Guidance on the use of codes for this mark scheme	
M	Method mark
A	Accuracy mark
B	Mark awarded independent of method
cao	Correct answer only
oe	Or equivalent
ft	Follow through

Question	Working	Answer	Mark	AO	Notes	Grade
1	2 kg = 2000 g 2000 ÷ 400 = 5 5 × 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.	M1 A1 M1 A1 B1 B1 **6**	3	M1 for method of finding how many lots of 30 minutes are needed A1 cao M1 for method of finding total time A1 cao B1 ft B1 No and a clear summing up of why it won't be ready	B
2	2 + 1 = 3 60 ÷3 = 20 2 × 20 = 40 She spends £40 on clothes	£40	M1 M1 A1 **3**		M1 for adding ratios to 3 M1 for method of finding the 2 share A1 cao	B
3 **a**	$\frac{25}{150}$ = 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%	M1 A1	2 3	M1 for method of finding part of a ratio A1 answer correct to 2 sf or more	B
b	$\frac{150}{4}$ = 37.5 = 38 to nearest car are red	Yes	M1 B1		M1 for diving by 4 B1 showing nearest whole number is more than 25	
c	17% green + 25% red Total 42%	No, she is not right.	M1 B1		M1 adding both together in some way B1 for no with justification	
d	Less than half the cars are accounted for, so there could be one third silver. 150 ÷3 = 50 which is a whole number.	Yes, he could be right.	M1 B1 **8**		M1 for method of looking at how many available to be silver B1 for yes with suitable justification	
4	One day is 60 × 24 = 1440 minutes 1440 ÷ 5 = 288 minutes This is less than 360 minutes.	360 minutes is longer.	M1 M1 A1 **3**	2	M1 finding a day in minutes. M1 dividing total minutes by 5 A1 cao	B

5 **a**		1%, by dividing by 100 Then multiply that figure by the percentage needed. E.g. find 8% of £32 32 ÷ 100 = 0.32 0.32 × 8 = 2.56 So 8% of £32 is £2.56	M1 B2	2	M1 for method of finding a percentage B1 for first example B1 dep for second example	B
b		20% is 2 × 10% or $\frac{2}{10}$ so need to divide by 10 then multiply by 2 Or divide by 5.	B1 **4**		B1 for clear explanation	
6 **a**		Look for common factors. When there are no common factors, it's in its simplest form.	B1 B1	2	B1 for clear explanation B1 for clear explanation	B
b		e.g. start with the ratio 12 : 18 Common factors are 2, 3 and 6 Dividing the ration by 6 gives 2 : 3 2 and 3 have no common factors, so you know that it is in its simplest form.	B1 B1 **4**		B1 for having a satisfactory example B1 for the accompanying explanation	
7	7 – 4 = 3 So 3 parts = £120 120 ÷ 3 = 40 So one part = £40 So Peter got 2 × £40 = £80	£80	M1 B1 M1 A1 A1 **5**	3	M1 for method of sorting the ratios B1 for finding 3 parts = 120 M1 dividing by 3 A1 cao A1 cao	B

8	**a**		Correct	B1	2	B1 for correct	B
			$\frac{2}{3}$ = 0.66666	B1		B1 for clear explanation	
	b		$\frac{3}{5}$ = 0.6 0.6666 > 0.6				
	c		Correct $\frac{3}{5}$ × 100% = 60%	B1 B1		B1 for correct B1 with clear justification	
			Not correct $\frac{70}{100}$ × 150 = 105 0.75 × 150 = 112.5	B1 B1 **6**		B1 for not correct B1 for clear explanation	
9	**a**	48 ÷ 3 = 16 pupils liked football best 48 ÷ 4 = 12 liked tennis 48 ÷ 8 × 3 = 18 liked athletics Total 16 + 12 + 18 = 46 Balance = 48 – 46 = 2	2 liked swimming	M1 A3 M1	3	M1 for method of finding each part A1 for each correct sport found M1 for correct method 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 ÷ 3 = 50 So total = 4 × 50 = 200	200	M1 B1 M1 B1 **9**		M1 for combining fractions B1 for recognising $\frac{3}{4}$ is 150 M1 for method of getting from $\frac{3}{4}$ to the whole B1 for correct answer alongside justification	
10		15 mm × 1.25 = 18.75 mm = 19 mm to next whole number 19 mm × 1.25 = 23.75 mm = 24 mm to next whole number 24 mm × 1.25 = 30 mm 30 mm × 1.25 = 37.5 mm = 38 mm to next whole number 38 mm × 1.25 = 47.5 mm = 48 mm to next whole number	15 mm, 19 mm, 24 mm, 30 mm, 38 mm, 48 mm	M1 A1 M1 A1 A1 A1 A1 B1 **8**	3	M1 for method of increasing by 25% A1 for 19 M1 for method of continuing in same way A1 for 24 A1 for 30 A1 for 38 A1 for 48 B1 for complete correct solution	M

