THE BRITISH INTERNATIONAL SCHOOL ABU DHABI

A NORD ANGLIA EDUCATION SCHOOL

Year 8 Maths

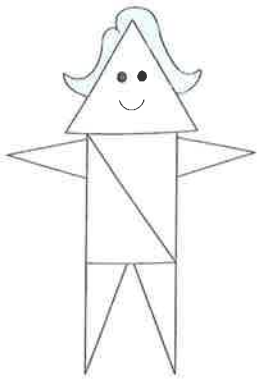
Topic 4–5–6 Workbook

In the table below translate the key terms into your home language and write a short definition for each term [if needed visit www.mathsisfun.com/definitions/].

TOPIC 4 - POLYGONS		
Quadrilateral		
Parallel		
Angle		
Length		
Polygon		
TOPIC 5 – RATIO AND PROPORTION		
Ratio		
Fraction		
Simplify		
Quantity		
Proportion		
TOPIC 6 – STATISTICAL MEASURES		
Average		
Frequency		
Mean		
Median		
Mode		
Range		

Properties of Triangles

1. Ms. Anne Gular is made up of seven triangles.



a) Shade all of the isosceles triangles.

b) How many right-angled triangles are there?

.....

c) What type of triangle is her head?

.....

2. Complete these sentences by underlining the correct words.

a) Every (**equilateral** / **isosceles**) triangle has three equal angles.

b) The number of equal angles in a scalene triangle is (**zero** / **two**).

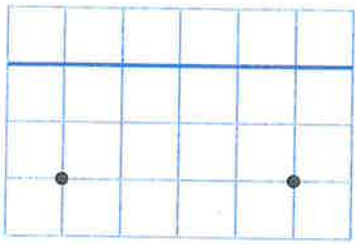
c) A right-angled triangle (**always** / **sometimes** / **never**) has one line of symmetry.

d) It's (**possible** / **impossible**) to draw a triangle with rotational symmetry of order 2.

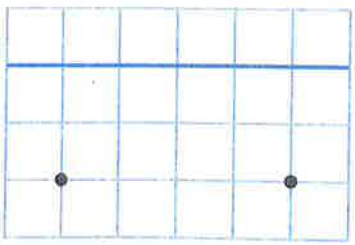
3. Two points have been drawn on each of these grids.

Draw a third point on the bold line and then join them up to create:

a) an isosceles triangle

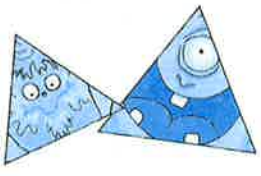


b) a scalene triangle



How did you do?

Triangles can be pointy creatures at first — but get to know them and you'll learn to love them. Once you're good pals, you should:



- ☐ **Be able to name and identify the different types of triangles.**
- ☐ **Know the properties of triangles, including any equal angles, equal sides and symmetries.**

☹ ☐ 😐 ☐ 😊 ☐

Properties of Quadrilaterals

1. Name all the quadrilaterals that have the following properties.

Your answers should come from the list on the right.

a) Two pairs of parallel sides

.....

b) Diagonals that cross at 90°

.....

c) The possibility to have **exactly** one obtuse angle

.....

Square
Rectangle
Rhombus
Parallelogram
Kite
Trapezium

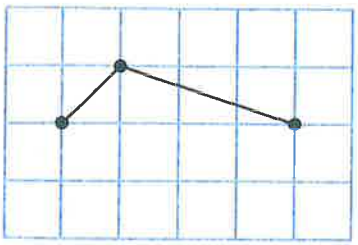
2. Tick all the statements that are true for a rhombus.

- ☐ It has four sides of equal length.
- ☐ It has two lines of symmetry.
- ☐ All four sides are different lengths.
- ☐ It has four equal angles.
- ☐ It has two pairs of equal angles.
- ☐ It has no lines of symmetry.

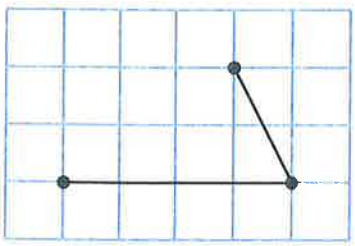
3. Two sides of a quadrilateral have been drawn on each of these grids.

Draw a fourth point and then join them up to create:

a) a kite



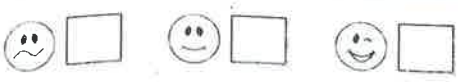
b) a trapezium



How did you do?

