.85	

<b>26 a</b>	$A \times 1.5 \times 1.5 = A \times 1.5^2$ $= A \times 2.25$	No: an increase to $A$ of 50% followed by another increase of 50% gives 2.25 $A$ . Doubling would be $2A$ $2A \neq 2.25A$	C1	2	C1 for clear explanation with calculated justification oe	H																					
	<b>b</b>	$A \times 0.75 \times 1.20 = 0.9A$ $A \times 1.20 \times 0.75 = 0.9A$	If the original cost is $A$ , the cost after a discount of 25% is $0.75A$ to pay VAT at 20% gives a new price of $0.9A$ . If VAT is added first, the price is $1.2A$ . A 25% reduction gives a new price of $0.9A$ . Because multiplication is commutative, the prices are the same. It makes no difference.				P1 C1																				
			<b>3</b>																								
<b>27 a</b>	$A \times \frac{6}{7} = \text{£}996$	£1162	M1	2 3	M1 for multiplication and rearrangement	H																					
	$A = \text{£}996 \times \frac{7}{6}$		A1				A1 cao																				
	<b>b</b>		$A \times 1.04 = \text{£}6.50$ $A = \text{£}6.50 \div 1.04$				M1 A1	M1 for multiplication by 1.04 and rearrangement. A1 cao																			
	<b>c</b>		$A \times 1.07 = \text{£}957.65$ $A = \text{£}957.65 \div 1.07$				M1 A1	M1 for multiplication by 1.07 and rearrangement A1 cao																			
	<b>d</b>		For an original amount $A$ , the multiplier is $b$ for a percentage increase or decrease, and the new value is $C$ $A \times b = C$				$A = C \times \frac{1}{b}$	C1	C1 for correct explanation either in words or by a general formula, provided the variables are defined																		
<b>e</b>		Multiplier ( $x$ ) $x > 1$ increase $0 < x < 1$ decrease	C1	C1 for clarity that a decrease will have a multiplier between 0 and 1 and increase will have a multiplier greater than 1 ( a multiplier of 1 will not change the value)																							
			<b>8</b>																								
<b>28</b>	Current costs are £1.50/mile and 20p/minute Competitive pricing structure: answers will vary.		P1 B1	2 3	P1 for process of finding charges B1 for working out current price structure	H																					
	<table border="1"> <thead> <tr> <th>Time taken</th> <th>2 minutes</th> <th>5 minutes</th> <th>10 minutes</th> <th>12 minutes</th> <th>15 minutes</th> </tr> </thead> <tbody> <tr> <td>Distance</td> <td>1 mile</td> <td>2 miles</td> <td>3 miles</td> <td>5 miles</td> <td>6 miles</td> </tr> <tr> <td>Total charge (A)</td> <td>£2.50</td> <td>£4.00</td> <td>£6.50</td> <td>£9.90</td> <td>£12.00</td> </tr> <tr> <td>Total charge (B)</td> <td>£1.90</td> <td>£4.00</td> <td>£6.50</td> <td>£9.90</td> <td>£21</td> </tr> </tbody> </table>		Time taken				2 minutes	5 minutes	10 minutes	12 minutes	15 minutes	Distance	1 mile	2 miles	3 miles	5 miles	6 miles	Total charge (A)	£2.50	£4.00	£6.50	£9.90	£12.00	Total charge (B)	£1.90	£4.00	£6.50
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			<b>3</b>																								

