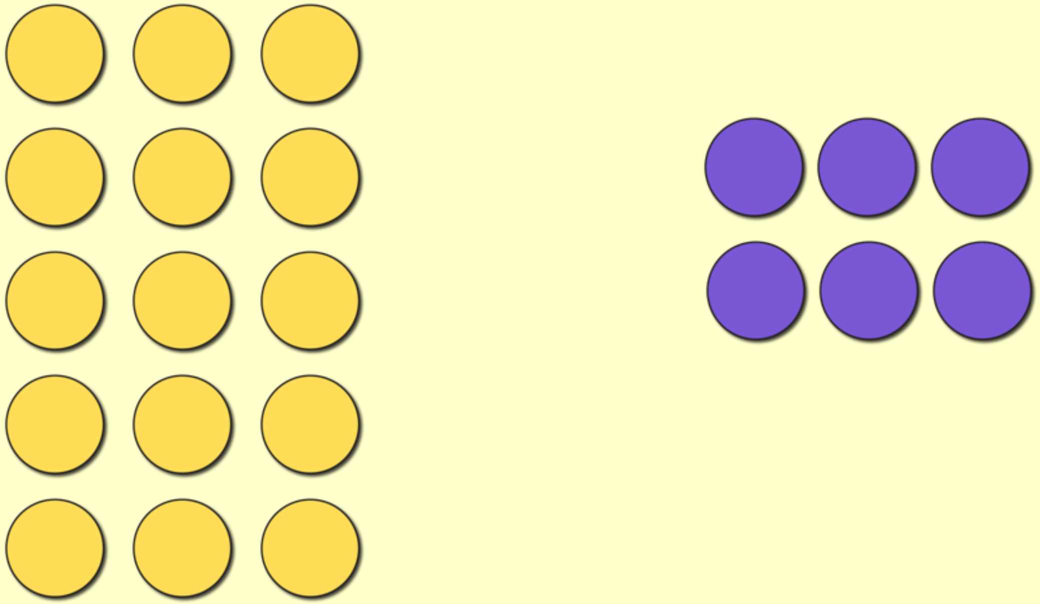
Multiplication & Division

Day 1

Starter

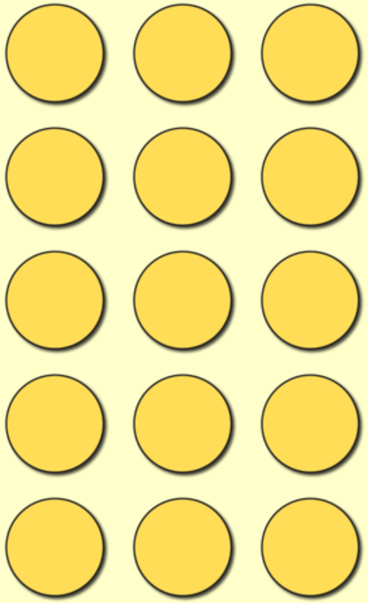
What's the same? What's different?

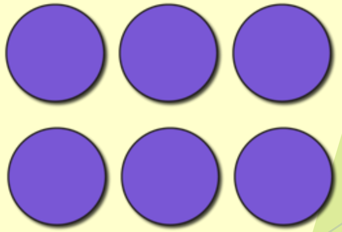


Explain your answer.

Starter - ANSWERS

Both arrays have three columns; however, the yellow array has three columns of five counters, whereas the purple array has three columns of two counters. Therefore, they have different totals.





Key Vocabulary

Date: Day 1

LO: To find the common factors of two numbers.

Success Criteria

I can use my knowledge of times tables and multiples to find common factors of two numbers.

I can explain my reasoning.

Descriptive Teaching

What is a factor?

A **factor** of a whole number is a smaller whole number which can be multiplied by another whole number to produce the first whole number.
For example, two and three are factors of six.

What is a 'common factor'?

A **common factor** is a smaller whole number shared by two larger whole numbers that can be multiplied by other smaller whole numbers to produce the starting pair of larger whole numbers.
For example, one and five are **common factors** of fifteen and twenty-five.

