

# Workshops: The heart of the MagiKats Programme

Every student is assigned to a Stage, based on their academic year and assessed study level.

Stage 3 students are approximately 9 to 11 years old.

The sheets in this pack are a small sample of what is available! These are only samples of the student's worksheets - our teaching methods include discussion and hands-on activities.

Core skills sheets are also provided for independent completion by each student (usually at home).

Topics offered at this level include: sequences; divisibility rules; ratio, proportion and percentages; working with negative numbers, prime numbers and factors; 24hr clock and timetables; continued development of working with shapes; drawing angles; solving problems using data; mean, median and mode; problem solving.



**MagiKats**  
**TUITION CENTRES**

**MATHS STAGE 3**



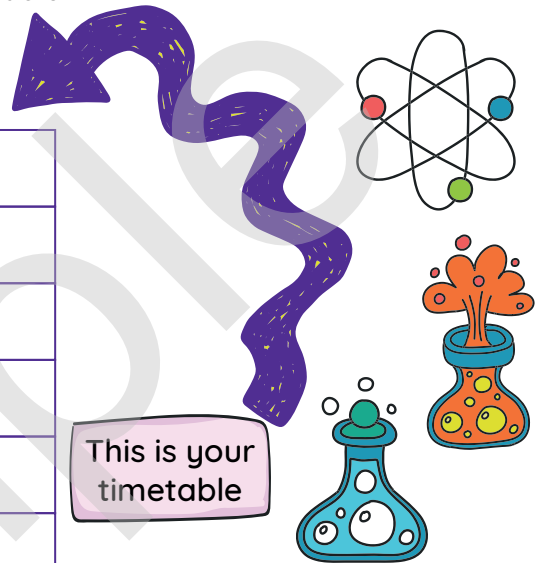
# Timetables



Planning a school outing to the Science Museum, your teacher works out that it will take 90 minutes to drive there from school, by coach.

She decides that you will need a 15 minute break after one hour on the road. You will be allowed three hours to enjoy yourselves in the Science Museum then will drive home, again with a break. Complete the table below.

Leave school	09:00
Break	
Arrive Science Museum	
Leave Science Museum	
Break	
Back at school	15:30



Timetables are used to tell us when we expect certain things to happen. They are especially useful when we need to plan a journey by train or bus. We can use a timetable to find out when we will arrive where – or to work out what time we need to leave.

## How to read a timetable

Timetables are very useful and, with a little practice, are simple to read.

Look at any timetable that you want to use, and be sure that you understand exactly what each column and row stands for. Don't allow yourself to be confused.

You will be looking down a column and along a row to read off any information that you need.

Be sure to look carefully at any special notes and to check what any strange symbols indicate.

Look, carefully, at the timetable on the next page and then answer the questions that follow.



Kat Town	09:10	10:05	11:30	14:30
Merlin Road	09:30	10:45	11:45	14:55
Spell Close	09:50	—	12:00	15:30
Wood Way	10:00	11:35	—	15:40
Goblin City	11:15	12:55	—	17:00
Eaten	11:45	14:15	13:40	17:45
Dogone	12:20	14:55	14:15	18:25

Use this coach timetable to answer the following:

- 1) What time does the 09:10 from Kat Town reach Dogone? \_\_\_\_\_
- 2) Which coach does the journey fastest? \_\_\_\_\_
- 3) How many stops does the 10:05 make before Dogone? \_\_\_\_\_
- 4) I catch the 15:30 from Spell Close. How long does it take me to reach Eaten?  
\_\_\_\_\_
- 5) I live on Spell Close. If I over sleep and miss the 9.50 coach, what is the earliest time that I can get to \_\_\_\_\_



- a) Eaten \_\_\_\_\_
- b) Goblin City \_\_\_\_\_

- 6) I live on Merlin Road. Tomorrow, I plan to leave home at 10.30 and want to visit my grandmother who lives in Eaten and also my friend who lives in Goblin City. Who should I visit first and why?  
\_\_\_\_\_  
\_\_\_\_\_



Real timetables tend to be much more complicated than these simple examples. Use the reference timetables to answer the following. Write your answers making sure that other people can understand your reasoning. When you finish, check your answers with another student and, if you disagree, work out who is right, then check with your mentor.

1) I need to get to Yottown Bus Station by 8.40 on a school day. I live in Fordwich. What is the latest bus I can catch?

