

# Looking for a Pattern

## Examples

1 Complete the number patterns.

(a) 1, 3, 5, 7, ( ), ( ), ...

(b) 2, 3, 5, 8, ( ), ( ), ...

(c) 1, 4, 9, 16, ( ), ( ), ...

(d) 2, 5, 11, 23, ( ), ( ), ...

**Solution:**

(a)  $1, 3, 5, 7, 9, 11, \dots$

(b)  $2, 3, 5, 8, 12, 17, \dots$

(c)  $1, 4, 9, 16, 25, 36, \dots$   
 $(1 \times 1) (2 \times 2) (3 \times 3) (4 \times 4) (5 \times 5) (6 \times 6)$

(d) 2<sup>nd</sup> term:  $2 \times 2 + 1 = 5$

3<sup>rd</sup> term:  $5 \times 2 + 1 = 11$

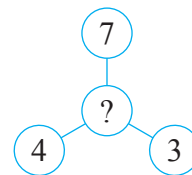
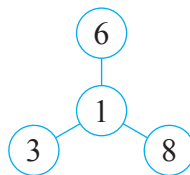
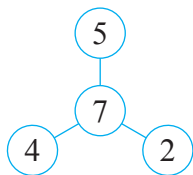
4<sup>th</sup> term:  $11 \times 2 + 1 = 23$

5<sup>th</sup> term:  $23 \times 2 + 1 = 47$

6<sup>th</sup> term:  $47 \times 2 + 1 = 95$

2, 5, 11, 23, **47, 95**, ...

2 Look at each pattern carefully and find the missing number.



**Solution:**  $4 + 5 = 9 = 7 + 2$

$3 + 6 = 9 = 1 + 8$

$7 + 4 = 11 = ? + 3$

$? = 11 - 3$

**= 8**

3 Look at each number pattern and find the unknown numbers.

<b>(a)</b>	<table style="border-collapse: collapse; text-align: center;"> <tr><td style="padding: 2px 10px;">12</td><td style="padding: 2px 10px;">3</td></tr> <tr><td style="padding: 2px 10px;">10</td><td style="padding: 2px 10px;">5</td></tr> </table>	12	3	10	5	<table style="border-collapse: collapse; text-align: center;"> <tr><td style="padding: 2px 10px;">8</td><td style="padding: 2px 10px;">3</td></tr> <tr><td style="padding: 2px 10px;">6</td><td style="padding: 2px 10px;">5</td></tr> </table>	8	3	6	5	<table style="border-collapse: collapse; text-align: center;"> <tr><td style="padding: 2px 10px;">14</td><td style="padding: 2px 10px;">4</td></tr> <tr><td style="padding: 2px 10px;">A</td><td style="padding: 2px 10px;">6</td></tr> </table>	14	4	A	6	<table style="border-collapse: collapse; text-align: center;"> <tr><td style="padding: 2px 10px;">16</td><td style="padding: 2px 10px;">2</td></tr> <tr><td style="padding: 2px 10px;">8</td><td style="padding: 2px 10px;">B</td></tr> </table>	16	2	8	B
12	3																			
10	5																			
8	3																			
6	5																			
14	4																			
A	6																			
16	2																			
8	B																			
<b>(b)</b>	<table style="border-collapse: collapse; text-align: center;"> <tr><td style="padding: 2px 10px;">13</td><td style="padding: 2px 10px;">4</td></tr> <tr><td style="padding: 2px 10px;">7</td><td style="padding: 2px 10px;">2</td></tr> </table>	13	4	7	2	<table style="border-collapse: collapse; text-align: center;"> <tr><td style="padding: 2px 10px;">12</td><td style="padding: 2px 10px;">5</td></tr> <tr><td style="padding: 2px 10px;">3</td><td style="padding: 2px 10px;">4</td></tr> </table>	12	5	3	4	<table style="border-collapse: collapse; text-align: center;"> <tr><td style="padding: 2px 10px;">18</td><td style="padding: 2px 10px;">8</td></tr> <tr><td style="padding: 2px 10px;">C</td><td style="padding: 2px 10px;">4</td></tr> </table>	18	8	C	4	<table style="border-collapse: collapse; text-align: center;"> <tr><td style="padding: 2px 10px;">22</td><td style="padding: 2px 10px;">3</td></tr> <tr><td style="padding: 2px 10px;">12</td><td style="padding: 2px 10px;">D</td></tr> </table>	22	3	12	D
13	4																			
7	2																			
12	5																			
3	4																			
18	8																			
C	4																			
22	3																			
12	D																			

**Solution:**

**(a)**  $12 + 3 = 15 = 10 + 5$   
 $8 + 3 = 11 = 6 + 5$   
 $14 + 4 = 18 = A + 6$                        $16 + 2 = 18 = 8 + B$   
 $A = 18 - 6 = \mathbf{12}$                                $B = 18 - 8 = \mathbf{10}$

**(b)**  $7 + 4 = 11 = 13 - 2$   
 $3 + 5 = 8 = 12 - 4$   
 $18 - 4 = 14 = C + 8$                        $12 + 3 = 15 = 22 - D$   
 $C = 14 - 8 = \mathbf{6}$                                $D = 22 - 15 = \mathbf{7}$

