Autumn Block 3

Multiplication and division A

Small steps

Step 1	Multiples
Step 2	Common multiples
Step 3	Factors
Step 4	Common factors
Step 5	Rules of divisibility
Step 6	Prime numbers
Step 7	Square and cube numbers
Step 8	Multiply by 10, 100 and 1,000

Small steps

Step 9 Divide by 10, 100 and 1,000

Multiples

Notes and guidance

In this small step, children find sets of multiples of given numbers and make generalisations about them. This allows them to begin to understand and use rules of divisibility, which will be built upon later in the block.

Children should already be familiar with the idea of multiples, understanding that a multiple of a number is any number that is in its times-table. This can then be generalised to define a multiple more formally as the result of multiplying a number by a positive integer.

Children first build multiples of numbers using concrete resources, before using pictorial representations. Arrays are particularly useful and will also help children when they study factors, prime numbers and square numbers later in the block.

When listing multiples, children should work systematically to avoid omissions. This will be built on in the next step when looking at common multiples.

Things to look out for

- Children may make errors with times-tables facts.
- Children may find it more difficult to identify and find multiples that go beyond the facts in the 12 times-table.

Key questions

- How do you find the multiples of a number?
- How can you tell if a number is a multiple of 2/5/10?
- Are multiples of 8/4 also multiples of 4/8?

Possible sentence stems

- A multiple is the result of multiplying a number by a _____
- The first multiple of a number is always _____

Single age small step links

- Multiples (Y5)

- N/A

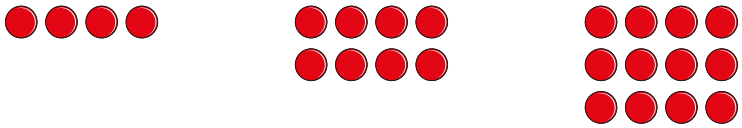
National Curriculum links

- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers (Y5)
- Solve problems involving multiplication and division, including using their knowledge of factors and multiples, squares and cubes (Y5)

Multiples

Key learning

- Here are the first three multiples of 4



Use counters to make these and the next three multiples of 4

List the first six multiples of 4

What is the same and what is different about the multiples of 4?

- Complete the number tracks.

0	5	10							
8	16								
				36	42				

- How can you tell by looking at a number if it is a multiple of 5?

Which of these numbers are multiples of 5?

35	37	90	501	120	151

1,000	5,000	3,002

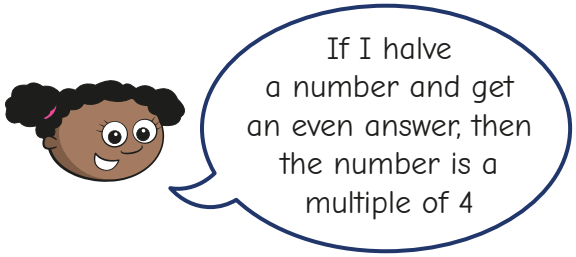
Which of these numbers are also multiples of 10?

- List the first six multiples of 3

List the first six multiples of 6

What do you notice?

- Whitney has found a rule for identifying multiples of 4



Use Whitney's rule to find out which of the numbers are multiples of 4

52	62	74	84	96	106	114	268

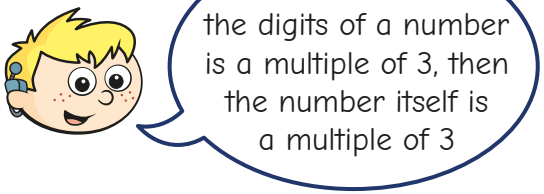
Find a rule to test if a number is a multiple of 8

- On separate copies of a hundred square, shade all the multiples of each number.
  - 2
  - 4
  - 6
  - 8

What patterns can you spot?

Multiples

Reasoning and problem solving



Use these multiples of 3 to check Max's rule.

54	99	912	6,102

Is the rule correct?

Use Max's rule to find out which of these numbers are multiples of 3

84	106	270

1,525	5,820

Yes

84, 270 and 5,820 are multiples of 3

Find the sum of the digits of all the numbers in the 9 times-table up to 10 × 9

What do you notice?

Find the digit sums of these multiples of 9

657	1,881	6,426

9,999	83,853

What do you notice?

What is the connection between numbers that are multiples of 9 and the sum of their digits?

The total is always 9

18, 18, 18, 36, 27

The total is always a multiple of 9

Common multiples

Notes and guidance

In this small step, children find common multiples of any pairs of numbers.

Arrays and other representations may be used as support, but children should start to become less reliant on these and more reliant on times-table knowledge and simple rules of divisibility. For example, a common multiple of 2 and 3 is also a multiple of 6, so a number is divisible by 6 only if it is divisible by both 2 and 3. This will be explored in detail later in the block.

Encourage children to work systematically to find lists of multiples, rather than just finding the product of the given numbers, as this may miss some common multiples. They do not need to be able to formally identify the lowest common multiple of two or more numbers, but Year 6 children can be challenged to find the first common multiple of two numbers.

Things to look out for

- Children may confuse factors and multiples.
- Children may make errors with times-tables facts.
- Children may think that the only common multiple of a pair of numbers is the product of the numbers.

