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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 |
| oe | Or equivalent |
| cao | Correct answer only |
| ft | Follow through |

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| **Question**  | **Working** | **Answer** | **Mark** | **AO** | **Notes**  | **Grade** |
| **1 a** **b** **c** | 1.75 × 3.50 = 6.1256.13 × 2 = 12.266.13 × 1.05 = 6.4365 | £6.13 to nearest penny £12.26 £6.44 to nearest penny | M1A1M1A1M1A1 | 3 | M1 for correct methodA1 caoM1 for correct method, accept 2 × 6.125 = £12.25A1 for £12.26 or £12.25M1 for correct method, accept 6.125 × 1.05 = 6.43125A1 for £6.44 or £6.43  | B |
| **6** |
| **2** |  | 995 ml | B1 | 3 | B1 for 995 | B |
| **1** |
| **3** | 1 km = 1000 m= 1000 × 100 cm= 100 000 cm | 1 km = 100 000 cm | B2 | 3 | B1 for km to metresB1 for metres to centimetres | B |
| **2** |
| **4** |  | He has forgotten that there are 60 minutes in an hour, not 100. 1 hours is 75 minutes | B1B1 | 2 | B1 for stating he has used 1 hour as 100 minutesB1 for correct answer as 75 minutes | B |
| **2** |
| **5** | 15 minutes =  =  hourTotal time is 1 hours + hour = 2 hours18:40 plus 2 hours gives 20:40. So the film will finish at 20:40.If Peter’s Dad leaves at 9 p.m. and it is a 20 min drive he will get to the cinema at 9:20 p.m. or 21:20. | No, Peter’s dad is not correct as they will have been waiting for 40 min by the time he gets there.  | M1A1B1B1 | 23 | M1 for calculating the time the boys will be leaving A1 caoB1 for dad’s arrival timeB1 for clear explanation of dad being late | B |
| **4** |

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| **6** |  |  could be odd one out as it’s the only terminating decimal equivalent/the only one with 1 as the denominator/unit fraction. could be odd one out as it’s the only one which is not in its simplest form. could be odd one out as after simplifying  it’s the only one not having a numerator of 1/unit fraction. | B1B1B1 | 2 | B1 for a valid reason for B1 for a valid reason for B1 for a valid reason for  | B |
| **3** |
| **7 a** **b** |  | Look at the first decimal place of the decimal, put the numbers in order. If any have the same digit in this place, look to the second decimal place and put these in order. Keep going along the decimal places until all numbers are in order.E.g. 0.24Closest to 0.23 as it is smaller than 0.25 which is halfway between the two numbers. | B1B1B1 | 2 | B1 for explanation of what you look for when ordering decimals. B1 for a decimal between 0 .23 and 0.27 (not 0.25)B1 for clear explanation | B |
| **3** |

