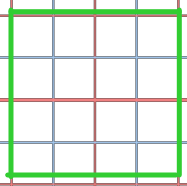
# Square Numbers

In your book draw some squares.

Count how many squares inside them and write it next to the square.



**The square numbers are:**

# The Square Numbers:

$1^2 = 1 \times 1 = 1$ $5^2 = 25$ $9^2 = 81$

$2^2 = 2 \times 2 = 4$ $6^2 = 36$ $10^2 = 100$

$3^2 = 3 \times 3 = 9$ $7^2 = 49$ $11^2 = 121$

$4^2 = 4 \times 4 = 16$ $8^2 = 64$ $12^2 = 144$

**Find the square numbers up to $20^2$ using your calculator.**

$13^2 = 169$ $16^2$ $19^2$

$14^2 = 196$ $17^2$ $20^2$

$15^2 = 225$ $18^2$

(level 5)

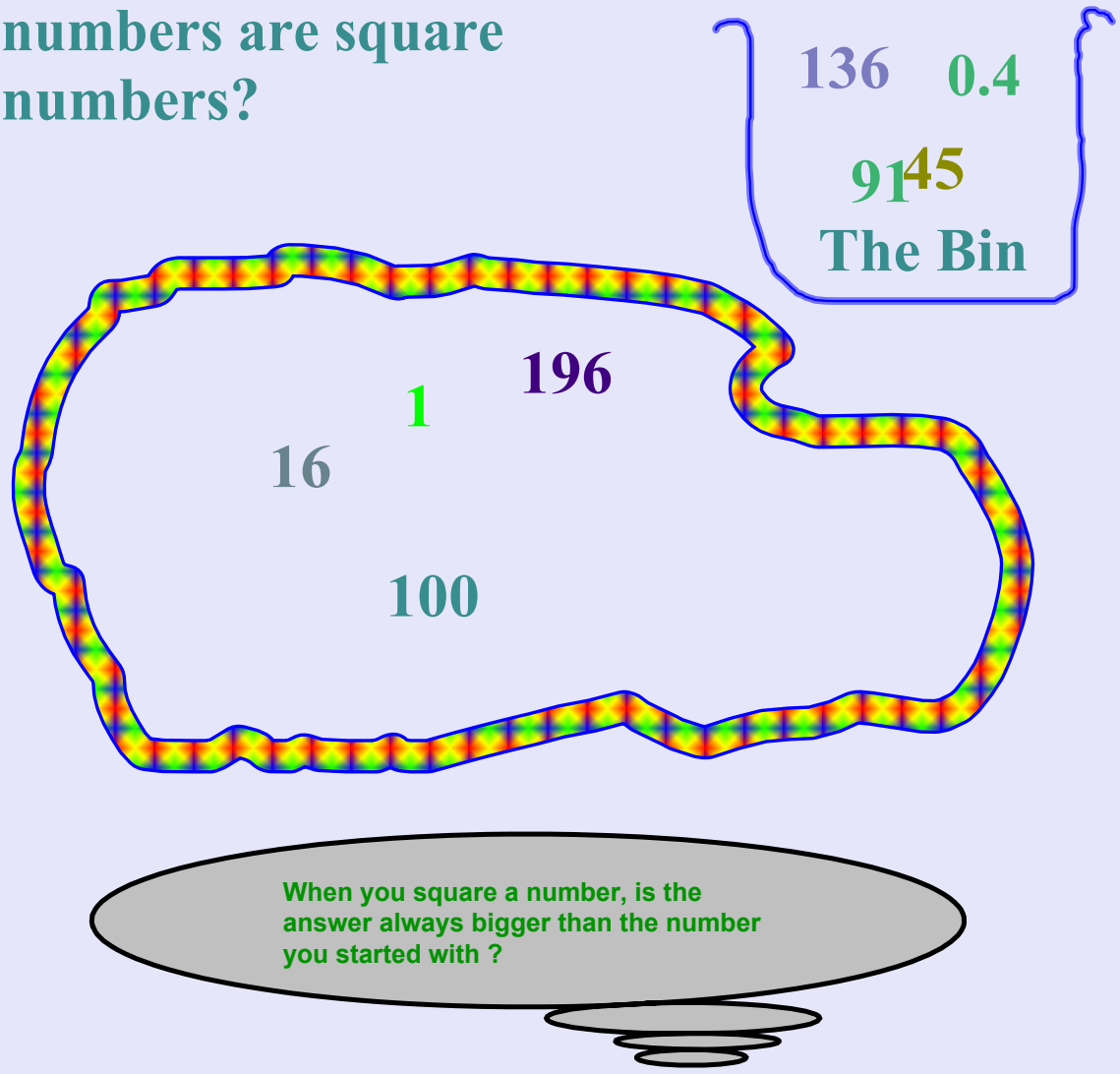
tic tac toe

# starter

tic tac toe for square numbers

# Square numbers

Which of these numbers are square numbers?




When you square a number, is the answer always bigger than the number you started with ?

## Square Roots

**The opposite of a square is a square root.**
**For example**

$\sqrt{36} = 6$ $\sqrt{9} = 3$

$\sqrt{121} = 11$ $\sqrt{81} = 9$

$\sqrt{1} = 1$ $\sqrt{196} = 14$

Set your neighbour 5 square roots to find.

**Your calculator has a square root key.**
**Use it to find:**

$\sqrt{400} = 20$ $\sqrt{1849} = 43$

$\sqrt{900} = 30$ $\sqrt{1089} = 33.$

game

$\sqrt{10201} = 101$

$432^2 = 186\,624$

# Cubes and cube roots

Build cubes:

1x1x1 $1^3$ = 1 cube

2x2x2 $2^3$ = 8 cubes

3x3x3 $3^3$ = 27 cubes

4x4x4 $4^3$ = 64 cubes

5x5x5 $5^3$ = 125 cubes

Work out how many cubes you need for each cube.

6x6x6 216 cubes

4 is the cube root of 64 $\sqrt[3]{64}$

$1^3$ =

$2^3$ =

$3^3$ =

$4^3$ =

$5^3$ =

Using a calculator work out:

