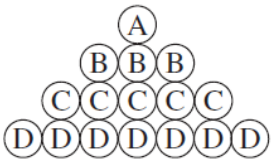
1 (a)



Draw the next row which will fit onto the bottom of this triangle.

(b) How many circles are used in total for the triangle in part (a) if seven rows are drawn?

2 Write down each sequence and find the missing numbers

(a)	3	12	48			
(b)	–4	–1		5	8	
(c)				11	6	1

3 Find the next term in each sequence.

(a) 1, 1, 2, 3, 5, 8, …

(b) 26, 24, 21, 17, …

(c) $\frac{5}{8}, \frac{10}{16}, \frac{15}{24}, \frac{20}{32}, \ldots$

(d) –9, –16, –23, –30, …

(e) $2n, 5n, 8n, 11n, \ldots$.

(f) $\frac{1}{2}$, 0.55, $\frac{3}{5}$, 0.65, ….

4 Luke says the next number in the sequence 1 2 4 is 8. Ali says that he is wrong and the next number is 7. Tom says that they are both correct. *Explain* why.

5 Find the next two terms in each sequence.

(a) 121, 144, 169, 196, ...

(b) 360, 180, 60, 15, ...

(c) 1, 8, 27, 64, …

1 The first term of a sequence is 4. Write down the first four terms of the sequence if the rule is:

(a) multiply by 3 and add 1 (b) double and add 4

2 Find the rule for each sequence. Each rule has two operations (similar to the rules in question (1) above).

(a) 3 → 9 → 21 → 45

(b) 1 → 3 → 11 → 43

(c) 1 → 6 → 31 → 156

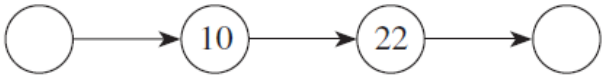
3 Find the missing numbers in these linear sequences.

(a)	6		14	18		
(b)		23	16		2	
(c)		49				17

4 A linear sequence has a 3rd term of 15 and a 4th term of 19. What is the 2nd term?

5 A linear sequence has a 1st term of 7 and a 3rd term of 19. What is the 4th term?

6 The rule for this sequence is 'multiply by 2 and add 2'. Find the missing numbers.



7 Write down the rule for this sequence.

8 Write down the first five terms of these sequences.

(a) the second term is 9 and the rule is 'subtract 11'

(b) the fourth term is 35 and the rule is 'add 6'

(c) the first two terms are 0, 3 and the rule is 'add the two previous terms'

(d) the third term is 48 and the rule is 'divide by 4'

(e) the fourth term is –11 and the rule is 'add 9'

1 Here is a sequence 5 7 10 14. Write the numbers in a table as shown.

Predict the numbers shown with ? marks to find the next two terms in the sequence 5, 7, 10, 14.

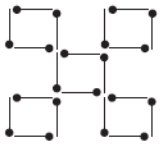
terms	differences
5	
	2
7	
	3
10	
	4
14	
	?
?	
	?
?	

2 Predict the next two terms in each sequence.

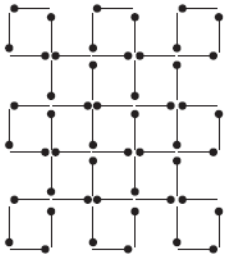
(a) 3, 8, 15, 24, … (b) 53, 41, 31, 23, … (c) 80, 71, 63, 56, … (d) 24, 39, 57, 78, …

3 Here is a sequence of matchstick squares.

$n = 1$



$n = 2$



$n = 3$

Shape number, n	Number of matches	Difference
1	4	
		16
2	20	
		32
3	52	
		48
4	100	
5	?	

Use the differences to predict the number of matches in shape number 5.

4 This sequence is more difficult.

Number	difference
3	
	1
4	
	4
8	
	9
17	
	16
33	

The first differences make no obvious pattern. Work out the second differences and find the missing numbers.

Number	difference	second difference
3		
	1	
4		3
	4	
8		5
	9	
17		7
	16	
33		?
	?	
?		

5 Use first, second and third differences to predict the next number in each of the sequences below.

(a)

5
7
11
20
37
?

(b)

7
12
20
35
61
?

(c)

1
9
21
46
93
?

6 Write down the first number in the sequence below which will *exceed* 1000.

4, 12, 25, 50, 94, 164, …