Key questions

- How do you find the multiples of a number?
- What multiples do _____ and _____ have in common?
- When do numbers have common multiples that are less than their product?

Possible sentence stems

- _____ is a multiple of _____ because _____ × _____ = _____
- _____ is a common multiple of _____ and _____

Single age small step links

- Common multiples (Y5)
- Common multiples (Y6)

National Curriculum links

- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers (Y5)
- Identify common factors, common multiples and prime numbers (Y6)

Common multiples

Key learning

- Here is a hundred square.

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

  - Shade the multiples of 4
  - Circle the multiples of 5

  What common multiples of 4 and 5 have you found?

  Use these common multiples to find other common multiples of 4 and 5

- Find the first three common multiples of each pair of numbers.

5 and 6	2 and 8	4 and 6	3 and 10

- Here is a table for sorting numbers.

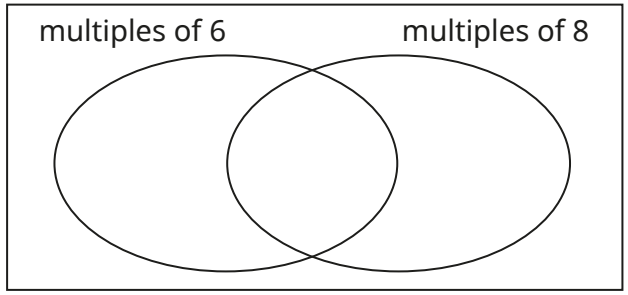
  Write one number in each box.

	Multiple of 7	Not a multiple of 7
Multiple of 10		
Not a multiple of 10		

  Compare answers with a partner.

- Write the numbers in the sorting diagram.

  12 18 24 36 78 60 96 100 102 104



- Nijah plays football every 3 days and Dani plays football every 4 days.

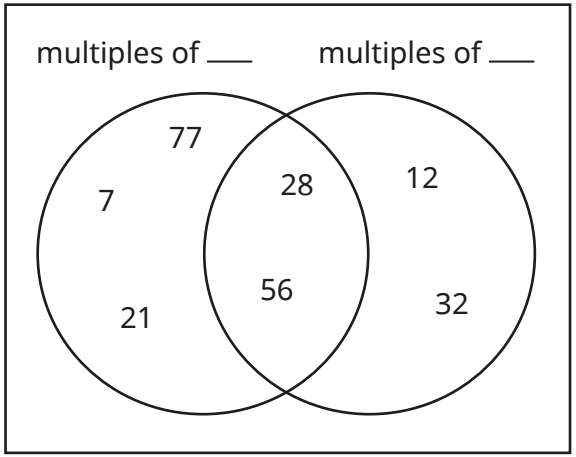
  They both played football today.

  In how many days will they next play football on the same day?

Common multiples

Reasoning and problem solving

Complete the labels of the sorting diagram.



Write another number in each section.

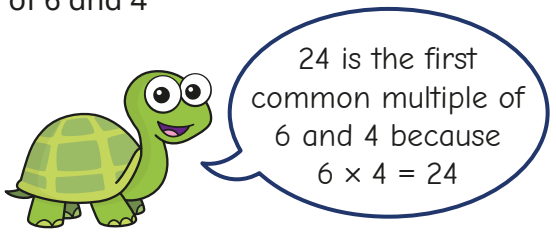
Compare answers with a partner.

multiples of 7,
multiples of 2 or 4

multiple possible answers, e.g.

14 84 4

Tiny is finding common multiples of 6 and 4



Is Tiny correct?

Explain your answer.

No

Tom is building two towers using different-sized blocks.

- He builds his first tower using 5 cm blocks.
- He builds his second tower using 8 cm blocks.

At what heights will the towers be the same size?

40 cm, 80 cm, 120 cm ...

The towers will be the same size when they are a multiple of 40 cm.

Factors

Notes and guidance

In this small step, children explore the relationship between multiplication and division, and consolidate their understanding of the words "factor" and "multiple".

Children should know, for example, that as 5 is a factor of 20, 20 is a multiple of 5. They need to be aware of the special cases such as 1 being a factor of all numbers, and every number being both a multiple and a factor of itself. They should also notice that although factors generally come in pairs, sometimes there is a repeated factor, for example 36 = 6 × 6, and this only needs to be listed once. This will be explored further later in the block.

Year 6 children can extend their knowledge of factors by looking at products of three factors and products including simple multiples of powers of 10. Products using multiples of powers of 10 is looked at in depth in Step 8

Things to look out for

- Children may confuse factors and multiples.
- Children may make errors with times-tables facts.
- Children may omit 1, the number itself or both when listing the factors of a number.

Key questions

- How do you find the factors of a number?
- How can you work in a systematic way to find all the factors?
- Do factors always come in pairs?
- Can a number be both a factor and a multiple of the same number?

Possible sentence stems

- _____ is a factor of _____ because _____ ÷/× _____ = _____
- _____ is a factor of _____ because _____ is in the _____ times-table.

