

## Does not recognise when a remainder is significant in the decision about whether to round up or down

*Opportunity for: solving problems and making decisions*

### Resources

- Twelve 'mini' boxes of chocolate beans
- Real money – 10p and 1p coins
- Mini whiteboard and pens

### Key vocabulary

how many times?	division
remainder	group
take away	spend
divided by	round

### Teaching activity

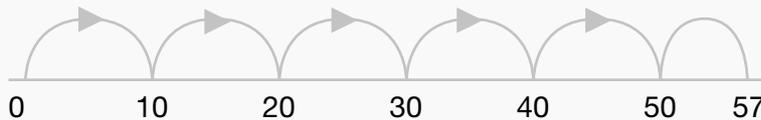
**Time** 20 minutes

'We are going to think carefully about what to do with the remainder when we are using division to solve problems.'

Look together at the calculation:

$$57 \div 10 =$$

**? How many tens are there in fifty-seven?**



Use jottings on a whiteboard to encourage the child to calculate the answer:

$$57 \div 10 = 5 \text{ r } 7$$

**? Tell me, what do you think the numbers in the answer mean?**

Encourage the discussion of five groups of ten and seven left over.

Look together at a real-life problem that uses the same numbers.

'Here are twelve mini boxes of chocolate beans that cost ten pence each. I have fifty-seven pence to spend.' (Check the amount of money together.)

**? What do you need to do to work out how many boxes of chocolate beans you could buy for fifty-seven pence?**

If the child has difficulty in finding a strategy to get started, support them to consider the problem in terms of:

**? How many 10p coins could we add together to make fifty-seven pence?**

and/or

**? How many times can we spend (take away) ten pence?**

Support the child to solve the problem practically, using the resources to support finding a solution.

Set out five 10p and seven 1p coins in a row.

Position one box of chocolate beans under each 10p coin, agreeing that we could have one box of chocolate beans for each 10p we spend.

**? Can we buy another box of chocolate beans with the remaining seven pence?**

Agree with the child that you could not buy a box of chocolate beans with the seven pence left, and that you can't buy part of a box. The seven pence would be left over (a remainder).

**? Is the answer to our question five remainder seven?**

**? What do you think the answer is? How do you know?**

Read the question again, emphasising that we are being asked: 'How many boxes of chocolate beans can we buy?'

We know we can only buy five boxes so that is our answer.

We do not have to say how much money is left over for this question.

Explain that when we solve problems we have to think carefully about what the question is asking and then 'round' our answer to make it make sense.

Repeat the teaching activity based on  $95 \div 10 =$

Work through the calculation with the child, jotting on a whiteboard. Then use coins and the boxes of chocolate beans. Remind the child that we are thinking about the problem and have to work out how to use the result of our calculation to answer the question.

## Spotlight 1

Does not recognise when a remainder is significant in the decision about whether to round up or down

*Opportunity for: using mathematical symbols to communicate*

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### Jumping taking away

**Time** 10–20 minutes

#### Resources

- Twenty-eight 'eggs' (ping pong balls or similar) in a bowl
- Six egg boxes
- Mini whiteboard and pens

#### Key vocabulary

how many times?	division
remainder	group
take away	spend
divided by	round
how many jumps?	

#### Teaching activity

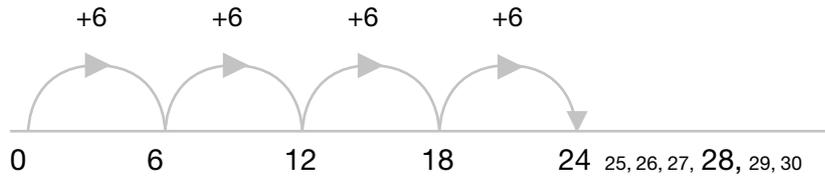
'Today we are going to be thinking carefully about what to do with the remainder when we have used division to solve a problem.'

Work together to calculate:  $28 \div 6 =$

Use whiteboard jottings to support the child's thinking, encouraging the child to make a record of their thinking.

Remind them that we could think about this as ‘How many times could we take six away from twenty-eight?’, or as ‘How many times would we have to add six to make twenty-eight?’

Work along a number line in single jumps of six.



We have added six four times to reach 24.

**? Can we fit in another jump of six?**

**? How many can we count between 24 and 28?**

Discuss and agree that the answer to  $28 \div 6 = 4 \text{ r } 4$ .

Remind the child that we are thinking carefully about what to do with remainders when we are solving problems.

