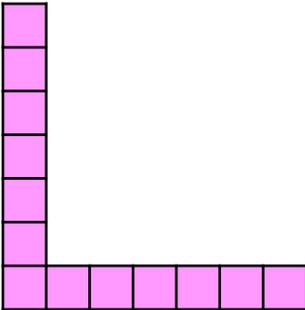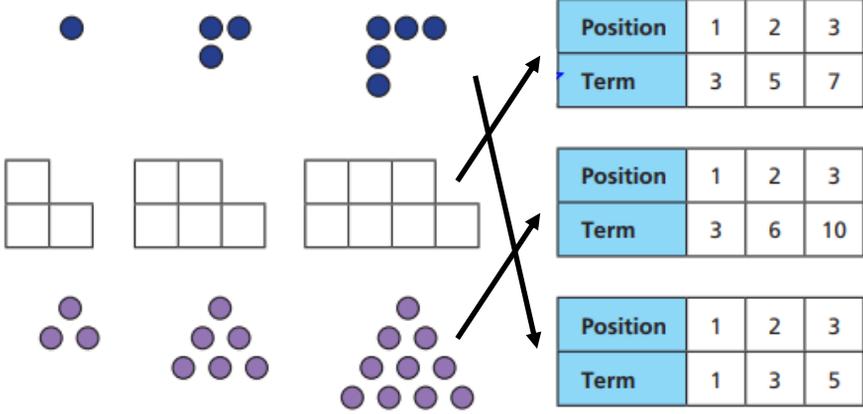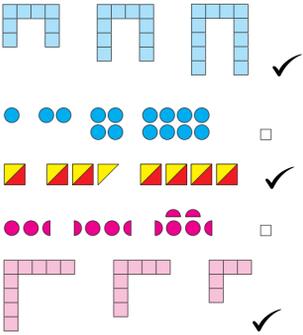| Question	Answer
1	a) Two more circles are added each time. b)
2	a) Two more squares are added each time. b)
3	a) One more square and one more triangle is added each time. b)
4	a) 3 more circles are added each time. b)
5	a) 4 rectangles are added each time. b)
6	a) Three circles are added, then four, then five etc. A new row is added to the triangle each time. b)
7	This could be seen as two squares added each time or the number of squares being tripled each time.
8	Answers vary depending on the number of circles drawn in the first term. Amir could have given this information to help.
9	Various answers depending on the sequence chosen. The number of blocks should decrease from term to term.
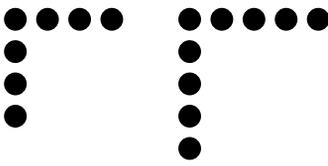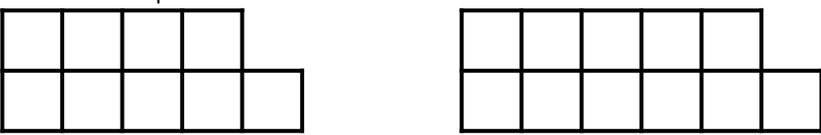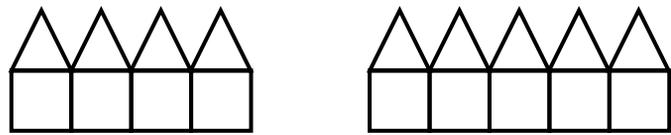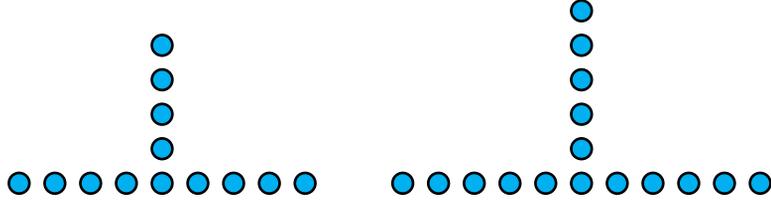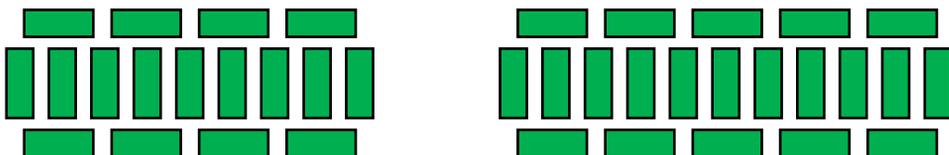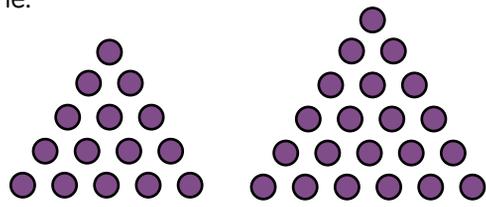
Question	Answer
1	a) 1, 3, 6 b) 10 c)
2	a) 3, 5, 7, 9 b) 11 c) 13 5th term 6th term
3	5 triangles and 16 lines 4th term 5th term
4	a) Annie might think that the number of circles doubles each time. Dexter might think that 3 circles are added each time. Both could be correct. b) If we had 3 terms, we'd know if the rule was add 3 each time or double each time. This is because we could compare the difference on two occasions, rather than having to make a prediction using just 1 difference.
5	Dora is not correct. In the 6th diagram there will be 13 squares and not 14 squares.
6	a) 1, 2, 3 b) 10 c) 6, 10, 14 d) 42 e) 402
7	It's not possible to draw the 6th term of the sequence as there would be no more squares left to reduce the vertical columns 4th term 5th term
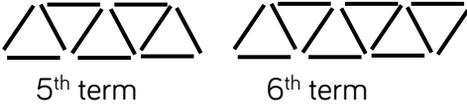
Question	Answer
1	