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2) I work at White Horse Business Park. I want to catch the 1.30 train from Battle tomorrow afternoon. I cannot leave work until the lunch hour starts at 12.30. Will I make it? Why or why not?

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3) Jim has broken his leg and is using crutches to get around. X4 has easy access but X5 is too hard for him to get on board. He goes to Bridgeton College. What advice would you give him?



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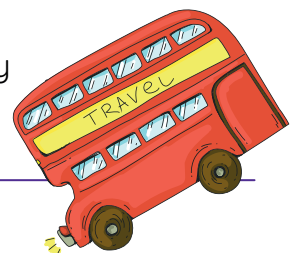
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4) Penny will be arriving at Batten, on her way home to Boreham Fields, at 5pm. Explain to her how she can get home. What time will she arrive? Bear in mind that buses are often delayed.

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5) Penny wants to go to a party that starts at 8pm at the Viaduct Hotel. Her Mum says she must be home by 11pm. Penny would usually be very happy with this curfew but this time she is not! Why?

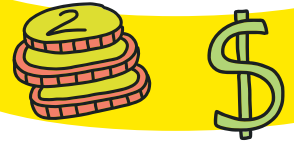


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# Money



Are you confident in your use of money? Time for a quick test!

1) Put these amounts of money in order, from smallest to largest.

\$927.05      \$762.71      \$989.44      \$323.45      \$222.42      \$101.94

\_\_\_\_\_

2) Circle the correct notation for each sum of money.

a) Thirty seven dollars and nineteen cents.

\$19.37                      \$37.90                      \$37.19



b) Fifty three dollars and one cent.

\$53.01                      \$51.03                      \$53.10

c) Fifty four dollars and three cents.

\$45.30                      \$54.03                      \$54.30



3) How many 1¢ coins are the same as \$10.61? \_\_\_\_\_

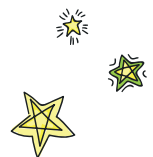
4) How many 10¢ coins are the same as \$5.50? \_\_\_\_\_

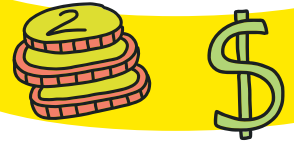
5) How many 10¢ coins are the same as \$6.80? \_\_\_\_\_

6) How many 50¢ coins are the same as \$12.50? \_\_\_\_\_

7) How many 5¢ coins are the same as \$3.25? \_\_\_\_\_

8) How many 20¢ coins are the same as \$4.20? \_\_\_\_\_





1) Circle the correct notation for each sum of money.

a) Nine hundred and nineteen dollars and fifty one cents.

\$900.50

\$919.51

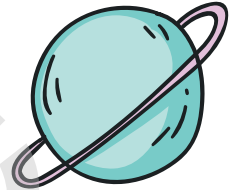
\$990.51

b) Four hundred and ninety dollars and six cents.

\$490.06

\$400.96

\$419.06



2) Write out the following amounts of money.

a) Seven hundred and sixty five dollars and thirteen cents

\_\_\_\_\_

b) Thirteen dollars and two cents

\_\_\_\_\_

c) Fifty one cents

\_\_\_\_\_

3) Round these amounts off to the nearest dollar.

a) \$12.63

\_\_\_\_\_

b) \$8.10

\_\_\_\_\_

c) \$246.31

\_\_\_\_\_

d) \$72.99

\_\_\_\_\_

e) \$0.82

\_\_\_\_\_

f) \$123.46

\_\_\_\_\_

g) \$12.13

\_\_\_\_\_

h) \$44.28

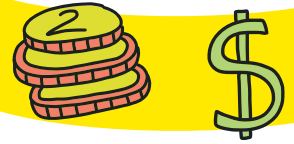
\_\_\_\_\_

i) \$60.70

\_\_\_\_\_

j) \$503.36

\_\_\_\_\_



1) Round these amounts off to the nearest ten dollars.

- a) \$116.82 \_\_\_\_\_
- b) \$42.01 \_\_\_\_\_
- c) \$9.99 \_\_\_\_\_
- d) \$58.23 \_\_\_\_\_
- e) \$610.92 \_\_\_\_\_
- f) \$91.46 \_\_\_\_\_
- g) \$277.08 \_\_\_\_\_
- h) \$23.81 \_\_\_\_\_
- i) \$684.02 \_\_\_\_\_
- j) \$13.90 \_\_\_\_\_

10

2) Now, round the same amounts off to the nearest five dollars.