Single age small step links

- Factors (Y5)

- N/A

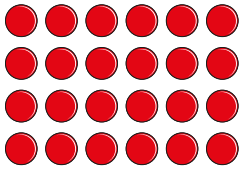
National Curriculum links

- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers (Y5)
- Solve problems involving multiplication and division, including using their knowledge of factors and multiples, squares and cubes (Y5)

Factors

Key learning

- The array shows that 4 and 6 are factors of 24



How many other arrays can you make using 24 counters?

Use your arrays to find all the factors of 24

- Which numbers are factors of 40?

2	80	3	15	4	5	10	400	40

Which factors of 40 are not shown?

- Scott has found the factors of 18

1 × 18	4 × ✗
2 × 9	5 × ✗
3 × 6	

Explain Scott's method to a partner.

How did he know when to stop?

Use Scott's method to find all the factors of 24

90	48	96	65	40	84	600	38

Which of the numbers is 4 a factor of? How do you know?

Which of the numbers is 6 a factor of? How do you know?

- In each pair of numbers, which number has more factors?
  - 100 or 101
  - 48 or 64
- Complete the calculations.
  - 2 × _____ = 12, so 4 × 12 = 4 × 2 × _____
  - 3 × _____ = 12, so 12 × 9 = 3 × _____ × 9
- Esther knows that 4 × 8 = 32, so 4 × 80 = 320

  Use this fact to complete the calculations.
  - _____ × 8 = 320
  - 4 × _____ = 3,200

Factors

Reasoning and problem solving

Are the statements true or false?

3 is a factor of 216, but not a factor of 215

40 is a factor of 150, but not a factor of 160

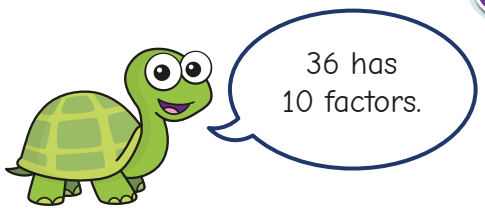
4 is a factor of 92, but not a factor of 93

Explain your answers.

True

False

True



What mistake has Tiny made?

The factors of 36 are: 1, 2, 3, 4, 6, 9, 12, 18, 36

Tiny has counted 6 twice, because $6 \times 6 = 36$

Is Mo correct?

Explain your answer.

Can you replace 20 with another number?

Yes

1, 2, 4, 5, 10, 25, 50

Are the statements always true, sometimes true or never true?

An even number has an even number of factors.

An odd number has an odd number of factors.

Explain your answers.

sometimes true

sometimes true

Common factors

Notes and guidance

In this small step, children learn that common factors are factors that are shared by two or more numbers. This is the first time that Year 5 children explore common factors.

Encourage children to work systematically to find lists of factors before comparing lists to find common factors. They should realise that 1 is a common factor of any set of numbers and that one of the numbers themselves could also sometimes be a common factor. For example, a common factor of 3 and 15 is 3

Arrays and other representations, including sorting diagrams for recording results, can be used as support. Children should use their times-tables knowledge to recognise factors of a number. Year 6 children should also be able to recognise factors using the rules of divisibility.

Children are not required to formally identify the highest common factor of two or more numbers, but Year 6 children can be challenged to consider this idea, if appropriate.

Things to look out for

- Children may omit 1 and the number itself when listing factors, leading to an incorrect conclusion that a pair of numbers does not have a common factor.

Key questions

- What are the factors of _____?
- Which are the common factors of _____ and _____?
- How can you easily tell if 2/5/10 is a factor of a number?
- Is 1 a factor of all numbers?

Possible sentence stems

- _____ is a factor of _____ and a factor of _____, so _____ is a common factor of _____ and _____

Single age small step links

- Common factors (Y5)
- Common factors (Y6)

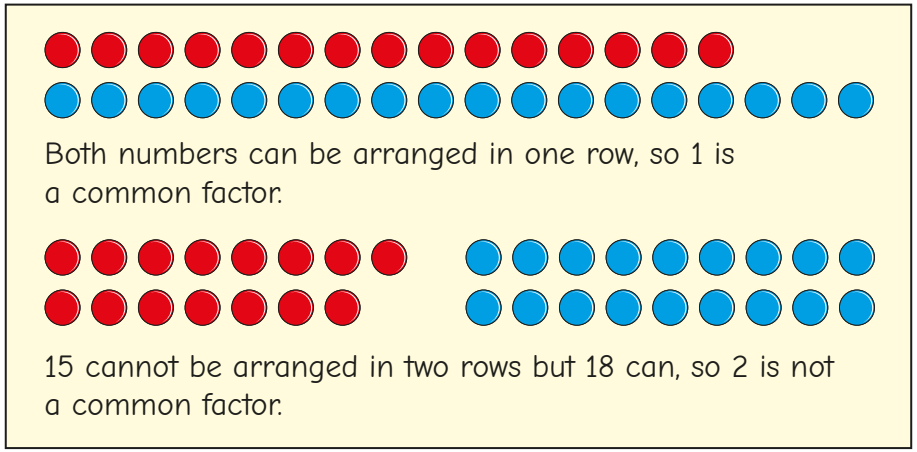
National Curriculum links

- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers (Y5)
- Solve problems involving multiplication and division, including using their knowledge of factors and multiples, squares and cubes (Y5)
- Identify common factors, common multiples and prime numbers (Y6)

Common factors

Key learning

- Aisha is using arrays to find the common factors of 15 and 18



  Working systematically, continue Aisha's method until you find all the common factors of 15 and 18

- List all the factors of 12

  List all the factors of 20

  What are the common factors of 12 and 20?

