Smalls and talls



Support materials for teachers

Year 3



Year 3 Reasoning in the classroom - Smalls and talls

These Year 3 activities include time, the concept of balancing, and simple fractions. Each topic is incorporated within Activity 1, and is then developed within one of the remaining activities.



Smalls and talls

Learners are given a range of problems to solve, involving fantasy characters known as smalls and talls.

Includes:

- Teachers' script
- PowerPoint presentation
- Smalls and talls questions
- Markscheme



What's the time Mr Wolf?

They play a game using time intervals and compare moves.

Includes:

- Explain and question instructions for teachers
- Teachers' sheet Time cards
- Teachers' sheet Times

Activity 3

Number balance

They investigate different ways of balancing weights.

Includes:

■ Explain and question – instructions for teachers

Activity 4

Balancing beans

They create their own balance scale then use beans to weigh different objects. Includes:

■ Explain and question – instructions for teachers

Activity 5

Lines and fractions

They draw lines on grids to show simple fractions.

Includes

- Explain and question instructions for teachers
- Whiteboard Half and half
- Resource sheet Half and half
- Resource sheet Quarter and three-quarters



Reasoning skills required

Identify

Learners choose for themselves how to apply a range of numerical skills to solve simple problems.

Communicate

They explain their methods and decide how to record their results.

Review

They consider different ways of showing solutions and choose the most effective.

Procedural skills

- Time and time intervals
- Multiplication (or repeated addition)
- **■** Subtraction
- **■** Simple fractions
- Area by counting squares (extension)

Numerical language

- Pair
- **■** Balance
- **■** Weights
- Solutions
- More
- Half
- Quarter and three-quarters
- Area (extension)

Activity 1

Smalls and talls

Activity 1 – Smalls and talls



Outline

This Year 3 activity incorporates a wide range of numerical concepts, including time, numerical equivalence and simple fractions.



You will need



Teachers' script



PowerPoint presentation



Smalls and talls questions

Three pages for each learner, pages 1 and 2 can be printed double-sided



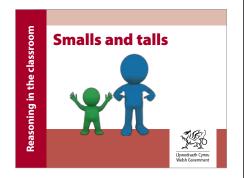
Markscheme



Presentation to be shown to learners before they work on Smalls and talls

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.

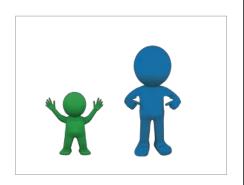
Slide 1



(Keep this slide on the screen until you are ready to start the presentation. Before you show the next slide, say . . .)

In a faraway land, a long, long way from here, there are just two types of people . . .

Slide 2

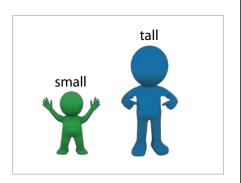


... green people and blue people.

The green people are called smalls.

The blue people are called talls.

Slide 3



The smalls and talls are really good friends. Sometimes groups of them go out together.

Slide 4



Here are 12 smalls and four talls. It's one of their birthdays, so they decide to go to the park.



Slide 5



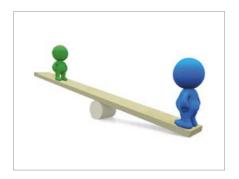
At the park there are two small swings . . . just the right size for smalls to swing on. Pairs of smalls can swing together. (Make sure that learners understand the word 'pair' as this is used in the assessment.)

Slide 6



There is also a see-saw. This see-saw is balanced. What would happen if a small sat on one end of the see-saw and a tall sat on the other? (Discuss and make sure that learners understand the word balance as this is used in the assessment/questions.) Let's see . . .

Slide 7



Well done. The tall is heavier than the small so the see-saw isn't balanced any more, it goes down on the side where the tall is.

The smalls and talls do lots of things at the park, but the thing that the smalls and talls like best of all is . . .

Slide 8



... the picnic! Yum.

You are going to answer some questions about the smalls' and talls' special day at the park.

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 There are 12 smalls.



At **2 o'clock** the first pair goes on the swings.





Each pair swings for 10 minutes.

When does the last pair **finish** swinging?

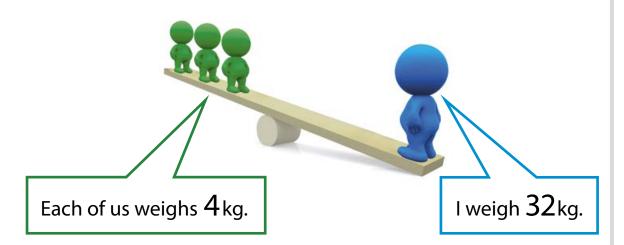
Show how you work it out.







