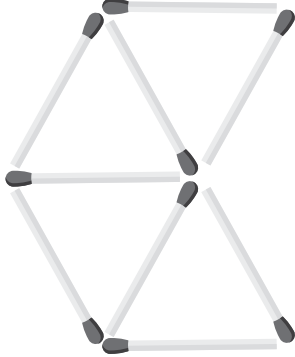


# Fully-worked Solutions

## Practice 1

### Formative Practice

1 3, 5, 7, 9, ...



Answer: A

2 (a)  $\begin{array}{cccc} \boxed{+5} & \boxed{+5} & \boxed{+5} & \boxed{+5} \\ \downarrow & \downarrow & \downarrow & \downarrow \\ 11, & 16, & 21, & 26, & 31, \dots \end{array}$

Pattern: Add 5 to its previous number.

(b)  $\begin{array}{cccc} \boxed{\times 3} & \boxed{\times 3} & \boxed{\times 3} & \boxed{\times 3} \\ \downarrow & \downarrow & \downarrow & \downarrow \\ 2, & 6, & 18, & 54, & 162, \dots \end{array}$

Pattern: Multiply 3 to its previous number.

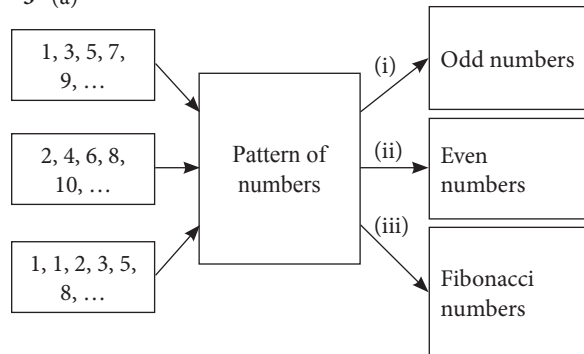
(c)  $\begin{array}{cccc} \boxed{-10} & \boxed{-10} & \boxed{-10} & \boxed{-10} \\ \downarrow & \downarrow & \downarrow & \downarrow \\ 43, & 33, & 23, & 13, & 3, \dots \end{array}$

Pattern: Subtract 10 from its previous number.

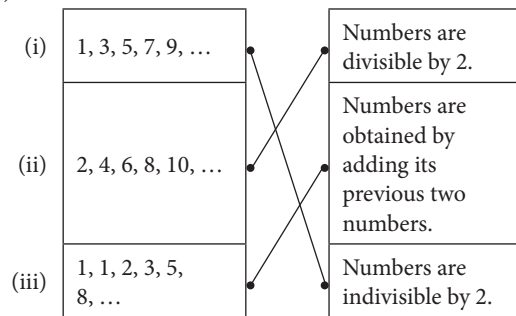
(d)  $\begin{array}{cccc} \boxed{\div 2} & \boxed{\div 2} & \boxed{\div 2} & \boxed{\div 2} \\ \downarrow & \downarrow & \downarrow & \downarrow \\ 120, & 60, & 30, & 15, & 7.5, \dots \end{array}$

Pattern: Divide 2 to its previous number.

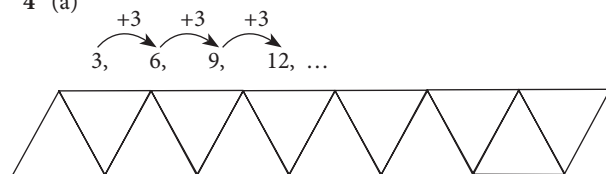
3 (a)



(b)



4 (a)

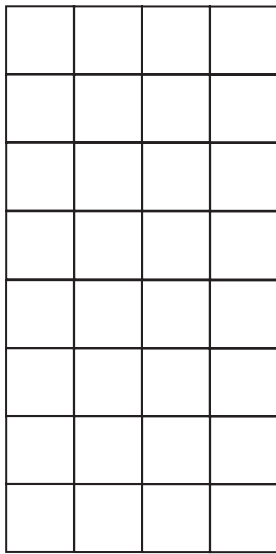


(i) ✓

(b)

$\times 2$   $\times 2$   $\times 2$   $\times 2$

2, 4, 8, 16, 32, ...