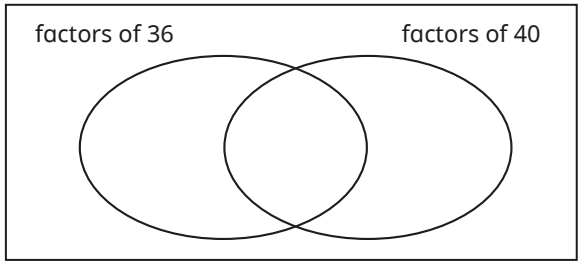
  How many common factors do 12 and 20 have?

- Find the common factors of each pair of numbers.

24 and 40	18 and 45	20 and 45

- Write the numbers in the sorting diagram.

1	2	4	6	8	12	18	36



  What other numbers can you add to the diagram?

  What are the common factors of 36 and 40?

- Use a sorting diagram to find the common factors of 12 and 30

- Here is a table for sorting numbers.

  Write one number in each box.

	Factor of 28	Not a factor of 28
Factor of 12		
Not a factor of 12		

  What are the common factors of 12 and 28?

Common factors

Reasoning and problem solving

Are the statements always true, sometimes true or never true?

0 is a factor of every number.

2 is a factor of every even number.

2 **and** 5 can be common factors of a number.

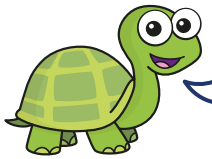
Explain your answers.

never true

always true

sometimes true

Tiny is thinking of two numbers.



The common factors of my numbers are 1, 2, 7 and 14

What could Tiny's numbers be?

Explain your answers.

multiple possible answers, e.g.

14 and 28

14 and 42

28 and 42

A fruit stall has 60 apples and 84 oranges.

The pieces of fruit are put into boxes with an equal number of apples or oranges in each box.

Dexter

There can be 6 pieces of fruit in each box.

There can be 4 pieces of fruit in each box.

Sam

Who is correct?

Explain how you know.

Both are correct.

Rules of divisibility

Notes and guidance

In this small step, children extend their knowledge of rules of divisibility. Children should already be familiar with some rules of divisibility from looking at patterns in times-tables.

Children establish that a number is divisible by: 2, 5 or 10 from looking at the ones digits of a number; 4 if halving the number gives an even result, or by 8 if halving and halving again gives an even result; 3 if the digit sum is divisible by 3, and 9 if the digit sum is divisible by 9

Children can combine these rules to deal with other potential factors, for example to be divisible by 6, a number must be divisible by both 2 and 3. As Year 6 children will be familiar with rules of divisibility, they should spend more time focusing on using factor pairs to find the divisibility of a number.

Things to look out for

- Children may over-generalise rules, for example applying the digit-sum rule for 3 and 9 or the final-digit rule for 5 to other numbers.
- Children may need support to understand the combining of rules such as "A number is divisible by 12 if it is divisible by both 3 and 4".

Key questions

- How does the ones digit help you to decide if a number is divisible by 2, 5 or 10?
- If a number is divisible by 6/12, what two other numbers must the number be divisible by?
- Which divisibility rules are based on the sum of the digits of a number?

Possible sentence stems

- The number is divisible by _____ because ...
- If a number is divisible by _____ and _____, then the number must also be divisible by _____

Single age small step links

- N/A

- Rules of divisibility (Y6)

National Curriculum links

- Solve problems involving addition, subtraction, multiplication and division (Y6)

Rules of divisibility

Key learning

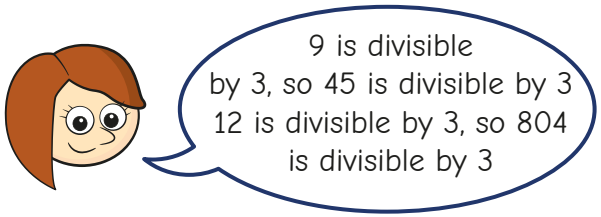
- Which of the numbers are divisible by 2?

52	401	2,223	5,434

Which of the numbers are also divisible by 4? How can you tell?

- Rosie is using digit sums to decide if 45 and 804 are divisible by 3

4 + 5 = 9 8 + 0 + 4 = 12



Use Rosie's method to decide which of these numbers are divisible by 3

102	193	354	453	2,709

- Find a number that matches each description.

a 6-digit number that is divisible by 5

a 4-digit number that is divisible by 5 and 3

- A worker is packing pencils into boxes.

He puts an equal number of pencils into each box with no pencils left over.

He has 1,068 pencils to pack.

How many pencils can go in each box?

- Use ticks and crosses to complete the table.

