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| --- | --- |
| Guidance on the use of codes for this mark scheme | |
| M | Method mark |
| A | Accuracy mark |
| B | Accuracy mark in AO1 |
| C | Communication mark |
| P | Proof or process mark |
| oe | Or equivalent |
| ft | Follow through |
| cao | Correct answer only |

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| **Question** | **Working** | **Answer** | **Mark** | **AO** | **Notes** | **Grade** |
| **1 a**  **b**  **c**  **d**  **e**  **f** |  | *D* = 7*w*  *C* = *pn*  *Y* =  *P* = 100*D*  *A* = *lw*  *P* = *nl* | B1  B1  B1  B1  B1  B1 | 3 | B1 oe  B1 oe  B1 oe  B1 oe  B1 oe  B1 oe | B |
| **6** |
| **2 a**  **b** |  | *C* = 80*h*  *C* = 80*h* + 50 | B1  B1 | 3 | B1 cao  B1 cao | B |
| **2** |
| **3 a**  **b** |  | No  To be able to work out what the number thought of, you need to know the answer.  Yes  Because I can write an equation from the information and solve it.  *x* + 15 = 26  so *x* = 11 | C1  C1  B1 | 2 | C1 for No and a reason  C1 for Yes and a reason  B1 for showing the equation and the solution | B |
| **3** |
| **4** |  | For example, in the rule pay =15 × hours.  As hours varies, so will the calculation to calculate pay.  Yes, there will be others, there will be hundreds of different possible calculations. | C1  C1  C1 | 2 | C1 for an explanation of why it is possible for more than one calculation to match with the same rule  C1 for using an example to go alongside the explanation  C1 for stating Yes there will be more, and qualifying this | B |
| **3** |
| **5** |  | We use (*x*, *y*) to describe the position, where the first part, *x*, is along the *x*-axis. Then the second part, *y*, is along the *y*-axis.  Example, e.g.  The convention for point A is (2, 3). If we didn’t have the convention then we could use (3, 2) but that could be confused now with point B. | C1  C1 | 2 | C1 for clear explanation  C1 for a clear example illustrated with a sketch graph | B |
| **2** |
| **6 a**  **b** |  | Yes  For example we could write as 2*x* = *y* – 6  Rearranging an equation.  Yes  The first equation has been divided by 2 throughout. | C1  C1  C1 | 2 | C1 for Yes with an example to illustrate  C1 for correct language  C1 for yes and a reason | B |
| **3** |
| **7** |  | Substitute *x* = 3 in the equation to give  *y* = 3 + 2 = 5  so when *x* = 3, *y* = 5, hence (2, 6) is not on the line **or** The constant term is 2 so the line crosses the *y*-axis at the point (0, 2). Then for every point across it goes up 1 (gradient is 1) so by the time *x* = 3, *y* will = 5. | C1 | 2 | C1 for a clear example | B |
| **1** |
| **8 a**  **b** | Money spent = 2 × £14.99 + 2 × £2.50 + (12 × £0.80 + £2.50)  = £29.98 + £5 + (£9.60 + £2.50)  = £34.98 + £12.10 = £47.08  Money left = £70 – £47.08  = £22.92 | Is the sum of the cost of the CDs plus the coffee and the taxi less than £70?  Money left = £70 – money spent  This is less than £70 so she can afford the taxi. | C1  B1  P1  A1  C1 | 3 | C1 for good question  B1 for a correct formula that could be used  P1 for the process of calculating how much has been spent  A1 cao  C1 for clear, complete solution with correct answer | B |
| **5** |
| **9** |  | Look for the words that will represent variables and if possible, use appropriate letters to represent those variables.  e.g.  Area = height multiplied by breadth  Formula could be *A* = *hb* | C1  C1 | 2 | C1 for an explanation of how to link a formula expressed in words to a formula expressed algebraically  C1 if a suitable example has been included | B |