- a) \$116.82 \_\_\_\_\_
- b) \$42.01 \_\_\_\_\_
- c) \$9.99 \_\_\_\_\_
- d) \$58.23 \_\_\_\_\_
- e) \$610.92 \_\_\_\_\_
- f) \$91.46 \_\_\_\_\_
- g) \$277.08 \_\_\_\_\_
- h) \$23.81 \_\_\_\_\_
- i) \$684.02 \_\_\_\_\_
- j) \$13.90 \_\_\_\_\_

5



# Money Problems



If you follow these steps whenever you tackle a problem you should always come up with the correct answer!

- Step 1 Take your time and read the question.
- Step 2 Work out what operation(s) you will need to use; + - x or  $\div$ . Write the sum.
- Step 3 Always make a rough estimate of the answer. Then you can check if your final answer makes sense.
- Step 4 Work out the solution showing all your working.
- Step 5 Check your answer. Does your answer make sense? Does it tie in with your estimate?
- Step 6 Read the question again and check that you have answered all parts.



Now try these questions:

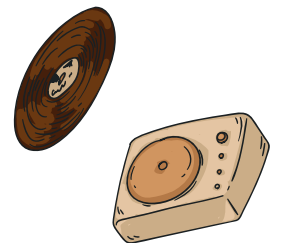
1) I want to buy four records. They cost \$15.99 each.

a) How much will they cost altogether?

Sum: \_\_\_\_\_

Estimate: \_\_\_\_\_

Answer: \_\_\_\_\_



b) How much change will I get from \$100?

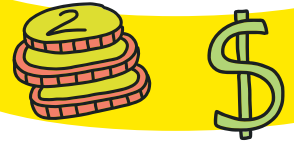
Sum: \_\_\_\_\_

Estimate: \_\_\_\_\_

Answer: \_\_\_\_\_







This is the menu at a café:

Menu						
Burger	Chips	Pie	Coffee	Coke	Milkshake	Ice cream
\$1.45	85¢	\$1.25	85¢	76¢	95¢	49¢

How much would it cost to buy:

1) a portion of chips and a coke?



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2) a burger and chips for two people?

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3) pie and chips for four people?

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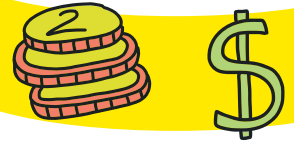
4) chips and coke for nine people?

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5) six milkshakes and two coffees?



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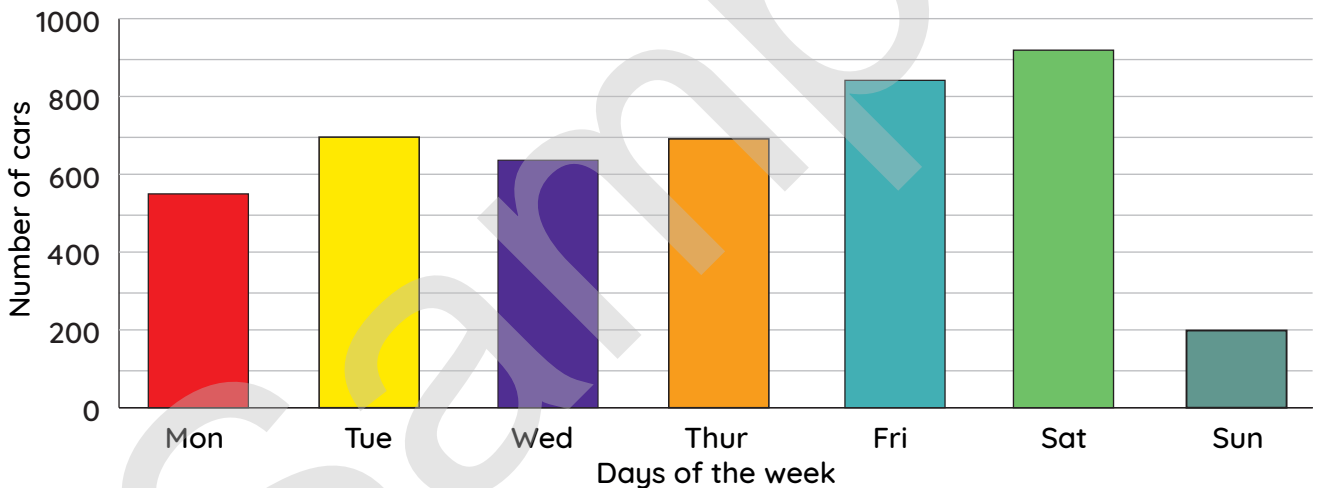
- 1) Toffees cost 90¢ for 250 grams.
- a) How much will 750 grams of toffee cost?

