Writes a remainder that is larger than the divisor, for example 36 ÷ 7 = 4 remainder 8

Opportunity for: developing mental images

Resources

- Interactive Teaching Program (ITP) – *Grouping*

Key vocabulary

how many times? take away
group divided by
remainder

Teaching activity

Time 20 minutes

Explain to the child that they are going to think carefully about division, especially the remainders, and find out exactly what to do when there is an amount left over.

Show the ITP set at 20 ÷ 4 =

Revise the language of division, encouraging an understanding that 20 ÷ 4 is the same as 'How many times can I take four away from twenty?' or 'How many fours are there in twenty?'.

Ask the child to collect groups of four by clicking and counting objects. Discuss how the objects are grouped on the number line. The child is finding out how many times they can take a group of four away. The number line is modelling how many times four can be added to make twenty.

Reinforce that the child must keep going until they have collected as many groups of four as possible.

Reset the ITP to 23 ÷ 5 = and repeat the activity, but discuss the remainder using the ITP model to demonstrate:

The '3' cannot be changed into a group of five. They are just 'left over'.

Reset the programme to show 21 ÷ 3 =

? **How many times do you think we can take a group of three away from twenty-one?**

Check the answer using the ITP.

Work through more examples, including calculations that will leave a remainder, for example:

32 ÷ 10 =

14 ÷ 4 =

22 ÷ 8 =

Model an error, setting the ITP to show 30 ÷ 4 =

Share your prediction that the answer will be six with a remainder.

? **Do you agree with my prediction?**

? **Can you tell me exactly what the remainder will be/how many will be left over?**

Model the error by collecting six lots of four and, with the child, count how many are left.

Discuss if that is the remainder.

? **Have we collected as many groups of four as we can?**

Use the ITP to demonstrate that we can make another group of four and the answer to 30 ÷ 4 is 7 remainder 2.

Model another error, for example 21 ÷ 4 = 4 remainder 5.

? **If I am dividing by four, can I have a remainder of five?**

Ask the child to use the ITP to show you the correct answer and to explain why you were wrong.

Work through some more examples together, encouraging the child to explain the remainders.

? **If you are dividing by three, could you ever have a remainder that is more than three?**

? **If you are dividing by four, could you ever have a remainder of four?**

? **If you are dividing by five, what possible remainders can I have?**

? **What is important to remember for next time?**

Spotlight 1

Writes a remainder that is larger than the divisor, for example 36 ÷ 7 = 4 remainder 8

Opportunity for: reasoning about numbers

Eggs in sixes

Time 10–15 minutes

Resources

- Six egg boxes (six-egg size)
- Twenty-six eggs (or objects to represent eggs)

Key vocabulary

how many times?
group
remainder
take away
divided by

Teaching activity

'Today we're going to learn a bit more about remainders, and how we cannot have a remainder bigger than the divisor – the number you are dividing by.'

Outline a problem:

'An egg box holds six eggs. If there were nineteen eggs I think we could fill two egg boxes and have some left over.'

? **Do you agree? How could we check the answer?**

Set out the nineteen eggs and collect a group of six to put in one box. Repeat with another group of six.

Discuss with the child: 'We had nineteen eggs and needed to group them in sixes to fit in the box. We filled two boxes and have some eggs left over.'

? **What was the calculation we carried out?**

'Nineteen divided by six equals two with some eggs left over.'

? **Are you sure we couldn't fill another box?**

Ensure that the child remembers you always keep going until you can't make another group.

Agree that one more box could be filled and we would have one egg left over.

Show the recording of the calculation that was carried out:

19 ÷ 6 = 3 remainder 1 (or 19 ÷ 6 = 3 r 1)

Relate this calculation back to the story.

Repeat the activity with twenty-six eggs, reinforcing the key point that you cannot have a remainder larger than the divisor (the number you are dividing by) because you can still take away another group.

? **Tell me what you think was the most important thing that we learned today.**

Spotlight 2

Writes a remainder that is larger than the divisor, for example 36 ÷ 7 = 4 remainder 8

Opportunity for: solving real-life problems

Footballs

Time 15–20 minutes

Resources

- Eight footballs
- Money – preferably real coins and notes (up to £44)

Key vocabulary

how many times?
group
remainder
left over
take away
divided by
cost

Teaching activity

'We're going to do a money problem today, so that you will get even better at working with remainders when we divide.'