 $\mathbf{2}$ 3 smalls and $\mathbf{1}$ tall are on the see-saw.



They need **more** smalls to make the see-saw balance.

How many more?







Now they eat their picnic.

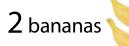
Each small eats 1 banana



 $\frac{1}{4}$ and $\frac{1}{4}$ sandwich



Each tall eats 2 bananas



 $\frac{3}{4}$ sandwich



There are 12 smalls and 4 talls.

Altogether, how many bananas do they eat?

bananas



Altogether, how many sandwiches do they eat?



sandwiches





Activity 1 - Smalls and talls - Markscheme

Q	Marks	Answer
1	3m	3 pm or equivalent time
	Or 2m	Shows or implies that the total time taken is 60 minutes (or 1 hour)
		Or
		Gives the answer 4 o'clock or equivalent time
		Or
		Gives the answer 2:50 or equivalent time
	Or 1m	Shows or implies that there are 6 pairs

- The time after 12 lots of 10 minutes, i.e. forgets pairs
- The time when the last pair of smalls starts swinging

2	3m	5
	Or 2m	Shows or implies that another 20kg is needed (accept units omitted) Or Gives the answer 8
	Or 1m	Shows or implies that 3 smalls weigh 12kg (accept units omitted) Or Shows or implies that 8 lots of 4 makes 32, e.g. • $8 \times 4 = 32$ • $4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 = 32$

- Difference in kg between 1 tall and 3 smalls
- The total number of smalls, i.e. has ignored 'more'
- **⋖** Weight of 3 smalls



Activity 1 – Smalls and talls – Markscheme (continued)

Q	Marks	Answer			
3i	1m	20 bananas			

3ii	3m	6 sandwiches
	Or 2m	Shows or implies that 4 talls eat a total of 3 sandwiches Or Shows or implies that, together, 4 smalls and 4 talls eat 4 sandwiches
	Or 1m	Shows or implies that 12 smalls eat a total of 3 sandwiches Or Shows understanding that four lots of $\frac{1}{4}$ (or $\frac{1}{4}$ and $\frac{3}{4}$) equals one whole Or Shows understanding that two lots of $\frac{1}{4}$ equals $\frac{1}{2}$

 $4 lots of (\frac{3}{4} and \frac{1}{4})$



Activity 1 – Smalls and talls – Exemplars

Question 1



1 gose 2:00 2 gose 2:10 3 gose 2:20 4 gose 2:30 5 gose 2:40 6 gose 2:50 so they go on for 10 minuets so it is 3 o'clock when they get of

Correct; 3 marks

• This learner works systematically, showing their method clearly.

2 4 6 8 10

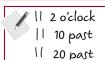
550 60

2:60

12

Total time 60 minutes; 2 marks

• This work also shows a systematic approach. However, the answer of 2:60 shows that this learner needs help to understand time.



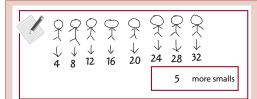
|| 30 past || 40 past || 50 past 50 past2 o'clock

Answer equivalent to 2:50; 2 marks



'50 past 2 o'clock' is acceptable, even though it is unconventional. The only error is to work with the times at which each pair starts, rather than finishes, swinging.

Question 2



Correct; 3 marks

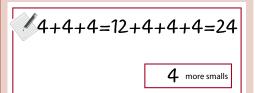
• This learner counts on in 4's to reach the correct solution.

1 2 3 4 5 4 8 12 16 20 6 7 8 24 28 32 8 more smalls

Answer 8; 2 marks



This learner also counts on in 4's but forgets that 3 smalls are already on the see-saw.



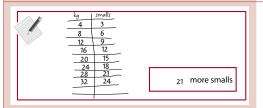
3 smalls weigh 12kg; 1 mark

'4 + 4 + 4 = 12' is sufficient to imply that 3 smalls weigh 12kg.
 Had this learner continued to add another 4 they would have found the correct solution. Learners should be encouraged to check their work!



3 smalls weigh 12kg; 1 mark

 The position of 12 by the side of the first row of three small circles implies the correct weight.