Descriptive Doing

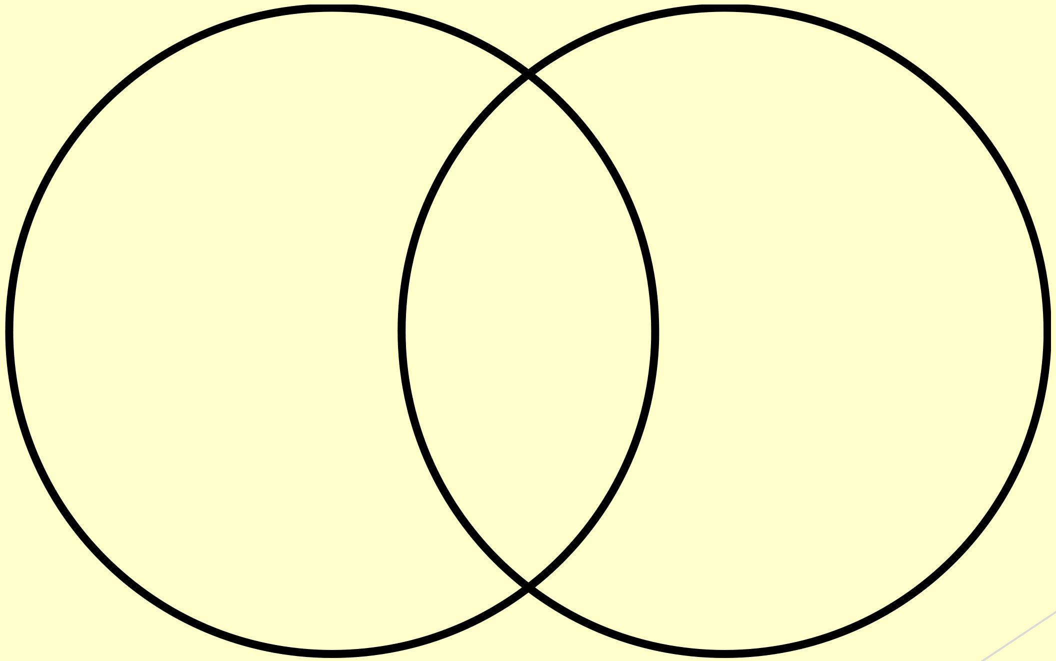
Find common factors for the following pair of numbers:

6 and 18

Draw the Venn diagram in your book.