11	One year's interest is £2500 × 0.02 = £50 Number of years needed to get £160 in interest £160 ÷ £50 = 3.2 4 years' interest is £50 × 4 = £200 Next whole year above is 4.	4 years	M1 A1 M1 A1 A1 **5**	3	M1 for finding one years' interest A1 cao M1 for setting up equation for number of years A1 for 3.2 A1 cao	M
12	Ratio of areas of small to large is 1 : 2 $\frac{3}{7}$ of small square is shaded. As a fraction of the larger square, this is $\frac{3}{7} \times \frac{1}{2} = \frac{3}{14}$ Total shaded is $\frac{1}{7} + \frac{3}{14}$ $= \frac{2+3}{14} = \frac{5}{14}$	$\frac{5}{14}$	M1 B1 M1 A1 M1 A1 **6**	3	M1 method of sorting ratio. B1 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	If Anna starts with fare of £x New fare is x × 1.15 = 1.15x A reduction of 15% on that will give negotiated fare as 1.15x × 0.85 = 0.9775x	No, she is better off.	M1 M1 A1 M1 M1 A1 B1 **7**	2 3	M1 method of stating a starting fare, say £x M1 finding 15% increase A1 cao M1 method of reducing new fare by 15% M1 finding 15% reduction. A1 cao B1 No with clear justification	M
14	Pens-R-Us Pay for 20 get 10 free Cost £1.50 × 20 = £30 Budget Stationery Number of pens 4 × (5 + 3) = 32 So pay for 20 and get 12 free. Cost is the same.	Budget Stationery has the better deal as Sian will get 32 pens for the same price as 30 at Pens-R-Us	M1 A1 M1 A1 B1 **5**	2 3	M1 for method for cost at Pens-R-Us A1 cao M1 for method at Budget Stationery A1 cao B1 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.	M1 A1 M1 A1 B1 **5**	2 3	M1 for method of finding ratio A1 for usable ratio. M1 for method of finding ratio A1 answer in a suitable form to compare B1 for buy one get one free with explanation	M
16 a	1 : 6 ≠ 6 : 1 Because 1 : 6 = 6 : 36 (× 6) Or 6 : 1 = 1 : $\frac{1}{6}$ (÷ 6)	No	M1	2	M1 for method of finding each ratio in its unitary form as a method of comparison, oe	M
b	19 : 95 (÷19) 1 : 5	19 : 95 (÷19) 1 : 5	B1		B1 for calculation showing a multiplicative cancelling down	
c	1 × 19 : 5 × 19	No, because the units must be the same in order to compare.	B1		B1 for an understanding of scale and equivalence of units	
d	B : G 2 : 5 4 : 10 6 : 15 (21 pupils) 7 : 17.5 (not possible!) 8 : 20 (28 pupils)	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	B1 **4**		B1 for reference to multiples of 7	
17 a	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.	6 packs of 15	B1 A1	2	B1 for correct combination to 90 A1 for correct cost	M
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	No , still select 6 packs of 15 but it now costs less !	M1 B1 **4**		M1 for a method for calculating $\frac{2}{3}$ of the cost B1 for correct justification of choice	

18		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 costs after the price increase? £10	B1 **1**	2 3	B1 for clarity of question	M
19	**a**	M : W 5 : 2 24 women so the total member ship is: 5 × 12 : 2 × 12 60 : 24 Total membership = 60 + 24 = 84	84	M1 A1	3	M1 for multiplying by 12 oe A1 for 84 members in total	H
	b	R : S : J = 2 : 3 : 5 2 + 3 + 5 = 10 £85 ÷10 = £8.50 Shaun pays 3 × £8.50 = £25.50	£25.50	M1 A1		M1 for division of 85 by 10 A1 for correct multiplication 3 × £8.50 oe	
	c		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	B1 **5**		B1 for correct type of question	
20	**a**	$b_2 = \frac{5}{4} \times b_1$ $= \frac{5}{4} \times 8$ $= \frac{40}{4}$ = 10 hours	10 hours	M1 A1	3	M1 for method of setting up equation A1 cao	H
	b	b_2 costs £198 b_1 costs £118 198 ÷ 118 = 1.68 to 2 dp 5 ÷ 4 =1.25	The increase in cost is proportionally more than the increase in battery life.	M1 B1		M1 for division of more expensive cost by cheaper cost B1 for use of comparison to justify	
	c	$\frac{b_2}{118} = \frac{5}{4}$ $b_2 = \frac{5 \times 118}{4}$ $= \frac{590}{4}$ = £147.50 Reduction is: £198 – £147.50 = £50.50	£50.50	M1 A1 **6**		M1 for multiplying cheaper cost by 5 and dividing by 4 A1 cao	