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| **8 a** **b** **c** | 500 – (85 × 5) = 500 = 75 | 75p500 – (85 × 5)e.g. for 500 × (85 ×5)Pip buys some nails in packs of five. Each pack is in a box containing 85 packs. He has ordered 500 boxes. How many nails has he ordered?e.g. for 500 + (85 × 5)Pip buys some nails in packs of five. He buys a box containing 85 packs. He already had 500 nails, so how many has he altogether now?e.g. for 500 ÷ (85 × 5)Pip needs 500 nails. The nails come in packs of 5 in boxes containing 85 packs. How many boxes does he need? | B1B1B1B1B1 | 23 | B1 caoB1 caoB1 for simple word problem that requires the calculationB1 for simple word problem that requires the calculationB1 for simple word problem that requires the calculation | B |
| **4** |
| **9 a** **b** | Difference between –123.67 and 1428.62, which equals 1428.62 + 123.67 = 1552.29 | She was overdrawn.£1552.29  | B1M1A1 | 23 | B1 a correct answerM1 for correct method of finding the differenceA1 cao | B |
| **3** |
| **10 a** **b** **c** |  | × 100Because multiplying by 100 will have the effect of moving 72 two places to the left.e.g. 100 ÷ 45 × 525 × 10E.g. I looked for a simple question with an answer of 10 × 25, then realised this is the answer. | B1B1B2B1B1 | 2 | B1 for a correct operationB1 for clear explanationB1 for a suitable question where the answer is 25.B1 for another suitable question where the answer is 25.B1 for a correct question with answer of 250B1 for a clear explanation | B |
| **6** |
| **11** |  | A prime number has only two factors, one and itself. So 36 is not a prime number.The true statement is that 36 has 8 factors. | B1B1 | 2 |  B1 for clear explanationB1 for correct true statement | B |
| **2** |
| **12 a** **b** **c** **d** **e** |  | No, a prime number cannot be a multiple of 4 because a prime number has only two factors, one and itself.e.g. 501the sum of its digits is divisible by 3A number is divisible by 6 if it is divisible by 2 (even) and divisible by 3 (the sum of its digits is divisible by 3)e.g. 105It ends in 5 and the sum of its digits is divisible by 3A number is divisible by 25 if it ends with 00, 25, 50, or 75. | B1B1B1B1B1B1B1B1 | 2 | B1 for NoB1 for clear explanationB1 for a suitable numberB1 for clear explanationB1 for clear explanationB1 for suitable numberB1 for clear explanationB1 for clear explanation | B |
| **8** |
| **13** | = 4 | 4 tiles | M1A1 | 3 | M1 for finding square root of 16A1 cao | **B** |
| **2** |
| **14** |  | 720Use multiplication as the inverse of division. 7.2 × 10 × 10 = 7.2 × 100 = 720  | B1B1 | 2 | B1 for 720B1 for clear explanation. | B |
| **2** |
| **15** | 1 × 20p (2 × 20p = 40p > 34p)14p left to find2 × 5p (3 × 5p = 15p > 14p)2 × 2p = 4p Total 34p as required 1 × 20p, 2 × 5p, 2 × 2p: 5 coins | 5 coins  | M1A1 | 3 | M1 for the process of finding suitable coinsA1 cao | B |
| **2** |
| **16 a** **b** | 1 cm = 10 mmSo 300 cm = 300 × 10 = 3000 mm | So 30 000 mm is longer.e.g. 500 cm, 5000 mm | M1B1B1 | 2 | M1 for method of changing one unit to the otherB1 for correct statementB1 for a correct example | B |
| **3** |

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| **17** | 12 × 15 = 180 ice creams all togetherCost of ice creams = 12 × £4.50 = £54105 × 80p = 8400p = £84180 – 105 = 7575 × 50p = 3750p = £37.50Total sales£84 + £37.50 = £121.50Profit = £121.50 – £54 = £67.50  |  £67.50 | B1B1B1B1B1M1A1 | 3 | B1 for 180B1 for 54B1 for 84B1 for 37.50B1 for 121.50M1 for finding differenceA1 cao | B |
| **7** |
| **18 a** **b** | 540 – 300 = 240240 × 5= 1200p = £12Add £25 for the month240 × 0.25 = 60So 180 calls @ 5p= 180 × 5p = 900p = £960 calls @ 3p= 60 × 3p = 180p = £1.80Total = £9 + £1.80 = £10.80Difference = £12 – £10.80 = £1.20 | £37£1.20 | M1A1A1M1B1B1M1A1 | 3 | M1 for finding how many calls chargeableA1 for 12A1 caoM1 for method of finding 25%B1 for 9B1 for 1.80M1 for finding differenceA1 cao  | B |
| **8** |
| **19 a** **b** | Change both fractions to 12ths =  = Between these two is Change each to a decimal and look at the difference to 1/3 →0.333 333 → 0.322 581, difference is 0.010 752→ 0.327 869, difference is 0.054 644→ 0.296 703, difference is 0.003 663→ 0.331 126, difference is 0.002 208So  is the closestORMake each fraction have a numerator of 1, so→ → → → The closer the denominator is to 3, the closer the fraction is to  |  | B1B1M1B1B1 | 2 | B1 for suitable fraction alongside with explanationB1 for any fraction between  and M1 for a suitable process of comparing the fractionsB1 for accuracy of resultsB1 cao | M |
| **5** |
| **20** |  | Compare the denominator but not take into consideration the numerator. | B1 | 2 | B1 for clear explanation | M |
| **1** |

