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## ANSWERS

lift-out in centre of book

# Patterns and sequences

Each group of numbers follows a pattern. Find the patterns by writing down differences between pairs of numbers. For each one write down the next three numbers.

**1** 5, 9, 13, 17, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

**2** 23, 30, 37, 44, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

**3** 4, 9, 14, 19, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

**4** 27, 23, 19, 15, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

**5** 61, 55, 49, 43, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

**6** 100, 97, 94, 91, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

**7** 4, 8, 12, 16, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

**8** 1, 7, 13, 19, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

**9** 12, 23, 34, 45, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

**10** 22, 33, 44, 55, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

**11**  $1, 1\frac{1}{2}, 2, 2\frac{1}{2},$  \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

**12**  $6, 5\frac{1}{2}, 5, 4\frac{1}{2},$  \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

**13** 1, 2, 5, 6, 9, 10, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

**14** 1, 2, 4, 5, 7, 8, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

**15** 1, 3, 10, 12, 19, 21, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

**16** 58, 56, 55, 53, 52, 50, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

**17** 47, 43, 41, 37, 35, 31, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

**18** 65, 58, 54, 47, 43, 36, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

# Find my rule

In each exercise, find the rule connecting the numbers in the first row with those in the second row. What is the missing number? Put it in the empty box.

**1**

3	7	4	8	2	
6	10	7	11		

**RULE**

**2**

7	12	8	9	15	
3	8	4	5		

**RULE**

**3**

4	2	7	5	3	
8	4	14	10		

**4**

6	1	8	10	4	
13	3	17	21		

**5**

1	2	3	4	5	
9	8	7	6		

**6**

3	4	5	6	7	
17	16	15	14		

**7**

9	7	12	6	10	
15	13	18	12		

**8**

6	3	9	11	4	
16	13	19	21		

**9**

6	3	9	7	2	
60	30	90	70		

**10**

1	3	5	7	9	
3	7	11	15		

**11**

6	3	7	8	2	
11	5	13	15		

**12**

1	2	3	4	5	
9	19	29	39		

**13**

6	9	3	7	5	
61	91	31	71		

**14**

6	9	13	17	5	
1	4	8	12		

**15**

14	8	10	18	6	
7	4	5	9		

**16**

3	6	4	7	1	
15	30	20	35		

**17**

3	6	4	7	1	
14	17	15	18		

**18**

23	16	14	17	21	
10	3	1	4		

# Missing numbers

In each exercise, find the rule connecting the numbers in the first row with those in the second row. What is the missing number? Put it in the empty box.

**1**

4	7	3	8	2	RULE
24	42	18	48		

**2**

44	12	45	20	13	RULE
36	4	37	12		

**3**

5	1	3	4	7	
20	4	12	16		

**4**

5	2	1	3	6	
55	22	11	33		

**5**

4	7	3	8	9	
8	14	6	16		

**6**

4	7	3	8	9	
7	13	5	15		

**7**

4	7	3	8	9	
9	15	7	17		

**8**

7	3	5	2	6	
69	29	49	19		

**9**

8	4	3	7	1	
84	44	34	74		

**10**

8	4	14	18	20	
3	1	6	8		

**11**

8	1	3	7	5	
18	4	8	16		

**12**

8	1	3	7	5	
24	3	9	21		

**13**

8	1	3	7	5	
23	2	8	20		

**14**

2	4	1	7	8	
7	13	4	22		

**15**

5	7	4	8	12	
25	35	20	40		

**16**

5	7	4	8	12	
24	34	19	39		

**17**

5	7	4	8	1	
17	23	14	26		

**18**

5	7	4	8	2	
8	12	6	14		

**19**

5	7	4	3	1	
25	49	16	9		

**20**

6	2	3	8	1	
35	3	8	63		

# Find two numbers

I am thinking of two numbers. What are my two numbers if:

their **sum** is:

<b>1</b>	5
<b>2</b>	5
<b>3</b>	7
<b>4</b>	7
<b>5</b>	7
<b>6</b>	8
<b>7</b>	8
<b>8</b>	8
<b>9</b>	10
<b>10</b>	10
<b>11</b>	10
<b>12</b>	11
<b>13</b>	11
<b>14</b>	11
<b>15</b>	11
<b>16</b>	12
<b>17</b>	12
<b>18</b>	12
<b>19</b>	12
<b>20</b>	12

and their **product** is

4
6
10
6
12
7
15
12
25
16
24
18
30
28
10
36
11
35
32
27

**My two numbers**

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

their **sum** is:

<b>21</b>	11
<b>22</b>	11
<b>23</b>	13
<b>24</b>	13
<b>25</b>	13
<b>26</b>	18
<b>27</b>	18
<b>28</b>	18
<b>29</b>	20
<b>30</b>	20

and their **difference** is

1
5
11
1
7
2
4
16
18
10

**My two numbers**

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

# Exploring numbers

The numbers 5, 8 and 9 are one-digit numbers.