Common Factors

Factors of 6

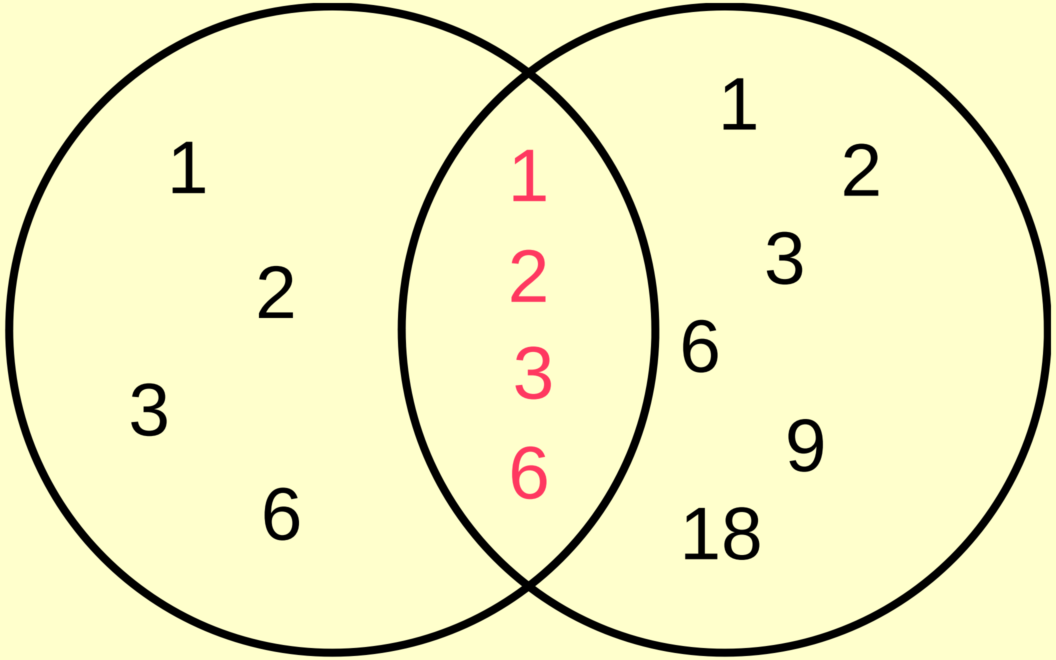


Factors of 18

Descriptive Doing - ANSWERS

6 and 18

Common Factors



Factors of 6

Factors of 18

Descriptive Doing

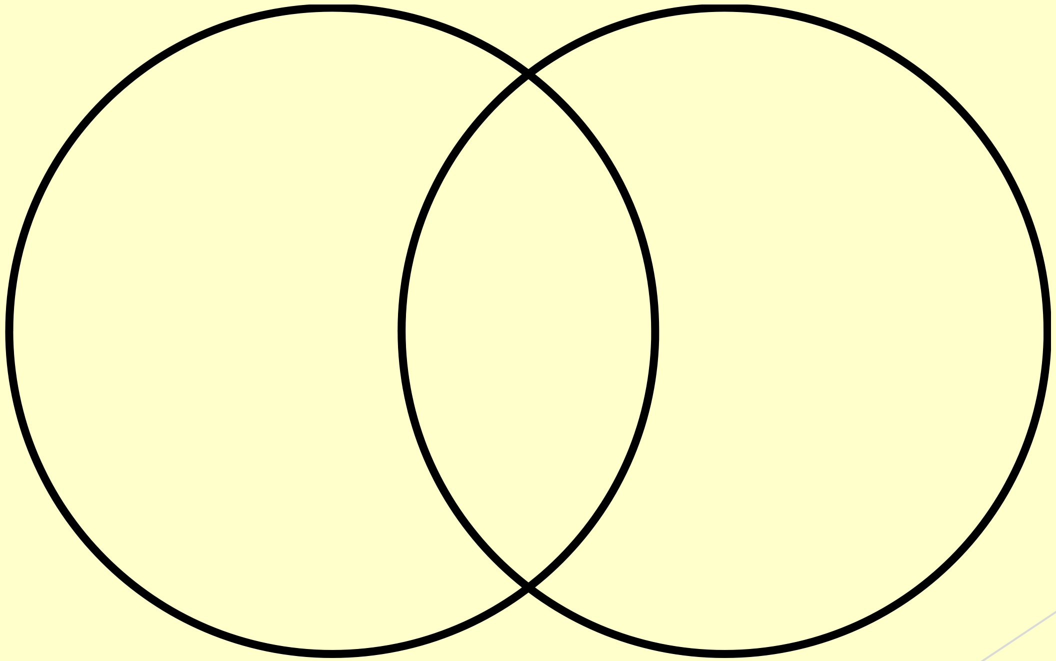
Find common factors for the following pair of numbers:

10 and 24

Draw the Venn diagram in your book.