Outline a problem:

'Footballs cost £5 each. I have £32 and want to buy as many footballs as I can.'

'I think I will only be able to buy five footballs but there will be some change.'

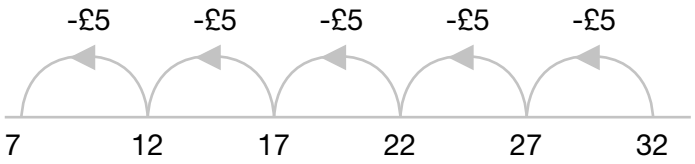
? **Do you agree with my calculation?**

Enter into a role-play situation.

Suggest that the child is the sports shop assistant and that you are the customer. Explain that you would like to buy as many footballs as you can, but only have enough money to buy five. Give the assistant £5 and take one football. Repeat, exchanging one ball for each £5 until you have five balls.

Discuss with the child the fact that you have £7 left over.

? **Have I bought as many footballs as possible?**
In my change can you see another group of £5?
Remember I had to buy as many balls as I could.



After agreeing that you could get six footballs and have £2 left over, look at the corresponding calculation:

32 ÷ 5 = 6 r 2

'We found out how many times we could take £5 away from £32.'

Repeat the activity, starting with £44.

? **How many footballs do you think I will be able to buy with £44?**

? **Do you think there will be any money left over?**

Look at the calculation together after working through the activity.

? **Did you enjoy working with money today? What did it help you learn about?**

Spotlight 3

Writes a remainder that is larger than the divisor, for example 36 ÷ 7 = 4 remainder 8

Opportunity for: reasoning about quantities

Party punch

Time 15–20 minutes

Resources

- Two mini whiteboards and marker pens
- 2-litre jugs
- Counters

Key vocabulary

how many times? remainder
two litres left over

Teaching activity

'Today we're going to think about a problem where there is going to be a remainder. We mustn't let the remainder get bigger than the divisor.'

Share a problem:

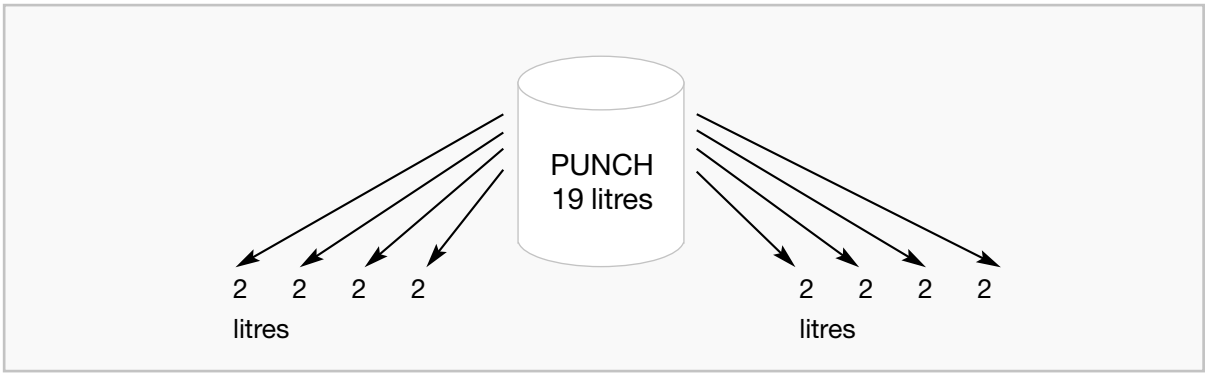
'I have mixed a tub of party punch for the weekend.
In total there are 19 litres.
I need to pour this into 2-litre jugs to set out on tables.
I have nine tables altogether but I am worried that I will only be able to fill eight jugs.'

? **How many times do you think I will be able to fill a 2-litre jug out of my nineteen litres of punch?**

? **Explain to me how you worked that out.**

Explore with the child how to use drawings/jottings to support thinking if you don't have the apparatus.

'Let's draw the tub of punch. Now we'll draw what we would do next. I thought I could fill eight jugs.'



Count in twos with the child and agree that we have filled eight jugs and used up 16 litres.

? **How many litres will still be in the tub?**

If necessary, set out nineteen counters and take away sixteen, two at a time.