Quadrilaterals are 2D shapes with four sides. Each type of quadrilateral comes with its own set of properties, so you just have to learn them all. After working through this page you should:

- ☐ **Be able to name and identify the different types of quadrilaterals.**
- ☐ **Know the properties of quadrilaterals, i.e. any equal angles or sides, parallel sides and symmetries.**

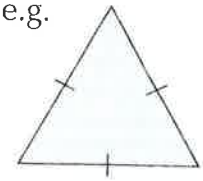


Triangles and Quadrilaterals

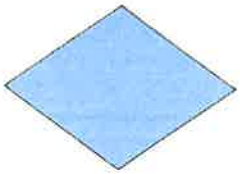
1. Look at the shapes below.

Measure the sides of the shapes with a ruler and mark on any equal and parallel sides.
Use these properties to name each shape.

e.g.



equilateral triangle



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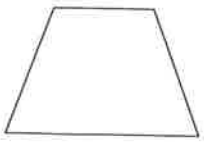


.....

.....

2. David has a new three-sided chopping board.

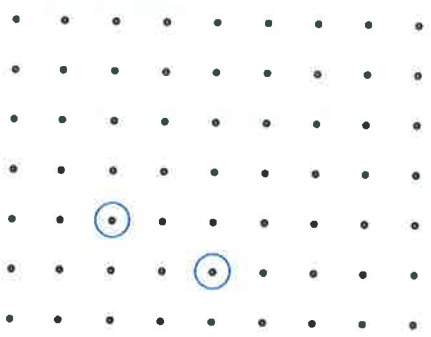
It has two sides of equal length, two angles of equal size, one line of symmetry, and no rotational symmetry.

What shape is the chopping board?

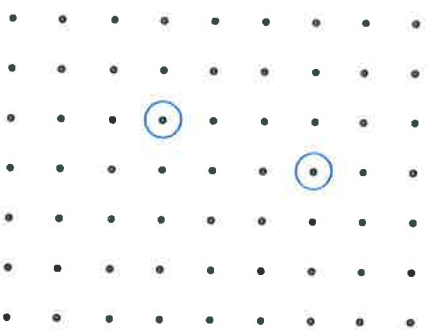
.....

3. Draw these shapes on the pin boards below, using the circled points as vertices.

a) A quadrilateral with 4 lines of symmetry.



b) A quadrilateral with no parallel sides and 1 line of symmetry.



How did you do?

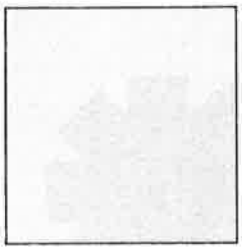
Chop chop! No time for slacking — you've still got the rest of the section to go. But before you rush off in an excited frenzy, check that you:

- ☐ **Know the different properties of triangles and quadrilaterals.**
- ☐ **Can identify a shape from its properties.**

Quadrilaterals

It's well worth learning the properties of simple shapes so you can just rattle them off if they ever come up in a test.

Q1 This is a square.



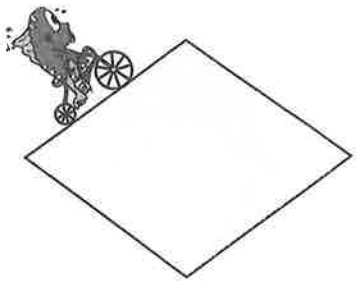
a) How many lines of symmetry does it have?

.....

b) What is its order of rotational symmetry?

.....

Q2 This diamond shape is called a rhombus.
It is nothing more than a pushed over square.



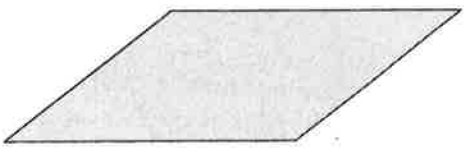
a) How many lines of symmetry does it have?

.....

b) What is its order of rotational symmetry?

.....

Q3 A parallelogram has two pairs of parallel sides.
It is really just a pushed over rectangle.



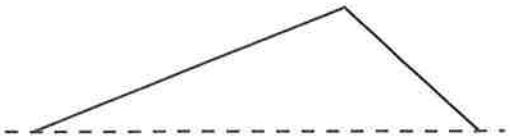
a) How many lines of symmetry does it have?