$7^3$ = $12.2^3$ = $0.9^3$ =

$\sqrt[3]{64}$ =

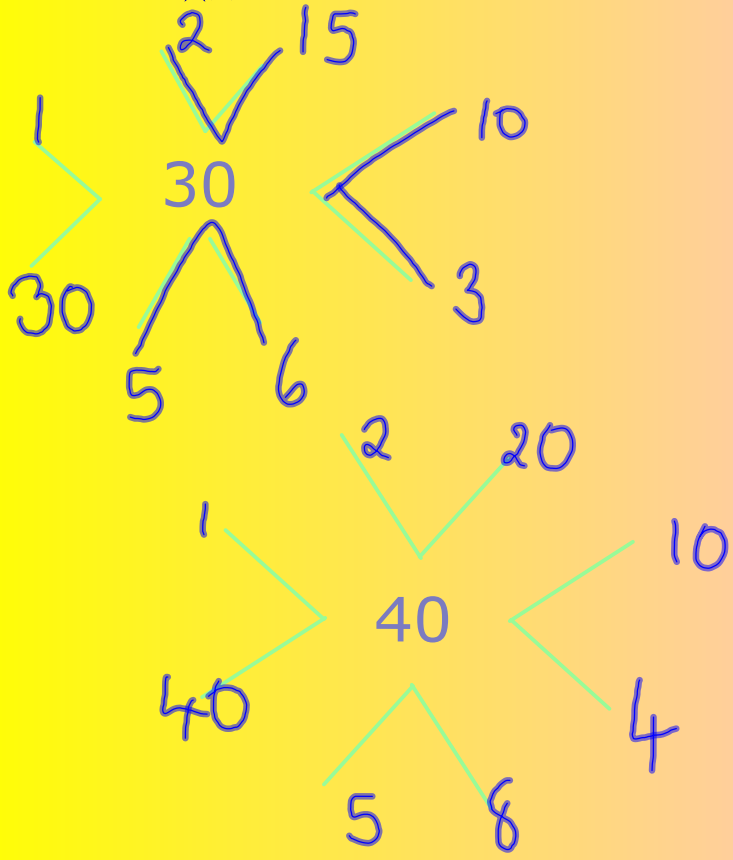
$\sqrt[3]{27}$= $\sqrt[3]{1000}$=

$\sqrt[3]{125}$= $\sqrt[3]{9.261}$=

cubes and roots crossnumber

# Factors

Factors are numbers that go into another number.
They come in pairs!




What are the factors of:

8 1, 8, 2, 4

12 6, 2, 1, 12, 3, 4

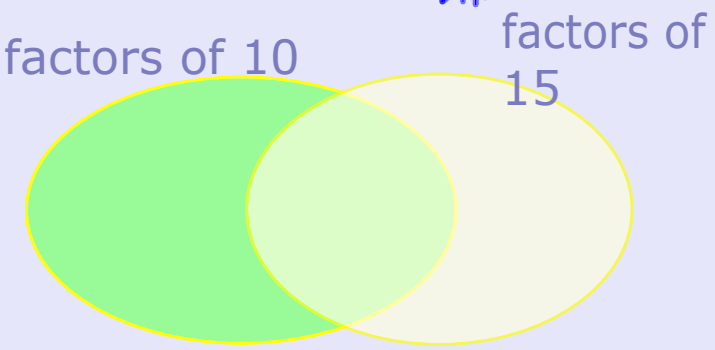
15 1, 15, 3, 5

16 8, 2, 1, 16, 4

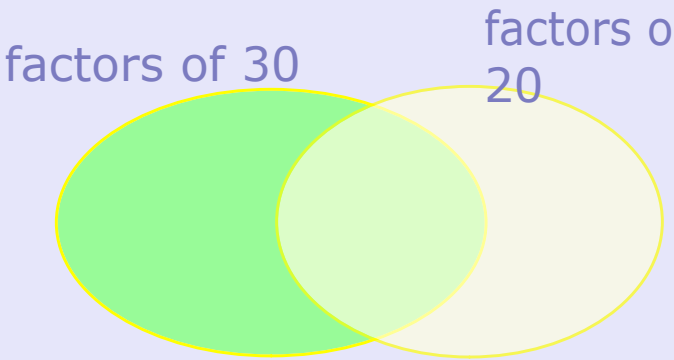
# Common factors



Amber




**HCF of 10 and 15**




**HCF of 20 and 30**

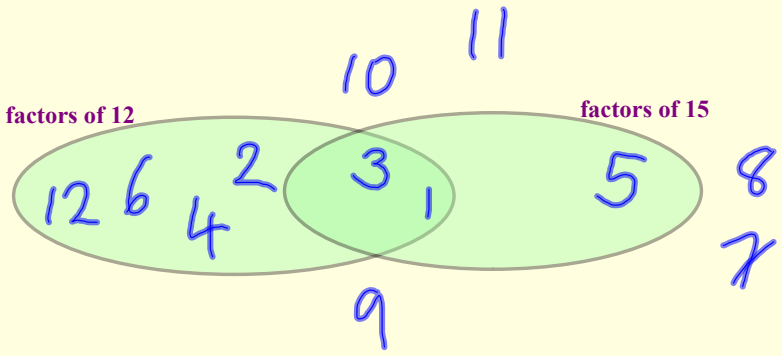
# Factors

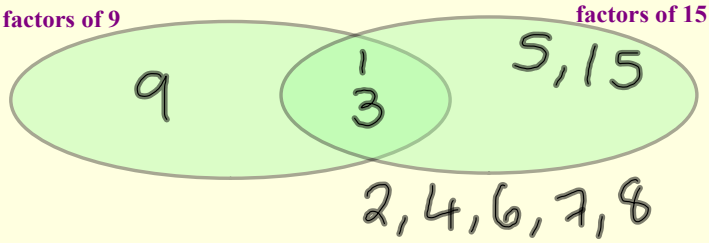