Question 2

a)

Position	1	2	3
Term	4	7	10

b)

Position	1	2	3
Term	5	9	13

Question 3

a) 4 sticks, 7 sticks, 10 sticks arranged to make squares.
The table tells us that the 1st term is 4, the 2nd term is 7 and the 3rd term is 10
The graph tells is the same information as the table but plotted on a set of axis.
b) Each representation shows the same sequence
c) The points join together to make a straight line segment. This is because they represent a linear sequence (there is a constant difference between each term).

Question 4

a)

Position	1	2	3	4	5
Term	1	4	9	16	25

b) The points don't make a straight line because the sequence isn't linear. There isn't a constant difference between each term.

Question 5

These sequences are linear because in each case there is a constant difference.

Question	Answer
1	a) ☐ b) ✔ c) ✔ d) ☐
2	a) +3, +3, +3 The sequence is linear as the difference is constant. a) +3, +5, +5 The sequence is non-linear as the differences are not constant.
3	a) Linear b) Non-linear c) Linear d) Linear e) Linear f) Non-linear
4	Tommy is incorrect. The sequence is not linear. The difference is not constant. Sometimes the difference is 5, and sometimes the difference is -5. This is an oscillating sequence.
5	a) 27 b) Any number other than 27
6	a)

Position	1	2	3	4	5
Term	20	17	14	11	8

✔

Position	1	2	3	4
Term	0.4	0.8	1.2	1.6

✔

Position	1	2	3	4	5
Term	2	6	12	20	30

b)
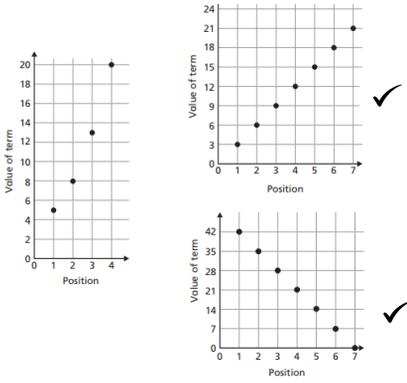
The points on the graphs showing linear sequences form a straight line. The points on the graph showing a non-linear sequence do not form a straight line. |

Question	Answer
7	Alex is correct. We only have one difference so we don't know if there is a constant difference. We would need 3 terms to know if a sequence was linear or non-linear, as this would give us two differences and we could see if they are constant or not. Therefore, it is impossible to tell what type the sequence is.
8	a) 75, 225, 375 b) 75, 225, and the third term is any number other than 375 (if the sequence is 3 terms long only) There is only one answer for part a) as you have to add on the same amount each time. For b) there are an infinite number of answers as the difference could be any number. In part a) the 5th term would be 675. For part b) there could be many answers for the 5th term if there is a pattern (e.g. doubling each time). If the sequence is random, then the 5th term can't be predicted.

Question	Answer
1	a) 162, 189, 216 b) 1300, 1500, 1700 c) 1, 1.2, 1.4 d) 2.2, 1.86, 1.52 e) 4, 0, -4
2	a) 538, 565, 592, 619, 646 b) 44, 63, 82, 101, 120 c) Yes, there could be 2 sequences in each case. This is because we are told the constant difference, but not whether the sequence is ascending or descending.
3	a) 3000, 3250, 3500, 3750, 4000 b) 3000, 2750, 2500, 2250, 2000 In each case there is only one possible answer as we are given the constant difference and told whether the sequence is ascending or descending.
4	a) 100, 99, 98, 97, 96 b) 10, 9.9, 9.8, 9.7, 9.6 c) Each term in part a) is 10 times bigger than the corresponding term in part b).
5	a) You can only create one sequence as you have to subtract 7 each time. b) You can create 2 linear sequences as you could add 7 each time, or subtract 7 each time. c) You can create an infinite number of linear sequences starting with 59 as you can choose from an infinite number of constant differences. d) You need at least 2 terms to continue a linear sequence (if you are told it is linear).
6	100 – 28 = 72
7	a) 1.6, 2.1, 2.6, 3.1, 3.6, 4.1, 4.6, 5.1 b) There is always a 1 or a 6 in the tenths column. It is not possible to have an integer in this sequence as you would need to add either 0.4 or 0.9. Since the constant difference is 0.5 this is impossible
8	There are lots of possible answers, here are 2 examples: 3.0, 3.5, 4.0, 4.5, 5.0, 5.5 10.9, 10.4, 9.9, 9.4, 8.9, 8.4