The numbers 23, 47 and 88 are two-digit numbers.

The numbers 347, 101 and 928 are three-digit numbers.

- 1 What is the largest two-digit number? \_\_\_\_\_
- 2 What is the smallest two-digit number? \_\_\_\_\_
- 3 What is the largest three-digit number? \_\_\_\_\_
- 4 What is the smallest three-digit number? \_\_\_\_\_
- 5 What is the largest two-digit number in which no numeral is repeated? \_\_\_\_\_
- 6 Write down the smallest three-digit number that uses the numerals 1 and 3 only once. \_\_\_\_\_
- 7 What is the largest three-digit number in which no numeral is repeated? \_\_\_\_\_
- 8 What is the smallest three-digit number that uses the numeral 0 once? \_\_\_\_\_
- 9 Write down the smallest three-digit number that uses three different numerals. \_\_\_\_\_
- 10 What is the largest three-digit number that uses two different numerals? \_\_\_\_\_
- 11 What is the smallest three-digit number that uses the numeral 9? \_\_\_\_\_
- 12 What is the largest three-digit number that uses the numerals 2 and 7? \_\_\_\_\_
- 13 How many one-digit counting numbers are there? \_\_\_\_\_
- 14 How many two-digit counting numbers are there? \_\_\_\_\_
- 15 How many two-digit numbers use the numeral 5? \_\_\_\_\_
- 16 How many two-digit numbers do not use the numeral 5? \_\_\_\_\_
- 17 Write down the smallest three-digit odd number. \_\_\_\_\_
- 18 Write down the largest three-digit number divisible by 5. \_\_\_\_\_
- 19 Write down the smallest three-digit number divisible by 4. \_\_\_\_\_
- 20 Write down the largest three-digit number divisible by 3. \_\_\_\_\_

# Shape values

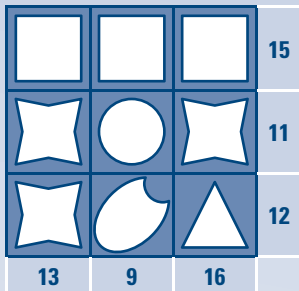
In every large square, each symbol has a different value. The sum of each row and column is given, and from them you can work out the values of the symbols.

For example, in the first row of square 1 you can see that  $\square = 5$ .

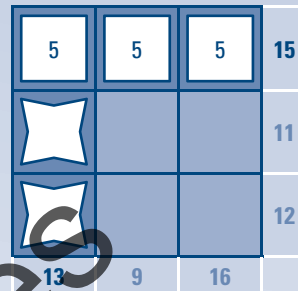
When you write the numbers in, you see that in the first column

$$5 + \text{star} + \text{star} = 13, \text{ so } \text{star} = 4.$$

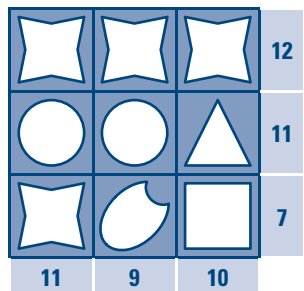
The other symbols can be found in the same way.



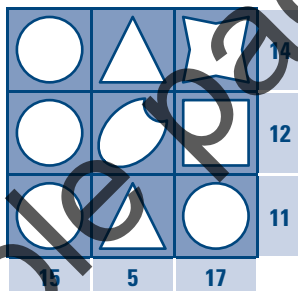
This is how you begin.



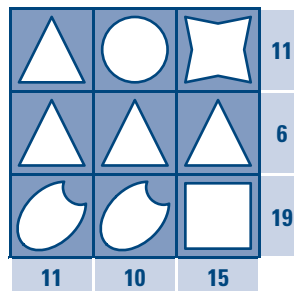
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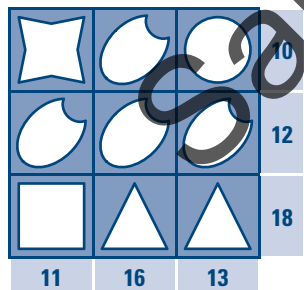
3