.....

b) What is its order of rotational symmetry?

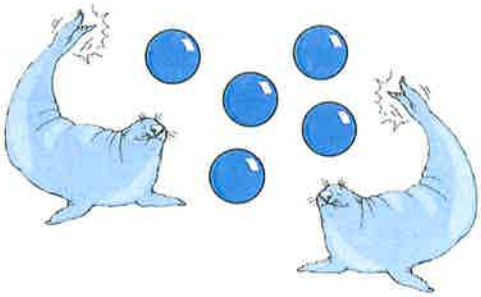
.....

Q4 Complete this drawing of a kite.



Ratios and Comparing

1. Look at the image on the right.
What is the ratio of sea lions to balls?



..... : .....

2. In this question, write any fractions in their simplest form.

Write 15 as a fraction of 25.

.....

Write 60 as a fraction of 42.

.....

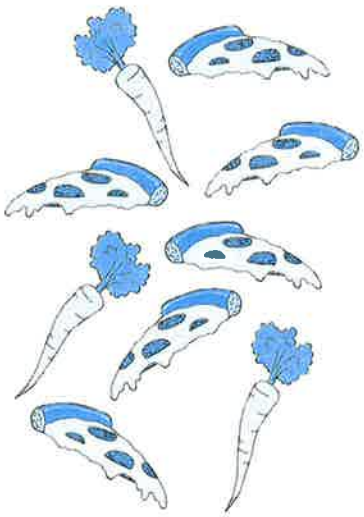
Write 12 as a percentage of 48.

..... %

Write 30 as a percentage of 20.

..... %

3. Look at the picture of pizza slices and carrots.



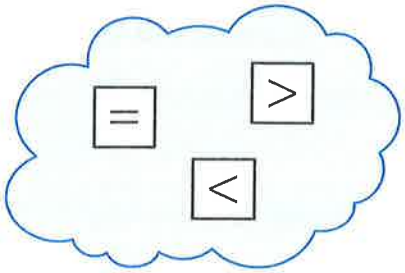
a) Tick the box that's next to the correct ratio of pizza slices to carrots.

☐ 3 : 6 ☐ 6 : 2 ☐ 6 : 3 ☐ 6 : 9

b) What is the ratio of pizza slices to carrots in its simplest form?

..... : .....

4. Choose the correct tile from the cloud to make each of these statements true.



10% of 70 ☐ 20% of 25

$\frac{3}{4}$ of 40 ☐ $\frac{3}{2}$ of 20

$\frac{2}{3}$ of 21 ☐ $\frac{3}{8}$ of 32

15% of 60 ☐ 25% of 40

Ratios and Comparing

5. The ratio of plates to mugs in a cupboard is 5 : 3. There are 10 plates in the cupboard. Circle the number of mugs that there are in the cupboard.

5 3 6 10 8

6. Deepak buys 2.6 m^2 of fabric and uses 1.95 m^2 of it to make a skirt.

a) Find the amount of fabric he uses as a fraction of the amount of fabric he bought. Give your answer in its simplest form.

.....

b) He uses 0.52 m^2 of the leftover fabric to make a matching headband. What percentage of the leftover fabric does he use?

..... %

7. Orange juice comes in bottles of different sizes. William buys a 600 ml bottle and Irina buys a 1 litre bottle.

a) William drinks 240 ml of his bottle. What fraction of the bottle has he drunk? Give your answer in its simplest form.

.....

b) Irina drinks 330 ml of her bottle. Who has drunk a larger percentage of their bottle? Show your working.

1 litre = 1000 ml

.....

How did you do?

Another topic, over far too soon... Once you're confident you know what you're on about, enjoy the satisfying feeling of ticking off these boxes. You've earned it. By this point, you should be able to:

- ☐ Write one number as a fraction or a percentage of another number.
- ☐ Compare different amounts using fractions, percentages and ratios.
- ☐ Write ratios using the proper notation.
- ☐ Reduce ratios to their simplest form.

Ratios

1. Draw a line to match each ratio to an equivalent ratio in its simplest form. The first one has been done for you.

6 : 4	10 : 25	16 : 18	12 : 3
4 : 1	3 : 2	2 : 5	8 : 9

2. Look at the ratios below.

10 : 16	10 : 7	6 : 9
3 : 8	4 : 1	1 : 5

a) Circle the four ratios that are in their simplest forms.

b) Write the other two ratios in their simplest forms below.