Look together at the following problem: ‘Here are twenty-eight eggs. I want to pack them into these egg boxes. How many egg boxes can I fill?’

**? How many eggs will fit into one box?**

**? What is the calculation we need to do?**

Encourage the child to see this as finding out how many times we can take groups of six eggs away from the twenty-eight eggs.

Work through the problem practically using six egg boxes and twenty-eight eggs.

Ask the child to count out six eggs and place them in egg boxes as they count.

If the child continues to count out eggs and place them in boxes after four boxes are full, stop them and return to the initial question.

**? How many egg boxes can I fill?**

Discuss and agree that the remaining eggs will not fill another box.

**? The answer to our earlier calculation was four remainder four.  
We have filled four egg boxes and we have four eggs left over.  
How many boxes can we actually fill?**

**? What happens to the remainder for this problem?**

## Spotlight 2

Does not recognise when a remainder is significant in the decision about whether to round up or down

*Opportunity for: reasoning with numbers*

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### Pack all the eggs

**Time** 10–20 minutes

#### Resources

- Twenty-eight 'eggs' (ping pong balls or similar) in a bowl
- Six egg boxes
- Mini whiteboard and pens

#### Key vocabulary

division	take away
how many times?	spend
group	divided by
remainder	round

#### Teaching activity

'We are going to be thinking carefully about what to do with the remainder when we have used division to solve problems.'

Quickly revisit the Spotlight 1 activity, reinforcing the key point that we rounded down from four remainder four to four in that problem, because the question was: 'How many egg boxes can I fill?'

Look together at a new problem that is very similar: 'I have twenty-eight eggs and would like to pack them all into egg boxes to keep them safe. Each egg box holds six eggs. How many egg boxes will I need to pack *all* my eggs safely away?'

#### **? Do you think the answer will be the same as the answer to the last problem?**

Assess the child's understanding as they explain their thinking.

Work through the problem in a practical way.

Ask the child to pack the eggs into boxes filling one box before moving to the next.

If they stop after filling four boxes because they know there are not enough eggs to fill another box, stop them and return to the initial question.

#### **? How many egg boxes will I need to pack all my eggs safely away?**

Discuss with the child how this is different from the last question and encourage them to pack the remaining four eggs into another box.

#### **? How many egg boxes did we need?**

Agree the answer is: 'I will need five boxes.'

Reinforce the need to think really carefully and to keep going back to check the question that you are answering.

#### **? What do you think is the most important thing you must remember about finding answers when there is a remainder?**

# Spotlight 3

Does not recognise when a remainder is significant in the decision about whether to round up or down

*Opportunity for: solving real-life problems*

## Pop concert

**Time** 10–20 minutes

### Resources

- Mini whiteboard and pens

### Key vocabulary

- |                 |            |
|-----------------|------------|
| division        | take away  |
| how many times? | spend      |
| how much?       | divided by |
| remainder       | round      |

### Teaching activity

‘Today we are going to be thinking really carefully about what to do with the remainder when we have used division to solve problems. We will see how useful drawing/jotting can be in helping us to understand the problem.’

Read the problem together:

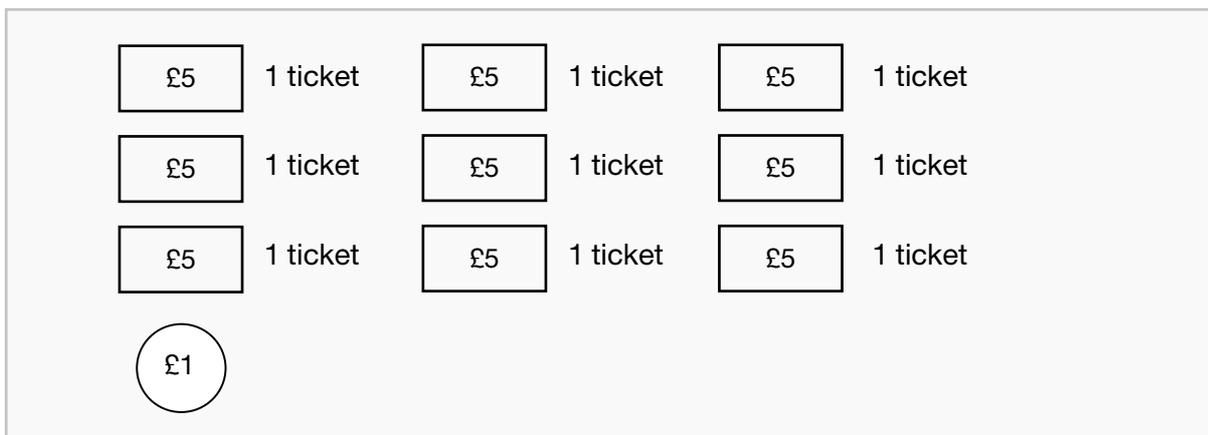
Tickets for a Top Pops concert are on sale at a special price of £5 each. I would like to take some friends. I have £46 altogether. How many tickets could I buy?