\_\_\_\_\_

- b) How much will 1½ kilograms cost?

\_\_\_\_\_

- 2) This bar chart shows the number of cars crossing a toll bridge.



- a) How many cars crossed on Tuesday and Sunday?

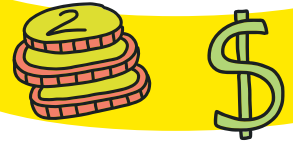
\_\_\_\_\_

- b) Estimate how many cars crossed on Monday and Wednesday?

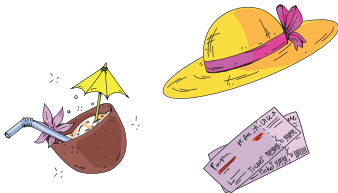
\_\_\_\_\_

- c) Each car has to pay \$1.50 to cross the bridge, how much money was paid on Thursday?

\_\_\_\_\_



- 1) A family spends \$4000 each year on a holiday. \$500 of this is travelling costs, \$800 is spending money and the rest is accommodation. If the accommodation costs rise by 10% next year what will their holiday cost altogether?



- 2) Two brothers, Rick and Rob, have part-time jobs. Rick earns \$18 every Saturday, Rob has a paper round, Monday - Friday in term-time only (36 weeks per year) and earns \$5 per day. Who earns the most in one year?

- 3) Suppose a man has to earn more than \$16000 per year before having to pay income tax. Calculate his maximum weekly pay if he doesn't pay any tax.

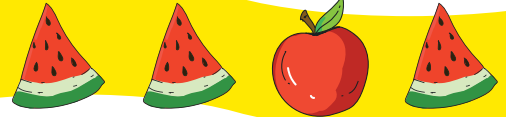
- 4) James earns \$15 a week doing a paper-round in 2020. If he gets a 10% pay rise in 2021, how much does he earn per week, and how much altogether for 2021? For 2022, he has fewer papers to deliver, so he gets a 10% pay cut; what is his new weekly pay?

- 5) Sarah has a part-time job which pays \$240 per week. If she saves 25% in the bank and spends \$6 daily on lunch (working five days per week), what does she have left for shopping? What percentage of her total pay is this?





# Sequences



Fill in the missing gaps in these sequences.

1) 

	90	80			50			20
--	----	----	--	--	----	--	--	----

2) 

	41	50		68			95	
--	----	----	--	----	--	--	----	--

3) 

		-1	-2	-3				
--	--	----	----	----	--	--	--	--

4) 

		134		118	110		94	
--	--	-----	--	-----	-----	--	----	--

5) 

	0	7	14				42	
--	---	---	----	--	--	--	----	--

6) 

	-4		10	17	24			45
--	----	--	----	----	----	--	--	----

7) 

		0.75	1.0					2.25
--	--	------	-----	--	--	--	--	------

8) 

	-7			11	17			
--	----	--	--	----	----	--	--	--

9) 

3			12	15			24	
---	--	--	----	----	--	--	----	--

10) 

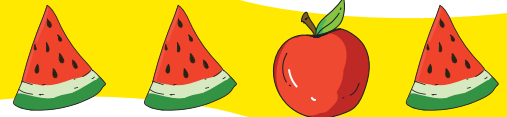
		3.3	4.3				8.3	
--	--	-----	-----	--	--	--	-----	--

11) 

15		-5	-15				-55	
----	--	----	-----	--	--	--	-----	--

12) 

	0.4		1.0	1.3	1.6			2.5
--	-----	--	-----	-----	-----	--	--	-----



Fill in the missing gaps in this sequence.

7.1	10.1			19.1		25.1	28.1	
-----	------	--	--	------	--	------	------	--

What is the **rule** for this sequence? \_\_\_\_\_

To describe the **rule** of a sequence, you need to state three things. Look at the first sheets that you filled in, and try to work out what three things are important to the **rule**.

What do you think are the three things you need to be able to write the **rule**?

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_

So, the **rule** for the example is? \_\_\_\_\_

Try these questions.