4 Look at each number pattern and find the unknown numbers.

<b>(a)</b>	<table style="border-collapse: collapse; text-align: center;"> <tr><td style="padding: 2px 10px;">2</td><td style="padding: 2px 10px;">2</td><td style="padding: 2px 10px;">8</td></tr> <tr><td style="padding: 2px 10px;">3</td><td style="padding: 2px 10px;">2</td><td style="padding: 2px 10px;">10</td></tr> <tr><td style="padding: 2px 10px;">5</td><td style="padding: 2px 10px;">3</td><td style="padding: 2px 10px;">A</td></tr> </table>	2	2	8	3	2	10	5	3	A	<b>(b)</b>	<table style="border-collapse: collapse; text-align: center;"> <tr><td style="padding: 2px 10px;">6</td><td style="padding: 2px 10px;">4</td><td style="padding: 2px 10px;">4</td></tr> <tr><td style="padding: 2px 10px;">8</td><td style="padding: 2px 10px;">3</td><td style="padding: 2px 10px;">10</td></tr> <tr><td style="padding: 2px 10px;">10</td><td style="padding: 2px 10px;">3</td><td style="padding: 2px 10px;">B</td></tr> </table>	6	4	4	8	3	10	10	3	B
2	2	8																			
3	2	10																			
5	3	A																			
6	4	4																			
8	3	10																			
10	3	B																			

**Solution:**

**(a)**  $2 + 2 = 4$        $4 \times 2 = 8$   
 $3 + 2 = 5$        $5 \times 2 = 10$   
 $5 + 3 = 8$        $8 \times 2 = A$        $A = \mathbf{16}$

**(b)**  $6 - 4 = 2$        $2 \times 2 = 4$   
 $8 - 3 = 5$        $5 \times 2 = 10$   
 $10 - 3 = 7$        $7 \times 2 = B$        $B = \mathbf{14}$

5 Fill in the blanks with the correct answers.

			1		
			2	3	
			4	5	6
		( )	( )	9	10
	11	12	13	( )	( )

**Solution:**      (7)      (8)      9      10  
                   11      12      13      (14)      (15)

**1** Complete each number pattern.

(a) 4, 8, 12, 16, 20, ( ), ( ), ...

(b) 1, 2, 4, ( ), 16, ( ), 64, ...

(c) 1, 1, 2, 3, 5, ( ), ( ), ...

(d) 2, 3, 5, 8, 13, ( ), ( ), ...

(e) 3, 6, 9, ( ), 15, ( ), ( ), ...

(f) 1, 4, 5, ( ), 14, 23, ( ), ...

(g) 2, 3, 4, 6, ( ), ( ), ...

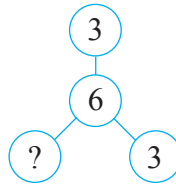
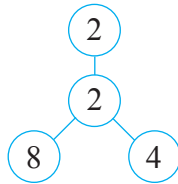
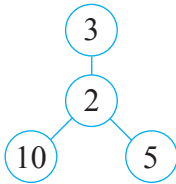
(h) 3, 2, 5, 4, ( ), ( ), ...

(i) 4, 5, 8, 13, ( ), ( ), ...

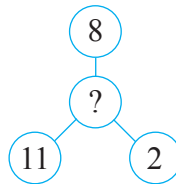
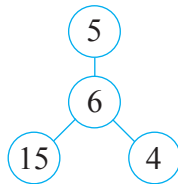
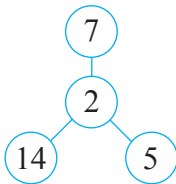
(j) 2, 4, 8, 14, ( ), ( ), ...

**2** Look at each pattern carefully and find the missing number.

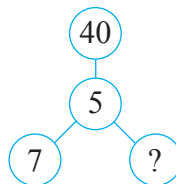
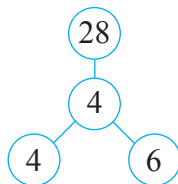
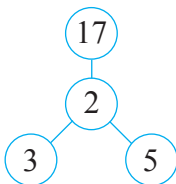
(a)



(b)



(c)



## Solutions to:

# Looking for a Pattern

1. (a) 4, 8, 12, 16, 20, **24**, **28**, ...  
Each term increases by 4.
- (b) 1, 2, 4, **8**, 16, **32**, 64, ...  
Each term is the multiplication of 2 and its previous term.
- (c) 1, 1, 2, 3, 5, **8**, **13**, ...  
Each term is the addition of the previous 2 terms.
- (d) 2, 3, 5, 8, 13, **21**, **34**, ...  
Each term is the addition of the previous 2 terms.
- (e) 3, 6, 9, **12**, 15, **18**, **21**, ...  
Each term is a multiple of 3.
- (f) 1, 4, 5, **9**, 14, 23, **37**, ...  
Each term is the addition of the previous 2 terms.
- (g) 2, 3, 4, 6, **9**, **14**, ...  
 $2 + 3 - 1 = 4$   
 $3 + 4 - 1 = 6$   
 $4 + 6 - 1 = 9$   
 $6 + 9 - 1 = 14$
- (h) 3, 2, 5, 4, 7, 6, ...  
There are 2 sequences, the odd numbers and the even numbers.
- (i) 4, 5, 8, 13, **20**, **29**, ...  
 $+1$   $+3$   $+5$   $+7$   $+9$
- (j) 2, 4, 8, 14, **22**, **32**, ...  
 $+2$   $+4$   $+6$   $+8$   $+10$

2. (a)  $10 - 2 = 8 = 3 + 5$   
 $8 - 2 = 6 = 2 + 4$   
 $? - 6 = 6 = 3 + 3$   
 $? = 12$
- (b)  $14 - 2 = 12 = 7 + 5$   
 $15 - 6 = 9 = 5 + 4$   
 $11 - ? = 10 = 8 + 2$   
 $? = 1$
- (c)  $17 - 2 = 15 = 3 \times 5$   
 $28 - 4 = 24 = 4 \times 6$   
 $40 - 5 = 35 = 7 \times ?$   
 $? = 5$

Adapted:

Maths Olympiad – Unleash The Maths Olympian In You!  
(Junior 1)

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