Implies that 8 lots of 4 makes 32; 1 mark

• Sadly, this learner has taken 4kg to be the weight of 3 smalls, not one. However, the left-hand side of the table shows the result of adding 8 lots of 4.



Activity 1 - Smalls and talls - Exemplars (continued)

Question 3i

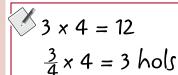
16 bananas

Incorrect; 0 marks



The answer 16, from 12 + 4, is a common error.

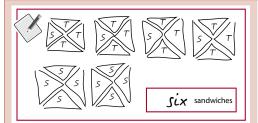
Question 3ii



6 sandwiches

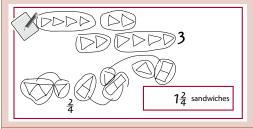
Correct; 3 marks

 This question is demanding for Year 3 so the depth of understanding of fractions and multiplication shown by this learner is impressive.



Correct; 3 marks

 This learner also shows good understanding and their communication is very clear.



Implies that 4 talls eat 3 sandwiches; 2 marks

 This learner also shows good understanding, though it is not clear how the answer of 1²/₄ has been obtained.



Four lots of $\frac{1}{4}$ equals one whole; **1 mark**

• The diagram shows sufficient understanding.

$$\frac{1}{4} + \frac{1}{4} = \frac{1}{2} + \frac{1}{4} + \frac{1}{4} = \frac{1}{2} + \frac{1}{2} = \frac{1}{1} + \frac{1}{4} + \frac{1}{4}$$

$$+ \frac{1}{4} + \frac{1}{4} = \frac{1}{1}$$

$$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{1}{1} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{1}{1}$$
sandwiches

Two lots of $\frac{1}{4}$ equals $\frac{1}{2}$; **1 mark**

• It is difficult to judge the understanding shown here as it is not clear whether this learner knows that $\frac{1}{1}$ is the same as a whole. However, $\frac{1}{4} + \frac{1}{4} = \frac{1}{2}$ is clearly shown.

$$\frac{1}{4} + \frac{1}{4} + \frac{1}$$

Incorrect; 0 marks



This learner has added the numerators and denominators. This is a common misunderstanding, especially among those who are introduced to 'formal' fractions too early.

Activity 2

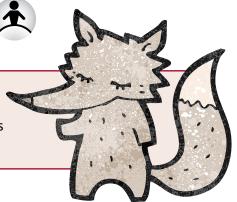
What's the time Mr Wolf?

Activity 2 – What's the time Mr Wolf? or or



Outline

Activity 2 – What's the time Mr Wolf? is a physical activity that encourages Year 3 learners to explore simple time intervals.



You will need



Teachers' sheet - Time cards

One card for each pair, with the '5 minutes' card marked (surreptitiously) so that during the game you can see which pair is holding it



Teachers' sheet - Times

Activity 2 – What's the time Mr Wolf?



Explain

Make sure learners know the traditional playground game of 'What's the time Mr Wolf?' Explain that they are going to play the game, but that the rules that allow them to move have changed.

Give each pair one of the **Time cards** (already cut up), differentiating by ability. Help learners to understand that the cards give the time interval that allows the pair to move forward (e.g. the 10 minutes card allows the pair to move at 'ten past', 'twenty past' and so on). These time intervals must be kept secret from other groups.

In pairs, the learners stand at one end of the playground/hall, while you, as Mr Wolf, stand at the other. Explain that when they hear a time that fits with their card, they move one step forward (you might want to restrict this to 'wolf-cub' footsteps – toe to heel).

Before you start, tell the learners that you are a magic wolf and you can tell which pair is going to get to you first (the one you can see has the 5 minutes card).

Call out the first time on the list in **Times** (the times have been selected to ensure a disparity between pairs in their ability to move forward). Learners move if they are eligible – some level of checking might be wise, but make sure not to refer to the times on their cards.

Once the '5 minutes' pair has reached Mr Wolf, reiterate your 'magic' ability and tell them they are going to see if they can be magic too by working out how you knew who would win. Collect in all the cards and place them on the ground so everyone can see, then either repeat the game, or allow them in their pairs (or the whole class) to find out why that pair was certain to win.



Question

- Which card is the 'best' to have? Why?
- Which is the 'worst'? Why?
- Can you think of a card that isn't here, but would be even better than the winning card? (1 minute, etc.)
- Suppose you had the card showing 30 minutes. Altogether, how many times are there between 9 o'clock and 10 o'clock when you could move? What about for the other cards? How do your times-tables help you to work out the answers?
- Can you think of something in real life that you might do every 5 minutes, every 10 minutes . . . every hour?

