Reasoning in the classroom

Megan's height

Support materials for teachers

Year 4

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Welsh Government

Year 4 Reasoning in the classroom – Megan's height

These Year 4 activities require learners to create and solve problems within the context of measurement. They choose their own method and decide for themselves what to write down.

Activity 1

Megan's height

Learners are provided with the information to solve a problem.

Includes:

- Megan's height question
- Markscheme

Activity 2

Halfway heights

They then select their own set(s) of images and create their own question(s).

Includes:

- Explain and question – instructions for teachers
- Resource sheet – Halfway heights
- Resource sheet – And now there are four!

Activity 3

What about us?

Applying the learning from the previous activities, learners explore the relationships between their own heights.

Includes:

- Explain and question – instructions for teachers

Reasoning skills required

Identify

Learners consider what measurements are realistic and why.

Communicate

They use clear mathematical language and consider whether all the necessary information is included.

Review

They review work produced by different groups and give feedback to help others improve their work.

Procedural skills

- **Addition and subtraction**
- **Estimation**
- **Measuring**

Numerical language

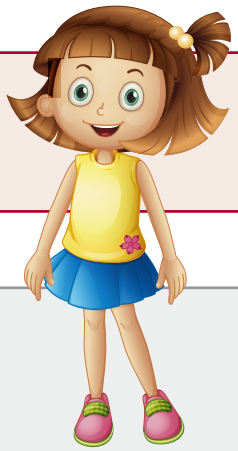
- **Height**
- **Tallest/shortest**
- **Dimensions**
- **Halfway**

Activity 1

Megan's height

Activity 1 – Megan's height

or



Outline

Learners work out Megan's height from two pieces of information provided.

You will need

Megan's height question
One page for each learner

Markscheme

Alun's height is exactly **halfway** between my height and Jo's height.

Megan

Alun

Jo

Alun's height is **98cm**.

Jo's height is **120cm**.

What is Megan's height?

cm

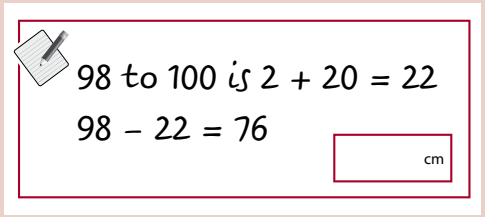
2m

Activity 1 – Megan's height – Markscheme

Marks	Answer
2m	**76**cm
Or 1m	Shows **22** Or Makes an error when finding 120 – 98, then **subtracts** that value **correctly from 98**, e.g. • 120 – 98 = 23 (error) 98 – 23 = 75

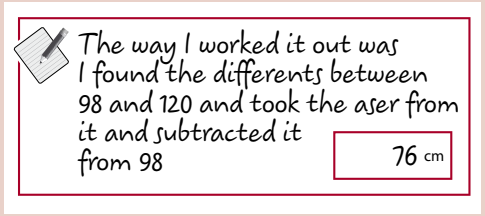
◀ **Jo's height – Alun's height, in cm**

Activity 1 – Megan's height – Exemplars



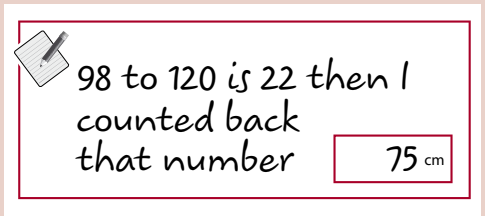
Correct; **2 marks**

- This work shows good communication skills: the method is clear.



Correct; **2 marks**

- This learner would benefit from discussing effective numerical communication. Thinking that a 'mini-essay' is required is a common misunderstanding.



Shows 22; **1 mark**

- This learner understands what to do but has made a slip when counting back.

Incorrect; **0 marks**

- Although this learner may have made a numerical slip, no method is shown so no marks can be given. This illustrates the importance of showing working.

Incorrect; **0 marks**

Common error

This is a common error. Learners need support to understand that diagrams are not drawn full size. They also need encouragement to review their work as this answer makes no sense within the given context.