| **2** |
| **10 a**  **b**  **c** |  | 2*n* means 2 times *n* while *n* + 2 means add 2 to *n.*  3(*c* + 5) means add 5 to *c* and then multiply the answer by 3, 3*c* + 5 means multiply *c* by 3 and then add 5 to the answer.  *n*2 means multiply n by itself, 2*n* means multiply *n* by 2. | C1  C1  C1 | 2 | C1 for clear explanation  C1 for clear explanation  C1 for clear explanation | B |
| **3** |
| **11** | Perimeter = 2 × *l* + 2 × 3*l*  = 2*l* + 6*l* = 8*l*  So 8*l* = 48  *l* = 6 cm  Area = length × width  = *l* × 3*l*  = 6 + 3 × 6  = 6 + 18 = 24 cm2 | 24 cm2 | M1  A1  M1  A1 | 3 | M1 for using perimeter formula  A1 cao  M1 for area formula  A1 ft | B |
| **4** |
| **12** | = 8 ÷ 4 = 2  24 – 2 × 4 = 24 – 8  = 16 | *C* = 16 | P1  A1 | 3 | P1 for the correct process of working out *C*  A1 cao | B |
| **2** |
| **13** |  | Plot the three points and draw the two sides. You can then complete the missing sides of the rectangle to complete the shape as shown in the diagram.  Hence find the fourth vertex as in the diagram as (4, 8). | C1  C1  B1 | 2  3 | C1 for clear explanation  C1 for including a sketch alongside the explanation  B1 for correctly indicating (4, 8) | B |
| **3** |
| **14** | Let the smaller number be *n*, then the next even number will be (*n* + 2).  *n* + (*n* + 2) = 50  2*n* + 2 = 50  2*n* = 48  *n* = 24  The lower number will be 24 so the larger number will be 26. | 26 | C1  M1  A1  A1 | 2  3 | C1 for stating starting points  M1 for method of setting up the equation  A1 for solving for the first number  A1 cao | B |
| **4** |
| **15** |  | Example 1  As 24 = 6 × 4  = 6 × 22  *t* = *ba*2  Will give 24 when *b* = 6 and *a* = 2  Example 2  As 24 = 3 × 8  = 3 × (2 + 6)  *t* = 3(*a* + *b*)  Will give 24 when *a* = 2 and *b* = 6 | B1  C1  B1  C1 | 2 | B1 for first formula that works  C1 for clear explanation of how it was found  B1 for second formula that works  C1 for clear explanation of how it was found | M |
| **4** |
| **16 a**  **b**  **c**  **d** |  | 5(*c* + 4) = 5*c* + 20  Feedback ‘Don’t forget to multiply out both terms in the brackets.’  6(*t* – 2) = 6*t* – 12  Feedback ‘Don’t forget 6(…..) means multiply both terms by 6.’  –3(4 – *s*) = –12 + 3*s*  Feedback ‘Don’t forget -3(……) means multiply both terms by 6 and a minus × minus = …  15 – (*n* – 4) = 15– *n* + 4 = 15 + 4 – *n*  = 19 – *n*  Feedback ‘Don’t forget - (*n* – 4) means multiply each term in the bracket by – 1 and that the – in the bracket belongs to the 4 to make it – 4.’ | M1  C1  M1  C1  M1  C1  M1  C1 | 2 | M1 for correctly expanding the brackets  C1 for suitable feedback  M1 for correctly expanding the brackets  C1 for suitable feedback  M1 for correctly expanding the brackets  C1 for suitable feedback  M1 for correctly expanding the brackets  C1 for suitable feedback | M |
| **8** |
| **17** |  | Any equation in the form *y* = *mx* + 1 will pass through (0, 1)  So *y* = 2*x* + 1  *y* = 3*x* + 1  will both pass through (0, 1) | C1  B1  B1 | 2 | C1 for clear explanation  B1 for first correct equation  B1 for second correct equation | M |
| **3** |
| **18 a**  **b** |  | A correct example  e.g. 2(*z* – 3) + 5*q*  A correct example  e.g. | B1  B1 | 2 | B1 for an expression that is equivalent to 4*z* + 5*q* – 6  B1 for an expression that simplifies to 5*x* – 2*y* | M |
| 2 |
| **19 a**  **b** |  | Own example that works. | B4  P1 | 3 | B1 for each correct entry in the table  P1 for their own correct example that works | M |
| 5 |