<b>29</b>	<b>a</b>	Travel 30 miles in 45 minutes $45 \text{ minutes} = \frac{3}{4} \text{ hour}$ $30 \div \frac{3}{4} = \frac{30 \times 4}{3} = \frac{120}{3}$ $= 40 \text{ mph as required}$	C1	2	C1 correct explanation with calculation that indicates 10 miles every 15 minutes implies 40 miles every 60 minutes oe	H	
	<b>b</b>	Not changing minutes into hours	C1				C1 clear explanation of given result
	<b>c</b>	Units of speed = units of distance $\div$ units of time	C1				C1 for stating a common misconception
			<b>4</b>	C1 for correctly stating the relationship between speed, distance and time			
<b>30</b>	A rectangle 1 m $\times$ 2 m Area = 2 m <sup>2</sup> A rectangle 4 m $\times$ 8 m Area = 32 m <sup>2</sup> Length scale factor = 4 Area scale factor = 16 (4 <sup>2</sup> ) Area = 2 $\times$ 16 = 32 m <sup>2</sup>	32 m <sup>2</sup>	P1	2 3	P1 for process of trial and improvement	H	
			A1				A1 cao
			<b>2</b>				
<b>31</b>	75 $\div$ 30 = 2.5 Length scale factor is 2.5 Volume scale factor is (2.5) <sup>3</sup> = 15.625 5 $\times$ 15.625 = 78.125 litres	78.125 litres	B1	2 3	B1 for calculation of length scale factor.	H	
			M1				M1 for calculation of volume scale factor.
			A1				A1 cao
			<b>3</b>				
<b>32</b>	Length scale factor = 450 $\div$ 15 = 30 Volume scale factor = 30 <sup>3</sup> = 27 000 450 $\times$ 27 000 = 12 150 000 cm <sup>3</sup> ( $\div$ 100 <sup>3</sup> or 1 000 000 for m <sup>3</sup> ) = 12.15 m <sup>3</sup>	12.15 m <sup>3</sup>	B1	3	B1 for calculation of length scale factor	H	
			M1				M1 for calculation of volume scale factor
			M1 A1				M1 for correct conversion to cubic metres A1 cao
			<b>4</b>				

33	<p>In year 1  <math>\text{£}8000 \times 0.03 = \text{£}240</math>  Interest = <math>\text{£}240</math>  So total at end of year 1 = <math>\text{£}8000 + \text{£}240 = \text{£}8240</math>  Year 2  <math>\text{£}8240 \times 0.03 = \text{£}247.20</math>  Interest = <math>\text{£}247.20</math>  At end of year 2 =  <math>\text{£}8240 + \text{£}247.20 = \text{£}8487.20</math>  Year 3  <math>\text{£}8487.20 \times 0.03 = \text{£}254.61</math>  (Banks round down)  Interest = <math>\text{£}254.61</math>  At end of year 3 =  <math>\text{£}8487.20 + \text{£}254.61 = \text{£}8741.81</math></p>	<p><math>\text{£}8741.81</math></p>	<p>P1 M1</p> <p>A1 B1</p> <p>B1</p> <p>A1 C1</p> <p style="background-color: #cccccc;">7</p>	<p>2</p>	<p>P1 for showing the concept of compound interest.  M1 for any suitable method of calculating total at end of year 1</p> <p>A1 cao  B1 for any suitable method of calculating total at end of year 2 (ft)</p> <p>B1 for any suitable method of calculating total at end of year 3 (ft)</p> <p>A1 cao (accept <math>\text{£}8741.82</math>).  C1 for clarity of explanation through set out of calculations</p>	<p>H</p>
34	<p>Let starting amount be <math>B</math>  Then <math>B \times 0.8^n &lt; \frac{B}{2}</math>  Divide both sides by <math>B</math>  <math>0.8^n &lt; 0.5</math>  Trial and improvement  <math>0.8^2 = 0.64</math> not yet  <math>0.8^3 = 0.512</math> not yet  <math>0.8^4 = 0.4096</math> now less than a half</p> <p>OR starting with a given amount  Say <math>\text{£}100</math>  <math>\text{£}100 \times 0.8 = \text{£}80</math>  <math>\text{£}80 \times 0.8 = \text{£}64</math>  <math>\text{£}64 \times 0.8 = \text{£}51.20</math>  <math>\text{£}51.20 \times 0.8 = \text{£}40.96</math></p>	<p>4 weeks</p>	<p>P1</p> <p>M1 P1</p> <p>A1</p> <p style="background-color: #cccccc;">4</p>	<p>2</p>	<p>P1 for choosing a starting a position, either a variable like <math>B</math> or a specific amount like <math>\text{£}100</math>  M1 for working through the weeks in some way  P1 for process of finding amounts for weeks 3 and 4 to show the point at which the bank account first dips below 50% of the original balance</p> <p>cao</p>	<p>H</p>