Reasoning in the classroom

Three bears

Support materials for teachers

Year 2

Llywodraeth Cymru
Welsh Government

Year 2 Reasoning in the classroom – Three bears

These Year 2 activities require learners to solve a range of problems all linked to the context of bears. The first activity was included in the 2014 National Numeracy Tests (Reasoning). This is followed by three further activities.

Activity 1

Three bears

Learners use their knowledge of number relationships, patterns and simple fractions to solve problems.

Includes:

- Teachers' script
- PowerPoint presentation
- Three bears questions
- Markscheme

Activity 2

Big steps, medium steps, little steps

They use their knowledge of the 2- and 5-times tables and take decisions on which bear to move in order to win a game.

Includes:

- Explain and question – instructions for teachers

Activity 3

Multi-coloured bears

Learners make salt-dough bears then give them different-coloured sweaters and hats.

Includes:

- Explain and question – instructions for teachers
- Whiteboard – Salt-dough bears

Activity 4

Much-loved bears

They sort bears by age and other characteristics, then choose how to display their findings using a block graph or pictogram.

Includes:

- Explain and question – instructions for teachers
- Whiteboard – Teddies
- Resource sheet – Oldest bear

Reasoning skills required

Identify	Communicate	Review
Learners decide on their methods, including working within constraints.	They work together to take decisions and agree their methods.	They review their work and amend accordingly.

Procedural skills

- Ordinals (1st, 2nd, 15th)
- Addition, subtraction
- Multiplication (or repeated addition)
- Fractions (addition of quarters)
- Measuring (mass)
- Patterns
- Combinations
- Sorting (sets)
- Block graphs/pictograms

Numerical language

- 1st, 2nd, 15th
- Altogether
- Older/oldest, youngest
- Line
- cm
- Long
- Quarter
- Closest
- Measure
- Equal
- Different/difference
- Sort
- Set
- Block graph
- Pictogram

Activity 1

Three bears

Activity 1 – Three bears

or

Outline

This Year 2 activity focuses on three somewhat fastidious bears and their world.

Learners use their understanding of number, including simple fractions, to solve a range of problems.

You will need

Teachers' script

PowerPoint presentation

Three bears questions
Three pages for each learner, can be printed double-sided

Markscheme

Presentation to be shown to learners before they work on Three bears

The text in the right-hand boxes (but not italics) should be read to learners. You can use your own words, or provide additional explanation of contexts, if necessary. However, if you are using this as an assessment item, no help must be given with the numeracy that is to be assessed.

Slide 1		*(Keep this slide on the screen until you are ready to start the presentation.)*
Slide 2		Here are three bears. This bear *(point)* is little bear. He is the smallest. And this bear *(point)* is big bear. He is the biggest. This bear *(point to the middle bear)* is bigger than little bear, but smaller than big bear. She is medium bear. The bears live in the forest. Their favourite game is climbing trees and their clothes get quite dirty. So, every day each bear puts on a clean jumper and a clean hat. But . . .
Slide 3		. . . little bear always wears a yellow jumper and a purple hat . . .

Slide 4		… medium bear always wears a pink jumper and a brown hat.
Slide 5		What do you think big bear always wears? Yes! A blue jumper and a red hat. Because they wear a clean jumper and hat each day, each bear has lots of jumpers and lots of hats. Once a week, they wash their jumpers and their hats ready for the next week. Fortunately, they have lots of pegs and a very long washing line. *(If necessary, explain what pegs and a washing line are.)*

Slide 6		Here are some of their jumpers and hats on the washing line. How many pegs does each jumper have? That's right, two. And how many pegs does each hat have? Yes, one. The bears are very neat and tidy, so they always put the washing on the line in the same order. How do they put their washing on the line? *(Allow discussion, and agree that the jumpers are in order of size, then the hats are in order of size, then the jumpers again, and so on. Do not refer to first position, second position, etc., and do not continue the pattern.)* You can't see it, but what would be next on the washing line? That's right, a red hat. And what would be after that? Very good, a yellow jumper because after the hats come the jumpers. Now you are going to answer some questions about little bear, medium bear and big bear. Remember to show your working so that someone else can understand what you are doing and why. *(If you are using this item for assessment purposes, you may wish to limit the time available, e.g. 15 minutes.)*

1 The bears wash their jumpers and hats.

 is 1st on the line.  is 2nd.

