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| 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 |

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| **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. | P1  A1  P1  A1  B1  C1 | 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  B1 ft  C1 No and a clear summing up of why it won’t be ready | B |
| **6** |
| **2** | 2 + 1 = 3  60 ÷3 = 20  2 × 20 = 40  She spends £40 on clothes | £40 | M1  P1  A1 |  | M1 for adding ratios to 3  P1 for process of finding the 2 share  A1 cao | B |
| **3** |
| **3 a**    **b**    **c**  **d** | = 0.17 (to 2 dp)  1 – 0.17 = 0.83 = 83%  Or 150 – 25 = 125  = 0.83 = 83%(to 2 dp)  = 37.5  = 38 to nearest car are red  17% green + 25% red  Total 42%  Less than half the cars are accounted for, so there could be one third silver.  150 ÷3 = 50 which is a whole number. | 83%  Yes  No, she is not right.  Yes, he could be right. | P1  A1  M1  C1  P1  C1  P1  C1 | 2  3 | M1 for process of finding part of a ratio  A1 answer correct to 2 sf or more  M1 for diving by 4  C1 showing nearest whole number is more than 25  P1 adding both together in some way  C1 for no with justification  P1 for process looking at how many available to be silver  C1 for yes with suitable justification | B |
| **8** |
| **4** | One day is 60 × 24 = 1440 minutes  1440 ÷ 5 = 288 minutes  This is less than 360 minutes. | 360 minutes is longer. | P1  M1  A1 | 2 | P1 finding a day in minutes.  M1 dividing total minutes by 5  A1 cao | B |
| **3** |

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| **5 a**  **b** |  | 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  20% is 2 × 10% or  so need to divide by 10 then multiply by 2  Or divide by 5. | M1  C2  C1 | 2 | P1 for process of finding a percentage  C1 for first example  C1 for second example  C1 for clear explanation | B |
| **4** |
| **6 a**  **b** |  | Look for common factors.  When there are no common factors, it’s in its simplest form.  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. | C1  C1  P1  C1 | 2 | C1 for clear explanation  C1 for clear explanation  P1 for having a satisfactory example  C1 for the accompanying explanation | B |
| **4** |
| **7** | 7 – 4 = 3  So 3 parts = £120  120 ÷ 3 = 40  So one part = £40  So Peter got 2 × £40 = £80 | £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 |
| **5** |

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| **8 a**  **b**  **c** |  | Correct  = 0.66666  = 0.6  0.6666 > 0.6  Correct  × 100% = 60%  Not correct  × 150 = 105  0.75 × 150 = 112.5 | B1  C1  B1  P1  B1  C1 | 2 | B1 for correct  C1 for clear explanation  B1 for correct  P1 with clear justification  B1 for not correct  C1 for clear explanation | B |
| **6** |
| **9 a**  **b** | 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  +  =  So  of total = 150  of total = 150 ÷ 3 = 50  So total = 4 × 50 = 200 | 2 liked swimming  200 | P1  A3  P1  P1  B1  P1  C1 | 3 | P1 for process of finding each part  A1 for each correct sport found  P1 for correct process leading to 2  P1 for combining fractions  B1 for recognising  is 150  P1 for process of getting from  to the whole  C1 for correct answer alongside justification | M |
| **9** |
| **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  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 |
| **8** |
| **11** | One years 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 | P1  A1  P1  A1  A1 | 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 |
| **5** |
| **12** | Ratio of areas of small to large is 1 : 2  of small square is shaded.  As a fraction of the larger square, this is  ×  =  Total shaded is  +  =  = |  | P1  C1  M1  A1  M1  A1 | 3 | M1 process of sorting ratio  C1 for explanation of each part  M1 finding fraction in small square  A1 cao  M1 adding the two fractions  A1 cao | M |
| **6** |
| **13** | If Anna starts with fare of £*x*  New fare is *x* × 1.15  = 1.15*x*  A reduction of 15% on that will give negotiated fare as  1.15*x* × 0.85  = 0.9775*x* | No, she is better off. | P1  M1  A1  P1  M1  A1  C1 | 2  3 | P1 process of stating a starting fare, say £*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 |
| **7** |
| **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 | P1  A1  P1  A1  C1 | 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 |
| **5** |