Common Factors

Factors of 10



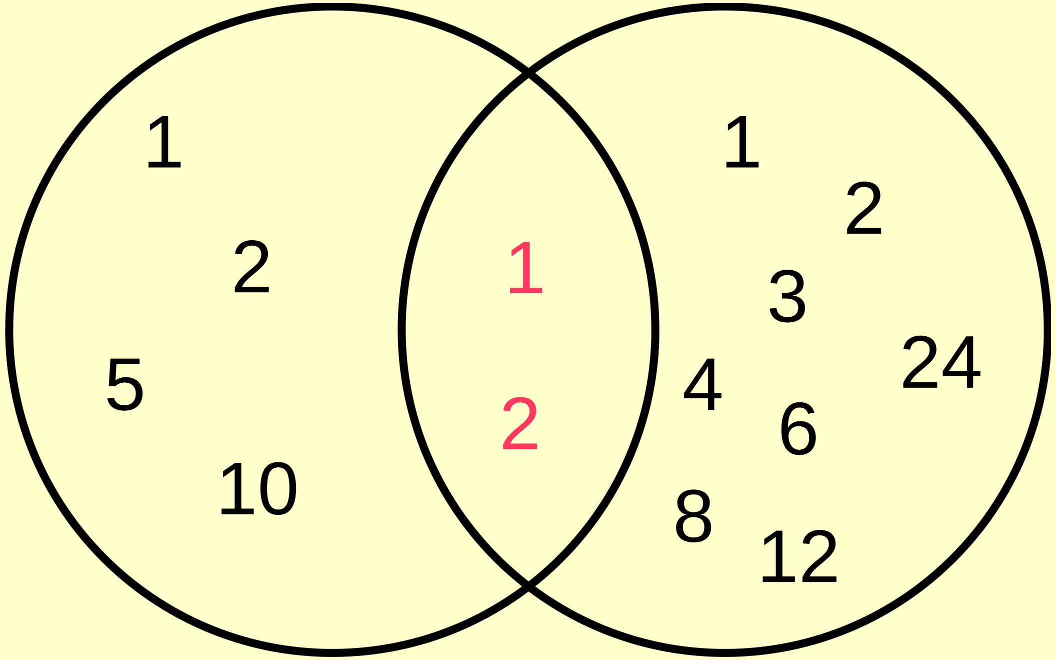
Factors of 24

Descriptive Doing

10 and 24

Common Factors

Factors of 10



Factors of 24

Descriptive Doing

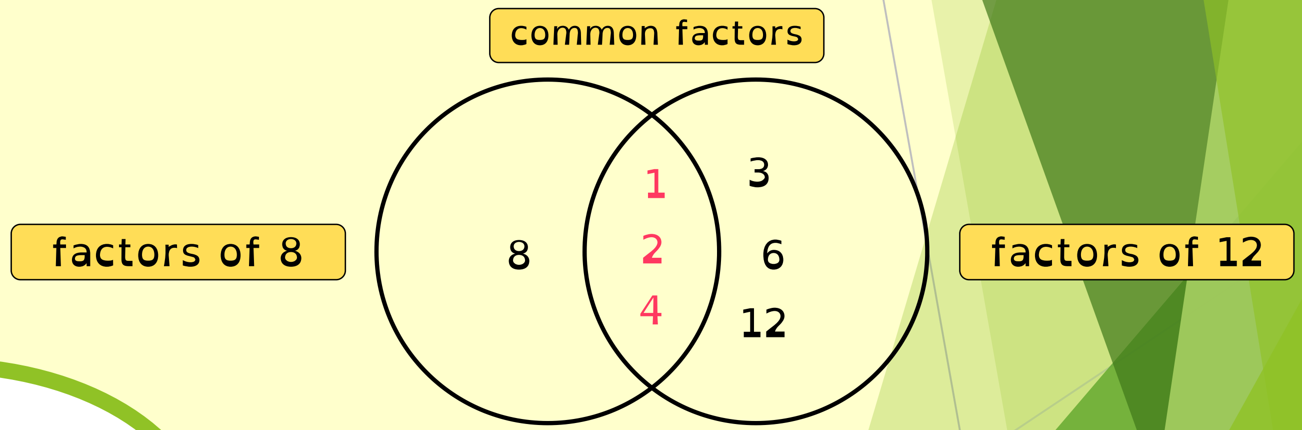
Find common factors for the following pair of numbers:

a) 12 and 36

b) 18 and 24

c) 20 and 36

d) 28 and 35



Draw Venn diagrams in your book.

Descriptive Doing - ANSWERS

a) 12 and 36
Common factors: 1, 2, 3, 4, 6 and 12

b) 18 and 24
Common factors: 1, 2, 3 and 6

c) 20 and 36
Common factors: 1, 2 and 4

d) 28 and 35
Common factors: 1 and 7

Reflective Doing

Yasmin is thinking of two 2-digit numbers.

She says, “They have common factors of 1 and 5 and both have digit totals of 8.”

What could the two numbers be?

Reflective Doing - ANSWERS

The two numbers are 35 and 80.

Choose your challenge

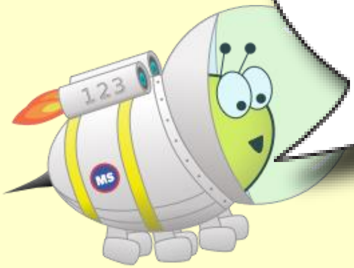
Challenges can be found on the document named ‘Maths Challenges Day 1’.

Choose an appropriate challenge OR work through green, orange and red.

Answers can be found at the bottom of the document.

Reflection Time

All numbers have 1 as a multiple and all numbers have 1 as a factor.



Part of what Astrobee has said is true, part of it is false.

What’s true? What’s false?

Reflection Time - ANSWERS

It’s true that all numbers have 1 as a factor, for example 9 has the factors 1, 3 and 9 and 8 has the factors 1, 2, 4 and 8; however, 1 is only a multiple of itself. From my times tables knowledge, I know that 1 x 1 = 1 is the only time 1 is a product. Therefore, the first half of Astrobee’s statement is false.

Multiplication & Division

Day 2

Starter

Thinking about factors, which one doesn't belong?

2	7	12	13

Explain your answer.

Starter - ANSWERS

12 doesn’t belong as it is the only number shown above that has more than one pair of facts. 2 has one factor pair (1 and 2), as does 7 (1 and 7), and 13 (1 and 13); however, 12 has three factor pairs (1 and 12, 2 and 6, and 3 and 4).

2	7	12	13

Key Vocabulary

Date: Day 2

LO: To identify prime numbers below 20.

Success Criteria

I can use terminology correctly relating to factors, composite numbers and prime numbers below 20.

I can explain my reasoning.

Descriptive Teaching

A **prime number** is a number that has factors of itself and one.
For example, 7 is a prime number as its only factors are 1 and 7.

A **composite number** is a number that has factors other than itself and 1.
For example, 8 is a composite number as it has factors of 1, 2, 4 and 8.