Activity 2

Halfway heights

Activity 2 – Halfway heights

Outline

This activity is designed to carry on from **Activity 1 – Megan's height**.

Learners choose one or more sets of images and develop their own question(s) about the heights of the people or animals.

They give their question(s) to other groups/pairs, then act as 'teachers', giving feedback about answers and methods shown.

You will need

Resource sheet – Halfway heights

Resource sheet – And now there are four!
Extension activity (if used)

Scissors

Glue

Activity 2 – Halfway heights

Explain

Give learners a copy of the resource sheet, **Halfway heights**.

Explain that each set of three images shows three people (or animals). One is the tallest, one is the shortest, and the height of the third is exactly halfway between the heights of the other two.

Ask them to cut out their chosen set of images and stick it on a piece of paper or card.

They should work together to agree realistic heights for two of the images and then write (on their paper/card) a question that asks for the height of the other image.

For example:

The boy's height is halfway between the dog's height and the man's height.

The man's height is 185cm and the boy's height is 120cm. What is the dog's height?

Learners present their question(s) to other groups/pairs to solve. Those solutions are 'marked' by the group who wrote the question, who also give feedback.

Question

- What measurements are realistic? How do you know?
- Are the heights you have chosen too difficult? If so, what can you change?
- Is your question clear? Will it make sense to everyone else?
- Have you checked your answer? How?
- Is your feedback to other groups clear and helpful?

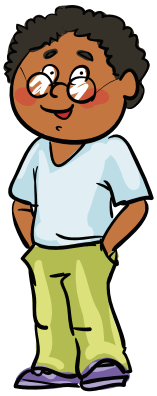
Extension

- See separate sheet: **And now there are four!** *(Solution: Stan 140cm, Joe 110cm.)*












Lisa

Stan

Joe

Alis

Lisa's height is 170cm. **Alis**'s height is 80cm.

Stan's height is halfway between Lisa's height and Joe's height.

Joe's height is halfway between Stan's height and Alis's height.

What are Stan's and Joe's heights?

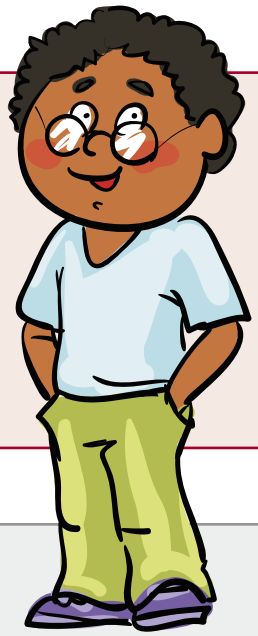
Now write your own questions using four people's heights

. . . or five . . . or?

Activity 3

What about us?

Activity 3 – What about us?



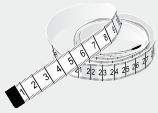
Outline

Learners build on the learning from **Activity 1 – Megan's height** and **Activity 2 – Halfway heights**, to explore the relationships between their own heights.

In pairs, they try to find someone whose height is approximately halfway between their own heights.

They then measure to see how accurate they are.

You will need



Tape measures

Activity 3 – What about us?

Choose two people of different heights. Ask learners to choose someone in the class whose height is halfway between them. Ask how they can find out whether the height is exactly halfway.

Explain

Split the class into pairs where there is a clear height differential.

Pairs then need to estimate the person in the room whose height is closest to halfway between them. At this stage, they must stay in their allocated place in the room, and can only use visual estimation *(avoids chaos!)*.

When they have all identified their 'middle' person, pairs take it in turns to work out whether they are correct.

(This could be done through a process of refining their estimates:

1. *They make a purely visual estimation.*
2. *They check by standing together, then may change their choice of person depending on what they now observe.*
3. *That is their final 'guess' and then they measure to see if they are correct.)*

Or

Five points for an estimate that is within 1cm of the halfway height, three points for within 3cm, and one point for within 5cm.

Question

- How are you estimating halfway?
- What units are you using to measure? Why?
- What accuracy are you using? (For example, to the nearest cm, or the nearest mm, or . . . ?) Why?
- What method have you used to work out whether your choice is correct or not?
- If your middle person is not exactly halfway in height, how much out are you?