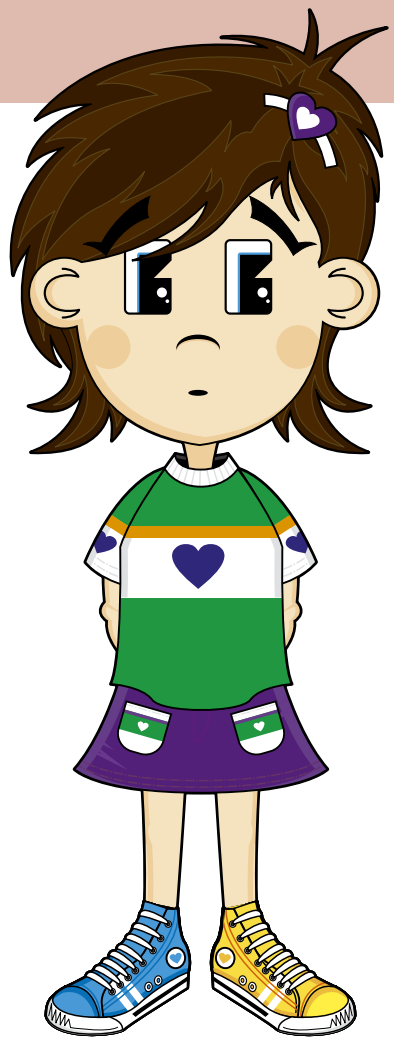
Reasoning in the classroom

Trainers

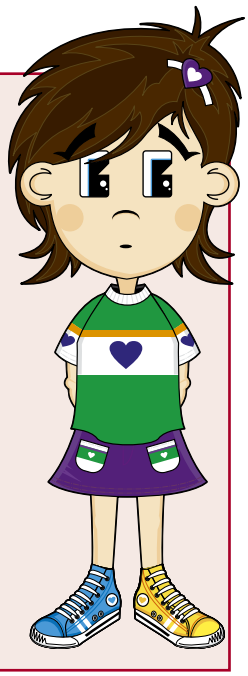


Support materials for teachers

Year 4

Llywodraeth Cymru
Welsh Government

Year 4 Reasoning in the classroom – Trainers



These Year 4 activities start with an item that was included in the 2014 National Numeracy Tests (Reasoning). A further linked activity is also provided.

Activity 1

Trainers

Learners work out simple combinations.

Includes:

- Trainers question
- Markscheme

Activity 2

Shoe sizes

Learners compare the actual size of their feet with published shoe sizes.

Includes:

- Explain and question – instructions for teachers
- Resource sheet – Shoe sizes
- Teachers' sheet – Results

Reasoning skills required

Identify

Learners decide on their methods and on how to present their work.

Communicate

They write and talk about their work.

Review

They draw their own conclusions, making their own decisions on what to include within their report.

Procedural skills

- **Combinations**
- **Measuring (millimetres)**

Numerical language

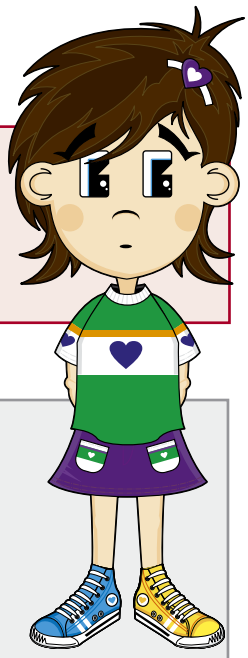
- **Different/difference**
- **Length/width**

Activity 1

Trainers

Activity 1 – Trainers

or



Outline

This question focuses on a girl who wears odd shoes. Learners use their reasoning skills to work out the combinations of shoes that she can wear.

You will need

Q **Trainers question**

M **Markscheme**

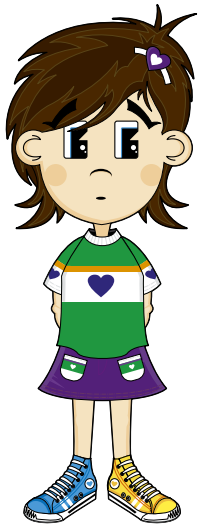
Abbi has three pairs of shoes:

blue **(B)**

yellow **(Y)**

pink **(P)**

She always wears shoes that are **different** colours!