Extension

■ Suppose it takes 30 steps to get from the start to the finish. If Mr Wolf called out every 5 minutes in order, from 9 o'clock, at what time would the pair with the 10 minutes card get to the finish? What about the pairs with other cards?



One card for each pair, ensuring only one 5 minutes card is handed out. Other times can be duplicated. Mark the back of the 5 minutes card, but in a way that is not obvious to learners.

5 minutes	10 minutes
10 minutes	15 minutes
15 minutes	20 minutes
20 minutes	30 minutes



Times have been chosen to ensure a disparity in movement between pairs. They can be changed or continued as appropriate.

	5 minutes	10 minutes	15 minutes	20 minutes	30 minutes
1. 10 o'clock	1	1	1	1	1
2. Twenty past 9	1	/		1	
3. Half past 8	1	1	1		1
4. 2 oʻclock	1	1	1	1	1
5. Quarter past 3	1	1	1		
6. Five to 12	1				
7. 6 oʻclock	1	1	1	1	1
8. Twenty to 7	1	1		1	
9. 1 minute past 7					
10. Ten past 6	1	/			
11. Ten to 11	1	/			
12. 3 oʻclock	1	1	1	1	1
13. Quarter to 4	/	/	1		
14. Half past 2	/	/	1		1
15. 6 minutes to 4					
16. 6:45	1		1		
17. 4:30	1	1	1		1
18. Twenty past 2	1	1		1	
19. Half past 1	1	1	1		1
20. 1 oʻclock	1	1	1	1	1

Activity 3

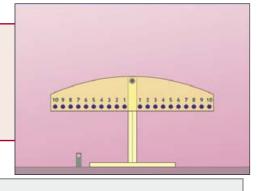
Number balance

Activity 3 – Number balance



Outline

This activity continues the concept of balance as introduced within **Activity 1 – Smalls and talls**. Learners use an online program from NRICH to explore different ways of balancing weights.



You will need



The computer program at <u>nrich.maths.org/4725/index</u> to show on the whiteboard.

Each group/pair will also need access to this program.

Activity 3 – Number balance

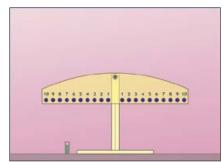


Explain

Show the full-screen version of **Number Balance**, available at nrich.maths.org/4725/index

Drag a weight to 6 on the left-hand side of the balance and discuss what happens. Now drag another weight to 6 on the right-hand side to show how the scales balance again.

Take one of the weights off, and say that you want to put two weights on that side to make the scales balance. Where could you put them? (1 and 5; 2 and 4; 3 and 3) Show all three possible solutions.



Take all the weights off and say that you are going to put two weights on the left-hand side, on 6 and on 4. You want to use two weights on the other side to make the scales balance. Ask learners to work in their groups/pairs to find all the different ways of doing this. Encourage them to find their own ways of recording solutions. (There are five different ways: 1 and 9; 2 and 8; 3 and 7; 4 and 6; 5 and 5.)

Learners come together to share solutions and ways of recording. Then they create a balance problem of their own for other groups/pairs to solve. (Remind them to work out the solutions!)



Question

- How do you know when the scales will balance?
- How many different answers have you found? How can you be sure that you have found them all?
- Suppose there were two weights on the left-hand side, on 5 and 4. Could you put two weights on the same peg on the other side? Why is it not possible?
- How did you record your answers? Now that you have seen other ways, which way do you think is best and why?
- What is your balance problem? Are you confident that you have found all the different answers? How?
- How could you make your balance problem easier/harder?

Extension

Use different numbers of weights, such as two weights on one side and three weights on the other. Activity 4

Balancing beans

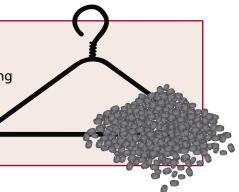
Activity 4 – Balancing beans



Outline

This practical Year 3 activity encourages learners to extend their understanding of mass.

They create their own simple balance scale, then use a standard unit of measurement (a bean) to investigate the masses of different objects.



You will need



The equipment for each pair/group to make a simple coat hanger balance Many websites provide instructions e.g. lets-explore.net/blog/2012/02/hanger-balance/



Dried beansAbout 100g for each pair/group

Activity 4 – Balancing beans



Explain

Tell learners that long ago, in Mexico, the Aztecs didn't have coins but used cocoa beans as their money.