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| **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 | 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 |
| **5** |
| **16 a**  **b**  **c**  **d** | 1 : 6 ≠ 6 : 1  Because 1 : 6 = 6 : 36 (× 6)  Or 6 : 1 = 1 :  (÷ 6)  19 : 95 (÷19)  1 : 5  1 × 19 : 5 × 19  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 | 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 |
| **4** |
| **17 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.  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 | 2 | B1 for correct combination to 90  A1 for correct cost  B1 for a method for calculating  of the cost  C1 for correct justification of choice | M |
| **4** |
| **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 | C1 | 2  3 | C1 for clarity of question | M |
| **1** |
| **19 a**  **b**  **c** | M : W  5 : 2  24 women so the total member ship is:  5 × 12 : 2 × 12  60 : 24  Total membership =  60 + 24 = 84  R : S : J = 2 : 3 : 5  2 + 3 + 5 = 10  £85 ÷10 = £8.50  Shaun pays 3 × £8.50 = £25.50 | 84  £25.50  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 | M1  A1  M1  A1  C1 | 3 | M1 for multiplying by 12 oe  A1 for 84 members in total  M1 for division of 85 by 10  A1 for correct multiplication 3 × £8.50 oe  C1 for correct type of question | H |
| **5** |
| **20 a**  **b**  **c** | *b*2 =  × *b*1  =  × 8  = 10 hours  *b*2 costs £198  *b*1 costs £118  198 ÷ 118 = 1.68 to 2 dp  5 ÷ 4 =1.25    *b*2 =  =  = £147.50  Reduction is:  £198 – £147.50 = £50.50 | 10 hours  The increase in cost is proportionally more than the increase in battery life.  £50.50 | P1  A1  B1  C1  M1  A1 | 3 | M1 for process of setting up equation  A1 cao  B1 for division of more expensive cost by cheaper cost  C1 for use of comparison to justify  M1 for multiplying cheaper cost by 5 and dividing by 4  A1 cao | H |
| **6** |
| **21 a**  **b** | 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  80 minutes is not long enough. | P1  B2  C1 | 3 | P1 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  C1 for explanation of possible reasons not to choose the best buy | H |
| **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 |
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| **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  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  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% | So she can make 44 complete packs of 15 biscuits.  49% profit to the nearest integer. | P1  B1  P1  B1  M1  A1  M1  A1 | 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  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 | H |
| **8** |
| **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. | P1  M1  B1  C1 | 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 |
| **4** |
| **25 a**  **b** |  | *A* × 0.85 = *B*  *A* = *B* ÷ 0.85 | M1  P1 | 2 | M1 for correct formula  P1 for correct rearrangement of ÷ by 0.85 | H |
| **2** |
| **26 a**  **b** | *A* × 1.5 × 1.5 = A × 1.52  = A × 2.25  A × 0.75 × 1.20 = 0.9A  A × 1.20 × 0.75 = 0.9A | No: an increase to A of 50% followed by another increase of 50% gives 2.25A.  Doubling would be 2A  2A ≠ 2.25A  If the original cost is A, the cost after a discount of 25% is 0.75*A* 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. | C1  P1  C1 | 2 | C1 for clear explanation with calculated justification oe  P1 for method of setting up both equations  C1 for clear explanation with calculated justification oe | H |
| **3** |
| **27 a**  **b**  **c**  **d**  **e** | A ×  = £996  A = £996 ×  A × 1.04 = £6.50  A = £6.50 ÷ 1.04  A × 1.07 = £957.65  A = £957.65 ÷ 1.07  For an original amount *A*, the multiplier is b for a percentage increase or decrease, and the new value is *C*  A × b = C | £1162  £6.25  £895  A = C ×  Multiplier (x)  x > 1 increase  0< x <1 decrease | M1  A1  M1  A1  M1  A1  C1  C1 | 2  3 | M1 for multiplication and rearrangement  A1 cao  M1 for multiplication by 1.04 and rearrangement.  A1 cao  M1 for multiplication by 1.07 and rearrangement  A1 cao  C1 for correct explanation either in words or by a general formula, provided the variables are defined  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) | H |
| **8** |
| **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 | | | P1  B1  B1 | 2  3 | P1 for process of finding charges  B1 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 |
| **3** |

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| **29 a**  **b**  **c** |  | | Travel 30 miles in 45 minutes  45 minutes =  hour  30 ÷ =  =  = 40 mph as required  Not changing minutes into hours  Units of speed = units of distance ÷ units of time | C1  C1  C1  C1 | 2 | C1 correct explanation with calculation that indicates 10 miles every 15 minutes implies 40 miles every 60 minutes oe  C1 clear explanation of given result  C1 for stating a common misconception  C1 for correctly stating the relationship between speed, distance and time | H |
| 4 |
| **30** | A rectangle 1 m × 2 m  Area = 2 m2  A rectangle 4 m × 8 m  Area = 32 m2  Length scale factor = 4  Area scale factor = 16 (42)  Area = 2 × 16 = 32 m2 | | 32 m2 | P1  A1 | 2  3 | P1 for process of trial and improvement  A1 cao | H |
| **2** |
| **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 | 2  3 | B1 for calculation of length scale factor.  M1 for calculation of volume scale factor.  A1 cao | H |
| **3** |
| **32** | Length scale factor = 450 ÷ 15 = 30  Volume scale factor = 303= 27 000  450 × 27 000= 12 150 000 cm3  (÷ 1003 or 1 000 000 for m3)  = 12.15 m3 | | 12.15 m3 | B1  M1  M1  A1 | 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 |
| **4** |
| **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 | | P1  M1  A1  B1  B1  A1  C1 | 2 | P1 for showing the concept of compound interest.  M1 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).  C1 for clarity of explanation through set out of calculations | H |
| **7** |
| **34** | Let starting amount be B  Then B × 0.8*n*<  Divide both sides by B  0.8*n* < 0.5  Trial and improvement  0.82 = 0.64 not yet  0.83 = 0.512 not yet  0.84 = 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 | | P1  M1  P1  A1 | 2 | P1 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  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  cao | H |
| **4** |