Although most prime numbers are odd, 2 is a prime number, as it only has factors of 1 and 2.

In simple terms, 1 is not a prime number as it only has one factor, 1.
Prime numbers have two factors, 1 and itself.

Descriptive Doing

Using your knowledge of times tables, copy the table and shade in all the cells showing composite numbers so only the prime numbers' cells are blank.

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

Descriptive Doing - ANSWERS

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

Reflective Teaching

We can use a hundred square to identify prime numbers. If we shade in all the numbers that are in our times tables, we are left with prime numbers.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Reflective Doing

Answer the questions below.

a) Which prime numbers end with the digit 1?

b) Which prime numbers end with the digit 3?

c) Which prime numbers end with the digit 7?

d) Which prime numbers end with the digit 9?

e) Why is there only one prime number that has the digit 5 in the ones place?

f) How many even-numbered prime numbers are there? Why is that?

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Reflective Doing - ANSWERS

a) Which prime numbers end with the digit 1?
11, 31, 41, 61 and 71 have the digit 1 in the ones place.

b) Which prime numbers end with the digit 3?
3, 13, 23, 43, 53, 73 and 83 end with the digit 1.

c) Which prime numbers end with the digit 7?
7, 17, 37, 47, 67 and 97 end with the digit 1.

d) Which prime numbers end with the digit 9?
19, 29, 59, 79 and 89 have the digit 1 in the ones place

e) Why is there only one prime number that has the digit 5 in the ones place?
All two-digit (or greater) numbers with 5 in the ones place are in the 5 times table.

f) How many even-numbered prime numbers are there? Why is that?
There is only one even-numbered prime number, 2; all others have 2 as a factor!

Choose your challenge

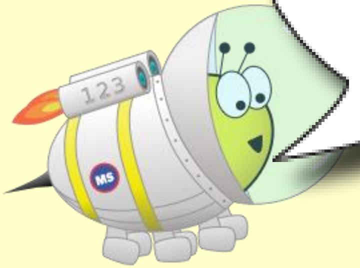
Challenges can be found on the document named ‘Maths Challenges Day 2’.

Choose an appropriate challenge OR work through green, orange and red.

Answers can be found at the bottom of the document.

Reflection Time

There is only one even prime number and all odd numbers are prime numbers.



Some of what Astrobee has said is true; some of what Astrobee has said is false.

What is true and what is false?

Reflection Time - ANSWERS

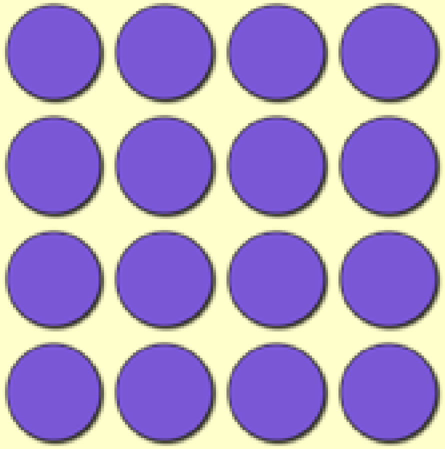
It is true that there is only one even prime number. 2 is the only even prime number as it has one factor pair of 1 and 2; however, all other even numbers have at least one other factor (which is – of course – 2). Although most prime numbers are odd, not all odd numbers are prime. For example, 15 has the factors 3 and 5…

Multiplication & Division

Day 3

Starter

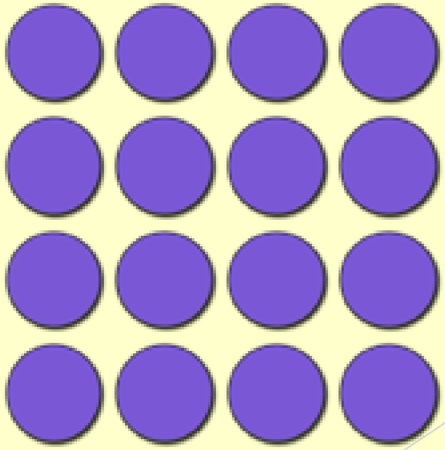
Looking at the representations below, what's the same and what's different?



Explain your answer.

Starter - ANSWERS

They are different colours – the Numicon Shape is green and the counters are purple. Also, they are different in terms of total amounts – the Numicon Shape represents 4, whereas the counters have a total of 16. They are similar in that both representations have sides of equal length and form the shape of a square.



Key Vocabulary

Date: Day 3

LO: To identify square numbers.

Success Criteria

I can use terminology correctly relating to factors and square numbers.

I can explain my reasoning.