What will be 15th on the line?

2m

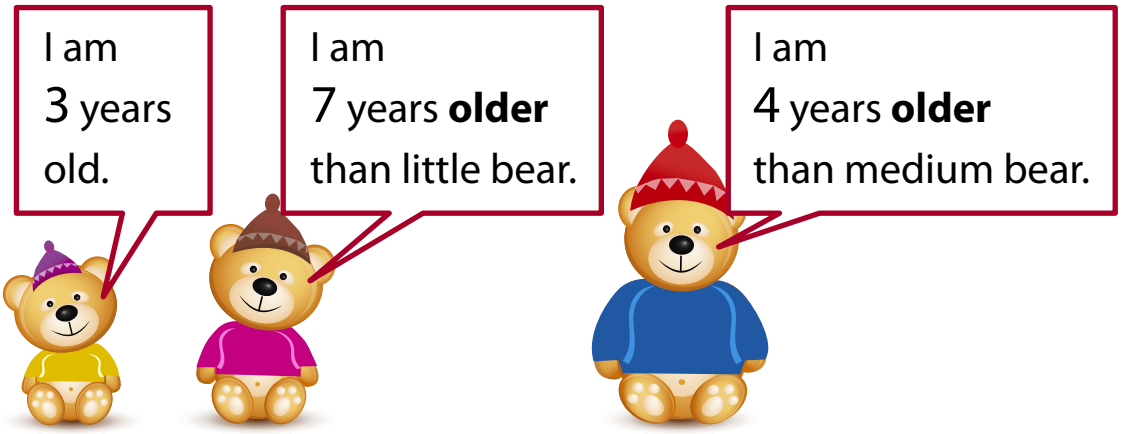
They wash 21 jumpers and 21 hats.

Altogether, how many **pegs** do they use?

pegs

2m

2

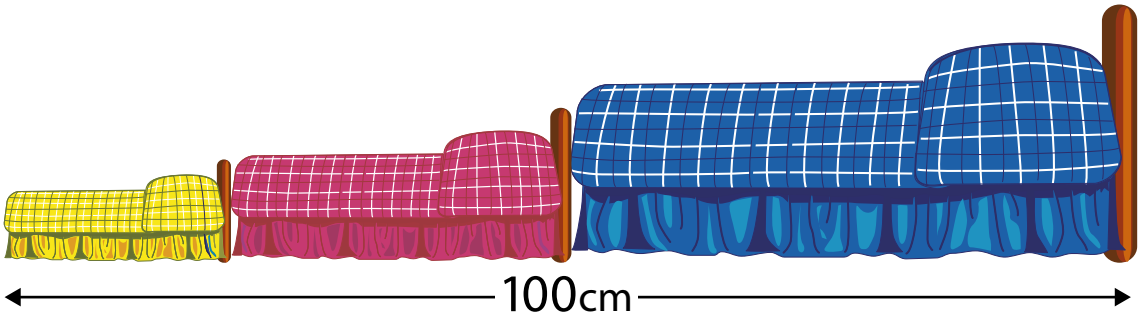


How old is **big** bear?

years old

1m

3 The bears put their beds in a line. The line is 100cm long.



Little bear's bed is 20cm long.

Big bear's bed is 50cm long.

How long is **medium** bear's bed?

cm

2m

4 The bears have three cakes.

The bears cut the cakes into **quarters**.

Can all the bears have what they want?

Show how you know.

3m

Activity 1 – Three bears – Markscheme

Q	Marks	Answer
1i	2m	**Blue jumper**
	Or 1m	Links position 14 to the pink jumper (accept any unambiguous indication)

Accept any unambiguous indication, e.g.
- **Big T-shirt**
- **Blue**

1ii	2m	**63** pegs
	Or 1m	Answers **42** or shows **42** in working Or Answers **62** or **64** Or Shows a method that would lead to 63 if calculated correctly, e.g. • 21 + 21 = 32 (error), + 21 = 52 (error)