| **20** | *Z* = 3*A*  *Z* = *A* + 18  So 3*A* = *A* + 18  2*A* = 18  *A* = 9  Substitute *A* = 9 into *Z* = *A* + 18 to give  *Z* = 27  Check  3 × 9 = 27 which is correct. | Zoe has 27 and Alyssa has 9. | C1  C1  M1  A1  M1  A1 | 3 | C1 for setting up first equation  C1 for setting up second equation  M1 for method of combining equations to eliminate one variable  A1 for first correct answer found  M1 for substituting first answer  A1 for correct second answer | M |
| 6 |
| **21** | *n* + *n* + 20 = 2*n* + 20  2*n* + 20 = 90  2*n* = 70  *n* = 35  So 35 on first shelf and  35 + 20 = 55 on second.  Need 90 ÷3 = 30 on each shelf. | So need to move 5 from first shelf onto third shelf and 25 from second to third shelf. | C1  M1  A1  A1  P1 | 2  3 | C1 for setting the initial expression  M1 for setting this up to equal 90  A1 for first shelf as 35  A1 for second shelf as 55  P1 for correct process of sorting the books out to 30 on each shelf | M |
| 5 |
| **22** |  | Select *x* values less than 0 and substitute into the equation. | P1 | 2 | P1 for clear explanation | M |
| **1** |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **23 a**  **b**  **c** | Using *y* = *mx* + *c* and  *m* =  *m* =  =  =  = 2  Giving *y* = 2*x* + *c*  You know the point (1, 2) is on the line, so substitute into *y* = 2*x* + *c*.  2 = 2 × 1 + *c* so *c* = 0.  So the equation of the line is *y* = 2*x*. | *y* = 3  *y* = 2*x*  Use this to find three more points in the third quadrant, e.g. (–1, –2), (–3, –6),  (–4, –8) | | B1  P1  P1  A1  P1  A1 | 2 | B1 cao  P1 for correct process of finding gradient in using  *y* = *mx* + *c*  P1 for correct process to find *c*  A1 for *y* = 2*x*  P1 for correctly only using negative values of *x*  A1 for three correct coordinates | M |
| **6** |
| **24** |  | Since *y* = 2*x* + 2  *y* = 2(*x* + 1)  Hence for any integer value of *x*, *y* will be an even number. | | C1 | 2 | C1 for clear explanation | M |
| **1** |
| **25** | *n*th term of first sequence is 6*n* – 1  *n*th term of second sequence is 3*n* – 2  So for a common term:  6*n* – 1 = 3*n* – 2  3*n* = –1  So *n* is not a whole number. And hence there is no term in both sequences. | No | | C1  C1  M1  B1  A1 | 2  3 | C1 for *n*th term of first sequence  C1 for *n*th term of second sequence  M1 for method of putting both *n*th terms equal to each other  B1 correctly finding *n* to be non-integer  A1 for No alongside clear solution | M |
| **5** |
| **26 a**  **b** | D (5, 1)  Area of trapezium = × (4 + 10) × 5  =  × 14 × 5  35 cm2 | (5, 1)  35 cm2 | | B1  M1  A1 | 3 | B1 cao  M1 for correct method in finding area of trapezium  A1 cao | M |
| **3** |
| **27** | Sketch a graph: | 11 am | | C1  C1  C1  B1 | 3 | C1 for showing runner on graph or explaining  C1 for showing cyclist on graph or explaining  C1 for showing where the two lines meet on graph or explaining  B1 cao | M |
| **4** |
| **28** | 100, 96, 92, 88, 84, 80, 76, 72, 68, 64, 60, 56, 52, 48, 44, 40, 36, 32, 28, 24, 20, 16, 12, 8, 4  2, 8, 14, 20, 26, 32, 38, 44, 50, 56, 62, 68, 74, 80, 86, 92, 98  Those in common 8, 20, 32, 44, 56, 68, 80, 92 | 8, 20, 32, 44, 56, 68, 80, 92 | | P1  P1  B1 | 3 | P1 for process of accounting for first sequence  P1 for process of accounting for second sequence  B1 for all 8 correct terms | M |
| **3** |
| **29** | Left hand graph is *x* + *y* = 5  Right hand graph is *y* = *z* + 1  Substitute *y* into first equation  *x* + *z* + 1 = 5  *x* + *z* = 4 |  | | B1  B1  M1  A1  C2 | 3 | B1 first graph equation  B1 second graph equation  M1 substituting to eliminate *y*  A1 cao  C1 for graph drawn with x on vertical axis. Allow *x* on horizontal axis  C1 for *x* + *z* = 4 drawn correctly | M |