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| **21 a** **b** **c** | Total area is 11.25 + 7.5 = 18.75 m218.75 × 78 = 1462.51463 to nearest whole brick1463 = 14 ×100 + 63= 1400 × 1.08 + 63 × 1.79= £1512 + £112.77= £1624.77Or 15 × 100= 1500 × 1.08= £1620Cheaper to buy 15 × 1001463 ÷ 11 = 133So buy 133 lots of 10, getting 133 freeGives 1463 bricksWould need to buy 1330 bricks at £1.65 plus VAT.= £1.65 × 1.20 × 1330= £2633.40About £1000 more. | 1463 bricks£1620No, because the cost is about £1000 more. | M1M1A1M1A1B1M1A1M1B1B1B1 | 3 | M1 for process of splitting the shape into two rectangles M1 for method of finding total area of the shapeA1 caoM1 for method of finding number of bricksA1 caoB1 for showing cheapest way to buy bricksM1 for method of calculationA1 caoM1 for process of finding out how many needed to buyB1 for 1330B1 for £2633.40 ftB1 for stating no with clear explanation | M |
| **12** |
| **22 a** **b** **c** |  | 4.6 × 40= 4.6 × 10 × 4= 46 × 4 = 184e.g. 4.6 × 40 Round to 5 × 40 = 200So the answer in part a makes sense.e.g. Divide both by 10, or multiply both by 10 to give11.56 ÷ 0.34 = 34Or 1156 ÷ 34 = 34 | M1B1B1B1B1B1 | 2 | M1 for correct way of creating answerB1 for 184B1 for clear explanationB1 for clear explanationB1 for first exampleB1 for second example  | M |
| **6** |
| **23 a** **b** |  | Story about the calculationOwn calculation story with mark scheme | B2B2 | 2 | B1 for a sensible storyB1 for suitable involvement of figuresB1 for story with calculationB1 for suitable mark scheme | M |
| **4** |
| **24 a** **b** **c** **d** **e** |  | 8 × 100 = 8 × 10 × 10 = 80 × 10 as required =  =  × 1 as required6 ÷  is the same as asking how many times does  go into 6 which is 6 × 3 = 186 ÷  will be less than 18 as  will go into 6 less times as it is bigger than Use 3 × 3 = 9 and 3 × 15 = 45 to create, for example:15 × 3 = 4545 ÷ 5 = 9e.g. Bill and Ted’s ages multiply together to make 64. What are their ages?The product of Bill’s baby sister and his dad is 64. What are their ages?The link is Bill.e.g. Three brothers win £15 between them. How much will each receive?Tom won £5 and bought some games that cost £1 each. How many games did he buy?The link is winning. | B1B1B1B1B1B1B1B2B1B2B1 | 2 | B1 for clear explanationB1 for clear explanationB1 for clear explanationB1 for clear explanationB1 for clear explanationB1 for first exampleB1 for second exampleB1 for first suitable questionB1 for second suitable questionB1 for creating and stating a linkB1 for first suitable questionB1 for second suitable questionB1 for creating and stating a link | M |
| **13** |
| **25** |  | 4, 9, 25, 49They are all the square of a prime number.  | A1B1 | 2 | A1 caoB1 for clear explanation | M |
| **2** |
| **26** |  | True when:4 is a factor of each of the numbersor 4 is a factor of just two of the numbers*.*False when:either only one or three of the numbers has a factor of 4 | B1B1 | 2 | B1 for clear explanationB1 for clear explanation | M |
| **2** |
| **27 a i** **ii** **iii** **b** **c** | 629 = *x* × 17Using inverse operations and rearranging:629 ÷ 17 = 37  | e.g. 101, 103, 107, 109103 = 1000So 93= 72989 + 112484: even so 2 is a factor17625: ends in 5 so 5 is a factor3426: even so 2 is a factor37 | B1M1B1B1B1B1M1B1 | 2 | B1 for any prime number greater than 100 with justificationM1 for process of looking for 93B1 caoB1 for correct pairB1 for explanation about both even numbersB1 for explanation about multiple of 5M1 for process of using inverse operationB1 cao | M |
| **8** |
| **28** | Try first as 2Second is 6Third is 11Sum is 19, out of rangeTry first as 3Second is 9Third is 14Sum is 26, possibleTry first as 5Second is 15Third is 20Sum is 40 out of range | There is only one possible first number and that is 3. | M1B1M1B1M1B1B1 | 3 | M1 for starting with smallest prime of 2B1 for clearly stating out of rangeM1 for trying next prime of 3B1 for clearly stating it’s a possible one.M1 for continuing with the next prime 5B1 for clearly stating out of rangeB1 for final solution of only one possible answer | M |
| **7** |