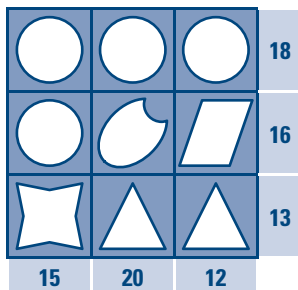
4



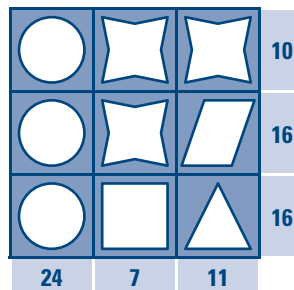
5



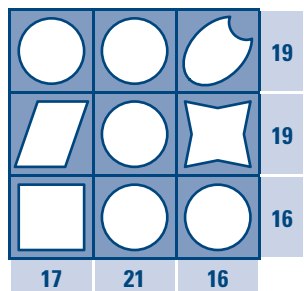
6



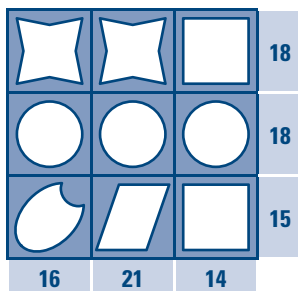
7



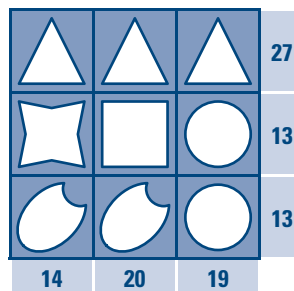
8



9



10



# The four operations

Follow the rules shown in the left-hand columns to complete these tables.

In every case,  $\blacksquare$  is larger than  $\blacktriangle$ .

**1**

$\blacksquare$	5	8	6							8		
$\blacktriangle$	2			3	7					3		
$\blacksquare + \blacktriangle$	7	11		9		6	10	11	11			
$\blacksquare - \blacktriangle$	3		4		2	2	4				1	3
$\blacksquare \times \blacktriangle$	10								30	18	27	56 42 40

**2**

$\blacksquare$	4	5	7			5	4					
$\blacktriangle$	3	2										
$\blacktriangle \times \blacktriangle$						16	4	4	1	9	4	25 49
$\blacksquare + \blacktriangle$				6	5			8		8		15
$\blacksquare \times \blacktriangle$			14	5	6				7		10	30

**3**

$\blacksquare$	4	7			8							
$\blacktriangle$	3	5	1	3		8	2	4				
$2 \times \blacksquare$			4	10					16			12 20
$\blacksquare - \blacktriangle$					7	2				1	6	3
$\blacksquare \times \blacktriangle$							14	24	32	20	27	30

**4**

$\blacksquare$	9	10		12	24		24	8				18
$\blacktriangle$	3		3			5					2	
$3 \times \blacktriangle$		6						12	27	12		
$\blacksquare + \blacktriangle$			15		27				45	32	20	24 24
$\blacksquare \div \blacktriangle$				2		4	4					7

# Table squares

You have often been asked to complete addition table squares like the example in exercise 2. The challenge in the other squares is to find the numbers that must be added as well to complete the squares.

In example 1, you are shown which numbers to look for first.

**1**

<b>+</b>			4	
		7		10
7			11	15
	12		13	
		11		

What number must be added to 7 to make 15?

What number must be added to 4 to make 13?

**2**

<b>+</b>	5	3	6	4
2	7	5		
7	12			
1	6			
8				

**3**

<b>+</b>	4			
7	11	8		
		13	19	
			15	16
				9

**4**

<b>+</b>		5		
	25	19		
10			18	
		12	15	
	14			9

**5**

<b>+</b>	2			
		16	8	
	7			13
		20		19
			4	

**6**

<b>+</b>		3		
			11	
			15	17
	14	5		
	19		14	

**7**

<b>+</b>	12			
	20			
		15	8	
	17	19		
7			14	10

**8**

<b>+</b>		10		
			9	14
	11	15	8	
	13			
		20		

**9**

<b>+</b>			8	
	13	7		
		10	13	
			16	20
	17			

**10**

<b>+</b>				9
		13		
			8	11
	8			13
7		12		

# Letters and symbols

In these equations, each letter or symbol represents a digit. Some of them have the same value. Can you replace them with the correct digits?