Descriptive Teaching

A square number is a number multiplied by itself.

This can also be called 'a number squared'. The symbol for squared is ^{2}.

E.g. $2^2 = 2 \times 2 = 4$

Descriptive Doing

Identify all the square numbers on the times tables grid below.

x	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

Descriptive Doing - ANSWERS

The square numbers make a diagonal line running through the times tables grid, showing each factor (or both factors!) has increased by one each time.

x	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

Reflective Doing

Is the following statement always, sometimes or never true?

The squares of even numbers are even;

the squares of odd numbers are odd.

Reflective Doing - ANSWERS

The statement above is always true. For example, the square number of 2 is 4, of 6 is 36 and of 12 is 144. Similarly, the square number of 1 is 1, of 5 is 25 and of 11 is 121.

Reflective Doing

Are the following statements true or false?
Explain where you think people may have gone wrong.

a) Ruth says, "9^2 is equal to 81."

b) Jamal says, "5^2 is equal to 10."

c) Yasmin says, "3^2 is equal to 5."

Reflective Doing - ANSWERS

a) Ruth says, "9^2 is equal to 81."
Ruth's statement is true, 9 x 9 = 81.

b) Jamal says, "5^2 is equal to 10."
Jamal's statement is false, rather than multiplying 5 by 5, he has multiplied 5 by the indices' digit, 2, to make 10.

c) Yasmin says, "3^2 is equal to 5."
Yasmin's statement is false, rather than multiplying 3 by 3, she has added 3 to the indices' digit, 2, to make 5.

Choose your challenge

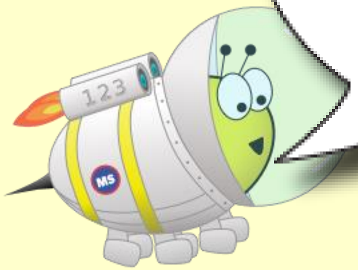
Challenges can be found on the document named ‘Maths Challenges Day 3’.

Choose an appropriate challenge OR work through green, orange and red.

Answers can be found at the bottom of the document.

Reflection Time

A square number has an odd number of factors.



The statement is ___ true because…

Is Astrobee's statement always, sometimes or never true?

Explain your answer.

Reflection Time - ANSWERS

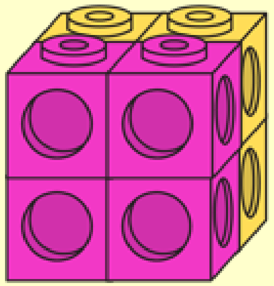
Astrobee’s statement is always true. For example, 9 has an odd number of factors, 1, 3 and 9, so three factors. Also, 16 has an odd-numbered amount of factors: 1, 2, 4, 8 and 16, so five factors. Similarly, 36 has an odd-numbered amount of factors: 1, 2, 3, 4, 6, 9, 12, 18 and 36, so 9 factors in total.

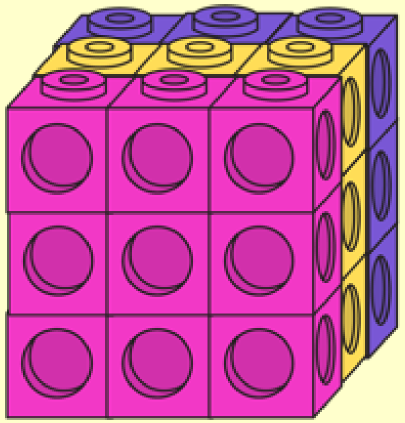
Multiplication & Division

Day 4

Starter

If the representations below are the 2^{nd} and 3^{rd} step in a sequence, what do you think would come before and after the part of the sequence shown below?





Explain your answer.

Starter - ANSWERS

As the 2nd step shows a cube that is 2 cubes high, 2 cubes wide and 2 cubes deep and the 3rd step shows a cube that is 3 cubes high, 3 cubes wide and 3 cubes deep, it follows that the 1st step would show a cube that is 1 cube high, 1 cube wide and 1 cube deep and the 4th step would show a cube that is 4 cubes high, 4 cubes wide and 4 cubes deep.

Key Vocabulary

Date: Day 4

LO: To identify cube numbers.

Success Criteria

I know that a cube number results from multiplying a number by itself and then by itself again, e.g. 2 x 2 x 2, and that it can be expressed using the digit 3 as an indices, e.g. 2^3.

I can explain my reasoning.

Descriptive Teaching

A cube number is a number multiplied by itself 3 times.

This can also be called 'a number cubed'.