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| **29 a** **b** |  | Sometimes True when the cube of a number is greater than 1.Not true for numbers 1 or less.AlwaysThe square of a positive number is positive.The square of a negative number is positive. | B1B1B1B1 | 2 | B1 for sometimesB1 for clear explanationB1 for alwaysB1 for clear explanation | M |
| **4** |
| **30 b** **c** **d** |  | 26 or 433362 | B1B1B1 |  | B1 for eitherB1 caoB1 cao | M |
| **3** |
| **31 a** **b** **c** |  | 10 × 2 or 2 × 1020 × 10 × 2= 2 × 10 × 10 × 2= 2 × 2 × 5 × 2 × 5 × 2= 2 × 2 × 2 × 2 × 5 × 5= 24 × 52 as required.He has treated 2*N*and *N* × 2 as the same calculation.  | B1M1B1 | 23 | B1 for 10 and 2 either way roundM1 for showing the process of reducing to a product of primesB1 for clear explanation | M |
| **3** |
| **32 a** **b** **c** **d** | 62 ÷ 62 = 62 – 2  | 16060 = 1When you divide a number by the same number you always get 1.Any combination of *a* and *b* such that the sum is equal to 9E.g. *a* = 8, *b* = 1 | B1M1A1B1B1B1 | 2 | B1 caoM1 subtracting the powersA1 caoB1 caoB1 for clear explanationB1 any correct pair that add up to 9 | M |
| **6** |

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| **33 a i** **ii** **iii** **b** **c** **d** |  | SometimesTrue when the digits are to the left of the decimal point.SometimesTrue when both are positive, false when one is negative.Sometimestrue for positive numbers,false for negative numberse.g. – × –  = This works because multiplying two negative numbers gives a positive one. Positive numbers are always larger than negative numbers.False because 0.1 is smaller than 0.9 | B1B1B1B1B1B1B1B1B1 | 2 | B1 for sometimesB1 for clear explanationB1 for sometimesB1 for clear explanationB1 for sometimesB1 for clear explanationB1 for a correct exampleB1 for clear explanationB1 for false with a clear explanation | M |
| **9** |
| **34 a** **b** | 42 – 15 | 27 °CEasy, e.g. 1 – 8Harder, e.g. –3 + –4 | M1A1B1B1 | 23 | M1 for subtractingA1 caoB1 for a correct exampleB1 for a correct, harder example | M |
| **4** |
| **35** |  | LargerDividing a positive number by a positive number less than 1 will always result in a larger number than you started with | B1B1 | 2 | B1 for largerB1 for clear explanation | M |
| **2** |
| **36** |  | I left home at 10 past 2 and walked for 50 minutes. The temperature was 13 °C.I could see an aeroplane overhead at 3000 feet. Altogether I had walked 3 miles.Own question similar to the one in part a together with an answer and mark scheme. | B2B2 | 2 | B1 for rounding the times and temperature sensibly.B1 for rounding distances sensiblyB1 for suitable questionB1 for the mark scheme | M |
| **4** |

