Prime and Composite Numbers

You will need
- a 100 chart
- grid paper
- counters

GOAL

Identify prime and composite numbers.

Robin needed batteries for her MP3 player. She noticed that packages of two or more batteries are arranged in arrays.

A two-pack and a three-pack of batteries can be packaged in only one way. So 2 and 3 are both **prime numbers**.

prime number

A whole number that has only two different factors, 1 and itself

composite number

A whole number greater than 1 that has more than two different factors

1 row of 2

AAA Batteries
1.5 V • 2-Batteries • Piles

1 row of 3

AAA Batteries
1.5 V • 3-Batteries • Piles

A four-pack of batteries can be packaged in more than one way. So 4 is a **composite number**.

1 row of 4

AAA Batteries
1.5 V • 4-Batteries • Piles

2 rows of 2

AAA Batteries
1.5 V • 4-Batteries

What other numbers of batteries, from 2 to 50, can be packaged in only one way?

Robin's Chart

I can answer the question by figuring out which numbers from 2 to 50 are prime numbers. I won't use arrays because that would take too long.

I'll use part of a 100 chart.

2 is a prime number, so I'll circle 2 and cross off every second number after 2. Each crossed-off number is even. Each even number has at least 1, 2, and the number itself as factors. So all even numbers greater than 2 are composite numbers.

1	②	3	4̶	5	6̶	7	8̶	9	1̶0̶
11	1̶2̶	13	1̶4̶	15	1̶6̶	17	1̶8̶	19	2̶0̶
21	2̶2̶	23	2̶4̶	25	2̶6̶	27	2̶8̶	29	3̶0̶
31	3̶2̶	33	3̶4̶	35	3̶6̶	37	3̶8̶	39	4̶0̶
41	4̶2̶	43	4̶4̶	45	4̶6̶	47	4̶8̶	49	5̶0̶

A. Continue Robin's work on a 100 chart. Circle 3, and cross off every third number after 3. How do you know that only composite numbers are crossed off when you cross off every third number after 3?

B. How do you know that 5 is the next prime number after 3? Cross off multiples of 5.

C. Circle 7, the next prime number after 5. Which multiple of 7 has not been crossed off yet? Explain why.

D. Continue circling prime numbers and crossing off their multiples. Which numbers from 2 to 50 are prime numbers?

Reflecting

E. Why did you not need to cross off any multiples of 11 or multiples of any prime number greater than 11?

F. How do you know that 1 is not a prime number or a composite number?

Checking

1. What are the prime numbers from 51 to 100? Use your 100 chart. Continue identifying prime numbers and crossing off their multiples to answer this question. Keep the chart for other questions.

Practising

2. Identify the factors of each number. Is the number prime or composite?
   a) 15
   b) 35
   c) 19
   d) 38
   e) 23
   f) 97

3. a) Show three ways to write 0 as a product of two whole numbers. How does this show why 0 would not be considered a prime number?
   b) Choose three composite numbers between 2 and 50. Show that you can write each as a product of two factors, without using the composite you began with.
   c) Try to write 0 as a product of two factors, neither of which is 0. How does this show why 0 would not be considered a composite number?

4. Suppose you want to arrange the candles on a birthday cake in an array to show your age each year from now until age 18.
   a) For what ages can the candles be arranged in only one array? Show your work.
   b) How does knowing how to identify prime and composite numbers help you answer part a)?

5. Decide whether each statement is true or false. Explain how you know.
   a) No two-digit prime number has a ones digit of 5.
   b) When you multiply two prime numbers, the product is a composite number.

6. How can you use an array of counters to identify whether a number of counters is prime or composite? Use a prime number and a composite number to explain.