1)

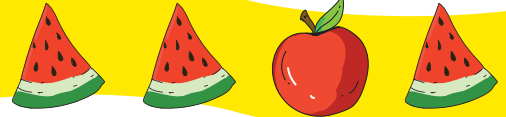
18	29			62			95	
----	----	--	--	----	--	--	----	--

What is the **rule** for this sequence? \_\_\_\_\_

2)

9.9			6.6	5.5		3.3		
-----	--	--	-----	-----	--	-----	--	--

What is the **rule** for this sequence? \_\_\_\_\_



Fill in the missing gaps in these sequences and write the rules for them.

1) 

5		3	2			-1		
---	--	---	---	--	--	----	--	--

What is the **rule** for this sequence? \_\_\_\_\_

2) 

1		4	8				128	
---	--	---	---	--	--	--	-----	--

What is the **rule** for this sequence? \_\_\_\_\_

(Remember that you can add, subtract, multiply or divide to make a sequence...)

3) 

20		60	80		120			180
----	--	----	----	--	-----	--	--	-----

What is the **rule** for this sequence? \_\_\_\_\_

4) 

30			0	-10		-30		-50
----	--	--	---	-----	--	-----	--	-----

What is the **rule** for this sequence? \_\_\_\_\_

5) 

11	19			43			67	
----	----	--	--	----	--	--	----	--

What is the **rule** for this sequence? \_\_\_\_\_

6) 

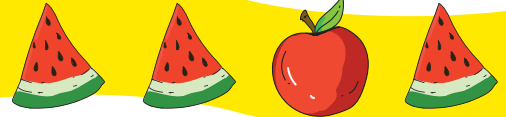
15	10		0			-15		
----	----	--	---	--	--	-----	--	--

What is the **rule** for this sequence? \_\_\_\_\_





## Finding different terms in a sequence



1) Write down the 2nd, 5th and 7th terms of this sequence.

**Hint** it helps to write out the sequence to find the terms you need!



82, 93, 104,

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2) Write down the 4th, 6th and 8th terms of this sequence.

2.25, 2.00, 1.75,

---

3) Write down the 5th, 6th and 10th terms of this sequence.

-56, -49, -42,

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4) Write down the 7th, 9th and 11th terms of this sequence.

294, 314, 334,

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5) Write down the 10th, 13th and 15th terms of this sequence.

26, 20, 14,

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Phew! Quite a lot of work there, I think you'll agree?

Get this sheet marked before you move on!

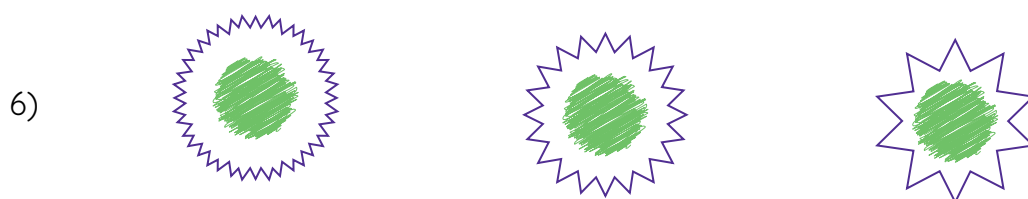
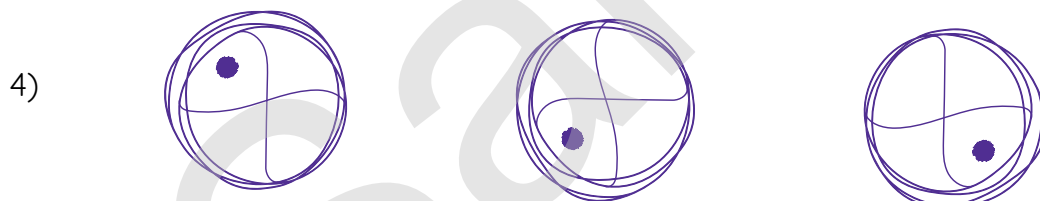
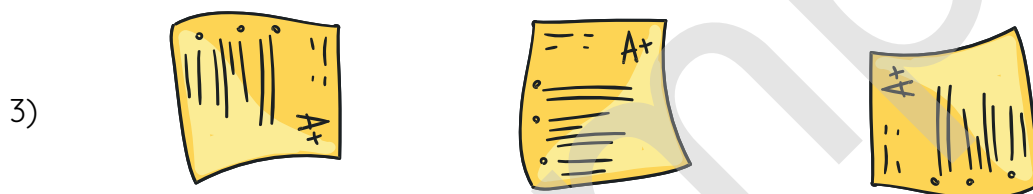
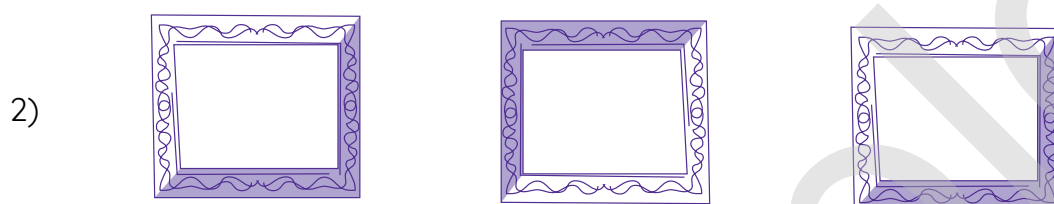
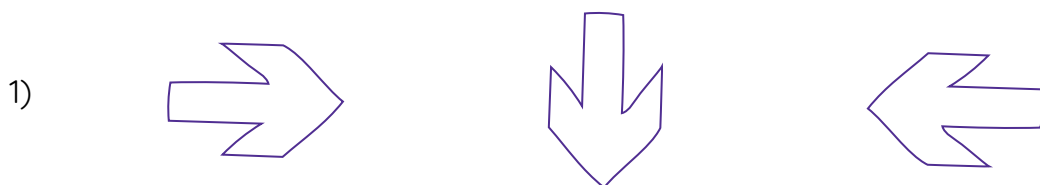