**? Can you think of a way to use jottings or drawings to help you to understand how you could solve the problem?**

Explain that a simple drawing can be very useful to help find out what calculation to do.

Support the child in making a diagram/drawing and using it to identify which calculation they need to do.

If they find producing a drawing of their own too challenging, offer something like the following as support, drawing the £5s one by one as the child counts up to find the nearest to £46:



**? How many tickets can we buy with the £46?**

**? Is there any money left over (a remainder)?**

**? The question was: ‘How many tickets could I buy?’ What is the remainder and what happens to the remainder in this problem?**

If the child suggests that the remainder is included in the answer, revisit the question and explain that the answer ‘We could buy nine remainder one tickets’ does not make sense.

It sounds as though we have one ticket left over, when it is actually £1 that is left over.

Remind the child that we have to think really carefully about deciding what to do with the remainder, and it is very important to go back to the question and look carefully again at our drawings to understand what we are working out.

## Spotlight 4

Does not recognise when a remainder is significant in the decision about whether to round up or down

*Opportunity for: solving practical problems and making decisions*



### Party bags

**Time** 10–20 minutes

#### Resources

- Six paper bags
- Selection of twenty-six small toys

#### Key vocabulary

- |                    |            |
|--------------------|------------|
| division           | divided by |
| share them equally | round      |
| how many times?    | left-overs |

### Teaching activity

Explain to the child that we are going to be thinking carefully about what to do with the remainder when we have used division to solve problems.

Read a problem together:

Liam is helping his mum to make party bags for his sister’s fourth birthday at the weekend. Six children will be at the party. Liam’s mum has twenty-six goodies altogether. She wants to share them equally between the six children.

How many goodies will each child get?

**? What will you find helpful to start solving this problem?**

Encourage the child to talk to you about what is happening and try to model it in some way. Support them in moving forwards from ‘the story’ to understanding what calculation is needed.

**? Have you thought of a good way of getting started on this problem?**

If the child has difficulty getting started, remind them that we can understand this as thinking about:

‘How many times can we take a group of six goodies from the bowl of twenty-six to put in the six party bags?’

Ask the child to use the toys and role play the task to help them understand the problem.

Support the child in recording the necessary calculation and their jottings to support their thinking.

Reread the question with the child, and ask them to look again at the bags and left-overs they have.

**? Would it make sense to say that each child would get four remainder two goodies?**

**? Why do you think this?**

Emphasise that for this question we round the remainder down and the correct answer is that each child will get four goodies.

**? Why did we have to round down?**

## Spotlight 5: a learning check

Does not recognise when a remainder is significant in the decision about whether to round up or down

*Opportunity for: explaining and discussing*

### Canoes

**Time** 10–20 minutes

#### Resources

- Mini whiteboard and pens

*Check: does the child use key vocabulary?*

division	take away
how many times?	divided by
group	round
remainder	

#### Teaching activity

Explain to the child that we are going to be thinking carefully about what to do with the remainder when we have used division to solve word problems.

Read through this problem together:

The school has taken a group of children on an adventure holiday. On Monday, they are going to try canoeing on the lake. Each canoe holds six pupils. Thirty-nine pupils will be in the group.

**? How many canoes will be needed to take all the pupils on the lake at the same time?**

Assess the child's ability to reason about the remainder by encouraging them to use the whiteboard to 'draw' a picture of the problem and to talk to you to explain their thinking.

Allow them to work through the whole problem without intervening so that you can be sure about what they understand.

If the child is still struggling to understand when to round up and when to round down, model a 'good' jotting that makes the decisions clear.

If they work independently and make the correct decisions ask a second question.

? **How many canoes will be full?**

Ask them to refer to their previous jotting to explain their answer to you.

? **Tell me what you think you've learned about solving problems where you have to think about a remainder while you are finding an answer.**

### *Learning outcomes*

By the end of this set of activities children should be able to:

- tackle related learning tasks with increased motivation and confidence;
- use and understand connected mathematical vocabulary;
- carry out division calculations resulting in remainders;
- identify from the context of a problem how to deal with any remainder from the division.