Five weights

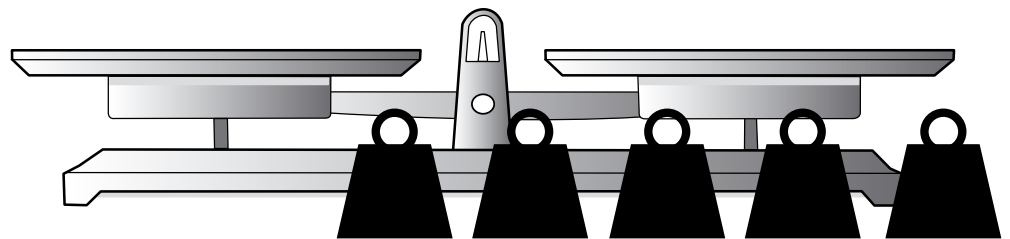**Reasoning in the classroom**

Support materials for teachers

Llywodraeth Cymru
Welsh Government

Year 5

Year 5 Reasoning in the classroom – Five weights

These Year 5 activities start with an item that was included in the 2014 National Numeracy Tests (Reasoning). They continue with an activity that is linked and requires learners to solve problems relating to numerical equivalence.
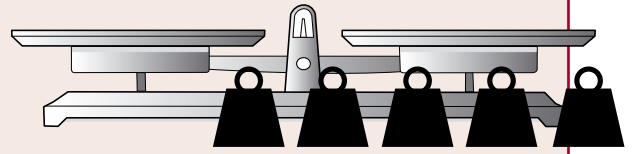
Activity 1

Five weights
Learners reason how to balance weights on a scale.
Includes:
- Five weights question
- Markscheme

Activity 2

Equal numbers
They identify equivalent number relationships.
Includes:
- Explain and question – instructions for teachers
- Whiteboard – Number balance
- Teachers' sheet – Number cards
- Teachers' sheet – Solutions
- Resource sheet – Number challenges

Reasoning skills required

Identify

Learners choose their own methods and find number relationships.

Communicate

They explain their reasoning and set challenges for others to solve.

Review

They check their work and that of their peers.

Procedural skills

- **Four rules of number**
- **Fractions (simple addition)**
- **Decimals (simple addition, subtraction, multiplication)**

Numerical language

- **Balance**
- **Equals**
- **Fractions ($\frac{1}{2}, \frac{1}{4}$)**
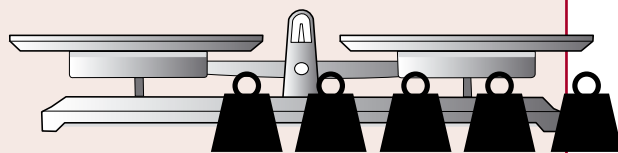- **Decimals (0.5, 1.5)**

Five weights

Activity 1 – Five weights

Outline

In this Year 5 activity, learners decide how to combine weights to achieve a balance.

You will need
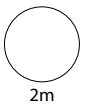
Q

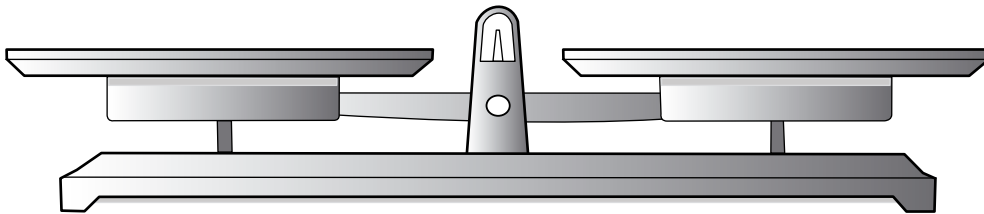**Five weights question**
A half-page for each learner

M

Markscheme

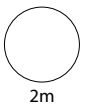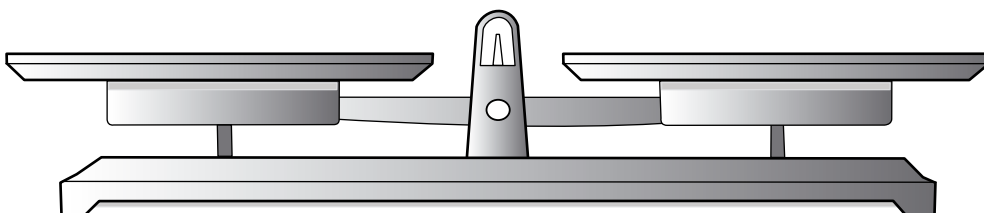Five weights: **1**kg **3**kg **9**kg **20**kg **27**kg

Put the five weights on the scales
so that the scales balance.