Question	Answer
1	a) 2, 4, 8, 16, 32 b) 1, 3, 9, 27, 81
2	a) 160, 80, 40, 20, 10, 5 To find the next term, half the previous term. b) 1, 4, 16, 64, 256, 1024 To find the next term, multiply the previous term by 4. c) 4, 7, 11, 18, 29, 47, 76, 123 To find the next term, add on the total of the previous 2 differences to the previous term. d) 4400, 5400, 7400, 10 400, 14 400, 19 400, 25 400 To find the next term, add 1000 onto the previous difference, and then add this total onto the previous term. e) $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{32}, \frac{1}{64}, \frac{1}{128}$ To find the next term, double the denominator each time (or divide the previous term by 2, or multiply the previous term by $\frac{1}{2}$).
3	a) Sequence A: 2, 6, 18, 54, 162, 486 Sequence B: 2, 32, 62, 92, 122, 152 Sequence A exceeds 200 first. I know this as, after the first 4 terms, multiplying by 3 makes numbers larger more quickly than adding on 30 The numbers in Sequence A will be larger than the numbers in sequence B in positions 5, 6 or more. Other solutions are possible depending on how the students continued the sequences.
4	There are many solutions, here are 2 examples: 15, 45, 75, 105, 135 15, 45, 15, 45, 15
5	a) 23, 53, 113, 233, 473, 953 b) All of the terms end in a 3
6	<table><tr><td></td><td>1st</td><td>2nd</td><td>3rd</td><td>4th</td><td>5th</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr><tr><td>2</td><td></td><td>4</td><td>10</td><td>28</td><td>82</td></tr><tr><td>3</td><td></td><td>7</td><td>19</td><td>55</td><td>163</td></tr><tr><td>4</td><td></td><td>10</td><td>28</td><td>82</td><td>244</td></tr></table> a) Eva is correct as the 2nd terms in each sequence create a sequence of their own: 1, 4, 7, 10 (constant difference = 3) b) The 3rd terms also create a sequence, this time with a difference of 9 c) The 4th terms also create a sequence, this time with a difference of 27 The 5th terms also create a sequence, this time with a difference of 81 The differences also create their own sequence: 3, 9, 27, 81. To find the next term in this sequence, multiply the previous term by 3 d) The 10th term in each sequence will form their own sequence and will increase by 3 x 3 x 3 x 3 x 3 x 3 x 3 x 3 x 3 = 19683 each time.
7	Lots of possible solutions, 2 examples are: 4, 0.4, 0.04, 0.004 4, 0.04, 0.0004, 0.000004

Question	Answer
1	a) Linear, subtract 8 each time b) Non-linear, divide by 2 each time c) Non-linear, multiply by 3 each time d) Non-linear, total the 2 previous differences and then add to the previous term e) Linear, add a half each time
2	a) Rosie has added 4 each time instead of multiplying by 4 **or** Rosie has been multiplying the position number by 4 rather than the previous term. b) 4, 16, 64, 256
3	Double the previous difference and then add onto the previous term **or** double the previous term each time.
4	a) 1, 1, 2, 3, 5, 8, 13, 21 b) 9th term which is 34
5	a) They could all be correct because a minimum of three terms are needed to determine the term-to-term rule of a sequence. b) Whitney c) Teddy, Alex and Annie d) Alex's sequence will have the greatest 5th term as she is using the highest multiplier.
6	Multiply by 2 then subtract 100

Question	Answer
1	Dora's correct as the sequence goes up by 9 each time
2	a) Sequence A: 100, 92, 84, 76, 68, 60 Sequence B: 18, 35, 52, 69, 86, 103 b) Sequence A: 28 Sequence B: 171
3	a) 1 b) 7th term
4	a) 4, 16, 28 b) 4, 10, 16 c) 4, 8, 12, 16 d) 4, 7, 10, 13, 16 e) 97, 92, 87, 82, 77 f) 4000, 4300, 4600, 4900, 5200, 5500
5	a) 1, 10, 100, 1000, 10000 b) 500, 100, 20, 4
6	a) 7 b) 10th c) 20th
7	41
8	a) 24, 80, 136, 192, 248 b) 24, 48, 96, 192, 384 Many different sequences can be created, for example: 24, 192, 24, 192, 24
9	a) Many possible answers: 2, 10, 18, 25 2, 6, 10, 14 2, 3, 4, 5, 6, 7, 8 b) 100, 5, 100, 5 100, 95, 90, 85, 80, 75, 70, 65, 60, 55, 50, 45, 40, 35, 30, 25, 20, 15, 10, 5 100, 5, 0.25, 0.0125 c) Compare answers with a partner.