	Is the number divisible by ...?				
	3	4	5	6	9
96					
153					
230					
705					

What do you notice?

- The children at a school all have lunch at the same time.

There are 372 children and an equal number of them sit at each table.

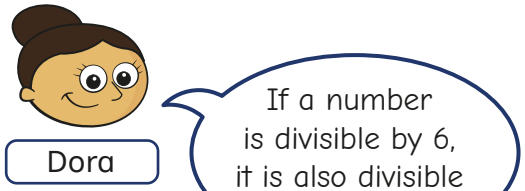
No more than 12 children sit at a table.

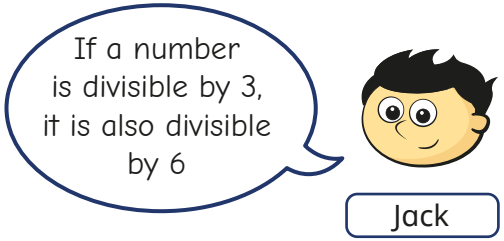
How many tables could there be?

Rules of divisibility

Reasoning and problem solving

Dora and Jack are talking about rules for division.





Who is correct?

Explain your answer.

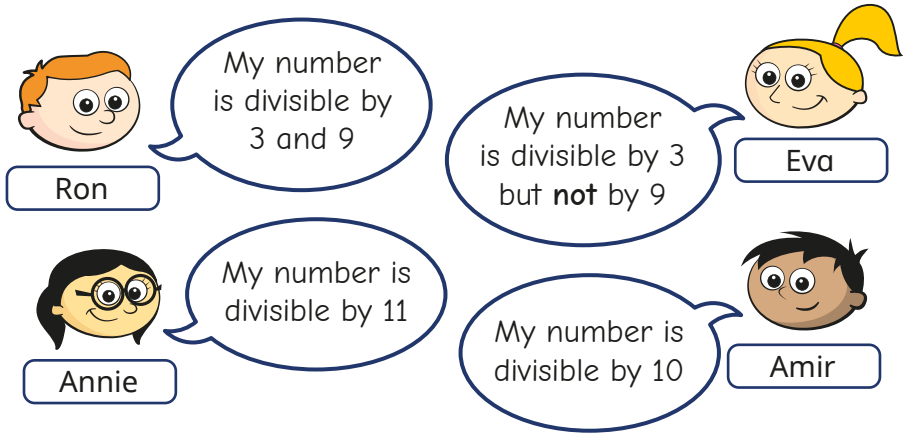
Dora

Here are five number cards.

1,133	1,230	1,268	1,254	1,701

Ron, Eva, Annie and Amir each take one card.

Use the clues to work out which number they each have.



Write a description of divisibility for the remaining number.

Ron: 1,701 Eva: 1,254
Annie: 1,133 Amir: 1,230

1,268 is divisible by 2 and 4

Prime numbers

Notes and guidance

In this small step, children use times-tables facts and the rules of divisibility to identify a prime number as a number that has exactly two factors: 1 and itself. They also learn that numbers with more than two factors are called "composite numbers".

Year 5 children should first focus on recalling prime numbers up to 19 and begin to understand prime factors of numbers, before looking at prime numbers to 100. Year 6 children need to be able to identify all prime numbers less than 100 and have a deeper understanding of prime factors of numbers.

Establish that 1 is a special case, as it is neither prime nor composite, because it has exactly one factor.

Things to look out for

- Children may think that 1 is a prime number.
- Children may think that all prime numbers are odd and not realise that 2 is a prime number.

Key questions

- How many factors does a prime number have?
- How can you find the prime factors of a number?
- Why is 1 not a prime number?

Possible sentence stems

- The only factors of _____ are _____ and _____, so _____ is prime.
- The prime factors of _____ are _____

Single age small step links

- Prime numbers (Y5)
- Primes to 100 (Y6)

National Curriculum links

- Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers (Y5)
- Establish whether a number up to 100 is prime and recall prime numbers up to 19 (Y5)
- Identify common factors, common multiples and prime numbers (Y6)

Prime numbers

Key learning

- All of the numbers are prime numbers.

2	7	11	17

Use counters to find the factors of each number.

What do you notice?

- A prime number has exactly two factors: 1 and itself.

A composite number has more than two factors.

Which of the numbers are prime and which are composite?

6	17	15	19	29	40	41

- List the numbers from 10 to 30

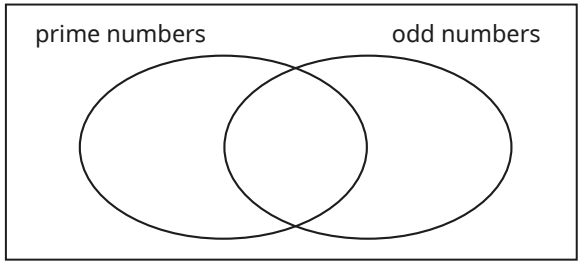
Which of the numbers are prime?

Which of the numbers are composite?

How do you know?

- Write the numbers in the sorting diagram.

2 10 17 27 37 47



- List the factors of 30

Which factors of 30 are prime?

- The sum of two prime numbers is 48

What might the numbers be?

