








Multiplication and Division: Prime Numbers

Aim: Establish whether a number up to 100 is prime and recall prime numbers up to 19. To know if a number up to 100 is prime and recall prime numbers up to 19.	Success Criteria: I can create arrays to prove my answers. I can find factors of numbers. I can explain the differences between prime and composite numbers.	Resources: Lesson Pack Counters or cubes Scissors and glue
	Key/New Words: Prime, composite, factor, product, arrays, multiply	Preparation: Differentiated Prime Numbers Activity Sheet – one per child Diving into Mastery Activity Sheets – as required

Prior Learning: It will be helpful if children are familiar with how to create arrays and how these link to their prior learning of multiplication.

Learning Sequence

	Remember It: Using the corresponding slide on the Lesson Presentation , the children will be reactivating prior learning on arrays and will consider the calculation that could match the image. The children will further explore other ways of building arrays for the number 12 and will list the factors that create this number.				
	Arrays: Using the three corresponding slides of the Lesson Presentation , the children will share their responses to the statement of 'There is only one way to create an array for the number 12.' Can the children understand that 12 can be organised into many array formations? Can the children further share the calculation that can be assigned to each array?				
	What Makes a Number Prime? Using the corresponding slide of the Lesson Presentation , the children will work in pairs to explore making arrays of the numbers listed on the slides. The children will be finding out if it is possible to make complete arrays for each number. They will further consider if there are any numbers where arrays can be built in more than one way. The children will look out for numbers where the array can only be built in one way. Working in pairs, the children will record their answers. The teacher could model on a flipchart how a simple table could be used to sort the numbers, using the headings 'prime' and 'not prime'. Having carried out the exploratory task, children will share their findings. Emphasise that numbers which create only one array of a single line or an incomplete array are prime numbers and have only two factors. Can the children use concrete resources to build arrays correctly for each number and list their factors? Can the children identify when an array is incomplete? Can the children work systematically and organise their findings clearly?				
	What Makes a Number Composite? Use the corresponding slides on the Lesson Presentation to lead a discussion on the differences between prime and composite numbers. It is important that the children grasp that prime numbers have two factors (one and itself) and composite numbers have more than two factors. Use the array images on the slideshow to provide a visual to back these facts up. Can the children distinguish that prime numbers have two factors whereas composite numbers have more than two factors?				
	Reasoning: Use the corresponding slides on the Lesson Presentation , the children will consider the statements provided by the three characters. This provides an opportunity for assessment and allows the common misconception of one being a prime number to be addressed and discussed. Can the children reason that one is neither a prime number nor a composite number, as it has only one factor?				
	Prime Numbers: The children work independently to complete the differentiated Prime Numbers Activity Sheets . <table style="width: 100%; border: none;"> <tr> <td style="width: 33%; border: none;"> Children will sort images of arrays to consolidate understanding on complete and incomplete arrays. They will then draw their own arrays and sort these under the headings 'prime' and 'composite'. </td> <td style="width: 33%; border: none;"> Children will sort numbers into a table under the headings 'prime' and 'composite'. They will draw an array to match each number. Children will answer reasoning questions to deepen their understanding. </td> <td style="width: 33%; border: none;"> Children will spot errors in the work of the child on the activity sheet. The children will complete challenges involving a missing number problem and will establish if statements are 'always true', 'sometimes true' or 'never true'. </td> </tr> </table>	Children will sort images of arrays to consolidate understanding on complete and incomplete arrays. They will then draw their own arrays and sort these under the headings 'prime' and 'composite'.	Children will sort numbers into a table under the headings 'prime' and 'composite'. They will draw an array to match each number. Children will answer reasoning questions to deepen their understanding.	Children will spot errors in the work of the child on the activity sheet. The children will complete challenges involving a missing number problem and will establish if statements are 'always true', 'sometimes true' or 'never true'.	
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	<p>Diving into Mastery: Schools using a mastery approach may prefer to use the following as an alternative activity. These sheets might not necessarily be used in a linear way. Some children might begin at the 'Deeper' section and in fact, others may 'dive straight in' to the 'Deepest' section if they have already mastered the skill and are applying this to show their depth of understanding.</p> <p> Children complete missing number sequences and fix a missing number calculation.</p> <p> Children answer reasoning questions where they consider a statement and provide evidence to back up if they agree or disagree.</p> <p> Children work individually or collaboratively on problem-solving questions related to creating prime numbers and ensuring all possible outcomes have been created.</p>	
	<p>Always, Sometimes or Never? Using the corresponding slide of the Lesson Presentation, the children will discuss the statement 'Prime numbers are odd'. They will decide if this is always, sometimes or never true. Can the children provide reasons for agreeing and disagree and draw on learning from the lesson to back up their answers?</p>	

<p>Exploreit</p> <p>Learnit: Children will find this visually exciting Knowledge Organiser a useful tool to support their understanding of multiplication and division.</p> <p>Captureit: Children can practise building arrays using a wide range of resources in the classroom and at home. You could have them photograph their creations to add to your working wall.</p> <p>Proveit: Children could apply prior learning on factors by creating factor rainbows or factor bugs when exploring prime numbers.</p>

Disclaimer

We hope you find the information on our website and resources useful.