# Shapes can form sequences too!



See if you can work out the next terms in these shape sequences

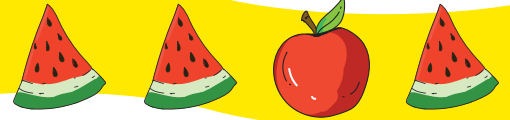


Hint : count the points!





## Understanding the $n^{\text{th}}$ term



You will probably have heard the expression ' $n^{\text{th}}$  term' already. But do you understand what on earth it means?



When you have to find certain terms in a sequence, you can work them out as you did on the previous sheet but what if you need to find the  $97^{\text{th}}$  term, or the  $2225^{\text{th}}$ ? You'll probably run out of space and energy before you get there!

This is why it is useful to find a way to work out any place in the sequence.

Do you know what the ' $n$ ' means in ' $n^{\text{th}}$  term'?

### The ' $n$ ' shows the place in the sequence

To explain better, look at the sequence below.

Terms in sequence	39	42	45	48	51
Place in sequence	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>
So, ' $n$ ' for this term is	1	2	3	4	5

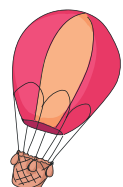
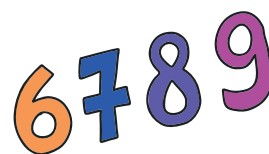
1) What would ' $n$ ' be for the  $6^{\text{th}}$  place in a sequence? \_\_\_\_\_

2) What would ' $n$ ' be for the  $10^{\text{th}}$  place in a sequence? \_\_\_\_\_

3) What would ' $n$ ' be for the  $23^{\text{rd}}$  place in a sequence? \_\_\_\_\_

4) What would ' $n$ ' be for the  $100^{\text{th}}$  place in a sequence? \_\_\_\_\_

5) What would ' $n$ ' be for the  $237^{\text{th}}$  place in a sequence? \_\_\_\_\_





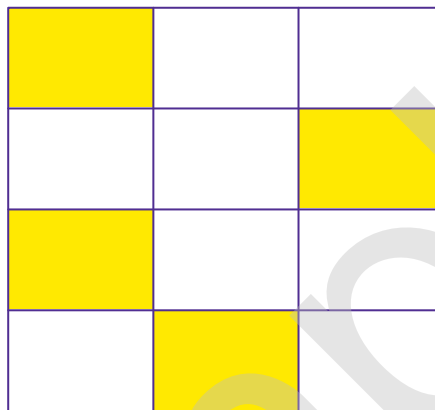
## Ratio and Proportion



Did you know? Proportion is written as a fraction - in fact they are very similar!

In this diagram, there are a total of 12 squares.

4 are coloured in so  $\frac{4}{12} = \frac{1}{3}$  are coloured.



Another way of looking at it is that there is one coloured square for every two white squares.

1 in every  $1 + 2 = 3$  squares is coloured, so  $\frac{1}{3}$  of the squares are coloured.