..... : .... : .....

3. Claire has 30 iced buns. She gives 12 to her brother and keeps the rest for herself.

a) What is the ratio of Claire's buns to her brother's buns in its simplest form?

..... : .....

b) Write the ratio of Claire's brother's buns to her buns in the form $1 : n$.

..... : .....

4. Daisy and Oscar make £90 at a car boot sale. They split the money in the ratio 5 : 4.

How much money did each of them make?

Daisy = £ ..... Oscar = £ .....

Ratios

5. The ratio of ham sandwiches to mustard sandwiches on each plate at a buffet is 3 : 4.

a) (i) A small plate has 6 ham sandwiches.
How many mustard sandwiches are there on a small plate?

.....

(ii) A large plate has 28 mustard sandwiches.
How many ham sandwiches are there on two large plates?

.....

b) Each plate only has these two types of sandwiches.
What is the ratio of ham sandwiches to all of the sandwiches on a plate?

..... : .....

6. In a pack of 24 pencils, the ratio of sharp pencils to blunt pencils is 3 : 1.

a) How many of the pencils in the pack are sharp?

.....

b) Emily sharpens some of the blunt pencils. The new ratio of sharp pencils to blunt pencils is 5 : 1. How many pencils did she sharpen?

.....

7. Wendell asked some people if they prefer tea or coffee. He found that the ratio of people who prefer tea to people who prefer coffee is 4 : 7.

16 people said they prefer tea. How many people did Wendell ask in total?

.....

How did you do?

Golly, there was plenty going on there, but that's ratios wrapped up. By now, you should be able to:

- ☐ **Use ratio notation.**
- ☐ **Reduce ratios to their simplest form and the form 1 : n.**
- ☐ **Find amounts and solve problems using ratios.**

Ratios

Welcome to another page of mind-blowing fun.
Ratios might look weird but they have a simple meaning —
if the ratio of cats to dogs is 2 : 3, it means there are 2 cats for every 3 dogs.

Q1 Express the following ratios in their simplest form.

a) 3 : 6 ..... : .....

b) 7 : 21 ..... : .....

c) 2 : 12 ..... : .....

d) 4 : 16 ..... : .....

e) 10 : 25 ..... : .....

f) 6 : 8 ..... : .....

Q2 Express these ratios in their simplest form.

a) 8 guides to 120 tourists. ..... : .....

b) 350 g of flour to 150 g of sugar. ..... : .....

c) 30 cows to 180 turkeys. ..... : .....

d) 16 doctors to 32 000 people in town. ..... : .....

Q3 Divide each amount in the ratio given:

Check your answers by adding the bits back together to see if you get the original number.

a) £8 in ratio 1 : 1

.....

b) £6 in ratio 1 : 2

.....

c) £15 in ratio 2 : 3

.....

d) £28 in ratio 5 : 2

.....

Q4 The ratio of men to women members at the Vanity Health Club is 3 : 2.

a) If there are 24 men, how many women members are there? .....

b) How many members are there altogether? .....

Proportion Problems

It may sound a bit confusing, but don't blow it out of proportion — it's just about dividing and multiplying. Remember, divide for <u>one</u>, then times for <u>all</u>.

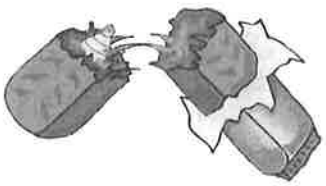
Q1 If 7 caterpillars cost £1.40, how much will 2 caterpillars cost?

£1.40 = ... pence

1 caterpillar costs ..... ÷ 7 = ... pence

2 caterpillars cost ..... × 2 = ... pence.

Q2 A box of 25 chocolate bug bars (with real bug centre) at the cash-and-carry costs £4.75.



a) How much does one bar cost? .....

b) How much do 6 bars cost? .....

Q3 A group of 20 angry bugs can eat 80 potatoes a day.
How many potatoes could 52 bugs eat in a day?

.....

Q4 I have some friends coming round for dinner and want to cook my favourite fish pie. My recipe serves 4 people, but I will need enough pie for 9 people.

a) How many potatoes will I need in order to cook my fish pie for everyone?

.....