(ii) ✓

5

		1		1		
		1	<i>a</i>	1		
	1	<i>b</i>	<i>c</i>	1		
	1	<i>d</i>	<i>e</i>	<i>f</i>	1	
1	5	10	10	5	1	

$$\begin{aligned} a &= 1 + 1 = 2 \\ b &= 1 + 2 = 3 \\ c &= 2 + 1 = 3 \\ d &= 1 + 3 = 4 \\ e &= 3 + 3 = 6 \\ f &= 3 + 1 = 4 \end{aligned}$$

6

$+1$   $+2$   $+1$   $+2$   $+1$   $+2$   $+1$   $+2$   $+1$

3, 4, 6, 7, 9, 10, 12, *p*, *q*, *r*, ...

$$\begin{aligned} p &= 12 + 1 = 13 \\ q &= 13 + 2 = 15 \\ r &= 15 + 1 = 16 \end{aligned}$$

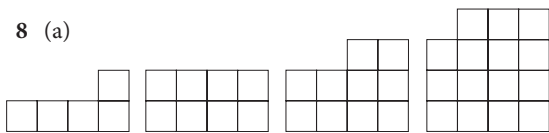
7

$+6$   $+6$   $+6$   $+6$

3, 9, 15, 21, 27, ...

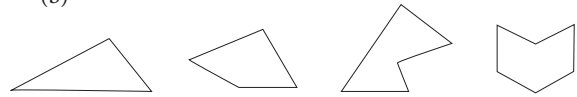
Answer: **B**

8 (a)



5, 8, 10, 15, ... is not a sequence.  
The number of squares does not vary in a certain pattern.

(b)



3, 4, 5, 6, ... is a sequence.  
The number of sides of a polygon increases by 1 to its previous polygon.

9 (a)

$+8$   $+8$   $+8$   $+8$   $+8$

2, 10, 18, 26, 34, 42, ...

(b)

$\times 3$   $\times 3$   $\times 3$   $\times 3$

5, 15, 45, 135, 405, ...

(c)

$-5$   $-5$   $-5$   $-5$

52, 47, 42, 37, 32, ...

(d)

$\div 2$   $\div 2$   $\div 2$   $\div 2$

8, 4, 2, 1,  $\frac{1}{2}$ , ...

10 (a)

$-12$   $-12$   $-12$   $-12$   $-12$

82, 70, 58, 46, 34, 22, ...

Subtract 12 from its previous number.

(b)

$+\frac{1}{2}$   $+\frac{1}{2}$   $+\frac{1}{2}$   $+\frac{1}{2}$   $+\frac{1}{2}$

0,  $\frac{1}{2}$ , 1,  $1\frac{1}{2}$ , 2,  $2\frac{1}{2}$ , ...

Add  $\frac{1}{2}$  to its previous number.

(c)

$\div 2$   $\div 2$   $\div 2$   $\div 2$   $\div 2$

24, 12, 6, 3, 1.5, 0.75, ...

Divide 2 to its previous number.

(d)

$\times 0.3$   $\times 0.3$   $\times 0.3$   $\times 0.3$   $\times 0.3$

1, 0.3, 0.09, 0.027, 0.0081, 0.00243, ...

Multiply 0.3 to its previous number.

11  $22 = 13(1) + 9$

$$35 = 13(2) + 9$$

$$48 = 13(3) + 9$$

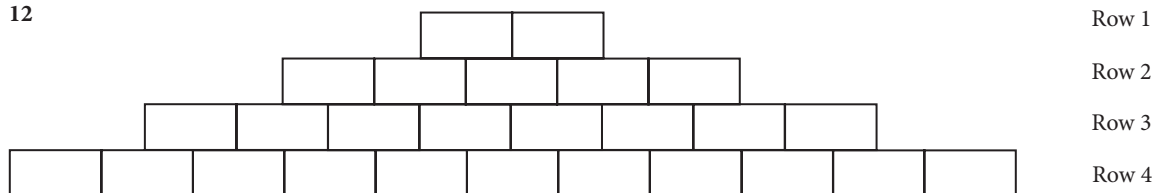
$$61 = 13(4) + 9$$

⋮

$$T_n = 13n + 9, n = 1, 2, 3, 4, \dots$$

Answer: **B**

12



(a)

$$\begin{array}{ccccccc} & & +3 & +3 & +3 & +3 & \\ & & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \\ & 2, & 5, & 8, & 11, & 14, & \dots \end{array}$$

The number of bricks on the fifth row is 14.

(b) (i) 2, 5, 8, 11, ...

(ii) Row 1 has 2 bricks. Its subsequent row has 3 bricks more than its previous row.