Common error

1 peg per item, or 2 × 21

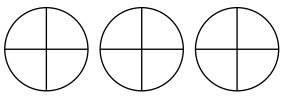
Common error

Probable error when working out 21 + 21 + 21

2	1m	**14** years old

3	2m	**30**cm
	Or 1m	Shows a method that would lead to 30 if calculated correctly, e.g. • 100 – 70 • 20 + 50 = 80 (error), answer 20 (subtraction from 100 implied) • 100 – 20 = 70 (error), 70 – 50

Activity 1 – Three bears – Markscheme (continued)

Q	Marks	Answer
4	3m	**No**, with both **12** and **13** seen Or **No**, with both **12** and **1 more quarter needed** (or equivalent statement) Or **No**, with both **13** and **1 too few quarters** (or equivalent statement)
	Or 2m	**No**, with **12** seen Or **No**, with **1 more quarter needed** (or equivalent statement) Or **No**, with **1 too few quarters** (or equivalent statement)
	Or 1m	**12** seen or implied, but not from an incorrect calculation, e.g. •  Or **13** seen

Throughout, accept 'No' implied provided it is clear that the correct decision has been taken

All three cakes must be clearly shown as 4 pieces each, even if the pieces are not equal in size

Activity 1 – Three bears – Exemplars

Question 1ii

21 + 21 = 42 + 21 = 63 pegs	Correct; **2 marks** • The answer 63 is clearly shown in the working.
21+41=62 62 pegs	Answer 62; **1 mark** Common error This learner shows understanding but has made an error when working out 21 + 21
 41 pegs	Incorrect; **0 marks** • This learner has lost count. Counting in fives using a tally would be a helpful strategy.

Question 2

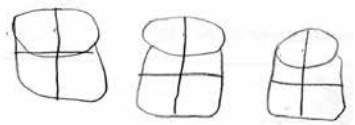
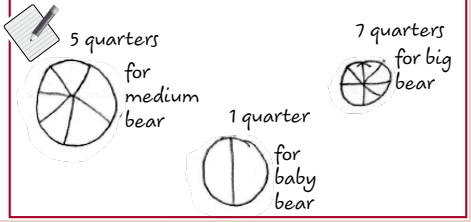
11 years old	Incorrect; **0 marks** Common error 11 is from 7 + 4, i.e. little bear's age has been ignored.
4 years old	Incorrect; **0 marks** Common error This learner has ignored 'older' and given the value shown alongside big bear.

Question 3

20 + 30 = 50 50 + 50 = 100 50 cm	Correct method; **1 mark** • The correct value is shown but the learner has then selected the wrong value for the answer.
40 cm	Incorrect; **0 marks** Common error The answer 40 from counting on from 70 to 100 is a common error, but so is the answer 40 from estimating. As no method is shown no marks can be given.
I used a ruler and measured in cm  4·5 cm	Incorrect; **0 marks** Common error Ignoring the information given in the question in favour of measuring is another common error.

Activity 1 – Three bears – Exemplars (continued)

Question 4

4 x 3 = 12 1 + 5 + 7 = 13 they can not get all of there orders because there is only 12 quarters and they want 13	Correct; **3 marks** • This response is very clearly communicated.
Because there is 12 and big bear wants 7 quarters and medium bear wants 5 and 5 + 7 = 12 so little bear can't have his	Correct; **3 marks** • 'No' is clearly implied, as is that 1 more quarter is needed.
 12 1 = 5 = 6 + = 13 No	Correct; **3 marks** • This response shows 13, 12 (by the cakes) and 'No', so gains all three marks. However, this learner would benefit from discussion after the test about how to improve their numerical communication.
No Big Bear can only haye 6 quarters of a cack	'No', with 1 more quarter needed; **2 marks** • For full marks, this learner would need to explain how they know that big bear needs an additional quarter.
 no	12 implied; **1 mark** • Each cake is clearly intended to be cut into four pieces. Had this learner then shown the value 12, this response would have gained two marks as 'No' is also shown.
No. Because if you add them all to gether then it's to much ~~1+5~~ 1qu + 5qu = 6qu 6qu + 7qu = 13qu	13 seen; **1 mark** • No evidence is given to show how this learner knows 'it's to much'.
	Incorrect; **0 marks** Common error This learner needs support to understand the concept of quarters.