2m

Five weights: **1**kg **3**kg **9**kg **20**kg **27**kg
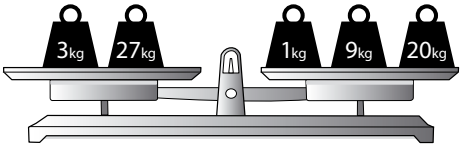
Put the five weights on the scales
so that the scales balance.

2m
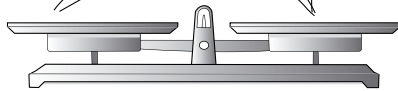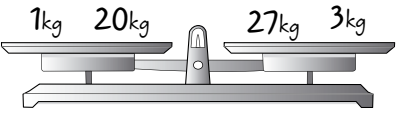
Activity 1 – Five weights – Markscheme and exemplars

Marks	Answer
2m	Positions the weights with 3 and 27 on one side, and 1, 9 and 20 on the other side, e.g. •
Or 1m	Shows **30**

◄ **Total for each side**

Correct; 2 marks

• The positioning of the weights is unambiguous.

Shows 30; **1 mark**

• The learner shows an effective strategy, finding the total for each side. However, the answer is incomplete.

Equal numbers

Activity 2 – Equal numbers

Outline

In this Year 5 activity learners continue the theme of balancing, but this time within the context of numbers.

$2 - 0.7 - 0.3$

You will need

WB **Whiteboard – Number balance**

T **Teachers' sheet – Number cards**
One set for each pair/group, cut up in advance
(laminating would improve durability)

T **Teachers' sheet – Solutions**

R **Resource sheet – Number challenges**
One sheet for each pair/group

Activity 2 – Equal numbers

Explain

Discuss the use of a balance to weigh objects, then ask if numbers can balance. Show **Number balance** on the whiteboard and write 5 on the left-hand pan. Ask what would balance with 5, other than another 5. Discuss and write on the right-hand pan a correct answer *(e.g. 4 + 1)*. Delete those numbers and repeat with other examples until you are sure learners understand what you are doing.

Move away from the balance scale on the whiteboard and continue asking for numbers that balance, writing, for example, '4 + 5 balances with 10 − 1'. Show a different example such as '10 × 2 balances with 24 − 4' then say that this is rather longwinded – can they think of another thing they could write instead of 'balances with'? *(The equals sign, =. This is a very important message to learners, as they often read the equals sign as 'makes' which leads to confusion later on in mathematics.)*

Give each pair/group a pack of cut-up cards from the teachers' sheet **Number cards**. Their first task is to find pairs of cards that balance – where the totals are equal. *(Solutions are provided on the teachers' sheet **Solutions**.)* Once everyone has completed their pairs, bring the class back together and ask them in turn to read out one of the pairs, making sure to use the word 'equals'. Write the calculation on the whiteboard and discuss, asking how they know they are correct. Go through all eight pairs.

Then give each pair/group a copy of the resource sheet **Number challenges** and ask them to see if they can find a solution for each challenge *(examples of correct solutions can be found in **Solutions**)*. Support them, using the questions below. Finally, ask groups to make their own cards containing challenges for other groups to solve.

Question

- How are you going to start finding the pairs? If you know each card has a pair, how does that help? *(One strategy is to work out the solutions for each card, then match.)*

- If you cannot find a pair for a particular card, what should you do? Why? *(Check, because you know that each one has a pair.)*

- What is $\frac{1}{2}$ as a decimal? So in this game, does it matter if the answer to one card is $\frac{1}{2}$ and the other is 0.5? Why not? *(They both represent the same amount, so are equal.)*

- Which was the most difficult pair for you to find? Why? *(Their response could provide evidence of areas of weakness, e.g. decimals and fractions.)*

- *(In relation to the card showing 227 – 82 – 118)* How did you work this out? Is there a quicker way? *(Add the 82 and 118 to make 200, and subtract that from the 227.)* What does that tell you about looking for solutions *(look for shortcuts)*?

- *(When they have found a solution for the first challenge)* Is this the only solution? Can you find another?

- How will you plan your challenge for another group? How will you check your answer?