Animations

This resource has been designed with animations to make it as fun and engaging as possible. To view the content in the correct formatting, please view the PowerPoint in 'slide show mode'. This takes you from desktop to presentation mode. If you view the slides out of 'slide show mode', you may find that some of the text and images overlap each other and/or are difficult to read.

To enter slide show mode, go to the **slide show menu tab** and select either **from beginning** or **from current slide**.

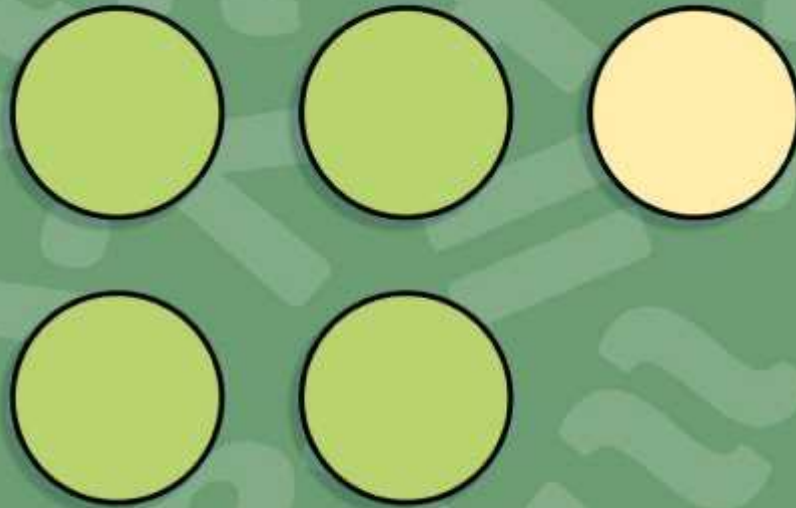
You may wish to delete this slide before beginning the presentation.



Maths

Multiplication and Division

Prime Numbers



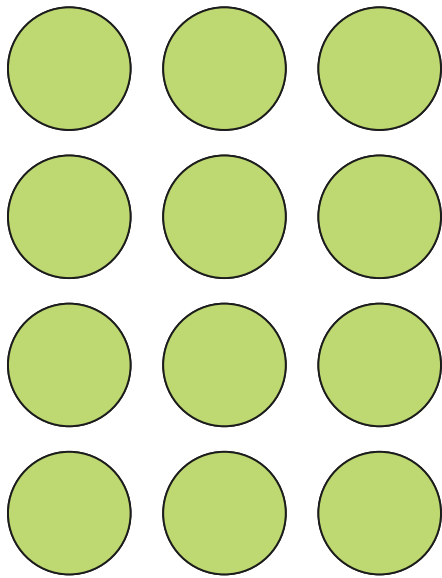
Aim

- To know if a number up to 100 is prime and recall prime numbers up to 19.

Success Criteria

- I can create arrays to prove my answers.
- I can find factors of numbers.
- I can explain the differences between prime and composite numbers.

Remember It



These counters have been arranged into a formation. What do we call this?

It is called an **array**.

Which calculation is this representing?

It is representing 3×4 or 4×3 .
4 and 3 are factors of 12.

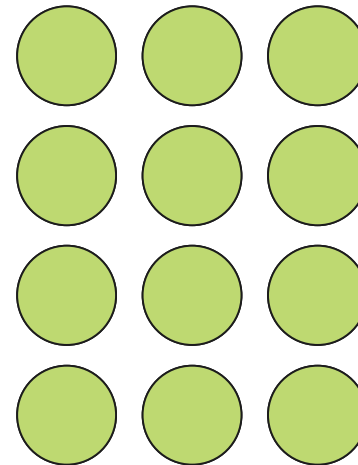
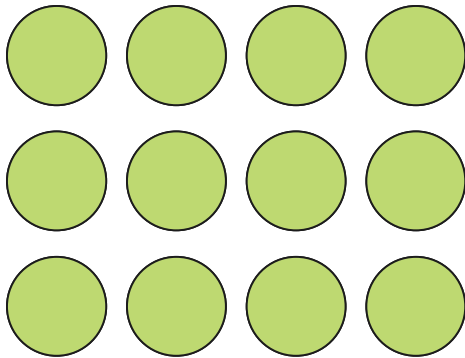
Is there only one way of creating an array for 12?
Are 3 and 4 the only factors for 12?
What other calculations could you write?

Arrays



There is only one way to create an array for the number 12.