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| **37** | 1 mile =  km5.5 miles =  × 5.5 km= 8.8 km | Her usual supermarket is closer.  | B1M1A1B1 | 3 | B1 for conversion statedM1 for multiplying distance by conversion factorA1 for a correct answerB1 for clearly stating correct solution. | M |
| **4** |
| **38** | 79 298 – 78 987 = 311 kWh used.80 kWh @ £20.95= 1676p= £16.76311 – 80 = 231231 kWh@ £10.80 = 2494.80= £24.948Total bill = £16.76 + £ 24.948 = £41. 708Assumptions that if you average consumption over the year April will be representative. | £41.71Yes | M1B1B1B1A1B1 | 2 | M1 for subtracting the given readings to find the amount of electricity used.B1 multiplying 80 by 20.95 or for writing down £16.76.B1 for subtracting 80 from 311 and then finding the cost of the remainder used by multiplying by 10.80 or for writing down £24.948B1 for adding the two amounts found together or writing down £41.708A1 for conversion to pounds correctly B1 for assumption made such as that given or showing that the standing order is higher than the cost of electricity used in April.oe assumptions stated | M |
| **6** |

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| **39** | Assuming inclusive and not a leap year27 August to 30 December= 4 + 30 + 31 + 30 + 30 = 125 days31 December to 9 April= 1 + 31 + 28 + 31 + 9= 100Total number of days = 225 daysTotal amount of electricity used = 55916 – 53480 = 2436 kWh**Current supplier**225 × 13.99 = 3147.75= £31.477515.09 × 2436 = 36759.24=£367.5924Total = £399.07**New supplier**225 × 23.818 = 5359.05= £53.590514.37 × 2436 = 35005.38= 350.0538Total = £403.64 | He should stay with his current supplier assuming that electricity use continues at the same level. The summary does not include the summer months when use is likely to be less. The difference is likely to be greater for the summer months. | M1A1B1B2B1B2A1B2 | 2 | M1 for showing how many days from each month are used and added together. B1 For stating the assumptions about inclusive days, that this is not a leap year and for calculating number of days correctly. B1 for showing how to find the difference of the readings B2 for showing how to calculate each part of the total cost. B1 if the conversion to pounds and correct rounding has not been done.B1 for showing how the cost is derived for the new supplier with same data as before.B2 for the finding the total cost and correctly rounding into money units. B1 if the correct amount has been calculated but not rounded or changed to correct monetary units.A1 for correctly stating he should stay with current supplier.B2 for clarity of answer, including any assumptions given.  | M |
| **11** |

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| **40 a i** **ii** **iii** **iv** **b** |  | 175 ÷ 8 = 21.875Round up to the nearest integer, 22, as tables are needed for everybody and you can’t have part of a table.175 ÷ 8 = £21.875If all the guests pay the same amount of £21.88 or more there is enough to cover the bill.175 ÷ 8 = 21.875Cannot have a fraction of a box, so only 21 boxes can be filled.21 × 8 = 168 rollshence 7 rolls left overAverage speed = distance ÷ time165 ÷ 8 = 21.875 km/hYou do not need to round this figure off as the speed can be given with this accuracy. | M1A1B1M1A1B1M1M1A1M1A1M1A1B1B2 | 23 | M1 for dividing guests by number at a table.A1 for the rounded, correct integer.B1 for explaining the need to round up to the nearest integer.M1 for dividing bill by the number at the table.A1 for a correct monetary amount higher than 21.875 and **less** than 22 unless a tip is mentionedB1 for stating the need to round up in order to create a total higher than the bill if they all pay the same.M1 for correctly dividing number of bread rolls by number in each box or the number 21.875M1 for stating the need to truncated amount as you can’t have a fraction of a boxA1 for the correct truncationM1 for dividing number of boxes by 8 or the total 168A1 for the answer of 7 rolls left over.M1 for stating formula for calculating speedA1 for the correct answer with correct units.B1 for stating no need to round off answerIn each case for part **b** 1 mark for answer and an extra mark for describing what is the same and different about each context. B2 Extra communication marks available for quality of questions and explanations in mark scheme  | M |
| **16**  |
| **41 a**  **b** | 24 × 72 = 17281728 ÷100 = 17.28 | Dividing both by tenCorrect calculation e.g. 2.4 × 7.2 = 17.28Divide both by 1024 × 0.72 = 17.28Divide one of the numbers by 100Suitable question using concepts introduced in part **a** | B2B2B2B2 | 3 | B1 for each correct statementB1 for each correct explanation of the relationships between the calculations.B1 for each set of questions, but the second must be harder than the first.B2 marks for correct explanation of the relationships between the calculations and identification of progression in difficulty.  | M |
| **8** |