**Complete the factor pairs:**

**60** 3, 20 **50** 2, 25

**40** 4, 10 **16** 4, 4

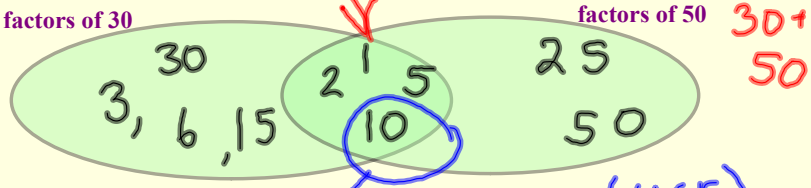
**19** 1, 19 **35** 7, 5



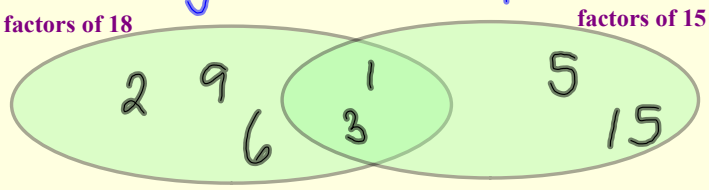




2, 4, 6, 7, 8

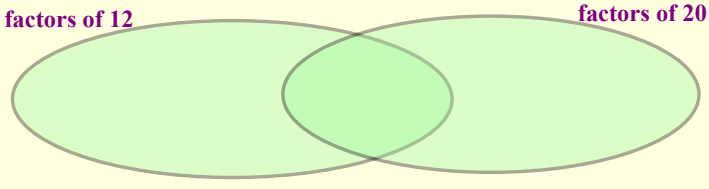
These are the common factors of 30 + 50

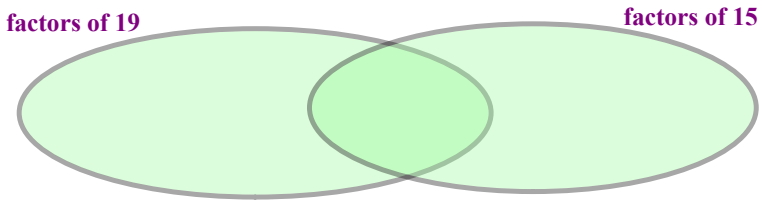


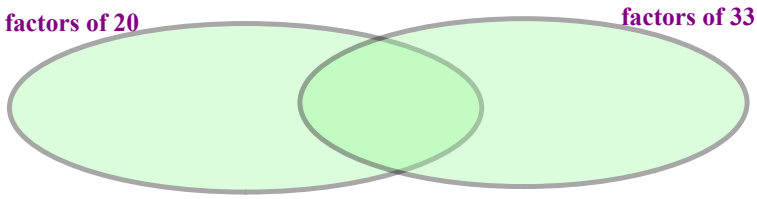

Highest common factor (HCF)