Is this true? Discuss with a partner.



$$3 \times 4 = 12$$

or

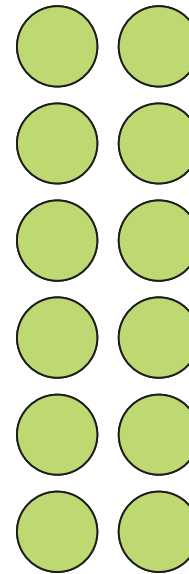
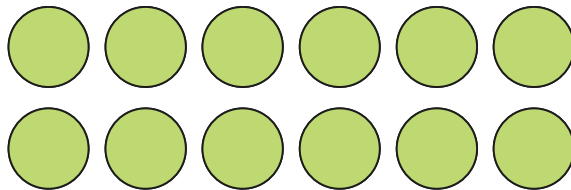
$$4 \times 3 = 12$$

Arrays



There is only one way to create an array for the number 12.

Is this true? Discuss with a partner.



$$2 \times 6 = 12$$

or

$$6 \times 2 = 12$$

Arrays



There is only one way to create an array for the number 12.

Is this true? Discuss with a partner.



$$1 \times 12 = 12$$

or

$$12 \times 1 = 12$$

What Makes a Number Prime?

1×18

2×9

3×6

6×3

9×2

18×1

What Makes a Number Prime?

These numbers
are prime!

Not Prime

6

18

24

You can create arrays for these numbers in **more than one** way. This means that these numbers have **more than two** factors.

Prime

5

7

11

13

You can create arrays for these numbers in **only one** way. This means that these numbers have **only two** factors.

What Makes a Number Prime?

Prime numbers always have **exactly two** factors. These special numbers always have 1 and themselves as a factor!

For example:

5 is a **prime number** as the only factors that create 5 are **1** and **5**. There are no other numbers that can be **multiplied** together to create the **product** of 5.



$$1 \times 5 = 5$$



$$5 \times 1 = 5$$

What Makes a Number Composite?

These numbers
are composite!

Composite

6

18

24

You can create arrays for these numbers in **more than one** way. This means that these numbers have **more than two** factors.

Prime

5

7

11

13

You can create arrays for these numbers in **only one** way. This means that these numbers have **only two** factors.

What Makes a Number Composite?

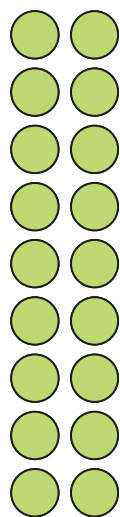
x



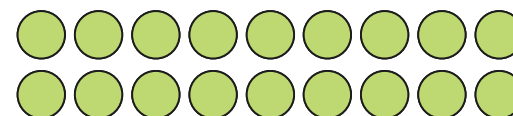
$$18 \times 1 = 18$$



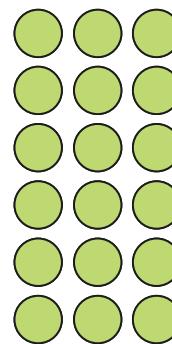
$$1 \times 18 = 18$$



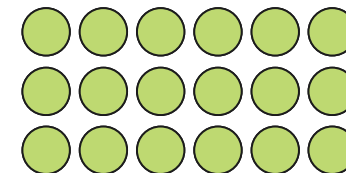
$$9 \times 2 = 18$$



$$2 \times 9 = 18$$



$$6 \times 3 = 18$$



$$3 \times 6 = 18$$

Reasoning

Which statement is correct? Explain your reasoning.



1 is a prime number because it has 1 and itself as factors.



1 is not a prime number so it must be a composite number.



1 is neither a prime nor a composite number as it has only 1 factor.

Reasoning



1 is neither a prime nor a composite number as it has only 1 factor.

1 is different to all other numbers as it is neither a prime number nor a composite number. By building an array, you can prove that it has only 1 factor.



$$1 \times 1 = 1$$

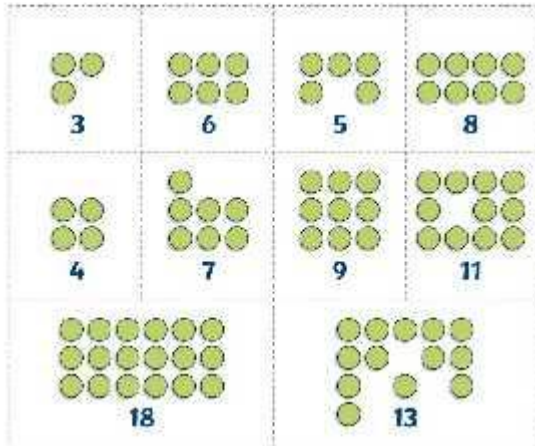
Prime Numbers

Prime Numbers

To know if a number up to 100 is prime or not, make prime numbers cards.

Take out the images of the arrays. Then sort them into the table to show if the arrays represent prime numbers or composite numbers.