Tell learners that they are going to decide the value of different items by finding out how much they weigh. So, for example, if one pencil weighed the same as 50 beans, to 'buy' a pencil, you would give the person selling it 50 beans.

In their pairs/groups learners create their simple balance scale. Then they select different items around the classroom and investigate how many beans each item weighs. They record their findings however they choose.

Their scales and findings can then be displayed within the classroom, and the scales revisited as many times as they wish!



Question

- How do you know your balance scale is accurate? (In each cup put something that you know to be a standard weight, such as three multilink cubes. The scale works if the cups are balanced.)
- What sort of items are you going to weigh? (Items need to be small, given the number of beans, and also the size of the cups.)
- How are you going to record your findings so that someone else can understand them?
- Look at your findings. One (...) weighs (...) beans. How much would two (...) weigh? How much would five (...) weigh? How are you working out the answers?
- Suppose one toy weighs 30 beans. How many of those toys would weigh the same as 150 beans? Or . . . ?
- In the real world, why would we not want to use beans as a standard unit of measurement? (They are not standard, and also you would need far too many for it to be practical think of weighing a car in beans! And a stone, for example, would be more valuable than a gold ring!)

Extension

■ Learners find the number of beans for 'real' weights, e.g. 10 grams, 20 grams, 50 grams, etc. They record their findings in a table, then review the outcomes. (The number of beans for 20 grams should be double the number of beans for 10 grams, etc. However, because beans are likely to be very slightly different weights and/or fractions of beans are required, it is likely that anomalies will be found – this allows you to talk about variation and approximation.)

Activity 5

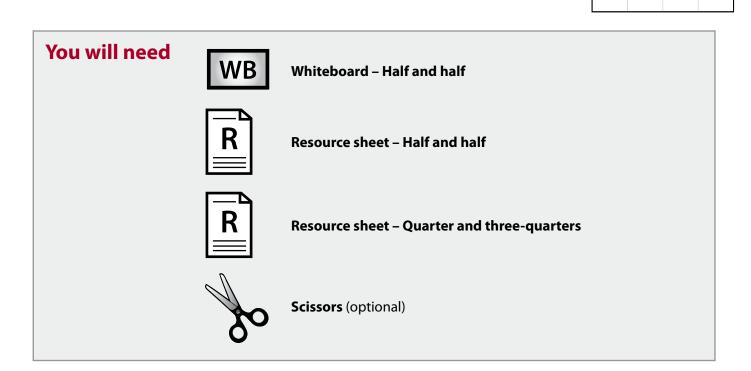
Lines and fractions

Activity 5 – Lines and fractions



Outline

This activity focuses on the use of half, quarter and three-quarters. Learners use their spatial and numerical understanding to 'cut' squares into different fractions.

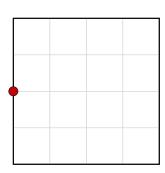


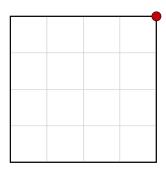
Activity 5 – Lines and fractions



Explain

Show **Half and half** on the whiteboard. Tell learners that you want to draw a line from the red dots so that each diagram is cut in half. Ask them where you should draw the lines.





Draw on the lines, then ask learners to convince you that each diagram is exactly half and half. (Some learners will benefit from cutting and folding.)

Now give each group or pair a copy of the resource sheet **Half and half**. Where should they draw lines to show half and half? (Again, some learners will benefit from cutting and folding.)

The resource sheet **Quarter and three-quarters** is more demanding. If necessary, learners can be encouraged to start by drawing a line to show half. If they understand that a quarter is half of a half, they should be able to continue without support.



Question

- Which diagrams are easier? Why?
- How can you check that the line cuts the square in half?
- After you answered this one (the fifth diagram of Half and half), was there a quick way of answering this one (the sixth diagram)? How?
- How many little squares are there in each diagram? (16) What is half of 16?
- How many quarters make a whole one? How many quarters make three-quarters? How many quarters make a half?
- How do we write a quarter using numbers? What about three-quarters?
- What is $\frac{1}{4}$ of 16? What is $\frac{3}{4}$ of 16?

Extension

- What is the area of each diagram? So what is the area of half of each diagram? How can we be sure that the space below this red line fits together to make 8 whole squares?
- Learners find fractions of squares and/or rectangles of different sizes.