| **6** |
| **30 a**  **b**  **c** | Distance = 2 × 25 km = 50 km  50 km ÷ 8 hours= 6.25 km per hour.  e.g. What is Philip’s highest speed?  At what times did Philip have a rest?  A two part question, getting more difficult.  And a mark scheme. | 6.25 km/h | | M1  A1  C1  C2 | 2  3 | M1 for division of total distance by time  A1 cao  C1 for an example of a questions that could be asked about this situation  C1 for a two part question using the graph with increase in difficulty  C1 for suitable mark scheme | M |
| **5** |
| **31** |  | Own story  Sketch graph  Question for the graph | | C1  C1  C1 | 2 | C1 for suitable story  C1 for matching sketch graph  C1 for suitable question | M |
| **3** |
| **32 a i**  **ii**  **b**    **c** | 35 × 8 + 10  35 × 14  35*n* + 10 = 220  35*n* = 210  *n* = = 6  (7 × 35) + 20 = £265  (7 × 35) = 10 = £255 | £290  £490  6 sessions  £10 more | | M1  A1  M1  A1  P1  A1  P1  A1 | 3 | M1 for the correct method  A1 cao  M1 for correct method  A1 cao  P1 for process of sorting which rule to use  A1 cao  P1 for finding suitable calculations to find the difference  A1 cao | M |
| **8** |
| **33** |  | 10 + 15 = 25 = 52  15 + 21 = 36 = 62 | | B4 |  | B1 for each correct part of the number pattern provided correct signs and symbols are present | M |
| **4** |
| **34 a**  **b**  **c**  **d / e** |  | | Triangle drawn  36 cm  48 cm  63 139 143 806 710 cm | C1  B1  B1  B1 | 3 | C1 for diagram drawn for all shapes  B1 cao  B1 cao  B1 cao | M |
| **4** |
| **35 a**  **b** |  | | Same difference of 2.4  but starting value is different.  What are the differences  What is the starting value. | B1  B1  B1  B1 | 2 | B1 cao  B1 cao  B1 cao  B1 cao | M |
| **4** |
| **36 a**  **b** |  | | Multiple of 4  No  because we need to know the starting value as well. | B1  B1  C1 | 2 | B1 cao  C1 for no  C1 for reason alongside no | M |
| **3** |
| **37** |  | | Boys  Get a red egg each from each of 4 girls: 4 red  One green egg each other: 2 green  Girls  Get a blue egg from each of the 2 boys: 2 blue  One yellow egg from each other will be 3 yellow eggs each: 12 yellow | C1  C1  C1  C1  C1 | 3 | C1 for explanation of 4 red  C1 for explanation of 2 green  C1 for explanation of 2 blue  C1 for explanation of 12 yellow  C1 for complete clear solution | M |
| **5** |
| **38** | Example  2*n*2 = 2 × (32) = 2 × 9 = 18  (2 × 3)2 = 6 × 6 = 36 | | Using BIDMAS for 2*n*2 tells you to calculate the power first. BIDMAS for (2*n*)2 tells you that you do the calculation inside the bracket first. | C1 | 2 | C1 for an explanation. An example could be given to support the argument | M |
| **5** |
| **39** |  | | A letter, say *f*, stands for an unknown if it is in an equation such as 3*f* + 2 = 14. Then *f* = 4 is the only number that satisfies this equation.  A letter stands for an variable if it is part of an equation that has more than two letters.  E.g. *A* = πr2 , where both *A* and *r* are variables that will be different for different values of *A* or *r*. | C1  C1  C1  C1 | 2 | C1 for clear explanation  C1 for an example alongside the explanation  C1 for a clear explanation  C1 for an example alongside the explanation | M |
| **4** |