Example:

Her right foot	Her left foot
B	**Y**

Show **all** the different ways she can wear her shoes.

2m

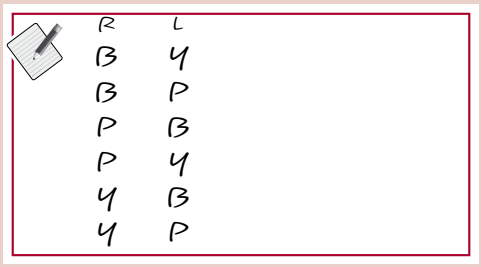
Activity 1 – Trainers – Markscheme

Marks	Answer
2m	Shows all six ways, in any order, with no duplications or errors, i.e. **BY BP PY** **YB PB YP** Or Omits the example, BY, but shows the remaining five ways correctly, with no duplications or errors
Or 1m	Shows these three ways, in any order, with no duplications or errors **BY** (or **YB**) **BP** (or **PB**) **PY** (or **YP**) Or Shows at least **4 different correct ways**, even if there are also duplications and/or errors

Common error

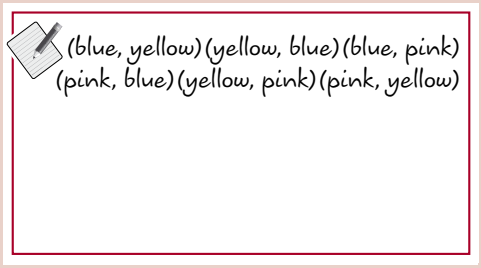
Has not realised that pairs can be reversed

Activity 1 – Trainers – Exemplars



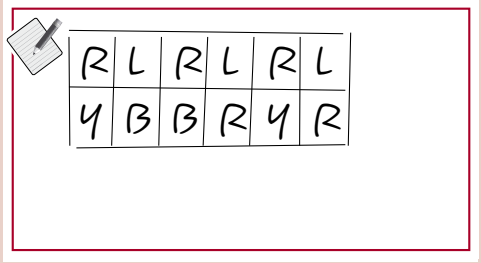
All six correct; **2 marks**

- This learner has an effective method, keeping the same colour for the right shoe whilst finding options for the left.



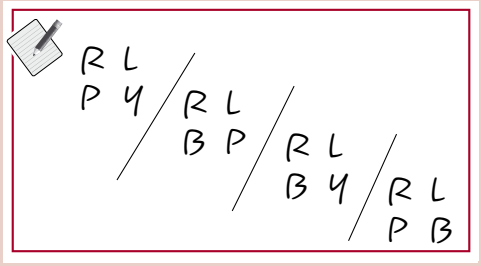
All six correct; **2 marks**

- This learner also has an effective method, choosing one pair and then reversing those colours.



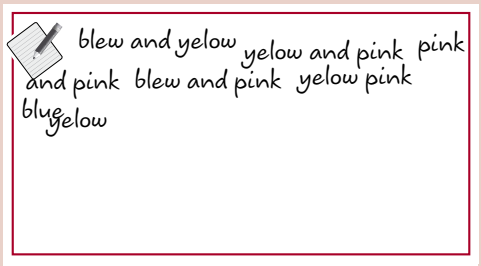
Shows YB, BP and YP; **1 mark**

- This learner has used R (red) rather than P (pink). This is unambiguous so is acceptable.
- Although the table uses headers for right and left, the learner has not realised that pairs can be reversed.



Four correct; **1 mark**

- This learner understands that colours can be reversed (BP and PB are shown), but has reversed only one pair.



Only three correct; **0 marks**

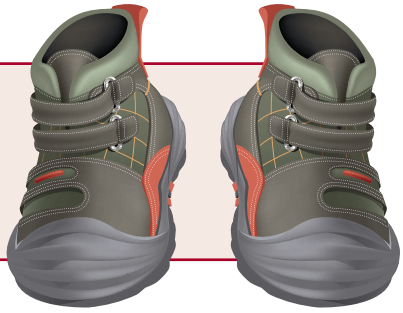
- Without a systematic method for listing, this learner has found it difficult to see what has already been used. Both YP and BY are repeated. PP is incorrect.