Remember: If the array is incomplete, it is a prime number.



Circle your own drawings of arrays for the numbers below and sort them into the table.

2	10	12	14	15	16	17
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Prime Numbers

To know if a number up to 100 is prime or not, make prime numbers cards.

Place correct place in the table to show if the number is prime or composite.

Prime Numbers	Composite Numbers

3	6	19	12
10	13	16	7

Prime Numbers

To know if a number up to 100 is prime or not, make prime numbers cards.

Numbers up to 50 are below. Use the images to show if the number is prime or composite.



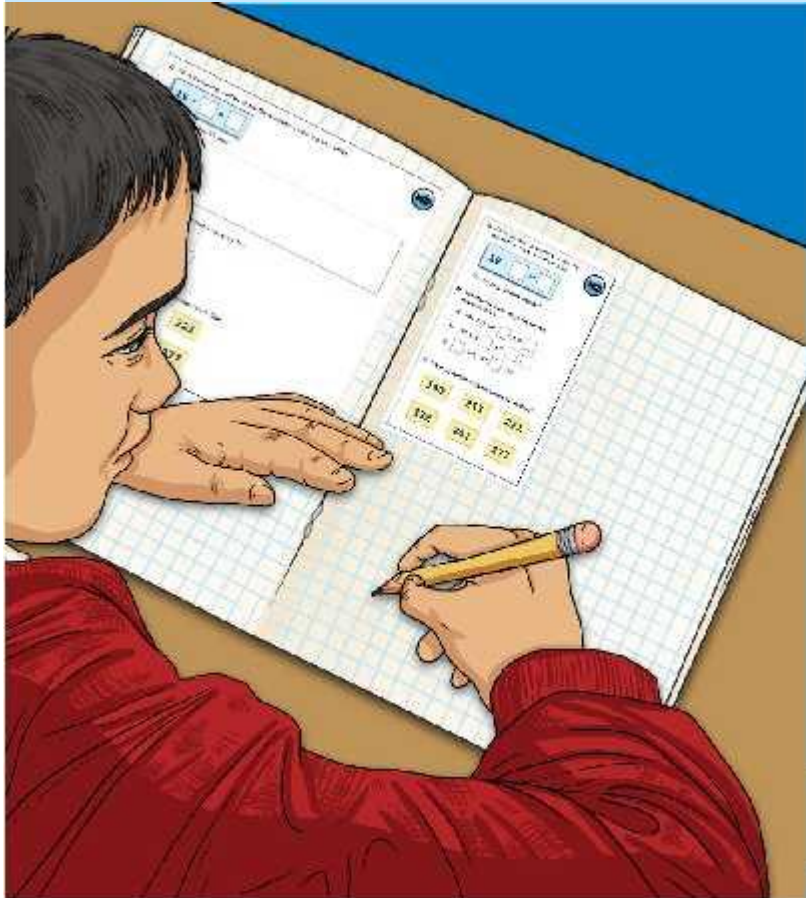
3	4	5	6	7	8	9	10
13	14	15	16	17	18	19	20
23	24	25	26	27	28	29	30
33	34	35	36	37	38	39	40
43	44	45	46	47	48	49	50

How do you know?

Show by drawing a model to show your reasoning.


Diving into Mastery

Dive in by completing your own activity!

A screenshot of a digital math activity interface. At the top, there is a problem: "19 - = ". Below this is a large empty rectangular box for the student's answer. The interface includes several navigation buttons: a blue circular button with a left arrow, a blue circular button with a right arrow, and a blue circular button with a refresh symbol. On the right side, there is a vertical scroll bar and a small circular icon of a person. Below the main problem area, there are several rows of math problems, some with input boxes and some with yellow buttons containing numbers like 160, 213, 221, 132, 241, and 177. At the bottom right, there are two yellow buttons with the numbers 00 and 15.

Always, Sometimes or Never?

Is the following statement **always**, **sometimes** or **never** true?
Prove it!



Prime numbers are odd.

Aim



- To know if a number up to 100 is prime and recall prime numbers up to 19.

Success Criteria

- I can create arrays to prove my answers.
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Aim: To know if a number up to 100 is prime and recall prime numbers up to 19.				Date:					
				Delivered By:			Support:		
Success Criteria	Me	Friend	Teacher	T	PPA	S	I	AL	GP
I can create arrays to prove my answers.				Notes/Evidence					
I can find factors of numbers.									
I can explain the differences between prime and composite numbers.									
Next Steps									
) _____									
) _____									

T	Teacher	I	Independent
PPA	Planning, Preparation and Assessment	AL	Adult Led
S	Supply	GP	Guided Practice

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1) There are 7 possible calculations:

$$19 - 17 = 2$$

$$19 - 16 = 3$$

$$19 - 14 = 5$$

$$19 - 12 = 7$$

$$19 - 8 = 11$$

$$19 - 6 = 13$$

$$19 - 2 = 17$$

2) a) 101, 103, 107, **109**, 113, **127**

b) 139, 149, **151**, 157, **163**, **167**

c) **181**, 191, 193, **197**, 199

3) **160, 221, 132 and 177**

1) Zach is incorrect because 290 is a composite number as it is divisible by ten.