Activity 2

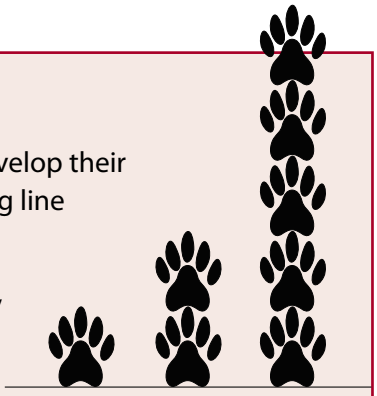
Big steps, medium steps, little steps

Activity 2 – Big steps, medium steps, little steps

Outline

This Year 2 physical activity continues the theme of the three bears. Learners develop their own strategy to help their group of bears to win a game by crossing the finishing line as close together as possible.

As learners will need to work collaboratively, discussing and agreeing strategies, it might be beneficial for this activity to be run with only three or four groups at any one time.



You will need

A space large enough to run the game, e.g. playground or hall

Activity 2 – Big steps, medium steps, little steps

Explain

Sort learners into groups of three *(if you have 'spare' learners create groups of four)*. Explain that they are the three bears – big bear, medium bear and little bear (*or little bear twins if a group of four)*. Tell learners they will swap roles later on. In the playground or other large space, draw a starting line and stand an appropriate distance away. The game is simple – you will call a number, and the bears must decide which one of their group is going to take steps towards you.

They are going to use heel-to-toe steps. However, just like in the story, little bear has little feet, medium bear has medium-sized feet and big bear has big feet. So each bear moves at a different rate: the number of steps little bear can move is exactly the number you call, while medium bear can move two times the given number, and big bear five times the given number. *(Check understanding using the question below as a guide.)*

The aim is to get all their group across the finishing line – but they must cross the line as close together as possible *(so if big bear races to the line and crosses it, but the others trail behind, they won't win the game. Twins move together as one.)*

Call a number from one to 10 and give learners time to decide who in their group should move. Continue until all the bears have crossed the line. Discuss using the questions below and agree which group crossed the line closest together and therefore won. Repeat the game, but first ask them to think about what they might want to change in the way they approached it last time. Ask them to swap their roles, so they 'become' a different bear. Run the game and again discuss.

Finally, repeat it *(again changing roles)*, but this time, tell them they can split the number you call, and their challenge is to get all of their group crossing the line at exactly the same time. *(So if you call 10, for example, they could decide to let big bear take three moves, thus moving 15 steps, and medium bear take the remaining seven, hence moving 14 steps. Or they could choose to have all three bears move.)* Let each group move in turn so you can check.

Question

- If I call the number three, how many steps can little bear take? *(3)* Medium bear? *(6)* Big bear? *(15)* What if I call five?
- How are you working out how many steps big bear and medium bear can take? Do your times tables help? How?
- Why have I told you to use heel-to-toe steps and not normal steps? Why is it fairer? *(Relate to length of stride.)* If we were to measure everyone's heel-to-toe steps would we find they were exactly the same? Why not? *(There will still be variation but it will be less than the variation within strides.)*
- How are you deciding who is going to go forward? Do you all agree? If not, how are you doing to decide?
- Who won the game? Why? Why didn't your team/another team win?
- What are you going to change? Why?
- Now you can split the number, how are you going to plan who moves and how?
- Which was easier – the first version of the game, or the second? Why?

Activity 3

Multi-coloured bears

Activity 3 – Multi-coloured bears

Outline

In this Year 2 activity, learners make salt-dough bears, which they then adorn with sweaters and hats in different combinations of colours.

As this is a practical activity in which learners make their own dough and decide how to apportion it fairly, you may wish to work with small groups at a time, or use additional adult helpers.

You will need

WB **Whiteboard – Salt-dough bears**

Each group of four learners will need:

- **2 cups of plain flour** (use a mug-sized cup, or ascertain quantities through making up a batch beforehand, using any cup/measure you choose)
- **1 cup table salt**
- **1 cup water**
- **Mixing bowl and wooden spoon**
- **Table on which to work and knead dough**
- **Tray on which to place their models** (metal If being dried out in the oven, microwave-proof if using a microwave)
- **Plastic knife**
- **Balance scales/weighing scales**
- **Bear biscuit cutters** (optional)
- **Poster paints – four different colours**
- **Brushes**
- **Varnish** (optional)

Activity 3 – Multi-coloured bears

Explain

Start with learners in groups of four making salt dough. Make sure everything is ready, and learners appropriately attired, then show **Salt-dough bears** on the whiteboard and discuss to make sure they understand what to do. *(Reassure that you will help.)* As far as possible, let them create their dough themselves, but make sure support is available to monitor the quantities *(so it works!)*.

