# Squares and primes

## Learn and revise

Make sure you know what **square numbers** and **prime numbers** are.

### Square numbers

The numbers 1, 4, 9 and 16 are examples of **square numbers**. Square numbers are found when two identical whole numbers are multiplied together, e.g.

3 squared = 9

4 squared = 16

$3^2 = 9$

$4^2 = 16$

### Prime numbers

If a number only has two factors, itself and 1, then it is a **prime number**. For example, 17 is a prime number because it can only be divided exactly by 1 and 17.

The number 1 is not a prime number because it only has one factor – itself.

## Practice activities

1. Answer these.

   **a)** $3 \times 3 = 3^2 =$ _____

   **b)** $10 \times 10 = 10^2 =$ _____

   **c)** $4 \times 4 = 4^2 =$ _____

   **d)** $6 \times 6 = 6^2$ $=$ _____

   **e)** $2^2$ $=$ _____

   **f)** $12^2$ $=$ _____

   **g)** $5^2$ $=$ _____

   **h)** $7^2$ $=$ _____

   **i)** $8^2$ $=$ _____

   **j)** $1^2$ $=$ _____

   **k)** $9^2$ $=$ _____

   **l)** $11^2$ $=$ _____

2. Investigate the number of factors for each of the square numbers in practice activity 1.

   Complete this sentence:

   Square numbers always have an _____ number of factors.

**3.** Eratosthenes was a Greek mathematician who lived from 275 BC to 195 BC. He discovered a method of finding prime numbers of less than 100.

To use his method, follow the stages under the grid below:

| 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 |

**a)** On this number grid, cross out numbers using different colours:

- Cross out 1.
- Cross out all the multiples of 2, but not 2.
- Cross out all the multiples of 3, but not 3.
- Cross out all the multiples of 5, but not 5.
- Cross out all the multiples of 7, but not 7.

**b)** Write down all the numbers that you have not crossed out. If you have done it correctly, this will be a list of all the prime numbers to 100.

_____

_____

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**c)** What do you notice about the factors of each of the numbers you have listed in part **b)**?

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