2) Mia is correct. The prime numbers from 100-200 are: 101, 103, 107, 109, 113, 127, 131, 137, 139, 149, 151, 157, 163, 167, 173, 179, 181, 191, 193, 197, 199

3) These numbers are either even or multiples of five. You can quickly spot that they are in either the two or five times tables.



1) a) You can create: 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97

b) Jessica is incorrect. You could use every number card except 0. When 0 is in the ones place, it makes the number a multiple of ten and ten is not a prime number as it has 1, 10, 2 and 5 as its factors.

2) **17, 31, 37, 71, 73, 79 and 97**





1) Fill in the missing numbers so that the calculation creates a prime number.

$$19 - \square = \square$$

Is there only one possible way?

2) Complete the following prime number sequences below.

a) 101, 103, 107, , 113,

b) 139, 149, , 157, ,

c) , 191, 193, , 199

3) Which of the following are composite numbers? Circle them.

160

213

221

132

241

177



1) Zach is reciting some prime numbers beyond 200.



211, 239 and 290 are all prime numbers.

Is Zach correct? Explain your answer.

2) Mia is investigating prime numbers from 100-200.



All prime numbers from 100 to 200 end in either 1,3,7 or 9.

Is Mia correct? Explain your answer.

3) Carla is looking at the numbers below.



I can tell quickly that none of these numbers are prime.

126

2476

8000

384

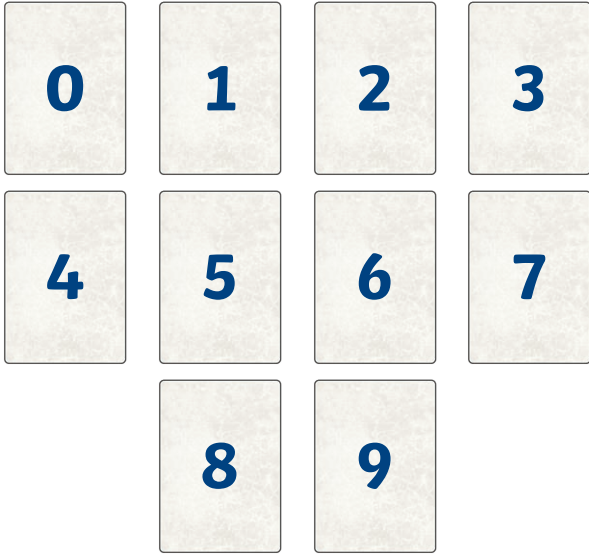
2895

775

How does Carla know that none of the numbers are prime?



- 1) a) Look at the number cards below. How many two-digit prime numbers can you create?
You can use the cards more than once.



- b) Jessica says that it is possible to use all of the number cards.
Is Jessica correct? Prove your answer.



- 2) 13 is a prime number. If you reverse the digits, it becomes 31, which is also a prime number.
How many two-digit prime numbers are there between 10 and 99 which have the same property?

- 1) Fill in the missing numbers so that the calculation creates a prime number.



$$19 - \square = \square$$

Is there only one possible way?

- 2) Complete the following prime number sequences below.

a) 101, 103, 107, , 113,

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c) , 191, 193, , 199

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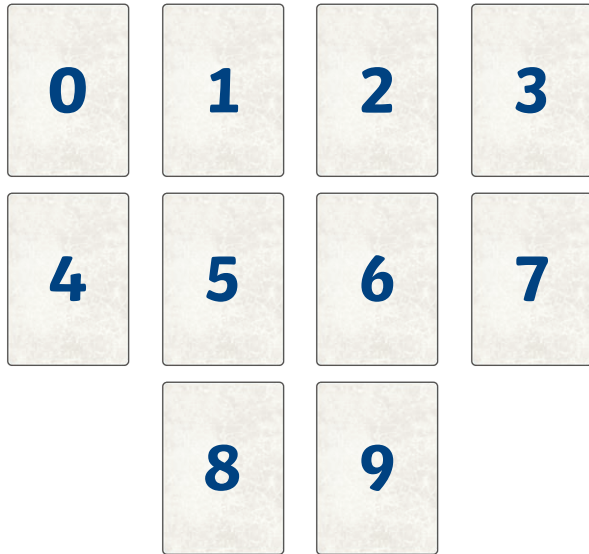
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How does Carla know that none of the numbers are prime?

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How many two-digit prime numbers
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cards more than once.