| **40 a**  **b** |  | | **ii**, **v** and **vi** might be difficult as they all involve squaring a term.  The classic error made in **ii** will be to calculate half of *at* and then to square that. The same error can be found in **vi** where 2πr can be calculated first and then squared.  **ii** and **vi** are also difficult to rearrange as they involve a quadratic element and it’s not easy to make each variable the subject of the formula.  Classic errors in rearranging *s* = *ut* + *at*2 to make *a* the subject include:  Incorrect sign when changing sides, e.g. *s* + *ut* = *at*2  Incorrect removal of fraction e.g.  (*s* + *t*) = *at*2 | C2  C2 | 2 | C1 for identifying some examples with a valid reason  C1 for clear identification and explanation of classic errors  C1 for identifying some examples with a valid reason  C1 for clear identification and explanation of classic errors | M |
| **4** |
| **41** |  | | Start with numbers that work  = 2.5  So *z* =  will satisfy the conditions.  Start with a formula say  *z* =  Substitute *z* = 2.5, *s* = 6, *t* = 2 to find *x*.  5 = 18 – 8 + *x*. *x* = –5  *z* = satisfies the conditions. | M1  B1  M1  B1  C1 | 2  3 | M1 for first method, e.g. starting with numbers  B1 for an example that works  M1 for second method, e.g. starting with a formula  B1 for an example that works  C1 for clear complete solution showing two different methods and two examples | M |
| **5** |

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| **42** |  | = = *n* + 3 | M1  B1 | 2 | M1 for factorising  B1 for any correct expression | M |
| **2** |
| **43** |  | Let base length be *b*, then height will be 3*b*  Area of triangle =  × base × height  =  × *b* × 3*b*  = *b*2  Where *A* = 6  *b*2 = 6  *b*2 = 2 × = 4  *b* = 2  so height is 3 × 2 which is 6 cm. | C1  C1  B1  M1  A1  A1 | 3 | C1 for stating variables  C1 for stating triangle formula  B1 for correct expression  M1 for equating 6 with found expression  A1 for *b* = 2  A1 for 6 cm | M |
| **6** |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **44 a**  **b** | |  |  |  |  | | --- | --- | --- | --- | | *x* | *x*3 | *x* + *x*3 | Too... | | 1 | 1 | 2 | small | | 2 | 8 | 10 | small | | 3 | 27 | 30 | big | | 2.5 | 15.63 | 18.13 | small | | 2.6 | 17.58 | 20.18 | big | | 2.55 | 16.58 | 19.13 | small |  |  |  |  |  | | --- | --- | --- | --- | | *x* | *x* + 2 | *x*(*x* + 2) | Too... | | 7 | 9 | 63 | small | | 8 | 10 | 80 | big | | 7.5 | 9.5 | 71.25 | big | | 7.3 | 9.3 | 67.89 | exact | | You could use trial and improvement or a graph to help you decide where to start.  Use trial and improvement to solve both problems.  Number is 2.6  Width is 7.3 cm | C1  P1  P2  A1  P2  A1 | 2 | C1 for explanation of suitable methods, could also be graphs  P1 for using their suggested method(s)  P1 for finding the range including the solution  P1 for process of finding which of the 1 dp trials is closest  A1 for 2.6 or more accurate  P1 for finding the range including the solution  P1 for process of finding which of the 1 dp trials is closest  A1 cao | H |
| **8** |
| **45 a**  **b i**  **ii**  **iii** |  | ‘I think of a number and double it’ just has an expression of 2*x* where *x* is the number I thought of – still unknown at the moment.  ‘I think of a number and double it – the answer is 12’ has a solution that I know is 6.  One  e.g. 10 = *p* + 3  Because each solution is *p* = 7 | B1  B1  B1  B1 | 2 | B1 for clear explanation of the difference  B1 cao  B1 for a correct example  B1 for a clear explanation | H |