How many different answers can you find?

- Find the prime factors of the numbers.

30	36	50	56	60

Prime numbers

Reasoning and problem solving

Decide whether each statement is true or false.

All prime numbers are odd.

There are three prime numbers with 9 as the tens digit.

The first prime number is 1

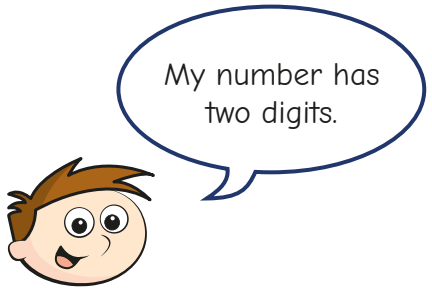
Talk about your answers with a partner.

False

False

False

Teddy is thinking of a number.



Use the clues to work out Teddy's number.

- It is a prime number.
- The sum of the digits is 5
- The difference between the digits is 3

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Square and cube numbers

Notes and guidance

In this small step, children learn that when they multiply a whole number by itself once, the result is a square number, and when they multiply a whole number by itself and then by itself again, the result is a cube number.

Year 5 children should first use concrete manipulatives such as cubes and counters to build square and cube numbers. It may be the first time that children in Year 5 have used the notation for squared (^{2}) and cubed (^{3}), so time should be spent to ensure that they do not get confused between the two.

Once children are confident with squares and cubes, they could be challenged to explore the factors of these numbers. They should notice that square numbers always have an odd number of factors, but cube numbers can have an odd or even number of factors.

Reinforce the vocabulary of "factor", "multiple" and "prime".

Things to look out for

- Children may confuse squaring/cubing with multiplying by 2/3
- Children may think that they can find the cube of a number by squaring it and then squaring the result.

Key questions

- How do you write _____ squared/cubed?
- Are the squares of even/odd numbers even or odd?
- Are the cubes of even/odd numbers even or odd?
- How can you use a square number to help find a cube number?

Possible sentence stems

- To square a number, I multiply the number by _____
- To cube a number, I multiply the number by _____ and then by _____ again.

Single age small step links

- Square numbers (Y5)
- Cube numbers (Y5)
- Square and cube numbers (Y6)

National Curriculum links

- Recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3}) (Y5)
- Solve problems involving addition, subtraction, multiplication and division (Y6)

Square and cube numbers

Key learning

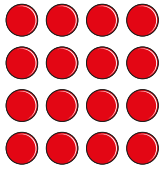
- 4 is a square number, because 4 counters can be arranged to form a square array.

$2 \times 2 = 4$

Use counters to decide if each number is square.

14	25	18	15	6	9	36

- 16 counters can be arranged into a square array with 4 rows and 4 columns.



$4 \times 4 = 16$

How many counters will there be in a square array with 8 rows and 8 columns?

- A square number is found by multiplying a number by itself.

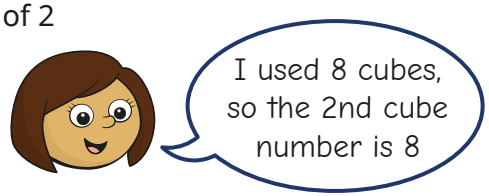
$5^2 = 5 \times 5$ and is said as "5 squared".

What is the value of 5^2?

Work out the values of the square numbers.

2^2	3^2	6^2	12^2	7^2

- Kim has used small cubes to make a cube with a side length of 2



Use cubes to work out the 3rd and 4th cube numbers.

- Write <, > or = to compare the calculations.

4 squared ◯ 3 cubed

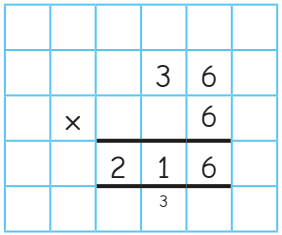
1^2 ◯ 1^3

28 squared ◯ 28 cubed

- Filip is using square numbers to help work out cube numbers.

Here are his workings.

$6^3 = 6 \times 6 \times 6$
$= 36 \times 6$
$= 216$



Use Filip's method to work out 7^3 and 8^3

Square and cube numbers

Reasoning and problem solving

Some square numbers can be written as the sum of two prime numbers.

Here is an example.

5 + 11 = 16

Find some other square numbers that can be written as the sum of two prime numbers.

multiple possible answers, e.g.

2 + 7 = 9

23 + 2 = 25

29 + 7 = 36

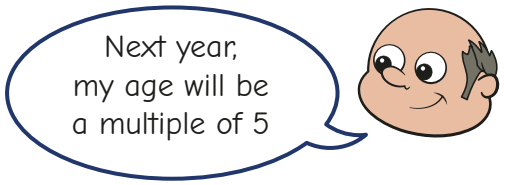
47 + 2 = 49

Is Tommy correct?

Explain your answer.

