

Step by step 1 (teacher sheet)

Introduction: measuring

(skills used: reading large numbers)

In pairs

What quantities do we measure in everyday life?

(10 min)

(Use think, pair, share.) Decide on something which you have noticed can be measured. Think of the units of measurement and what is used to measure it as well.

slides 1-5

Collect answers, one from each pair e.g.

<u>What</u>	<u>how</u>	<u>units</u>
length	ruler	cm or inches
distance	mileometer	miles or km
temperature	thermometer	°C or °F
weight	scales	grammes or lb
angles	protractor	°
time	clock	minutes or hours

(5 min)

*Gather objects/pictures for display. Pictures and labels available to discuss any other measures pupils may not have mentioned(hard copies or slideshow).
Extension: pupils can make their own displays*

In pairs

Why do we measure things?

(5 min)

(Use think, pair, share.) Collect answers, one from each e.g.

slide 6

To answer questions about

How much?

How long?

Does it fit?

When.... etc.

Help with building, cooking, planning journeys, organising time to do things, etc

Whole class

Unlikely that children will come up with measuring activity. So ask question:

(2 min)

How do we know how much activity we are doing in a day?

slide 7

*What measure can we use for this?
Something convenient?*

Whole class

Who has heard of a pedometer?

(2 min)

Other words beginning 'ped'

pedal, pedestrian,.....

Other words ending 'meter'

thermometer, swingometer, photometer,.....

When were they invented?

Who invented them?

Whole class

About my pedometer

(5 min)

Give out sheet and pedometer. Pupils should be told to leave pedometer on desk (otherwise playing takes over during discussion).

slides 8-10

*Discuss show it works, where it's worn, how to look after it
They should be numbered, but pupils can name theirs.*

Whole class

How do we read the numbers?

(5 min)

*Place value. Ask who can say 70000. Take several responses before agreeing. Then 00007.....
Discuss the difference between 00007, 00070, 00700, 07000, 70000
What's 1000 more than / less than.....?*

Whole class

Let's try it out

Rest of lesson

Try out in class. Practise resetting and walking round class a few times.

Step by step 2 (teacher sheet)

Do girls step more than boys?

(Skills used: organising data)

In pairs
(2 min)
slide 11

How do I find out?

(Use think, pair, share.) Pupils consider these questions:
Guess the total number of steps you do in a school day.
What do you think the answer will be to 'Do girls step more than boys?' ?
Report back and note all answers. Decide on class response to the question.

Whole class
(15 min)

Pupil Activity

Pupils now go for an accompanied walk. Make sure all pedometers are zeroed at the beginning and pupils should pair up to check each others pedometer reading at the end before they are removed. So now we have a single measure for each child. On return, totals for both girls and boys can be recorded.

In pairs
(5 min)
slide 12

Should I get more evidence?

(Use think, pair, share.) Pupils consider these questions:
Over how many days should the evidence be collected ?
Which days should be considered?
Report back and note all answers. Decide what you will do.

One day or 5 day school week

(5 min)
slide 13

What needs to be on the recording sheet?
Should you work in groups?
Report back and note all answers.

*Names - how many? Days - which
To limit the size of totals use small groups of pupils.*

Decide on size of groups note: If groups not same size division required.

Whole class
Rest of lesson
slides 14-16

*Show group copy of recording sheet to be used. e.g.
Customise it if you have chosen to record for just one day.
Suggest pedometers given out at start of day and taken in at end of school day.
Make sure pupils know where/when they collect their pedometer and where/when they return it.
Decide if teacher records results.*

girls group1	no of steps day 1	day 2	total
Anne	6024	5893		11917
Billy Jo	5246			
.....				
total	11270			

Copy and complete table.

individually
After trial complete
slide 17

Pupil activity:

- Find the totals from your trial.
- Write a sentence which gives your answer to the question "Do girls step more than boys?" in your class.
- Do you think the answer would be the same in other classes in your school?
- What could girls/boys do to be more active?

slide 18

Homework/ extension:

Red group stepped a total of 22340 steps in a school day.
Green group stepped a total of 24600 steps in a school day.
There were the same number in each group.

- How many do you think were in each group? e.g. $24000 \div 6000 = 4$
- One group was boys, the other girls. Which group do you think was boys? You must explain how you arrived at your answers.

Step by step 3 (teacher sheet)

If we had wanted to know how far we had walked we would want to know

How long is my step?

(skills used: measuring length, finding average)

Whole class

(5 min)

Take largest and smallest in class and ask them to take 10(or suitable number of) steps.

Have they gone the same distance?

Did they take natural steps?

How do I find out my step length?

In pairs

(10 min)

slide 19

Use think, pair, share to elicit any possible answer, e.g.

(a) Step against a metre ruler the same each time?

If not why not?

(b) Use a standard length on a sports pitch, e.g. 25m, 100m.

The longer the better so that pupils step as normally as possible.

Whole class

(5 min)

slide 20

What do I need to measure/record?

For (a) Do I measure from toe to toe/heel to heel. Does it matter? How accurate should I be?

For (b) If using sports pitch, does length need to be measured? How will we do it?

Encourage discussion of units.

Should each pupil be responsible for recording their own measurement or create a table of results?

Whole class

Pupil Activity: go and walk (distance has to be known) and/or get out the metre rulers

(10 min)

Whole class

(5 min)

slides 21-25

What calculation do I have to do to find my average step length?

Is every step the same length?

So what is an average? A single **representative value**.

(Could be mean, mode or median although they will not necessarily know these names.)

Elicit their ideas or if necessary make suggestions:

e.g.