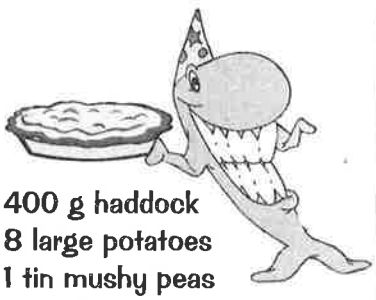
b) How much haddock will I need?

.....

c) If eggs come in boxes of 6, how many boxes should I buy?

.....

RECIPE FOR MY FAVOURITE FISH PIE



400 g haddock
8 large potatoes
1 tin mushy peas
12 eggs
1 pinch of salt
2 tb/spoons curry powder

Mean, Median, Mode and Range

1. Look at this list of numbers: 5, 7, 3, 4, 6, 3, 2

a) Which of the numbers is the mode?

.....

b) (i) Put the numbers in order, starting with the smallest.

....

(ii) Calculate the range of the numbers.

.....

(iii) What is the median of the numbers?

.....

2. The box below shows how many training sessions each of the members of a goalball club have attended in the last year.

32	40	25	12
9	48	27	15

a) Add up all of the numbers.

.....

b) Find the mean number of training sessions attended.

.....

3. Harvey counts how many light bulbs there are in each room of his house. The results are: 4, 3, 1, 2, 1, 1

a) Find the range of this data.

.....

b) Complete each of these sentences by using the words on the right.

(i) The ..... of the numbers is 2.

(ii) The ..... of the numbers is 1.5.

Median

Mode Mean

Mean, Median, Mode and Range

4. Priti weighs six conkers that she collected from the park. The masses, in grams, are shown on the right.

3.2	6.8	7.2
5.3	4.4	5.5

a) Find the mean mass.

..... g

b) (i) What is the range of Priti's data?

..... g

(ii) The conker that Priti recorded as having a mass of 3.2 g was weighed incorrectly. The actual mass of this conker is between 3.2 g and 7.2 g. How would using the actual mass affect the range? Explain your answer.

.....

.....

5. Rachel asks a group of people at the library how long it took them to travel there. The responses are shown below.

32 minutes 45 minutes 1 hour 26 minutes 15 minutes

a) What was the median time? Circle your answer above.

b) (i) Find the mean time taken to travel to the library, to the nearest minute.

..... minutes

(ii) Rachel asks a different group of people the same question. She finds that the mean time taken to travel to the library for that group is 40 minutes.

Using the means, compare the time it took the second group to travel to the library with the time it took the first group.

.....

.....

How did you do?

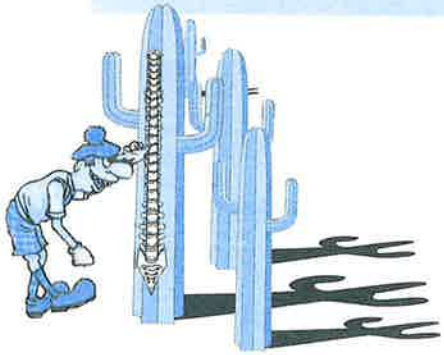
The average person really loves answering questions on the mean, median, mode and range — but I'm afraid those questions are all done with for the moment. Moving on then, you should be able to:

- ☐ **Calculate the mean, median and mode of a set of data.**
- ☐ **Calculate the range of a set of data.**

☹ ☐ 😐 ☐ 🙂 ☐

Mean, Median, Mode and Range

1. Dudley counts how many spines there are on 12 cacti. His results are shown on the right.



321	234	214	118
279	156	178	478
192	349	225	406

a) Calculate the mean.

.....

b) Find the median.

.....

2. The table below shows the number of weeks it took to train 10 guide dogs.

Number of weeks	24	25	26	27
Frequency	1	2	5	2

a) Write down the modal number of weeks.

..... weeks

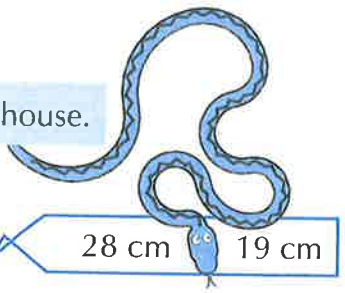
b) Calculate the mean number of weeks taken to train a guide dog.

Add a third row to the bottom of the table showing 'number of weeks × frequency'.

..... weeks

3. Lewis measures the length of six snakes in his reptile house.

One of his measurements is missing.



13 cm	34 cm	23 cm		28 cm	19 cm

The mean length is 25 cm. Find the missing length.

Start off by using the mean to find the sum of the heights.