Ensure they all take a turn in kneading the dough. When it is ready, ask them to divide it into equal parts so everyone has a fair share. How can they do that? *(Balance scales if available, using trial and error. Or, using ordinary scales, weigh an easy quantity, then divide into four equal portions, repeating as many times as necessary.)* Each learner then rolls out their dough and creates a bear, using a biscuit cutter if possible, or otherwise creating their own design. Make sure, however, that every bear has a hat, and ask them to include a pompom on top. *(Use water to join pieces of dough.)*

Their bears can be dried out traditionally in a low oven for around three hours. Alternatively, if you want instant results, place them in a microwave for three minutes at full power. If they are not fully dry, put them back in for 20 seconds at a time. Make sure they are fully dry, otherwise they go soft.

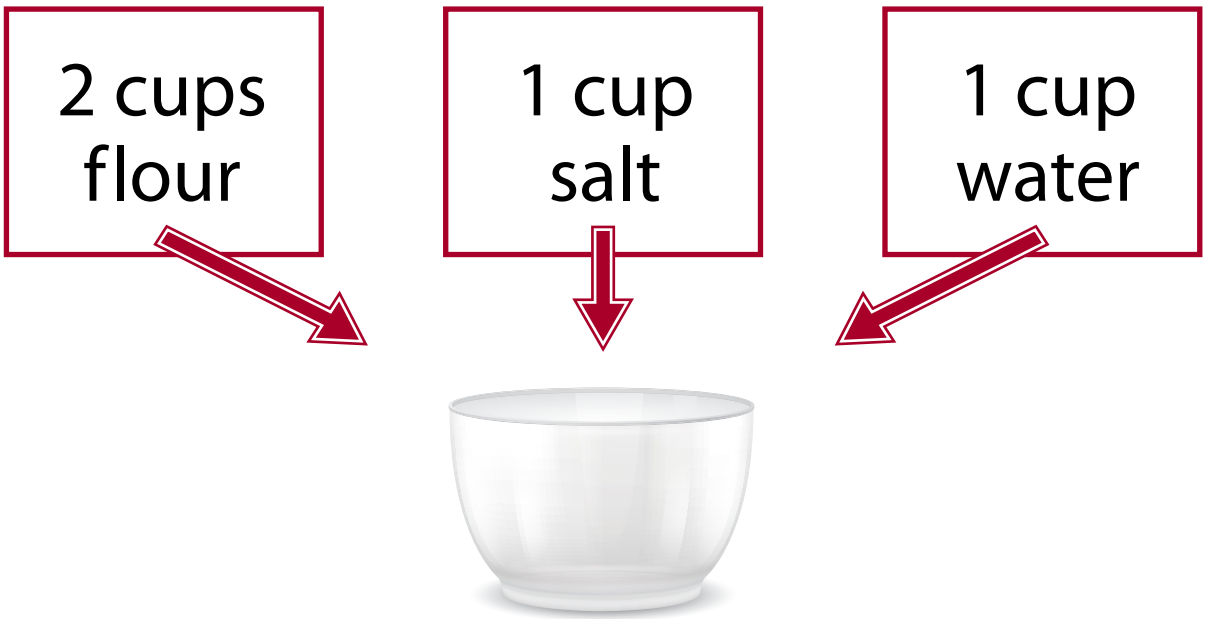
Once their bears are ready, give each group a set of four poster paints of different colours, and brushes. Their task is to paint their bears, giving each a beautiful striped sweater, using two colours, and a different-coloured hat, with a different-coloured pompom *(so all four colours per bear)*. But . . . each bear must be different from any other bear in their group. The bears are very fussy and insist that no sweater should be in the same two colours, and the same for their hats.

Give them paper and pens so they can work out a plan, and suggest they check with an adult before they start to paint. Once they have painted their bears, take a photo of their masterpieces and ask them to write a report on what they have done, to create a display for the classroom. The salt-dough bears can be finished by a coat of clear varnish, which protects and enhances the colour.