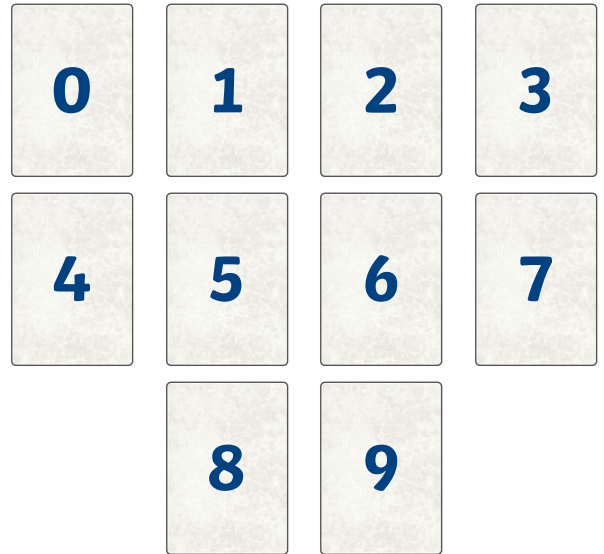
- b) Jessica says that it
is possible to use all
of the number cards.
Is Jessica correct?
Prove your answer.



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How many two-digit prime numbers are there
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Is Jessica correct?
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- 2) 13 is a prime number. If you reverse the digits,
it becomes 31, which is also a prime number.

How many two-digit prime numbers are there
between 10 and 99 which have the same property?

Prime Numbers

To know if a number up to 100 is prime and recall prime numbers up to 19.



Cut out the images of the arrays. Then sort them into the table to show if the arrays represent prime numbers or composite numbers.

Remember: if the array is incomplete, it is a prime number.

 3	 6	 5	 8
 4	 7	 9	 11
 18		 13	

Create your own drawings of arrays for the numbers below and sort them into the table.

2	10	12	14	15	16	17
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Prime Numbers (Incomplete Arrays)	Composite Numbers (Complete Arrays)

Prime Numbers

To know if a number up to 100 is prime and recall prime numbers up to 19.



- 1) Sort the numbers into the correct place on the table.
Draw an array next to each number to prove your answer.

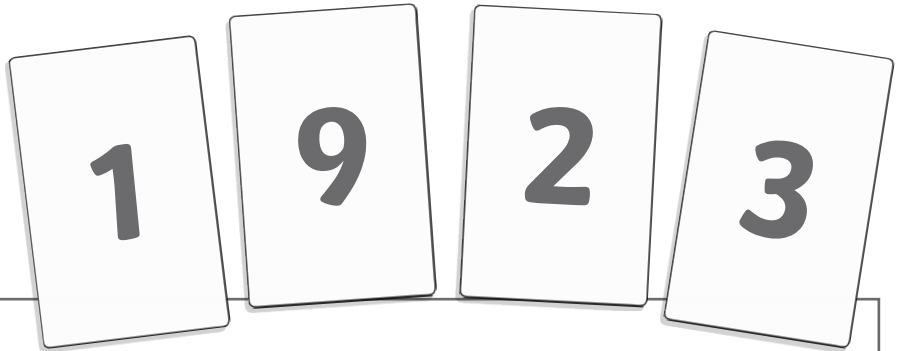
Prime Numbers	Composite Numbers

3	6	19	12
10	13	16	7

2) Write the missing prime numbers in the number sequence.

2, 3, , 7, 11 , 17, , , 27

3) How many prime numbers can you make using the digit cards below?



76 is a prime number because 7 is a prime number.

4) Felix is incorrect. Can you explain why he might believe that 76 is a prime number and explain why he is wrong?

Prime Numbers

To know if a number up to 100 is prime and recall prime numbers up to 19.



- 1) Sam has circled prime numbers up to 50 on the number square below. His teacher says that he has missed some numbers. Circle the prime numbers that Sam has missed.



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

- 2) Is 98 a prime number? How do you know?
Prove your answer below by drawing a model to show your reasoning.

3) The sum of two prime numbers is 32. What are the numbers?

Write the calculation in the box below.

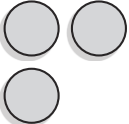
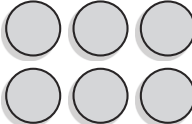
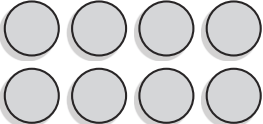
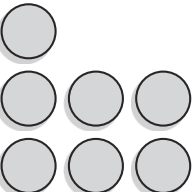
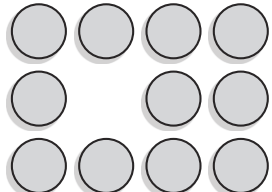
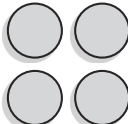
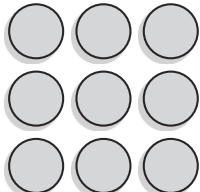
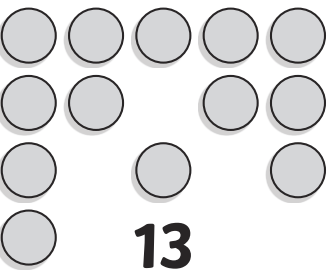
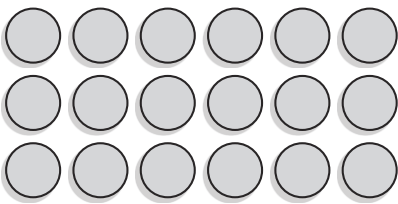
4) Write the three prime numbers which multiply to make 231.

$$\square \times \square \times \square = 231$$

5) Tick each statement according to whether it is always true, sometimes true or never true.