Hint - show the number of coloured squares over number of squares in total, then reduce to the smallest fraction.

The fraction of coloured squares is  $\frac{1}{3}$

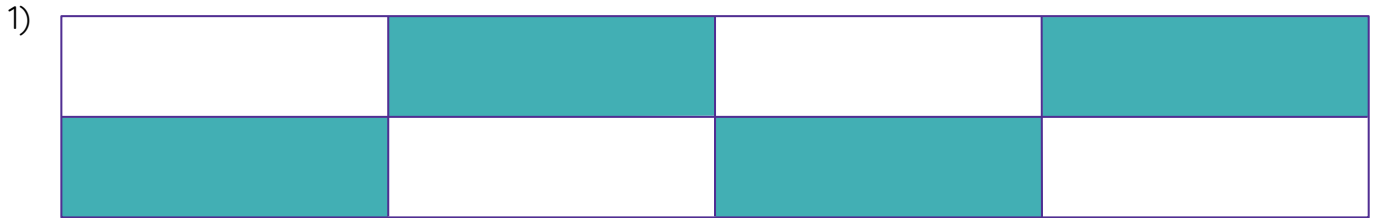
The **proportion** of coloured squares is 1 in 3 which we show as  $\frac{1}{3}$

The ratio of coloured squares is 1 : 2

Look at Sheets 2 and 3.

For each diagram, fill in the gaps in the sentences that describe it.

Remember the bottom number in the fraction is the **total** number of squares.



- a) There are \_\_\_\_\_ coloured squares and \_\_\_\_\_ white squares.
- b) We can reduce this to say there is 1 coloured square to every \_\_\_\_\_ white squares.
- c) \_\_\_\_\_ (fraction) of the squares are coloured.



Hint - number of coloured squares over number of squares in total, then reduce to the smallest fraction.

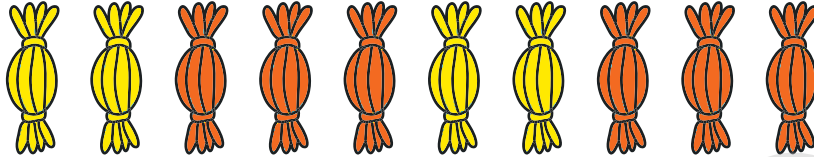
- d) This means 1 in every \_\_\_\_\_ squares is coloured.
- e) So, the **proportion** (fraction) of coloured squares is \_\_\_\_\_
- f) The **ratio** (see b) of coloured squares to white squares is \_\_\_\_\_ to \_\_\_\_\_ which we show as \_\_\_\_\_ :



- a) There are \_\_\_\_\_ coloured squares and \_\_\_\_\_ white squares.
- b) We can reduce this to say there is 1 coloured square to every \_\_\_\_\_ white squares.
- c) \_\_\_\_\_ (fraction) of the squares are coloured.
- d) This means 1 in every \_\_\_\_\_ squares is coloured.
- e) So, the **proportion** (fraction) of coloured squares is \_\_\_\_\_
- f) The **ratio** (see b) of coloured squares to white squares is \_\_\_\_\_ to \_\_\_\_\_ which we show as \_\_\_\_\_ :



How did you get on? Here's how it should have been done!



**Example 1:** Worked answer

Jack and George have a bag of lemon and orange sweets.  
There are 2 lemon sweets for every 3 orange ones.  
What proportion of the sweets does George eat?

Ratio of sweets lemon : orange = 2 : 3

Proportion of orange is  $\frac{3}{2+3} = \frac{3}{5}$  (number of orange / total number of sweets)

So George eats  $\frac{3}{5}$  of the sweets.



**Example 2:** Worked answer

There is 1 red car to every 2 silver cars in a showroom.  
There are 12 cars in total.  
What proportion of the cars are red?

Ratio of red : silver = 1 : 2     $\frac{1}{3}$  are red    or    1 in 3 are red.

How many cars are red?

so  $\frac{1}{3}$  of 12 are red.    "of" means x so     $\frac{1}{3} \times 12 = 4$  are red

There is 1 dented car to every 5 perfect cars. How many are dented?  
dented : perfect = 1 : 5

$\frac{1}{6}$  are dented     $\frac{1}{6} \times 12 = 2$  are dented    1 in 6 are dented.

Now try the questions on the following sheets - remember to show **all** your working.  
Use these worked answers for help, if you need it.