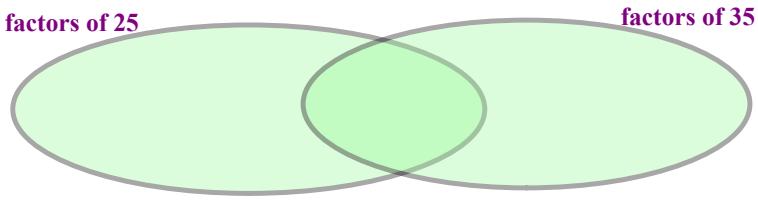


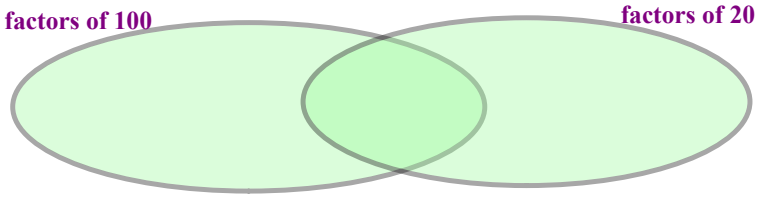

HCF = 3

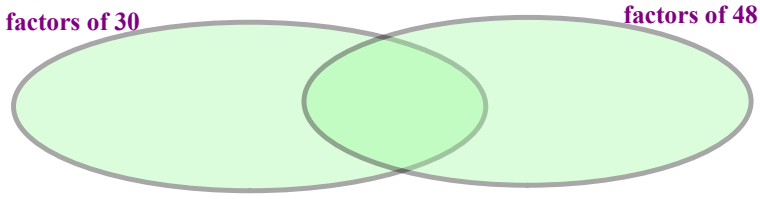



factors of 19
factors of 15


factors of 20
factors of 33


factors of 25
factors of 35


factors of 100
factors of 20


factors of 30
factors of 48

# Multiples

## Multiples of 3.....

## Using 1-100 grids:

1. Shade the multiples of 3 blue and the multiples of 5 red.
Write down the common multiples of 3 and 5.

15, 30, 45, 60, 75, 90

2. Shade the multiples of 7 blue and the multiples of 4 red.
Write down the common multiples of 4 and 7.

28, 56, 84

How many of these sequences can you start...?

even numbers

2, 4, 6, 8, 10 . . .

square numbers

1, 4, 9, 16, 25

odd numbers

1, 3, 5, 7, 9

multiples of 5

5, 10, 15, 20, 25

1, 4, 7, 10, 13

A sequence going up in 3s Starting with 1

# Sequences

**Write down a sequence of numbers beginning with:**

2, 100, 398, 596, 794, 992

+198

2, 20, 200, 2000

20000 ×10

2, 92, 4232, 194672

8954912

2 4 8 16

32 64 128

2, 3, 5, 8, 12, 18

25

# Continuing Sequences

Write down the next 3 terms of a sequence.Write down the rule.

1. 4,7,10, 13..16, 19, 22 add 3

2. 0.5, 1.5, 2.5, 3.5...4.5 +1
   5.5, 6.5...

3. 7, 5, 3, 1...-1, -3, -5 -2

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| 3 | 5 | 7 | 9 | 11 | 13 |

Double the term number and add 1

8, 18, 28, 38, 48, 58

Times the term number by 10 and subtract 2

-4, -3, -2, -1, 0, 1.....

subtract 5 from the term number

5, 7, 9, 11, 13, 15.....

double the term number and add 3

## Making the Rules

**A sequence begins:**

**1. 3, 6, 9, 12, 15.....**

**2. 9, 19, 29, 39, 49.....**

**3. 6, 11, 16, 21, 26.....**

**For each sequence:**
**a) Write down the next three terms**

**b) The term to term rule for the sequence**

# Making the rules

| n | 1 | 2 | 3 | 4 | 5 | 6 | 100 |
|---|---|---|---|---|---|---|---|
| 2n | 2 | 4 | 6 | 8 | 10 | 12 | 200 |
| 5n | 5 | 10 | 15 | 20 | 25 | 30 | 500 |
| 3n | 3 | 6 | 9 | 12 | 15 | 18 | 300 |
| n+7 | 8 | 9 | 10 | 11 | 12 | 13 | 107 |
| n-4 | -3 | -2 | -1 | 0 | 1 | 2 | 96 |
| 2n+1 | 3 | 5 | 7 | 9 | 11 | 13 | 201 |

1000

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 10n-2 | 8 | 18 | 28 | 38 | 48 | | 998 |
| 6n+1 | 7 | 13 | 19 | 25 | 31 | | 601 |
| 5n+3 | 8 | 13 | 18 | 23 | 28 | 33 | 503 |
| 12n-10 | 2 | 14 | 26 | 38 | 50 | 62 | 1190 |

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## Look at these sequences:

What is the next term?
What is the 10th term?
What is the rule for the sequence?