For example :  $D + D + 3 = 15$        $D = 6$

- 1**  $A \times A = A$       **A** = \_\_\_\_\_
- 2**  $B \times B = B + B$       **B** = \_\_\_\_\_
- 3**  $C \times C = 16$       **C** = \_\_\_\_\_
- 4**  $D \times D \times D = 8$       **D** = \_\_\_\_\_
- 5**  $E \times E \times E = 1$       **E** = \_\_\_\_\_
- 6**  $P + P + P + P + P = 0$       **P** = \_\_\_\_\_
- 7**  $Q + Q + Q + Q = 24$       **Q** = \_\_\_\_\_
- 8**  $F \times F \times F = 27$       **F** = \_\_\_\_\_
- 9**  $G \times G = 20 + G$       **G** = \_\_\_\_\_
- 10**  $M \times M = 30 + M$       **M** = \_\_\_\_\_
- 11**  $26 - L = 21$       **L** = \_\_\_\_\_
- 12**  $26 - N - N = 20$       **N** = \_\_\_\_\_
- 13**  $26 - R - R - R = 14$       **R** = \_\_\_\_\_
- 14**  $H + H + H + H + H = 20$       **H** = \_\_\_\_\_
- 15**  $J + J + J + J = 20$       **J** = \_\_\_\_\_
- 16**  $P + P + P = 10 + P$       **P** = \_\_\_\_\_
- 17**  $Y + Y + Y = Z + Z$       **Y** = \_\_\_\_\_      **Z** = \_\_\_\_\_
- 18**  $W + W + W + W = V + V + V$       **W** = \_\_\_\_\_      **V** = \_\_\_\_\_
- 19**  $K + K + K = U + U + U + U + U$       **K** = \_\_\_\_\_      **U** = \_\_\_\_\_
- 20**  $T + 1 = 10$       **T** = \_\_\_\_\_
- 21**  $Z \times Z + 1 = 10$       **Z** = \_\_\_\_\_
- 22**  $S + S + 2 = 10$       **S** = \_\_\_\_\_
- 23**  $X + X - 4 = 10$       **X** = \_\_\_\_\_
- 24**  $\heartsuit + 9 = 17$        $\heartsuit$  = \_\_\_\_\_
- 25**  $\spadesuit \times \spadesuit + 1 = 17$        $\spadesuit$  = \_\_\_\_\_



# What's my message?

In these messages, letters have replaced numbers. Can you work out the problems below each message and so find out what I am saying? (Note that **O** represents the letter **O**, *not* the number 0.)

1

$\frac{\quad}{5} \frac{\quad}{7} \frac{\quad}{6} \frac{\quad}{3}$       $\frac{\quad}{7}$       $\frac{\quad}{9} \frac{\quad}{8} \frac{\quad}{8} \frac{\quad}{1}$       $\frac{\quad}{4} \frac{\quad}{3} \frac{\quad}{3} \frac{\quad}{0} \frac{\quad}{3} \frac{\quad}{2} \frac{\quad}{1}$

$$N \times N = N + N$$

$$N - N = K$$

$$E + N = H$$

$$D + D = N$$

$$D + K = D$$

$$A - N = H$$

$$N + N + N = V$$

$$N \times N \times N = O$$

$$H + W = G$$

$$W \div N = N$$

$$E \times E = G$$

$$W + W = O$$

$$V - N = W$$

$$E + W = A$$

$$E + E = V$$

$$V + D = A$$

2

$\frac{\quad}{9} \frac{\quad}{5} \frac{\quad}{4}$       $\frac{\quad}{3} \frac{\quad}{1} \frac{\quad}{8}$       $\frac{\quad}{7} \frac{\quad}{6} \frac{\quad}{8} \frac{\quad}{2} \frac{\quad}{8} \frac{\quad}{1}$

$$R \times R = R$$

$$A \times A = Y$$

$$R + R = V$$

$$Y - L = A$$

$$V + V = U$$

$$U + U = E$$

$$U + R = O$$

$$V + C = Y$$

$$A + V = O$$

$$A + O = E$$

$$L - U = V$$

$$Y - O = U$$

$$V \times A = L$$

$$L + O = RR$$



# Square puzzles

Find the values of the letters **A**, **B**, **C**, **D** and **E** in these squares. The sums of the rows and columns are given, and only the numbers 1, 2, 3, 4 and 5 have been used.

Using the value of the one letter given for each square, work out the values of the other letters and complete the grid.

**1**

E	C	C	9
E	B	A	9
B	D	A	8
11	7	8	

A	B	C	D	E
_____	_____	_____	_____	5

5			9
5			9
			8
11	7	8	

**2**

A	B	C	12
A	C	E	8
D	D	E	5
8	11	6	

A	B	C	D	E
3	_____	_____	_____	_____

3			12
3			8
			5
8	11	6	

**3**

B	A	C	8
D	E	E	11
D	A	C	6
11	8	6	

A	B	C	D	E
2	_____	_____	_____	_____

	2		8
			11
	2		6
11	8	6	

**4**

A	E	A	13
B	C	D	6
B	E	C	9
6	13	9	

A	B	C	D	E
_____	1	_____	_____	_____

			13
1			6
1			9
6	13	9	

**5**

D	E	C	8
B	A	C	12
C	A	D	11
10	9	12	

A	B	C	D	E
_____	_____	_____	2	_____

2			8
			12
		2	11
10	9	12	