- 1) Barry and Jim are playing some funky tunes on the jukebox. For every 5 songs Barry plays he lets Jim choose 2.
  - a) Jim chooses 4 songs. How many tunes does Barry choose?
  - b) Barry picks 35 songs. How many choices does Jim have this time?
  - c) Yesterday Jim picked 6 songs. How many songs did the two of them play?
  
- 2) Paul the paper boy throws his paper towards the houses from the pavement. He misses 1 house for every 3 he hits. He delivers to 20 houses in total.
  - a) How many houses has Paul missed?

On Sundays Paul delivers the Sunday paper to the 20 houses. He misses 3 houses for every 2 that receive the Sunday paper.

- b) How many of the houses receive the Sunday paper?

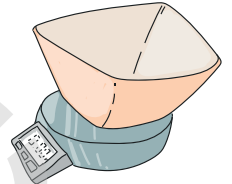


- 3) There are 2 rotten apples to every 3 good ones in a bag. If there are 20 apples in a bag, how many are rotten?
  
- 4) Two brothers share £140 in the ratio 3 : 4. What is the size of the larger share?



- 1) A recipe for 4 people needs 800g of sugar.  
How much sugar is needed for 6 people?

- 2) Divide £98 into 2 parts in the ratio 5 : 9.



- 3) Amy, Peter and Thomas are aged 16, 8 and 4. They share £59.92 so that the money they receive is in the same ratio as their ages. How much does Amy receive?

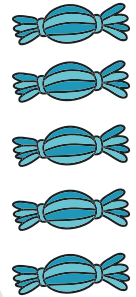
- 4) Divide 28.6 kg into 4 parts in the ratio 4 : 5 : 6 : 7.

- 5) Divide £3376 into 3 parts in the ratio 2 : 5 : 9





- 1) Divide 1.17 kg of sweets between Mary and John so that their shares are in the ratio 8 : 5.



- 2) Divide £576 into 3 parts in the ratio 1 : 3 : 5.

- 3) If a group splits their 3.95 litres of drink into 3 parts in the ratio 4 : 5 : 6, how many millilitres of drink will they each have?



- 4) Two gardeners share 11 tonnes of rockery stone so that one has half as much again as the other. The total cost, including delivery charges, is £22.75. How much does each pay?





Ratio and proportion calculations are sometimes “hidden” in word questions. Try these!

- 1) Here is a rule for the time it takes to cook a chicken:  
Cooking time = 20 minutes plus an extra 40 minutes for each Kilogram.



How many minutes will it take to cook a 3kg chicken?

What is the mass of a chicken that takes 100 minutes to cook?

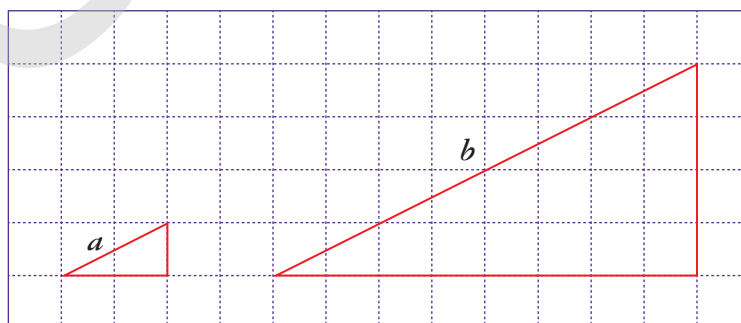
- 2) Amina planted some seeds.  
For every 3 seeds she planted, only 2 seeds grew.  
Altogether 12 seeds grew.

How many seeds did Amina plant?

- 3) On a map, 1cm represents 20 km.  
The distance between two cities is 250km.

What is the distance between them on the map?

- 4) Here are two similar right-angled triangles.



Write the ratio of side a to side b.





1) A recipe for fruit squash for six people is:

300 g chopped oranges

1500 ml lemonade

750 ml orange juice



- a) Tina made fruit squash for ten people. How many millilitres of lemonade did she use?
- b) Jim used 2 litres of orange juice for the same recipe. How many people was this enough for?
- 2) Short crust pastry is made from flour and fat in the ratio 2 : 1. How much flour will make 450 g of pastry?
- 3) 1 litre of fruit drink contains 200 ml of orange juice. How much orange juice is there in 1.5 litres of fruit drink?
- 4) £1 is worth 1.62 euros. How many euros will I get for £50?