Five weights
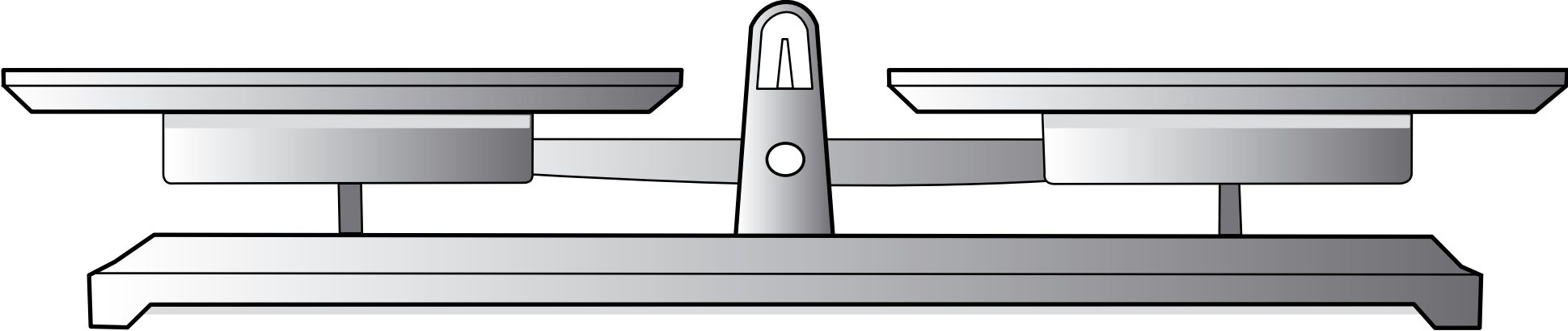
$83 - 76$	0.25×2	$227 - 82 - 118$	$5.5 + 4.5$
$3 \div 2$	$1000 \div 10 \div 10$	$10 \div 20$	$85 \div 5$
1.7×10	One quarter of 108	$78 \div 2$	$\frac{1}{2} + \frac{1}{4} + \frac{3}{4}$
$0.3 + 0.5 + 0.2$	3×13	$560 \div 80$	$2 - 0.7 - 0.3$

Solutions – part 1

Cards (the numbering 1 to 8 supports part 2)			Total each side
1	83 – 76	560 ÷ 80	7
2	0.25 × 2	10 ÷ 20	0.5
3	227 – 82 – 118	One quarter of 108	27
4	5.5 + 4.5	1000 ÷ 10 ÷ 10	10
5	0.3 + 0.5 + 0.2	2 – 0.7 – 0.3	1
6	3 ÷ 2	$\frac{1}{2} + \frac{1}{4} + \frac{3}{4}$	1.5
7	85 ÷ 5	1.7 × 10	17
8	3 × 13	78 ÷ 2	39

Examples of solutions – part 2 (note: there are more!)

| Challenge	One side	Other side	Total each side
Two cards on one side, one on the other	One card from 1 One card from 4	One card from 7	17
	One card from 2 One card from 5	One card from 6	1.5
Two cards on both sides	Any two pairs, with one from each on either side		
Three cards on one side, one on the other	**Both** cards from 4 One card from 1	One card from 3	27
	Both cards from 6 One card from 1	One card from 4	10
Four cards on one side, two on the other	One card from 4 One card from 1 One card from 5 One card from 2	One card from 7 One card from 6	18.5
	Both cards from 4 **Both** cards from 7	**Both** cards from 3	54
Six cards on one side, one on the other	**Both** cards from 1 One card from 4 One card from 2 One card from 5 One card from 6	One card from 3	27

Can you place . . .

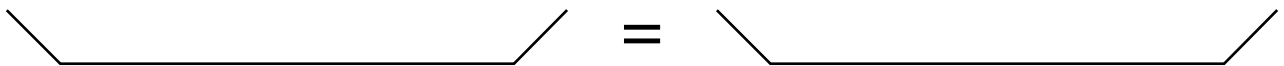Two cards on one side and one on the other?

_____ = _____
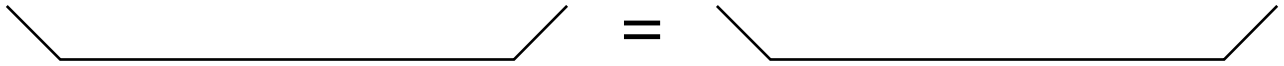
Two cards on both sides?

_____ = _____
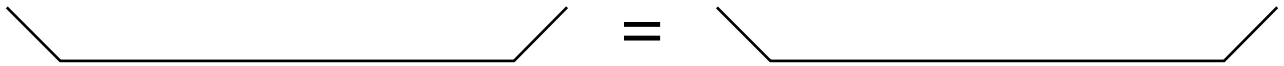
Three cards on one side and one on the other?

_____ = _____
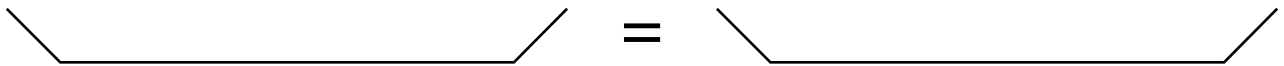
Four cards on one side and two on the other?

_____ = _____

Six cards on one side and one on the other?

_____ = _____