The symbol for cubed is ^{3}.

e.g. $2^3 = 2 \times 2 \times 2 = 8$

Descriptive Doing

Copy and complete the table below:

	1 x 1 x 1	1
2^3		8
	3 x 3 x 3	
	4 x 4 x 4	
5^3		125
		216
7^3		
	8 x 8 x 8	

Descriptive Doing - ANSWERS

1^3	1 x 1 x 1	1
2^3	2 x 2 x 2	8
3^3	3 x 3 x 3	27
4^3	4 x 4 x 4	64
5^3	5 x 5 x 5	125
6^3	6 x 6 x 6	216
7^3	7 x 7 x 7	343
8^3	8 x 8 x 8	512

Reflective Doing

a) Jamal's brother's age is a prime number (he is less than 10 years old).
Next year his age will be a cube number.
How old is he now? How old will he be next year?

b) Jamal's uncle's age is a square number (he is aged between 20 and 30).
In two years' time his age will be a cube number.
How old is he now? How old will he be in two years' time?

Reflective Doing - ANSWERS

a) Jamal's brother's age is a prime number (he is less than 10 years old).
   Next year his age will be a cube number.
   How old is he now? How old will he be next year?
   Jamal's brother is 7 years old now; he will be 8 years old next year.

b) Jamal's uncle's age is a square number (he is aged between 20 and 30).
   In two years' time his age will be a cube number.
   How old is he now? How old will he be in two years' time?
   Jamal's uncle is 25 years old now; he will be 27 years old in two years' time.

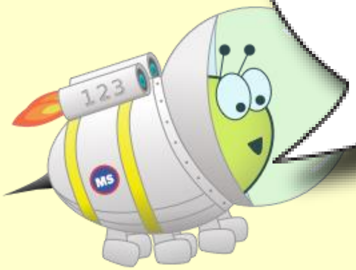
Choose your challenge

Challenges can be found on the document named ‘Maths Challenges Day 4’.

Choose an appropriate challenge OR work through green, orange and red.

Answers can be found at the bottom of the document.

Reflection Time



7^3 is equal to 21.

Do you agree with Astrobee?

Explain your answer.

I agree/disagree because…

Reflection Time - ANSWERS

Astrobee is wrong – rather than using the indices to make sure 7 is multiplied by itself and itself again, Astrobee has instead multiplied 7 by 3 to make 21.

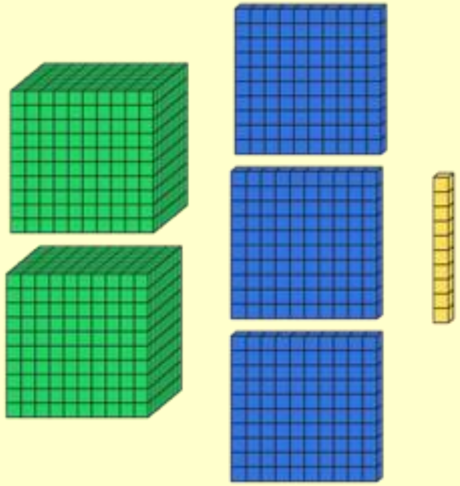
$7^3 = 7 \text{ x } 7 \text{ x } 7 = \underline{343}$.

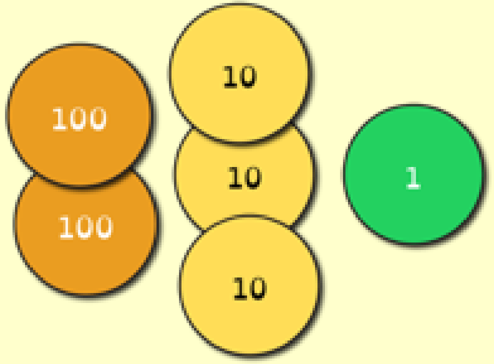
Multiplication & Division

Day 5

Starter

What's the same? What's different?





Explain your answer.

Starter - ANSWERS

Both representations show numbers that have the digit 2 in the highest value place, the digit 3 in the second highest value place and the digit 1 in the third highest value place. Both numbers also share the same digit total of 6; however, the Base 10 pieces represent the number 2,310, whereas the place value counters represent 231. So, the place value representation is ten times smaller than the Base 10 representation,

Key Vocabulary

Date: Day 5

LO: To use related facts to calculate using other multiples of 10, 100 and 1000.

Success Criteria

I can use related facts to solve calculations using similar multiples of 10, 100 and 1000.

I can explain my reasoning.

Descriptive Teaching

What knowledge can we use to solve the calculation?

We know that 2 x 5 = 10.

We also know that 5 x 10 = 50.

Therefore we can multiply our answer to

2 x 5 = 10, by 10.