I measured 10 separate steps.
Their lengths were ..., ..., ... cm.
Their total was cm.
So their mean average was

or

I measured 10 separate steps.
Their lengths were ..., ..., ... cm.
The length that occurred most often was cm.
So their modal average was

or

I measured 9 separate steps.
Their lengths in order were ..., ..., ... cm.
The middle one was cm.
So their median average was

or copy and complete

In <input style="width: 30px;" type="text" value="25"/> metres I made <input style="width: 30px;" type="text" value="36"/> steps.
This distance is <input style="width: 30px;" type="text" value="25"/> x 100 = <input style="width: 60px;" type="text" value="2500"/> cm
Each step is <input style="width: 60px;" type="text" value="2500"/> ÷ <input style="width: 30px;" type="text" value="36"/> = <input style="width: 30px;" type="text" value="69"/> cm on average.
My average step length is <input style="width: 30px;" type="text" value="69"/> cm.

If more than one method suggested then which method do you think is best?

Individually

(5 min)

Each pupil can then calculate their own average step length.

slides 26-27

Homework/extension:

Complete a table which shows how far you step on average:

Number of steps	Average distance in cm	Average distance in m
1	e.g. 70	
10	700	7
100		70
500		350
1000		700

If a spreadsheet is used there is an opportunity to discuss formulas, which are hidden on slide 27.

Step by step 4 (teacher sheet)

How many steps in a kilometre?

(skills used: metric units, direction, calculator)

No of steps	Dist in cm	Dist in m
1	e.g. 70	
10	700	7
100		70
500		350
1000		700

In pairs
(5 min)
slide 28

Guess how many steps in a kilometre,and mile?
Pupils can use table from Step 3 (slide 26) to help.
Take feedback.

In pairs
(5 min)
slide 29

Can you work out how many steps in a km?

How many metres are there in a kilometre?

Are there more than 1000 steps in a kilometre?

Talk about table and discuss advantages of changing from smaller to larger units.

e.g. use table:

$$\begin{array}{r} 670\text{m} = 1000 \text{ steps} \\ 335\text{m} = 500 \text{ steps} \\ + 1005\text{m} = 1500 \text{ steps} \end{array}$$

or

use proportion:

$$1 \text{ step is } \frac{2}{3} \text{ m} \Rightarrow 1\text{m is } \frac{3}{2} (1.5) \text{ steps} \Rightarrow 1\text{km is } 1500 \text{ steps}$$

or

$$\text{use division of distance by av step length:} \\ (1000 \times 100) \text{ cm} \div 67 = 1493 (1500) \text{ steps}$$

Share methods and answers, then come to a class decision.

Whole class
(25 min)

What does walking 1km feel like?

Go out for walk for about 20 min. Or go out for about 800 steps then think about returning.
Visit www.multimap.com or maps.google.co.uk for a printable local area map with street names.
Did they notice street names?
Can they say which direction they are walking in at each turn?
Pupils can identify school and mark out walk when they return.

In pairs
(5 min)
slide 30

Can you work out how many steps in a mile?

First of all can you guess?

Then try using this rule:

To change miles into kilometres multiply by 8 and divide by 5

$$\begin{array}{l} \text{e.g. } 1 \text{ mile is } 1 \times 8 \div 5 \text{ km} \\ 1 \text{ mile is } (1500) \times 8 \div 5 \text{ steps} \\ 1 \text{ mile is } 2400 \text{ steps} \end{array}$$

Share answers, then come to a class decision.

slides 31-32

Homework/extension:

- How far do you walk in a day at school?
- How far do you walk in a week at school?

Number of steps	Distance covered in cm	Distance covered in m	Distance covered in km
1	e.g. 70		
10	700	7	
100		70	
500		350	
1000		700	
2000		1400	1.4
5000			3.5
10 000			7

- Complete this table to show how far you go on average.

Step by step 5 (teacher sheet)

How many steps would it take my class to walk to*?

(skills used: gathering information, calculator)

**Might be school trip location, homeland of immigrant pupil, capital city, location in the news.*

In pairs

(10 min)

slide 33

If everyone in the class took it in turns to walk to a place far away* (teacher chooses),

Guess: How many steps would it take?

How far is it in kilometres?

How long would it take?

Take feedback from each pair.

Which of these is it easiest to find?

In pairs

(10 min)

slides 34-35

How do I find out how far in miles/km?

Discuss whether road maps, atlases, multimap, google map etc might be helpful.

Watch out for units.

Find out the answer to "When will we be more than half way?" Is there a place, landmark which can be identified as the half-way target?

Take feedback from each pair, then reach a consensus.

In pairs

(5 min)

slide 36

How do I find out how many steps altogether?

Requires result from Step by Step 4 (no of steps in 1km).

e.g. 5000 km \Rightarrow 5000 x no of steps in 1 km [1500 (approx)] = 7 500 000 steps

Take feedback and decide on one value for the class.

Whole class

(5 min)

slide 37

Deciding on the rules

Should we count school day stepping totals or 24 hour stepping totals? (requires home use)

Is the recording sheet from Step by Step 2 useful?

Guess how many days it will take our class to walk to , and how many days to the half way target.

Pupils record their daily step totals on class sheet, or can be organised in groups.

Daily cumulative totals can be found.

Pupils should actually count the days it takes the class to step the distance to

slide 38

Homework/extension:

When walk has been completed:

Write a few sentences about your class walk including:

how far, describe route, how many people took part, how long to half way target,

how long to complete.

Support for Learning might consider a place not too far away.

Wheel chair users. Is it possible to measure distance travelled by fitting milometer to wheelchair? Such distances can be transformed into steps by dividing by the class average step length. Take care to consider units.