| **4** |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **46** | Looking at total counters needed for each step, he uses:  Step 1: 6 counters  Step 2: 12 counters  Step 3: 18 counters  Step 4: 24 counters  Step *n*: 6*n* counters  Adding how many counters he needs in total:  Step 1: 6 counters  Step 2: 18 counters  Step 3: 36 counters  Step 4: 60 counters  Looking at the pattern suggests products being involved, I see that this pattern can be written as  Step 1: 3 × 1 × 2 = 6  Step 2: 3 × 2 × 3 = 18  Step 3: 3 × 3 × 4 = 36  Step 4: 3 × 4 × 5 = 60  Step *n*: 3*n*(*n* + 1)  I need to find a value for *n* where this total is first over 1000  Use trial and improvement   |  |  |  |  | | --- | --- | --- | --- | | *n* | *n* + 1 | 3*n*(*n* + 1) | Too… | | 10 | 11 | 330 | small | | 20 | 21 | 1260 | big | | 15 | 16 | 720 | small | | 17 | 18 | 918 | small | | 18 | 19 | 1026 | big | | Harry will run out of counters while trying to complete step 18. | B1  P1  P1  B1  C1  P1  A1  A1 | 3 | B1 for the process of finding how many counters needed for each step  P1 for 6*n*  P1 for the process of finding the total number of counters used by each step  B1 for the process of looking to generalise this pattern  B1 for the generalisation  P1 for the explanation of what he needed to do.  A1 for a suitable process of finding which step he would get to  A1 cao | H |
| **8** |
| **47** |  | No. All the terms will be even. | B1  C1 | 2 | B1 for no  C1 for clear explanation | H |
| **2** |

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| **48** | *H* = 1.10*E*  *E* = *C* – 50  *D* = *E*  *C* = 500  Charles is in the next round  Substitute *C* = 500 into each equation:  *E* = *C* – 50  *E* = 450  Eliza is in the next round  *D* =  × 450 = 300  Denise will not be in the next round  *H* = 450 × 1.10  = 495  Hussein will be in the next round. | There will be 3 candidates in the next round. | C1  M1  A1  M1  A1  M1  A1  B1 | 3 | C1 for setting up all the equations from the given data  M1 for substituting *C* = 500  A1 for *E* = 450 and staying in next round  M1 for calculating *D*  A1 for *D* = 300 and not being in the next round  M1 for calculating *H*  A1 for 495 and being in next round  B1 for stating 3 candidates in next round | H |
| **8** |
| **49** | (*x* + 1)2 = *x*2 + *x* + *x* + 1 | (*x* + 1)2 = *x*2 + 2*x* + 1  As required. | C2  C1 | 2 | C1 for showing the *x*2 in the correct place  C1 for correctly showing *x*, *x* and 1  C1 for clearly showing the required result from the diagram | H |
| **3** |

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| **50 a**  **b**  **c**  **d**  **e** | | | 1 6 15 20 15 6 1  1 7 21 35 35 21 7 1  1 8 28 56 70 56 28 8 1  Looking at the diagonal rows:  The first diagonal row contains only 1s.  The second diagonal consists of all [counting numbers](http://www.cut-the-knot.org/do_you_know/few_words.shtml#whole): 1, 2, 3, 4, 5, etc.  The third row consists of the [triangle numbers](http://www.cut-the-knot.org/do_you_know/numbers.shtml#square): 1, 3, 6, 10, 15, etc.  Triangle numbers  1, 2, 4, 8, 16, 32 ….  Multiplying by 2 each time, the *n*th term will be 2*n* – 1 |  | B1  C3  B1  B1  C1 | 2  3 | B1 for correct next three rows  C1 for first pattern  C1 for second pattern  C1 for third pattern  B1 for triangle numbers  B1 for correct sequence  C1 for clear explanation | H |
| **7** |
| **51** | | | 6(*x* – *c*) = 5*x* – 4  6*x* – 6*c* = 5*x* – 4  *x* = 6*c* – 4  6*c* is always even as even × odd/even = even  4 is even  So *x* must be even as even – even = even |  | M1  A1  C1 | 2 | M1 for expanding the bracket  A1 for *x* as subject  C1 for clear explanation | H |
| **3** |