	Always True	Sometimes True	Never True
Prime numbers are odd.			
Prime numbers can have 3 or more factors.			
The sum of 2 prime numbers is always even.			
If you create an array of a prime number, it will be incomplete.			

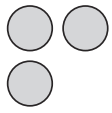
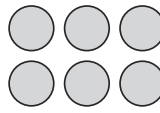
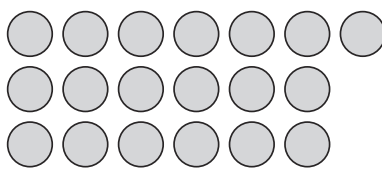
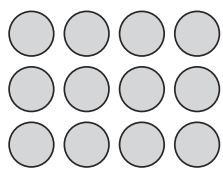
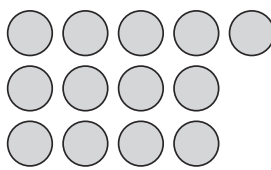
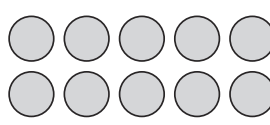
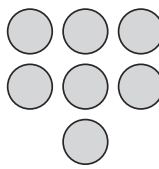
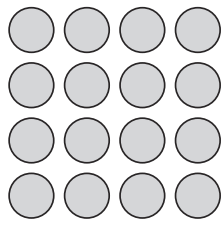
Prime Numbers Answers

Prime Numbers	Composite Numbers
 <p>3</p>	 <p>6</p>  <p>8</p>
 <p>7</p>  <p>11</p>	 <p>4</p>  <p>9</p>
 <p>13</p>	 <p>18</p>
<p>17 - Accept any suitable array.</p>	<p>2 - Accept any suitable array.</p> <p>10 - Accept any suitable array.</p> <p>12 - Accept any suitable array.</p> <p>14 - Accept any suitable array.</p> <p>16 - Accept any suitable array.</p>

Prime Numbers Answers

- 1) Sort the numbers into the correct place on the table.
Draw an array next to each number to prove your answer.

Accept any suitable arrays. For example:

Prime Numbers	Composite Numbers
<p>3</p> 	<p>6</p> 
<p>19</p> 	<p>12</p> 
<p>13</p> 	<p>10</p> 
<p>7</p> 	<p>16</p> 

- 2) Write the missing prime numbers in the number sequence.

2, 3, **5**, 7, 11, **13**, 17, **19**, **23**, 27

- 3) How many prime numbers can you make using the digit cards below?

2, 3, 11, 13, 19, 23, 31

- 4) Felix is incorrect. Can you explain why he might believe that 76 is a prime number and explain why he is wrong?

The child may believe it is a prime number as the tens value is 7 and 7 is a prime number. They have forgotten to take into account the ones value. The ones are even which means that 2 is a factor of 76.

Prime Numbers Answers

- 1) Sam has circled prime numbers up to 50 on the number square below. His teacher says that he has missed some numbers. Circle the prime numbers that Sam has missed.

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

- 2) Is 98 a prime number? How do you know?

Prove your answer below by drawing a model to show your reasoning.

98 is not a prime number as it has more than two factors. Children may make reference to the fact that 98 is a multiple of 2 so that tells us it has more than two factors. Children may draw a model where they list the factors that make 98. The factors of 98 are: 1, 2, 7, 14, 49 and 98.

- 3) The sum of two prime numbers is 32. What are the numbers?

Write the calculation in the box below.

$$13 + 19 = 32 \quad \text{or} \quad 29 + 3 = 32$$

- 4) Write the three prime numbers which multiply to make 231.

$$\boxed{3} \times \boxed{7} \times \boxed{11} = 231$$

5) Tick each statement according to whether it is always true, sometimes true or never true.

	Always True	Sometimes True	Never True
Prime numbers are odd.		✓	
Prime numbers can have 3 or more factors.			✓
The sum of 2 prime numbers is always even.		✓	
If you create an array of a prime number, it will be incomplete.	✓		

Prime Numbers

To know if a number up to 100 is prime and recall prime numbers up to 19.



Cut out the images of the arrays. Then sort them into the table to show if the arrays represent prime numbers or composite numbers.

Remember: if the array is incomplete, it is a prime number.