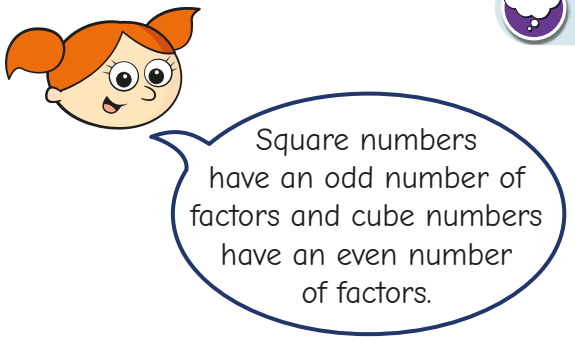
No

Mr Rose's age is a cube number.



How old is Mr Rose?

64 years



Is Alex correct?

Explain your answer.

Alex is correct about square numbers, but cube numbers can have an even or odd number of factors. For example, 8 has 4 factors and 64 has 7 factors.

Multiply by 10, 100 and 1,000

Notes and guidance

In this small step, children consolidate their understanding of multiplying whole numbers by 10 and 100, and move on to multiplying whole numbers by 1,000

Representations such as place value charts and Gattegno charts can be used to support understanding, using children's knowledge of the relationship between digits in rows/columns.

Children need to recognise that the effect of multiplying by 10 twice is the same as multiplying by 100, and that multiplying by 10 three times is the same as multiplying by 1,000. Once this is secure, they can move on to multiplying by multiples of 10, 100 and 1,000. Children can break a calculation down into a series of easier calculations using knowledge of factors. For example, to multiply by 300, 300 = 3 × 100, so multiply by 3 and by 100. They can use the commutative law to know that they can multiply by the factors in either order.

Things to look out for

- Children may move digits in the wrong direction.
- Children may over-generalise and think that multiplying by a power of 10 always results in adding zeros.

Key questions

- In what direction do the digits move when you multiply by 10/100/1,000? How many places do they move?
- When you have an empty place value column, what digit do you use as a placeholder?

Possible sentence stems

- _____ multiplied by 10/100/1,000 is equal to _____
- Multiplying by 100 is the same as multiplying by _____ twice.

Single age small step links

- Multiply by 10, 100 and 1,000 (Y5)
- Multiples of 10, 100 and 1,000 (Y5)

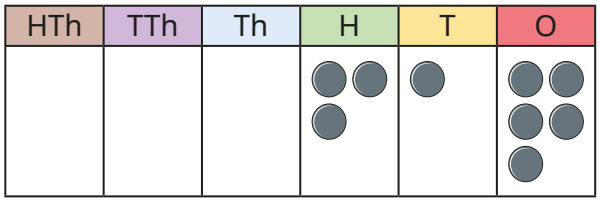
- N/A

National Curriculum links

- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000 (Y5)
- Multiply and divide numbers mentally, drawing upon known facts (Y5)

Multiply by 10, 100 and 1,000

Key learning

- 

  - What number is represented on the place value chart?
  - If you multiply 315 by 10, where do the counters move to?
    What is the result of multiplying 315 by 10?
  - If you multiply by 100, where do the counters move to?
    What is the result of multiplying 315 by 100?
  - If you multiply by 1,000, where do the counters move to?
    What is the result of multiplying 315 by 1,000?

- Use a place value chart to complete the calculations.
  - 273 × 10 = _____
  - _____ = 5,788 × 10
  - 109 × 1,000 = _____
  - 431 × 1,000 = _____

- Work out the multiplications.

10 × 45	100 × 45	1,000 × 45

What is the same and what is different?

- Work out the multiplications.
  - 17 × 10 = _____
    17 × 100 = _____
    17 × 1,000 = _____
  - 107 × 10 = _____
    107 × 100 = _____
    107 × 1,000 = _____

What do you notice?

- Here are two methods to work out 13 × 20

Method 1

13 × 10 × 2
= 130 × 2
= 260

Method 2

13 × 2 × 10
= 26 × 10
= 260

What is the same and what is different?
Work out the multiplications.

11 × 40	32 × 30	12 × 300	14 × 2,000

- Tom has 9 boxes of 20 pencils.
  Whitney has 2 boxes of 90 pencils.
  How many pencils do they each have?
  What do you notice? Why does this happen?

Multiply by 10, 100 and 1,000

Reasoning and problem solving

100,000	200,000	300,000	400,000	500,000	600,000	700,000	800,000	900,000
10,000	20,000	30,000	40,000	50,000	60,000	70,000	80,000	90,000
1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9

Show 890,000 on the Gattegno chart.

Use the chart to work out the missing numbers.

890,000 = _____ × 10

890,000 = _____ × 100

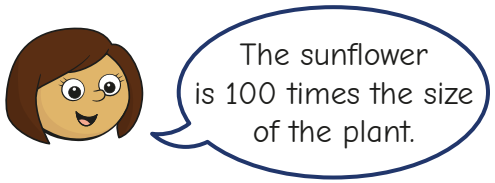
890,000 = _____ × 1,000

counters on 800,000 and 90,000

89,000 8,900 890

A sunflower has a height of 3,020 mm.

A plant has a height of 32 mm.

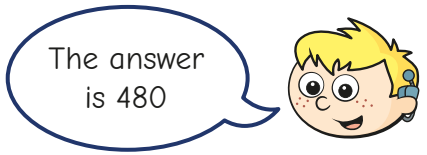


Is Kim correct?