| | | | | | |
|---|---|---|---|---|---|
| 1. | 3, | 6, | 9, | 12,... | 3n |
| 2. | 5, | 10, | 15, | 20,.... | 5n |
| 3. | 11, | 22, | 33, | 44, ... | 11n |
| | 1 | 2 | 3 | 4 | |
| 4. | 5, | 6, | 7, | 8,... | n+4 |
| 5. | 4, | 7, | 10, | 13,... | 3n+1 |
| 6. | 6, | 11, | 16, | 21,... | 5n+1 |
| 7. | 5, | 8, | 11, | 14... | 3n+2 |
| 8. | 9, | 19, | 29, | 39.... | |

# Generating a sequence

Write down the first 5 terms of these sequences:

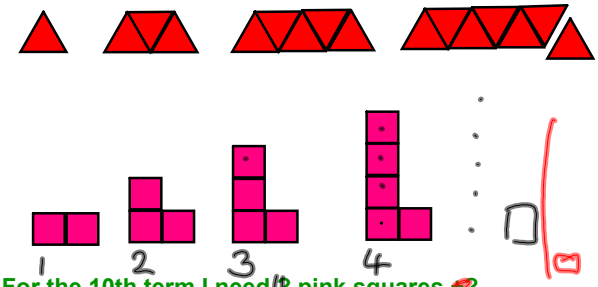
| n | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 6n | 6 | 12 | 18 | 24 | 36 |
| n+6 | 7 | 8 | 9 | 10 | 11 |
| 4n | 4 | 8 | 12 | 16 | 20 |
| 4+n | 5 | 6 | 7 | 8 | 9 |
| n+10 | 11 | 12 | 13 | 14 | 15 |
| 2n+10 | 12 | | | | |
| 3n+1 | 4 | 7 | 10 | 13 | 16 |

**Find the 10th,100th and nth term of each sequence:**

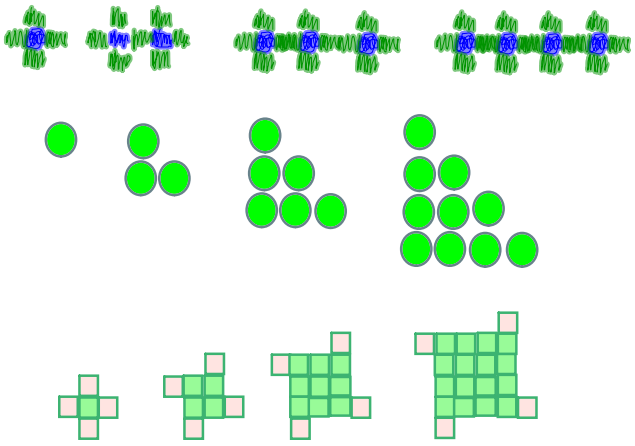
| | 10 | 100 | n |
|---|---|---|---|
| 1 2 3<br>9,18,27,36,45..... | 90 | 0 | |
| 15,30,45,60,75... | 150 | 1 | 15 |
| 3,6,9,12,15,18.... | | | |
| 2,5,8,11,14,17..... | | | |
| 11,21,31,41,51,61.... | | | |

## Picture Sequences

**What will the 5th and 10th diagram look like?**




For the 10th term I need ? pink squares +?
For the 100th term I need ? pink squares +?
For the nth term I need ? pink squares +?



For the 10th term I need ? pink squares +? green squares
For the 100th term I need ? pink squares +? green squares
For the nth term I need ? pink squares + ? green squares

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| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| | 5 | 10 | 15 | 20 | 25 |

b) no of matchsticks is 5x number of pents

c) $m = 5 \times p = 5p$

(2) $t = 10l + 8$

a) $l = 3$ $\quad t = 10 \times 3 + 8 = 38$

b) $l = 5$ $\quad t = 10 \times 5 + 8 = 58$

## Attachments

14 Spinner 2 (Multiplication 1 to 12).ppt

10 Rings 2 (Addition).ppt

Multiples.xls