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| **42** | 4.75 ≤ space < 4.854.25 ≤ car < 4.75 | A: Yes, the car is always smaller than the smallest possible spaceB: No, the smallest space is the same size as the largest car length.C: No, because the car is always smaller than the minimum size of the space you can always say it will fit. | B1B1B1B1B1 | 3 | B1 for stating upper and lower bounds of space.B1 for stating upper and lower bounds of carB1 for correct explanation of why this is definitely true oeB1 for correct explanation of why this is definitely not true oeB1 for correct explanation of why this is definitely not true oe | M |
| **5** |
| **43** | 14.5 cm ≤ brick < 15.5 cm | So maximum length for 20 identical bricks is: 20 × 15.5 = 310 cm | M1A1 | 3 | M1 for identifying the upper bound of the length of one brick and multiplying this by 20A1 cao | M |
| **2** |
| **44 a** **b** **c** |  | How long will it take Barry to recover the money it cost him to convert the car?Cost of 1 litre of LPG (*l*)Cost of 1 litre petrol (*p*)The distance he can travel per litre of each fuel (*dl* and *dp*)How far does he travel in one month (*d*)Cost of using LPG per month (*cl*) is: *cl* = *l* × (*d* ÷ *dl*)Cost of using Petrol per month (*cp*) is: *cp* = *p* × (*d* ÷ *dp*)The saving is *cp* – *cl* | B1B4M1B1M1B1B1B2 | 3 | B1 for suitable question oeB1 for each piece of information oeM1 for trying to find first costB1 for correct method of finding this costM1 for trying to find second costB1 for correct method of finding this costB1 for finding this difference correctlyB2 for clarity of explanation throughout part **c** | H |
| **13** |

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| **45** | Assume the dolphin starts from the bottom. A complete cycle from top to bottom, back to top, takes 7 minutes.Therefore in 90 mins competed the following cycles:90 ÷ 7 = 12.857 142 8 cycles.It has therefore completed 12 cycles but is NOT back at the back at the bottom.To work out which of the other options is correct calculate:0.857 142 8 × 7 = 6 minutesTherefore if we assume that the time started by observing the dolphin at the surface, the 6 minutes of the cycle will be towards the end of the cycle, it is on its way up. | On its way up. | M2B1M1B1A1 | 23 | M1 for adding the times to create a 7 minute cycleM1 for dividing 90 by the time of one cycleB1 for stating that the dolphin has completed 12 cyclesM1 for multiplying the fraction part of 12.8… by 7B1 for finding this time and relating it to a part of the cycleA1 cao | H |
| **6** |
| **46** | 26 letters × 25 numbersSo 26 × 25 = 650 | 650 | B1M1A1 | 23 | B1 for knowing to use 26 and 25M1 for 26 × 25A1 cao | H |
| **6** |
| **47 a****b i** **ii** **iii** **iv** **v** **vi** |

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| **Planet** | **Distance from the sun (million km)** | **Diameter (km)** |
| Mercury | 5.8 × 101 | 4.878 × 103 |
| Venus | 1.08 × 102 | 1.2104 × 104 |
| Earth | 1.5 × 102 | 1.2756 × 104 |
| Mars | 2.28 × 102 | 6.787 × 103 |
| Jupiter | 7.78 × 102 | 1.42796 × 105 |
| Saturn | 1.427 × 103 | 1.20660 × 105 |
| Uranus | 2.871 × 103 | 5.1118 × 104 |
| Neptune | 4.497 × 103 | 4.8600 × 104 |

 | B2 | 2 | B1 for correct distance columnB1 for correct diameter columnB1 caoB1 caoB1 caoB1 caoB1 caoB1 cao | H |
| Jupiter MercuryMercuryJupiterUranusEarth and Venus | B6 |
| **8** |