| **52** | | | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | *n* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |   Only  is a terminating decimal. | | C1  C1  C1 | 2 | C1 for showing the pattern of fractions  C1 for showing all the decimals  C1 for clear explanation | H |
| **3** |
| **53 a**  **b**  **c**  **d**  **e**  **f**  **g**  **h** | |  | | even  odd  even  even  even  even  odd  even | B1  B1  B1  B1  B1  B1  B1  B1 | 2 | B1 cao  B1 cao  B1 cao  B1 cao  B1 cao  B1 cao  B1 cao  B1 cao | H |
| **8** |
| **54 a**  **b**  **c**  **d** | |  | | *t* = : Graph B  One person will take a long time, many people will take a short time.  *s* = –4.9*t*2 + 40*t* + 80: Graph D  This is a quadratic graph and it shows the value 80 when *t* is 0, the height of the cliff.  *y* = 3*x* + 320: Graph A  This will be a linear graph and this graph also crosses the vertical axis at (320, 0) showing his starting pay before selling any items.  *x*2 + 72*x* – 225 = 0: Graph C  The area from the dimensions will create a quadratic graph which moves further and further into the first quadrant. | B2  C1  B2  C1  B2  C1  B2  C1 | 2  3 | B1 for correct equation  B1 for correct graph  C1 for good reason for choice  B1 for correct equation  B1 for correct graph  C1 for good reason for choice  B1 for correct equation  B1 for correct graph  C1 for good reason for choice  B1 for correct equation  B1 for correct graph  C1 for good reason for choice | H |
| **12** |
| **55** |  | | **c** and **d** can be difficult because they contain minus signs and this is a point where errors are made, combining minus signs.  In substituting *x* = –3 into *t* = –2(3 – *x*) , a classic error is to assume 3 – –3 is 0.  In substituting *x* = –3 into *z* = , a classic error is to give a negative divided by a negative a negative answer.  A suggestion to avoid these errors is to remember that when multiplying or dividing with positive and negative numbers, same signs means positive, different signs means negative. | C1  C2  C1 | 2 | C1 for identifying some examples with a valid reason  C1 for clear identification of one classic error with one equation  C1 for another classic error  C1 for a satisfactory suggestion | H |
| **4** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **56** |  | The similarities are that both have an equals sign and both require the manipulation of terms.  The difference is that in solving an equation you end up with a numerical answer, but in rearranging you still have a formula. | C1  C1 | 2 | C1 for clear explanation of similarities  C1 for clear explanation of differences | H |
| **2** |
| **57 a**  **b**  **c**  **d** |  | The two straight-line graphs will be parallel, with the same gradient of 2.  *y* = 2*x* crosses the *y*-axis at the origin and *y* = 2*x* + 6 crosses the *y*-axis at *y* = 6  The two straight-line graphs will be parallel, with the same gradient of 1.  *y* = *x* + 5 crosses the *y*-axis at *y* = 5, and *y* = *x* – 6 crosses the *y*-axis at *y* = –6  The two straight-line graphs will cross each other at (,) and each one is a reflection of the other in a vertical mirror line.  The two straight-line graphs will both cross the *y*-axis at the origin, one with gradient 2, another with a gradient of . | C2  C2  C2  C2 | 2 | C1 for explanation of parallel  C1 for explanation containing points of intersection of axes  C1 for explanation of parallel  C1 for explanation containing points of intersection of axes  C1 for explanation containing point of intersection  C1 for explanation of symmetry  C1 for explanation of passing through origin  C1 for explanation about gradient | H |
| **8** |