Activity 2

Shoe sizes

Activity 2 – Shoe sizes

or



Outline

In this Year 4 activity learners compare the size of their feet with those used by manufacturers for shoe sizes.

You will need

Resource sheet – Shoe sizes
One sheet for each group

Teachers' sheet – Results

Each group will need

A3 paper and colouring pencils

Ruler (showing millimetres)

Activity 2 – Shoe sizes

Explain

Ask learners if they know their shoe size. If they don't, ask them to check on their shoe or, if necessary, measure against a shoe that is sized. Identify a common size and ask if they think everyone with that shoe size has exactly the same size feet. Tell learners they are going to find out.

Give each group sheets of A3 paper. Ask them to remove their shoes *(but not socks)* and draw round one another's feet – both feet – so they have outlines of the feet of every member of their group. Emphasise the need to do this carefully and to check that their completed outline looks correct. Next, they measure, in millimetres, the longest and widest parts of the feet, writing these measurements on their drawings.

Give each group a copy of the resource sheet **Shoe sizes** which shows the equivalent shoe size for different lengths of feet. *(Some manufacturers use different measurements.)* Ask learners why the shoe sizes change from $13\frac{1}{2}$ to 1 and why there are two size 5's *(children and adult sizes)*.

Create a chart on the whiteboard as shown in the teachers' sheet **Results**. Ask each learner within each group to write their measurements on the chart under their shoe size *(using the bigger foot if there is a difference between their two feet)*. Bring the class back together to discuss the results, using the questions below as a guide.

Groups then work together to create a report to show their findings *(for the whole class)* in any way they choose. Ask them to make sure to include at least one chart *(e.g. a bar chart)* and to show their conclusions clearly. Their reports can then be displayed in the classroom.

Question

- Why do we have shoe sizes and not shoes that are made just for us? *(Cost – but some people need to have shoes made especially for them, as their feet do not fit standard sizes.)*
- When you have your feet measured in a shoe shop, how do they do it? Why do they ask you to keep your socks on? *(Because you generally wear socks/tights when wearing shoes, so you need to allow for them when measuring.)*
- Are both your feet the same length and width? How much difference is there between them? How did you work that out? What does it mean to have different-sized feet when you are buying shoes? *(You buy according to the bigger measurement – but some people have a difference of one whole shoe size or more, which makes buying a pair very difficult, or expensive.)*
- How much difference is there within the group of learners that wear shoe size xx? How many people have feet that measure exactly the length shown on the resource sheet? Did you expect that? Why/why not?
- The resource sheet only provides measurements for shoe length. What else makes a difference to shoe size? *(Width)* Look at the results for the class – is there much difference in width? What happens if you end up with shoes that are too narrow? Or too wide?
- How are you going to present your results? What chart are you going to include? Why? Why is a chart a good way to present information?

Shoe sizes

Foot length (in millimetres)	Shoe size
126	5
130	$5\frac{1}{2}$
134	6
138	$6\frac{1}{2}$
142	7
147	$7\frac{1}{2}$
151	8
155	$8\frac{1}{2}$
159	9
164	$9\frac{1}{2}$
168	10
172	$10\frac{1}{2}$
176	11
181	$11\frac{1}{2}$

Foot length (in millimetres)	Shoe size
185	12
189	$12\frac{1}{2}$
193	13
198	$13\frac{1}{2}$
202	1
206	$1\frac{1}{2}$
210	2
214	$2\frac{1}{2}$
218	3
222	$3\frac{1}{2}$
226	4
230	$4\frac{1}{2}$
235	5

Create this chart, or similar, on the whiteboard for learners to insert their measurements.
Make sure to include all the shoe sizes identified at the start of the activity.

Length of feet (in millimetres)

Insert shoe sizes

Length	**Width**	**Length**	**Width**	**Length**	**Width**	**Length**	**Width**	**Length**	**Width**	**Length**	**Width**	**Length**	**Width**	**Length**	**Width**

Learners write in their dimensions, using the bigger foot, under the size of shoe that they wear.