Explain your answer.

No

Max is using the fact that $8 \times 6 = 48$ to work out 600×8



What mistake has Max made?

What is the correct answer?

Max has multiplied 48 by 10 instead of by 100

4,800

Divide by 10, 100 and 1,000

Notes and guidance

In this small step, children consolidate their understanding of dividing whole numbers by 10 and 100, and move on to dividing whole numbers by 1,000, all with integer answers.

As with multiplying, place value charts and Gattegno charts can be used to support understanding of dividing.

Children need to recognise that the effect of dividing by 10 twice is the same as dividing by 100, and that dividing by 10 three times is the same as dividing by 1,000. They should be comfortable with the language of "one-tenth/one-hundredth/one-thousandth the size of". They can then divide by multiples of 10, 100 and 1,000, working out related divisions using knowledge of factors and multiples of powers of 10

Children should be aware that multiplication and division are inverse operations and make links between this and the previous step.

Division with decimal answers is covered in the Spring term.

Things to look out for

- Children may make errors with zeros used as placeholders and with the number of zeros at the end of a number.

Key questions

- What direction do the digits move when you divide by 10/100/1,000? How many places do they move?
- How is dividing by 10/100/1,000 linked to multiplying by 10/100/1,000?

Possible sentence stems

- _____ divided by 10/100/1,000 is equal to _____
- _____ is one-tenth/one-hundredth/one-thousandth the size of _____

Single age small step links

- Divide by 10, 100 and 1,000 (Y5)
- Multiples of 10, 100 and 1,000 (Y5)

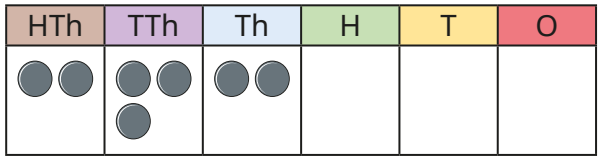
- N/A

National Curriculum links

- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000 (Y5)
- Multiply and divide numbers mentally, drawing upon known facts (Y5)

Divide by 10, 100 and 1,000

Key learning

- 

  - What number is represented on the place value chart?
  - If you divide the number by 10, where do the counters move to?
    What is the result of dividing the number by 10?
  - If you divide by 100, where do the counters move to?
    What is the result of dividing the number by 100?
  - If you divide by 1,000, where do the counters move to?
    What is the result of dividing the number by 1,000?

- Use a place value chart or a Gattegno chart to work out the divisions.

530 ÷ 10	4,800 ÷ 100	75,000 ÷ 1,000

- Divide each number by 10, 100 and 1,000

95,000	210,000	673,000

- Work out 36,000 ÷ 10 ÷ 10

  How else could you write this calculation?

  How else could you write 36,000 ÷ 10 ÷ 10 ÷ 10?

- Work out the divisions.
  - 801,000 ÷ 10 = _____

    801,000 ÷ 100 = _____

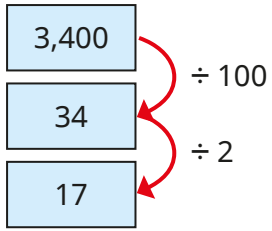
    801,000 ÷ 1,000 = _____

HTh	TTh	Th	H	T	O
8	0	1	0	0	0

- Fill in the missing numbers.
  - 240,000 ÷ _____ = 240
  - _____ ÷ 100 = 307
  - 59,000 ÷ _____ = 5,900
  - _____ ÷ 1,000 = 76
  - _____ ÷ 10 = 91,200
  - 800 ÷ _____ = 8

- The diagram shows that 3,400 ÷ 200 = 17

  Use a similar strategy to work out the divisions.
  - 1,600 ÷ 40
  - 1,600 ÷ 400
  - 12,000 ÷ 30
  - 12,000 ÷ 300



Divide by 10, 100 and 1,000

Reasoning and problem solving

Is the statement always true, sometimes true or never true?

> Dividing by 1,000 is the same as dividing by 10 three times.

Explain your answer.

always true

Scott has 80 lolly sticks.

Nijah has 100 times as many lolly sticks as Scott.

Mo has one-tenth of the number of lolly sticks that Nijah has.

How many lolly sticks do Scott, Nijah and Mo have altogether?

8,880

Complete the calculations.

_____ × 1,000 = 837,000

_____ × 100 = 8,703,000

_____ ÷ 1,000 = 8,307

_____ ÷ 100 = 8,378

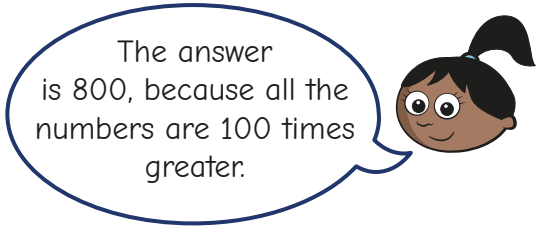
837

87,030

8,307,000

837,800

Sam is using the fact that $8 \times 6 = 48$ to work out $4{,}800 \div 600$



Is Sam correct?

Explain your answer.

No