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| **48 a**  **b** |  | FalseYou can’t find the square root of a negative number that is a real number.Always trueThe cube root of a positive number is positive and the cube root of a negative number is negative. | B1B1B1B1 | 2 | B1 for falseB1 for correct explanationB1 for always trueB1 for correct explanation | H |
| **4** |
| **49 a i** **ii** **b** | 56 ÷ 5–3 = 5(6 – –3) = 59OR  = = 5956 × 5–3 = 5(6 + –3) = 53OR  = 5 × 5 × 5 = 53 |  as a power represents the reciprocal of square so the square root. | M2M2B2 | 2 | M1 for showing subtraction of indicesM1 for recognising 6 – –3 = 6 + 3Or M1 for showing each number as a product of factorsM1 for combining them to give all the 5s as numerators.M1 for showing the indices are addedM1 for recognising 6 + –3 = 6 – 3Or M1 for showing each number as a product of factorsM1 for combining them to give all the 5’s as numerators.B1 for showing square rootB1 for clear explanation. | H |
| **6** |
| **50 a** **b** **c** | 8.848 × 103 ÷ 8.298 × 102 = 10.668.298 × 102 ÷ 103 = 0.8298 km20 ÷ 1 000 000 000 = 2 × 10–8 | 10.660.8298 km2 × 10–8 | M1A1M1A1M1A1 | 2 | M1 for dividing mountain by skyscraperA1 accept 10.66… or 10.7M1 for dividing skyscraper height by 100A1 caoM1 for finding reciprocal of 1 000 000 000A1 cao | H |
| **6** |
| **51** | Fractions unshaded are  and  =  = 1 – =  |  | M1M1A1M1A1 | 2 | M1 for adding given fractionsM1 for use of common denominator 63A1 caoM1 for subtracting fraction sum from 1A1 ft from their  | H |
| **5** |
| **52** | So  of the residential land is used for services. × 5 =  m2( ÷ 15) × 100= 13.75% | 13.75% of the total area is used for services. | B1M1A1M1A1 | 3 | B1 for recognising and stating  of residential development is used for the servicesM1 for multiplying  by 5A1 oeM1 for finding above fraction of 15 and multiplying by 100A1 accept 14 or 13.8 | H |
| **5** |
| **53** |  | The volume of the 2 cm dice is 2 × 2 × 2 = 8 cm3. The volume of the 4 cm dice is 4 × 4 × 4 = 64 cm3This is 8 times as much plastic as the 2 cm cube.The 4 cm cube will use 64 – 8 = 56 cm3 more plasticOr could say 8 times as much | B2B1 | 3 | B1 for clear explanation showing how to find volumes of each cube.B1 for clear indication that the volume of the 4 cm dice is not twice as much as the 2 cmOr B2 for stating twice as large in dimensions will be 23 as large in volume.B1 For correctly stating 56 cm3 more plasticOr for stating 8 times as much | H |
| **3** |
| **54 a** **b** |  | 75 × 20 = 1500 oeThe approximation will be smaller because each term has been rounded down = 5 oeThe approximation will be smaller because the numerator has been rounded up and the denominator rounded down. Dividing a smaller number by a larger number will result in a smaller answer. | M1A1B1M1A1B1 | 3 | M1 for a suitable rounding of each numberA1 for correctly multiplying the rounded numbers. B1 for a correct justificationM1 for a suitable rounding of each numberA1 for correctly dividing the rounded numbers. B1 for a correct justification In each case answer marks only if the estimation is one that could be done in your head. Explanation marks only for a valid explanation but allow ft for a given approximation | H |
| **6** |
| **55** |  | Three calculations that approximate to 75 e.g. 1.1 × 75.1 based on 1 × 7524.7 × 3.2 based on 25 × 3147 ÷ 1.9 based on 150 ÷ 2 | B3B2B2 | 23 | B1 for each example that approximates to 75B1 for use of multiplication and division.B1 for evidence of progression of complexity in the questions oeB2 for use of mathematical language and possibly connectives in answer | H |
| **7** |