 3	 6	 5	 8
 4	 7	 9	 11
 18		 13	

Create your own drawings of arrays for the numbers below and sort them into the table.

2	10	12	14	15	16	17
----------	-----------	-----------	-----------	-----------	-----------	-----------

Prime Numbers (Incomplete Arrays)	Composite Numbers (Complete Arrays)

Prime Numbers

To know if a number up to 100 is prime and recall prime numbers up to 19.



- 1) Sort the numbers into the correct place on the table.
Draw an array next to each number to prove your answer.

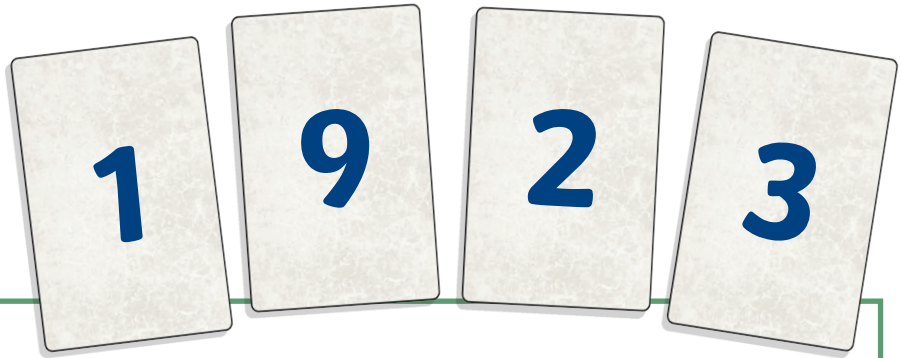
Prime Numbers	Composite Numbers

3	6	19	12
10	13	16	7

2) Write the missing prime numbers in the number sequence.

2, 3, , 7, 11 , 17, , , 27

3) How many prime numbers can you make using the digit cards below?



76 is a prime number because 7 is a prime number.

4) Felix is incorrect. Can you explain why he might believe that 76 is a prime number and explain why he is wrong?

Prime Numbers

To know if a number up to 100 is prime and recall prime numbers up to 19.



- 1) Sam has circled prime numbers up to 50 on the number square below. His teacher says that he has missed some numbers. Circle the prime numbers that Sam has missed.



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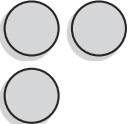
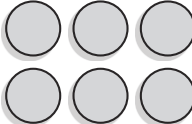
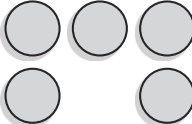
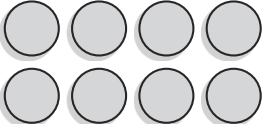
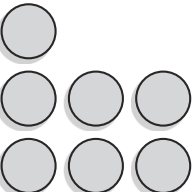
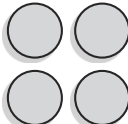
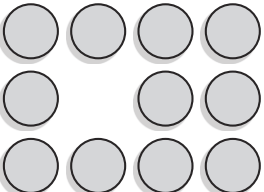
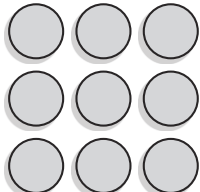
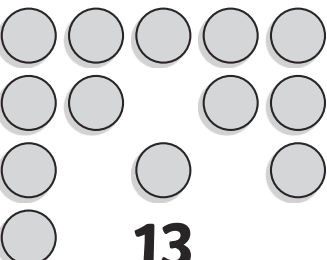
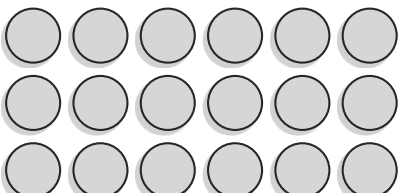
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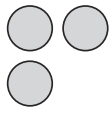
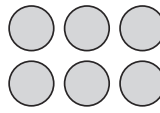
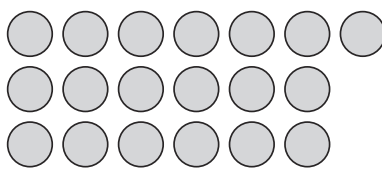
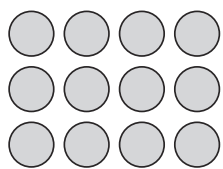
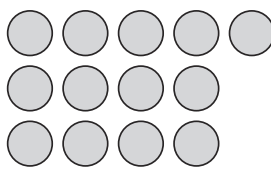
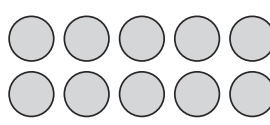
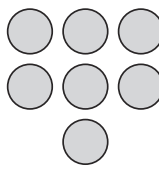
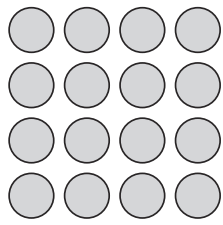
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