10 x 10 = 100.

2 x 5 = 10

2 x 50 = 100

Descriptive Doing

Use the knowledge that 64 x 5 = 320, to calculate the following:

64 x 50 =	50 x 640 =
5 x 640 =	640 x 500 =
500 x 64 =	5,000 x 64 =

Descriptive Doing - ANSWERS

64 x 50 = 3,200

50 x 640 = 32,000

5 x 640 = 3,200

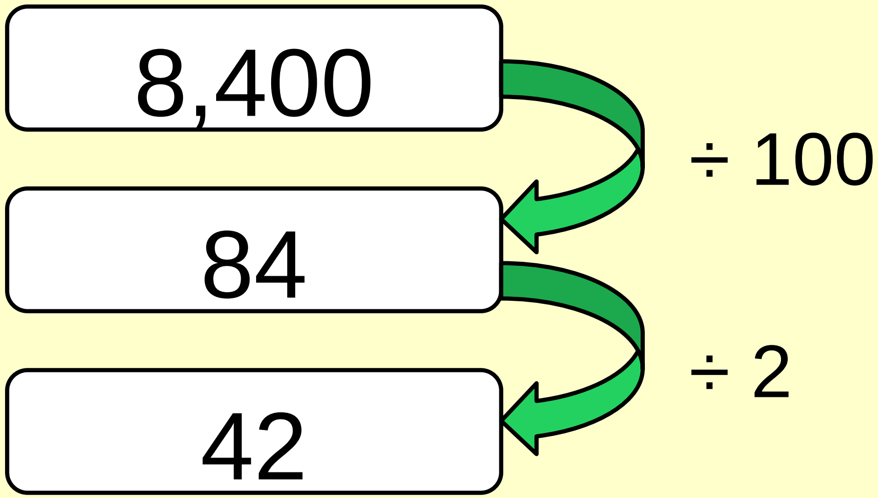
640 x 500 = 320,000

500 x 64 = 32,000

5,000 x 64 = 320,000

Reflective Teaching

Yasmin uses the following strategy to calculate 8,400 ÷ 200 = 42.



Reflective Doing

Use Yasmin's strategy to calculate
2,600 ÷ 200 = ___

2,600

Reflective Doing - ANSWERS

$$\begin{array}{c} 2{,}600 \\ \downarrow \div 100 \\ 26 \\ \downarrow \div 2 \\ 13 \end{array}$$

Reflective Doing

Use the comparison symbols (<, > or =) to complete the following statements:

3,600 ÷ 200		240 x 50
50 x 36		360,000 ÷ 200
64 x 500		84,000 ÷ 200
65,000 ÷ 200		65 x 5 x 10

Reflective Doing - ANSWERS

3,600 ÷ 200	$<$	240 x 50
50 x 36	$=$	360,000 ÷ 200
64 x 500	$>$	84,000 ÷ 200
65,000 ÷ 200	$<$	65 x 5 x 10

Reflective Doing

Jamal says, "If I know that 8 x 7 = 56, then 560 ÷ 70 must equal 80 as all the numbers are just ten times bigger than the first calculation."

Do you agree?

Explain your answer.

Reflective Doing - ANSWERS

Jamal is incorrect – it would be more helpful to have a multiplication calculation that used 70 and 560 to use the known fact to give the correct answer, which is 8.

In other words, if we know that 70 x 8 = 560, then we know that 560 ÷ 70 = 8.

Jamal should have also calculated that 70 only goes into 560 eight times, 80 lots of 70 makes 5,600.

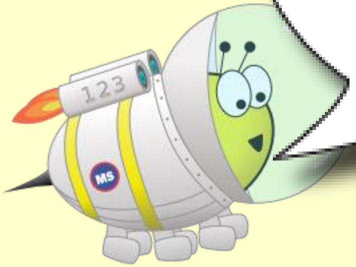
Choose your challenge

Challenges can be found on the document named ‘Maths Challenges Day 5’.

Choose an appropriate challenge OR work through green, orange and red.

Answers can be found at the bottom of the document.

Reflection Time



If I know that
60 x 90 = 5,400, then I
know that
9,000 ÷ 60 = 54.

Do you agree with Astrobee?

Explain your answer.

I
agree/disagree
because…

Reflection Time - ANSWERS

Astrobee is wrong on this occasion – we can move the product (5,400) across with one of the factors, either 60 or 90, and replace the multiplication symbol with a division symbol to create the following number sentences: 5,400 ÷ 60 = 90 and 5,400 ÷ 90 = 60. In fact, 9,000 ÷ 60 = 150. So, Astrobee is wrong today!