? **Is three litres the remainder? Could we fill another jug?**

Model and talk through the calculation that was used to solve the problem:

19 ÷ 2 = 8 r 3.

'We can't have a remainder of three litres because we could fill one more jug.'

The calculation should be 19 ÷ 2 = 9 r 1.

Reinforce that you can never have a remainder that is bigger than the divisor.

? **Can you tell me why you can't have a remainder bigger than the divisor?**

Spotlight 4

Writes a remainder that is larger than the divisor, for example 36 ÷ 7 = 4 remainder 8

Opportunity for: reasoning about numbers

Is it right?

Time 15–20 minutes

Resources

- Cubes
- Interactive Teaching Program (ITP) – *Grouping*
- Prepared series of calculations:

Key vocabulary

how many times? take away
group divided by
remainder

A

24 ÷ 5 = 5 r 4
24 ÷ 5 = 4 r 4
24 ÷ 5 = 3 r 9

B

30 ÷ 8 = 4 r 2
30 ÷ 8 = 2 r 14
30 ÷ 8 = 3 r 6

C

18 ÷ 5 = 3 r 3
18 ÷ 5 = 2 r 8
18 ÷ 5 = 3 r 2

Teaching activity

'Today we are working on the computer again, looking at grouping and the remainders that are left over.'

? **Can you remember something important about remainders?**

Look together at card A and set the ITP to 24 ÷ 5 =

? **Can you tell me which of the answers is the correct one?**
Talk to me about each of the calculations.

Use the ITP model to demonstrate grouping sets of five.

Stop after grouping three 'lots of 5'.

? **How many counters are left?**

? **Can we have nine as a remainder when we are dividing by five?**

Work through each of the examples in the same way until the correct answer has been modelled.

Reinforce that the remainder can never be the same as or bigger than the divisor.

Work through the other series of calculations in the same way.

Encourage the child to work with the ITP but to predict, explaining the correct answer from the set, as they work.

Record some of the 'silly' number sentences.

Spotlight 5: a learning check

Writes a remainder that is larger than the divisor, for example 36 ÷ 7 = 4 remainder 8

Opportunity for: discussing and explaining

Silly number sentences

Time 15–20 minutes

Resources

- Cubes
- Bag
- Empty number lines
- At least two children
- Prepared series of number sentences

Check: does the child use the key vocabulary?

how many times? take away
group divided by
remainder

15 ÷ 5 = 4	17 ÷ 4 = 5	13 ÷ 3 = 4
15 ÷ 5 = 3	17 ÷ 4 = 4 r 1	13 ÷ 3 = 3 r 4
15 ÷ 5 = 2 r 5	17 ÷ 4 = 3 r 5	13 ÷ 3 = 4 r 1

Teaching activity

'Today we are going to play a game, **Silly number sentences**, and you are going to decide which ones are silly and which ones are sensible.'

? **Tell me what you have remembered about the size of a remainder when we have been dividing.**

Prepare several number sentences – some right, some wrong – as in the resource list.

The children could work cooperatively in pairs or teams, or they could compete against each other.

You might want to play the game where the players can shout.

Put all the number sentences in the bag so that you can pull them out one at a time, and so that each player can see the sentence at exactly the same moment.

How to play

1. Take a number sentence out of the bag and show it to everyone.
2. If it is a silly sentence, for example 18 ÷ 5 = 2 r 8, everyone shouts 'silly!'.
3. If it is a sensible sentence, for example 11 ÷ 2 = 5 r 1, everyone shouts 'sensible!'.
4. The players score ten points every time they get one right.

If a child needs more help, use cubes or number lines to work out the sentences and put them in two groups, silly and sensible, so that you can help the child to reflect on what is the same about the silly sentences.

? **What makes a silly sentence silly?**

Variations

- The children could compete and win a card if they shout first.
- The children could make up sets of three number sentences themselves to give to a friend to play the game.

? **What do you notice about this: 50 ÷ 7 = 6 r 8?**

Learning outcomes

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

- tackle related learning tasks with increased motivation and confidence;
- use and understand connected mathematical vocabulary;
- decide whether a remainder is within the range appropriate for a particular division calculation;
- make decisions about how to treat a remainder based on the context within which it occurs;
- explain how they know that a particular remainder is a reasonable one.

Notes

Notes