..... cm

Mean, Median, Mode and Range

4. Beth asks a group of people how many times they've been to Scunthorpe. The results are shown in this frequency table.

Number of times they've been to Scunthorpe	Frequency
0	0
1	1
2	2
3	3
4	5
5	0
6	4

a) Find the range of Beth's data.

.....

b) Calculate the mean, giving your answer to one decimal place.

.....

c) Find the median.

Work out the position of the median, then count up through the frequencies to find which row it's in.

.....

5. Look at the set of data values on the right. 23 29 21 93 28 27 24

The value of 93 is much greater than the other values. It is called an 'outlier'.

a) Which average do you think is most likely to be affected by the outlier?

.....

b) Which average do you think would be the most sensible to use for this data?

.....

6. Steph records the number of glasses of water that she drinks each day in November and then summarises the data in the incomplete frequency table below.

Number of glasses	4	5	6	7	8
Frequency	4	.....	10	.....	.....

The range of Steph's data is 3 and the mode is 6.
She drinks 5 glasses on more days than she drinks 7 glasses.
Use this information to fill in the missing values in Steph's table.

Remember that there are 30 days in November.

How did you do?

Why did the mode fall out with the median? Because he was really *mean*... Hey — if you don't like that joke, I've got a whole *range* of them... ☹ I'll only stop if you promise that you know how to:

- ☐ **Find the mean, median, mode and range of a set of data and use these values to solve problems.**
- ☐ **Find the mean, median, mode and range of a set of data from frequency tables.**

☐ ☐ ☐

Comparing Distributions

1. A pottery teacher has two classes — one for adults and one for children. She asks all of her students to make a vase and then weighs all the vases.

a) The median mass of the adults' vases is 5 kg and the median mass of the children's vases is 4 kg. Use this information to compare the masses of the vases in the two classes.

.....

.....

b) The range of the adults' vases is 2 kg and the range of the children's vases is 3 kg. State a conclusion that you can draw from this information.

.....

.....

2. Cameron measures the beak length of ducks from each of two ponds, A and B. Some information about his results is shown in the table below.

	Median	Mean	Range
Pond A	5.2 cm	5.0 cm	2.5 cm
Pond B	6.3 cm	8.9 cm	8.1 cm

State **two** conclusions that you can draw about the beak lengths of the ducks in the ponds.

.....

.....

Compare the averages and the ranges in the two ponds.

.....

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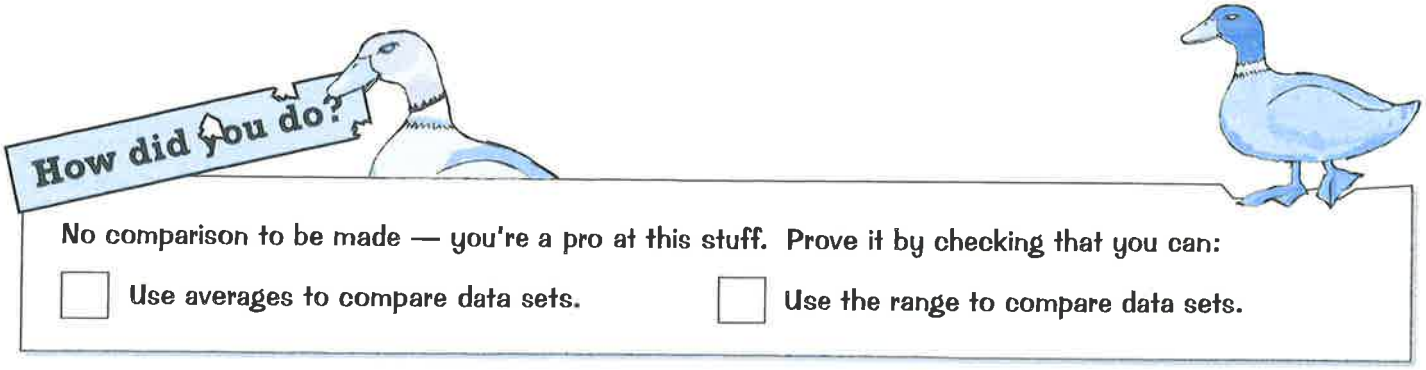

No comparison to be made — you're a pro at this stuff. Prove it by checking that you can:

☐ **Use averages to compare data sets.** ☐ **Use the range to compare data sets.**