Question

- If we want dough for eight people, how many cups of flour, salt and water do we need?
- What does equal mean? *('The same as' – this is an important message to young learners, as they often mistakenly believe equals means 'makes'.)* How are you going to make sure everyone in your group has an equal amount of dough? Are there different ways you could try? Which way is best? Why? What do you think bakers do to make sure their cakes are all the same?
- How are you going to plan your designs so you make sure that every bear in your group has a different sweater and a different hat? Have you remembered that you have to use all four colours for each bear – two on the sweater and two on the hat?
- How many different sweaters can you make with just four colours? *(Six – using colours A, B, C and D we can make AB, AC, AD, BC, BD, CD.)* And the hats? *(The same)*
- What are you going to write in your report, so other people find it interesting? Are you all working together? Has everyone had a say?

Salt dough for 4 people



1. Mix.
2. Knead to make the dough.
3. Share into equal pieces.
4. Roll out your dough to make your bear. Remember the hat!

Activity 4

Much-loved bears

Activity 4 – Much-loved bears

Outline

This Year 2 activity continues the context of the preceding activities. Learners gather and present data about a collection of bears they bring to the classroom.

Activity 4 – Much-loved bears would sit well in a topic relating to (twentieth century) history, and could readily be extended by asking learners to write about the teddy bear they have brought in and its origins and importance. If it is owned by someone else, they could interview them about its history.

You will need

A teddy bear for each learner – although they are asked to bring in their own, it might be wise to have spares

Whiteboard – Teddies

Resource sheet – Oldest bear
One sheet for each learner

Activity 4 – Much-loved bears

Explain

Show **Teddies** on the whiteboard and ask which is the oldest of the three. How do they know? Discuss, encouraging them to articulate their reasons. Ask if they know anyone who might have an old teddy. What is the oldest teddy *(or other similar cuddly toy)* they have at their home?

Give each learner a copy of **Oldest bear** and tell them you want them to find the oldest teddy they can *(from any family member or friend)*, find out information about it, then bring it into school on xxxday. (*Reassure them that the oldest teddy or cuddly toy they have might not be very old at all – but that is fine. And if they don't have any cuddly toys, that's fine too, as you can lend them one. Make sure that the learner who is 'borrowing' a teddy from you asks the relevant questions of you and fills in a sheet.)* Learners either draw a picture of their teddy at the bottom, or if technology permits, glues on a photograph.

On the allocated day, sit in a large circle and ask learners to introduce their teddy, giving information on its age and where it came from, and so on. When everyone has spoken, ask which is the oldest and which the youngest, then ask the whole class to order their bears, oldest to youngest. Then ask how many bears are older than . . . years. And how many are between . . . and . . . years? *(And so on. Choose about four categories that are appropriate for the ages of the bears you have in front of you, and write on the whiteboard a table showing the categories and the relevant totals.)*

Tell them you would like them to record their findings – how could they do that? Discuss and agree that a block graph or pictogram would be a good approach. If necessary, draw part of the graph on the whiteboard.

Once they have completed their graph relating to the ages of their bears, bring the class back together and ask if they could sort their bears in a different way. (*Colour, height, those with ribbons, hats, etc.)* Allow learners to do the sorting into sets themselves, and encourage them to explore all the different attributes they can find, and then show the information in a block graph/pictogram.

The activity could end with groups writing a short report to go with their graph, then individual learners writing about their teddy and its origins and illustrating their work with a drawing/painting.

Question

- What does 'oldest' mean? *(Existed for the longest number of years)* Who is the oldest person in this room? And the youngest? *(How many months' difference is there between them?)*
- Who is the oldest person you know? If they had a teddy, how old might that be? What about your teddy/cuddly toys? How old is your oldest one?
- Why did I choose these categories for the ages of your bears? Why didn't I choose xxx? *(Because none of the bears was as old/young as that)*
- What type of chart are you going to choose to show your findings? Why? Why do we use charts? *(Because they present information in a way that is easy to understand, and are attractive)*
- Look at all the bears. Is there only one way to sort them? Can you find another? And another? . . . And another? Which is the most interesting way? Why?

Name _____

The oldest teddy bear (or cuddly toy) I can find is called _____

It belongs to _____ and is about _____ years old.

It is important because _____

_____

_____

This is what my bear looks like.