Calculator Power

You need: a calculator (not a scientific one), a classmate

ACTIVITY

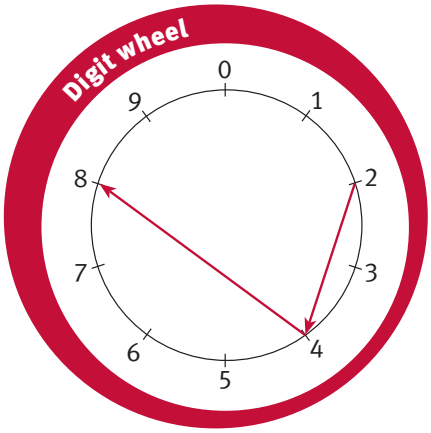
2^6 is 2 x 2 x 2 x 2 x 2 x 2 = 64.
On some calculators, you can find this by pressing these keys:

(If this doesn't work on your calculator, try  .)

1. a. Record the starting number (2) and the number showing in the calculator window each time  is pressed.

b. Look at the ones digits of the numbers you have recorded. What pattern do they make?

c. Show the pattern of the ones digits on a wheel like this:



2. a. Use the pattern to predict the ones-digits of the following powers of 2. Check your prediction on your calculator. Discuss your reasoning with a classmate.
i. 2^9 **ii.** 2^{15} **iii.** 2^{20}

b. What would the ones digit of 2^{100} be? Explain your answer.

3. $2^{10} = 1\,024$. Will 2^{20} be more or less than 2 048? Why?

INVESTIGATION

Use your calculator to investigate the ones-digit pattern for:

a. Powers of 3, for example, 3^1, 3^2, 3^3, 3^4, ...

b. Powers of 5, for example, 5^1, 5^2, 5^3, 5^4, ...
and powers of 6, for example, 6^1, 6^2, 6^3, 6^4, ...
Why are these two patterns so boring?

c. Powers of 7, for example, 7^1, 7^2, 7^3, 7^4, ...

d. Powers of 8, for example, 8^1, 8^2, 8^3, 8^4, ...