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| **56** | The minimum area is:14.5 × 18.5 = 268.25The maximum area is less than:15.5 × 19.5 = 302.25Given lengths are 2 sf, so it would be sensible to give area to 2 sf as well.Where area = 15 × 19 = 285The sensible answer for the area is 290 m2  | 268.25302.25268.25 ≤ floor area < 302.25290 m2 | M1A1M1A1A1B1B1 | 2 | M1 for multiplying the lower bounds A1 caoM1 for multiplying the upper boundsA1 caoA1 caoB1 for explanation of why 2 sf should be used B1 cao | H |
| **7** |
| **57** **a** **b** **c** | Assume pallets are at maximum of 525 kg.A 6-axle lorry can carry up to 44 ÷ 0.525 = 83.8So a maximum of 83 pallets per trip. A 5-axle lorry can carry up to 40 ÷ 0.525 = 76.2So a maximum of 76 pallets per trip. | 6 axle max of 83 pallets5 axle max of 76 pallets80 is less than 83 but more than 76, so choose the 6-axle lorry, as this can do it in one trip.150 pallets can be split into two loads of 75, this is less than 76, sochoose 5-axle lorry to make two trips, as this works out cheaper per trip.159 can be split into two loads, 76 + 83. So choose the 5-axle lorry to make one trip, as this is cheaper per trip, and 6-axle lorry to make one trip as this avoids the need for a third trip. | B1M1A1A1B2B2B2 | 23 | B1 for stating maximum possible mass of palletM1 for dividing both load limits by maximum palletA1 caoA1 cao B2 for clear explanation of correct choiceB2 for clear explanation of correct choiceB2 for clear explanation of correct choice | H |
| **10** |

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| **58 a** **b** **c** **d** **e** | 13.25 ≤ runner 1 < 13.3513.295 ≤ runner 2 < 13.305 | 0.4 m is written to 1 dp and could have a value between 0.35 m and 0.449999 m0.400 m is written to 3 dp and could have a value between 0.3995 m and 0.4004999 mIf the answer is required to 3 dp to provide all the information required you need to include 3 dp even if the digits are 0.425 cm ≤ length < 435 cmTenth of a metre or 10 cm.Therefore Runner 1 fastest time could be faster than Runner 2.But also true is that the slowest time for runner 1 is slower than the slowest of runner 2.If each person is measured to the nearest kg, they could each for example have a mass 100.4 kg and 7 × 100.4 > 700 kg. | B2B1B1B1B1B1B2B1B2 | 23 | B1 for clear explanation B1 for showing the range of possible values each could haveB1 for clear explanationB1 for communicating clearly this informationB1 for communicating clearly this informationB1 for runner 1 limitsB1 for runner 2 limitsB2 for clear explanation showing both possibilitiesB1 for a given exampleB2 for clear and concise explanation | H |
| **12** |
| **59** | Maximum number of people turning up will be 104 (as 105 will round to 110)Assume 5% of the 280 do not turn up.0.05 × 280 = 14Hence assume 266 seats already taken.365 – 266 = 99 free seats | If the estimate of how many will fail to turn up is correct, 266 seats will be taken with advance sales. This leaves 99 seats free. If up to 99 extra people turn up, they all get seats. If 100–104 turn up, some will not get a seat. | B1B1B1B1B2 | 3 | B1 for stating maximum number of people that could turn up.B1 for finding the assumed number not turning upB1 for finding assumed seats takenB1 for finding assumed number of free seatsB2 for clear explanation using all the calculated data | H |
| **6** |

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| **60** | 12.25 seconds ≤ time < 12.35 seconds99.995 m ≤ distance < 100.005 mSpeed = distance ÷ timeFastest speed is longest distance divided by shortest time= 100.005 ÷ 12.25 = 8.164 m/s | 8.164 m/s | B1B1M1A1M1A1 | 2 | B1 for time rangeB1 for distance rangeM1 for correct formula used for speedA1 for explanation of longest distance used with shortest timeM1 for divisionA1 for suitably rounded speed (4 or 5 sf) | H |
| **6** |
| **61** | 124.5 ≤ volume < 125.5Take cube root for lengths of sides giving4.9933244 ≤ length < 5.0066578Area of side will be square of lengths, giving24.933289 ≤ area < 25.066622 | 24.93 cm2 ≤ area < 25.07cm2 | B1M1A1M1A1 | 2 | B1 for stating limits of accuracy for volumeM1 for finding cube root to find lengthA1 for unrounded limits to lengthM1 for squaring unrounded length limitsA1 for rounded limits to 3 or 4 sf | H |
| **5** |