(iii)  $2 = 3(1) - 1$

$5 = 3(2) - 1$

$8 = 3(3) - 1$

$11 = 3(4) - 1$

⋮

$T_n = 3n - 1, n = 1, 2, 3, 4, \dots$

13 (a)  $3 = 5(1) - 2$

$8 = 5(2) - 2$

$13 = 5(3) - 2$

$18 = 5(4) - 2$

$23 = 5(5) - 2$

(b)  $T_n = 5n - 2, n = 1, 2, 3, 4, \dots$

14 (a)  $T_1 = 17 = 4 \times 1 + 13$

$T_2 = 21 = 4 \times 2 + 13$

$T_3 = 25 = 4 \times 3 + 13$

$T_n = 4 \times n + 13, n = 1, 2, 3, 4, \dots$

(b) (i)  $T_{17} = 4 \times 17 + 13$

$= 68 + 13$

$= 81$

(ii)  $T_{45} = 4 \times 45 + 13$

$= 180 + 13$

$= 193$

15 (a)

$$\begin{array}{ccccccc} & & +24 & +24 & +24 & +24 & \\ & & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \\ & 65, & 89, & 113, & 137, & x & \end{array}$$

$x = 137 + 24$

$= 161$

Bag 5 contains 161 marbles.

(b)  $65 = 24 \times 1 + 41$

$89 = 24 \times 2 + 41$

$113 = 24 \times 3 + 41$

$137 = 24 \times 4 + 41$

⋮

$T_n = 24 \times n + 41, n = 1, 2, 3, 4, \dots$

(c) (i)  $T_{16} = 24 \times 16 + 41$

$= 384 + 41$

$= 425$

(ii)  $T_n = 24 \times n + 41$

$1\ 313 = 24 \times n + 41$

$1\ 272 = 24n$

$n = 53$

### Summative Practice

1

$$\begin{array}{ccccccc} & & +4 & +4 & +4 & +4 & +4 & +4 & \\ & & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \\ & 25, & 29, & 33, & 37, & m, & n, & 49, & \dots \end{array}$$

$m = 37 + 4$

$= 41$

$n = 41 + 4$

$= 45$

$m + n = 41 + 45$

$= 86$

Answer: C

2

$$\begin{array}{ccccccc} & & -20 & -20 & -20 & -20 & -20 & \\ & & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \\ & 150, & 130, & 110, & 90, & 70, & 50, & \dots \end{array}$$

The next two numbers are 70 and 50.

$70 + 50 = 120$

Answer: D

3

$$\begin{array}{ccccccc} & & \times 3 & \times 3 & \times 3 & \times 3 & \times 3 & \\ & & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \\ & 1, & 3, & 9, & 27, & 81, & p, & \dots \end{array}$$

$p = 81 \times 3$

$= 243$

Answer: B

4

$$\begin{array}{ccccccc} & & +7 & +14 & +21 & +28 & +35 & \\ & & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \\ & -41, & -34, & -20, & 1, & k, & 64, & \dots \end{array}$$

$k = 1 + 28$

$= 29$

Answer: B

5 7, 14, 21, 28, 35, ...

$= 7(1), 7(2), 7(3), 7(4), 7(5), \dots$

The 15<sup>th</sup> term

$= 7(15)$

$= 105$

Answer: C

6 (a)  $T_1 = 2 = 7 \times 1 - 5$   
 $T_2 = 9 = 7 \times 2 - 5$   
 $T_3 = 16 = 7 \times 3 - 5$   
 $T_4 = 23 = 7 \times 4 - 5$   
 $\vdots$   
 $T_n = 7 \times n - 5, n = 1, 2, 3, 4, \dots$

(b)  $T_{10} = 7 \times 10 - 5$   
 $= 65$   
 $T_{20} = 7 \times 20 - 5$   
 $= 135$   
 $T_{50} = 7 \times 50 - 5$   
 $= 345$

7  $T_1 = 74 = 82 - 8 \times 1$   
 $T_2 = 66 = 82 - 8 \times 2$   
 $T_3 = 58 = 82 - 8 \times 3$   
 $T_4 = 50 = 82 - 8 \times 4$   
 $\vdots$   
 $T_n = 82 - 8 \times n, n = 1, 2, 3, 4, \dots$   
 $T_8 = 82 - 8 \times 8$   
 $= 18$   
 $T_{36} = 82 - 8 \times 36$   
 $= -206$

8 (a)

Number of squares	Number of circles	Pattern
1	4	$2 \times \boxed{1} + 2$
2	6	$2 \times \boxed{2} + 2$
3	8	$2 \times \boxed{3} + 2$
4	10	$2 \times \boxed{4} + 2$

(b)  $T_n = 2n + 2, n = 1, 2, 3, 4, \dots$

(c) (i) When  $n = 25, T_n = 2(25) + 2$   
 $= 52$

(ii)  $T_n = 70$   
 $2n + 2 = 70$   
 $2n = 68$   
 $n = 34$