21 **a**	5 × 90 = 450 minutes £6.50 ÷ 450 = 1.44p per minute 5 × 80 = 400 minutes £6.50 ÷400 = 1.625p per minute 5 × 80 = 400 minutes £4.00 ÷ 400 = 1p per min **cheapest** Or 450 ÷ 6.50 = 69 minutes per £1 400 ÷ 6.50 = 62 minutes per £1 400 ÷ 4.00 = 100 minutes per £1 **best value**	Best buy is 5 pack for 80 minutes each @ £4.00	M1 B2	3	M1 for method of multiplying up for total minutes and then division to identify either cost per minute or time per £ 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.	B1		B1 for explanation of possible reasons not to choose the best buy	
			4			
22	800 × 1.19 = €952 800 × 1.22 = €976 €976 – €952 = €24	They will get €24 more.	M1 B1 A1	2	M1 for multiplications B1 for subtraction ft A1 cao	H
			3			

23 **a**	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 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.	M1 B1 M1	2 3	M1 for method of division to see how many batches of 15 biscuits can be made with each ingredients B1 for 32, 35 100 and 28 M1 for correct identification of limiting value	H
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 = (£126.81 – £85)/£85 0.489529412 × 100% = 48.95%	49% profit to the nearest integer.	 B1 M1 A1 M1 A1 **8**		 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	
24	£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.	M1 M1 B1 B1 **4**	2	M1 for method of 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 B1 for demonstrating over-payment with explanation	H
25 **a**		$A \times 0.85 = B$	B1	2	B1 for correct formula	H
b		$A = B \div 0.85$	B1 **2**		B1 for correct rearrangement of ÷ by 0.85	

26	**a**	$A \times 1.5 \times 1.5 = A \times 1.5^2$ $= A \times 2.25$	No: an increase to A of 50% followed by another increase of 50% gives 2.25A. Doubling would be 2A $2A \neq 2.25A$	B1	2	B1 for clear explanation with calculated justification oe	H
	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 fives a new price of 0.9A. Because multiplication is commutative, the prices are the same. It makes no difference.	M1 B1 **3**		M1 for method of setting up both equations B1 for clear explanation with calculated justification oe	
27	**a**	$A \times \frac{6}{7} = £996$ $A = £996 \times \frac{7}{6}$	£1162	M1 A1	2 3	M1 for multiplication and rearrangement A1 cao	H
	b	$A \times 1.04 = £6.50$ $A = £6.50 \div 1.04$	£6.25	M1 A1		M1 for multiplication by 1.04 and rearrangement. A1 cao	
	c	$A \times 1.07 = £957.65$ $A = £957.65 \div 1.07$	£895	M1 A1		M1 for multiplication by 1.07 and rearrangement A1 cao	
	d	For an original amount A, the multiplier is b for a percentage increase or decrease, and the new value is C $A \times b = C$	$A = C \times \frac{1}{b}$	B1		B1 for correct explanation either in words or by a general formula, provided the variables are defined	
	e		Multiplier (x) $x > 1$ increase $0 < x < 1$ decrease	B1 **8**		B1 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)	
28		Current costs are £1.50/mile and 20p/minute Competitive pricing structure: answers will vary. 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 | £9.90 | £21		M1 M1 B1 **3**	2 3	M1 for method of finding charges M1 for working out current price structure B1 for a correct calculation of a pricing structure that has an element of competition. The suggestion (B) competes for short distances, matches for mid distances and is not competitive for longer journeys	H

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

33	In year 1 £8000 × 0.03 = £240 Interest = £240 So total at end of year 1 = £8000 + £240 = £8240 Year 2 £8240 × 0.03 = £247.20 Interest = £247.20 At end of year 2 = £8240 + £247.20 = £8487.20 Year 3 £8487.20 × 0.03 = £254.61 (Banks round down) Interest = £254.61 At end of year 3 = £8487.20 + £254.61 = £8741.81	£8741.81	M1 M1 A1 B1 B1 A1 B1 **7**	2	M1 for showing the concept of compound interest. B1 for any suitable method of calculating total at end of year 1 A1 cao B1 for any suitable method of calculating total at end of year 2 (ft) B1 for any suitable method of calculating total at end of year 3 (ft) A1 cao (accept £8741.82). B1 for clarity of explanation through set out of calculations	H
34	Let starting amount be B Then $B \times 0.8^n < \frac{B}{2}$ Divide both sides by B $0.8^n < 0.5$ Trial and improvement $0.8^2 = 0.64$ not yet $0.8^3 = 0.512$ not yet $0.8^4 = 0.4096$ now less than a half OR starting with a given amount Say £100 £100 × 0.8 =£80 £80 × 0.8 = £64 £64 × 0.8 = £51.20 £51.20 × 0.8 = £40.96	4 weeks	M1 M1 M1 A1 **4**	2	M1 for choosing a starting a position, either a variable like B or a specific amount like £100 M1 for working through the weeks in some way M1 for method 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 cao	H