

N5.2

Remainders

objectives

- Recall multiplication facts to 10×10 and derive associated division facts.
- Calculate mentally $TU \times U$ and $TU \div U$.
- Express a quotient in fraction or decimal form.
- Divide £.p by a single-digit number.

starter

Vocabulary

remainder
divided by

Resources

digit cards or
mini-whiteboards

As a class, chant the six times table, forwards and backwards. Tell pupils that it is often possible to work out a calculation like 17×6 in their heads. Show them how to split the larger number and to jot down each part.

$$\begin{array}{r} 17 \\ 10 + 7 \\ \downarrow \quad \downarrow \\ 60 + 42 = 102 \end{array} \times 6$$

They could choose to write this as $17 \times 6 = (10 + 7) \times 6 = 60 + 42 = 102$. Practise a couple of examples, such as 18×5 and 24×3 . Then extend to decimals, with a calculation like 1.4×7 .

$$\begin{array}{r} 1.4 \\ 1 + 0.4 \\ \downarrow \quad \downarrow \\ 7 + 2.8 = 9.8 \end{array} \times 7$$

Say that they could write this as $1.4 \times 7 = (1 + 0.4) \times 7 = 7 + 2.8 = 9.8$. Practise a couple of examples, such as 2.3×5 and 3.4×6 .

Explain that a calculation like $91 \div 7$ can be done similarly. However, the first number has to be split in a slightly different way, into the largest multiple of 10 that is an exact multiple of the divisor 7, plus the rest. So 91 is split into $70 + 21$.

$$\begin{array}{r} 91 \\ 70 + 21 \\ \downarrow \quad \downarrow \\ 10 + 3 = 13 \end{array} \div 7$$

Practise some examples, such as $85 \div 5$ (splitting 85 into $50 + 35$) and $78 \div 3$ (splitting 78 into $60 + 18$).

main activity

Vocabulary

remainder

Resources

digit cards or
mini-whiteboards

Say that sometimes a number will not divide exactly. The remainder is what is left over.

Q What is the remainder when 26 is divided by 6?

Q How do you know that you are right?

Remind pupils that if they are asked to explain how they know they are right, it is helpful to describe or write a calculation. Establish that $26 = (6 \times 4) + 2$, and that 2 is the remainder.

Tell the class that you are going to call out some numbers. You want them to use their digit cards or whiteboards to show what the remainder would be when that number is divided by 6. Call out whole numbers less than 60, and check responses. Each time, ask:

Q How do you know that you are right?

Write on the board $21 \div 5$. Establish that this is $4 \text{ r } 1$, and complete $21 \div 5 = 4 \text{ r } 1$.

Draw an empty number line on the board. Demonstrate jumping on in steps of 5 to 20, then count the jumps: one, two, three, four. Say that four fives jump to 20. Establish that five fives would jump to 25 and would be too much. The answer to $21 \div 5$ must be greater than 4 but less than 5. To get to 21 would need four and a bit fives.

Write on the board $21 = 20 + 1$. Point to the 20 and say: '20 divided by 5 equals 4'. Point to the 1, and ask:

Q How could we represent 1 divided by 5?

Establish that $1 \div 5$ is $\frac{1}{5}$. Say that $21 \div 5 = 4\frac{1}{5}$. Record:

$$21 \div 5 \text{ is } 4 \text{ r } 1 \text{ or } 4\frac{1}{5}$$

Repeat the above for $23 \div 5$ and $24 \div 5$, and record in the same way:

$$23 \div 5 \text{ is } 4 \text{ r } 3 \text{ or } 4\frac{3}{5} \qquad 24 \div 5 \text{ is } 4 \text{ r } 4 \text{ or } 4\frac{4}{5}$$

Q What do you think the answer to $22 \div 5$ will be?

Establish that the answer to $22 \div 5$ is $4 \text{ r } 2$ or $4\frac{2}{5}$.

Q How can we write $\frac{2}{5}$ as a decimal? (0.4)

Remind pupils that $4\frac{2}{5}$ can be written as $4 + 0.4 = 4.4$.

Repeat for $4\frac{3}{5}$ and $4\frac{4}{5}$.

Ask the class:

Q £27 is shared equally among 5 people. How much does each person get?

Establish that the answer to $27 \div 5$ is $5\frac{2}{5}$ or 5.4.

Q What amount of money does this represent? (£5.40)

Write on the board $63 \div 10$. Establish that this is $6 \text{ r } 3$. Use an empty number line to demonstrate that the answer will be greater than 6 but less than 7.

Write $63 \div 10 = (60 \div 10) + (3 \div 10)$.

Point to $60 \div 10$, and ask for the answer (6). Point to $3 \div 10$, and ask for the answer (three tenths or 0.3).

Complete $63 \div 10 = (60 \div 10) + (3 \div 10) = 6 + \frac{3}{10} = 6\frac{3}{10}$.

Q How can we write $6\frac{3}{10}$ as a decimal?

Establish that $6\frac{3}{10} = 6 \text{ r } 3 = 6.3$.

Q How would you explain your answer to $94 \div 10$?

Establish that $94 \div 10$ can be written as $(90 \div 10) + (4 \div 10) = 9 + \frac{4}{10}$. Stress that the remainder of 4 is divided by 10 to give $\frac{4}{10}$.

Q How can we write $9\frac{4}{10}$ as a decimal?

Establish that $9\frac{4}{10} = 9 \text{ r } 4 = 9.4$.

Ask pupils to choose whole numbers to divide by 10, and write their answers in both fraction and decimal form. Take feedback and discuss methods.

other tasks

Springboard 7

Units 10 and 15

Unit 10 section 4: Division II

1 Review of division page 340
Star challenge 8: You choose the method page 341

Unit 10 section 6: Money and 'real life' problems

1 Dividing with a calculator page 350

Unit 15 section 2: Mental calculations – division

2 Dividing whole numbers with fraction answers page 478

plenary

Resources

self-prepared OHT of numbers (optional)

Remind the class that, when dividing by 10, the remainder is divided by 10, and can be written as a fraction in tenths. When dividing by 5, the remainder is divided by 5, and can be written as a fraction in fifths. In each case there are decimal equivalents.

Q What is the answer to $13 \div 2$?

Establish that answer is 6 r 1. The remainder is 1, which will be divided by 2, and then written as $\frac{1}{2}$, so that the answer to the calculation is $6\frac{1}{2}$ or 6.5.

Q What is the answer to $33 \div 4$?

Establish that the answer is 8 r 1, and that the remainder of 1 will be divided by 4. This can be written as $\frac{1}{4}$ or its decimal equivalent of 0.25, to make an answer of $8\frac{1}{4}$ or 8.25. Refer to the number line, if necessary.

Ask the class to divide 19 by 2, 4, 5 and 10. Record the answers, in remainder form, and in fraction and decimal equivalents.

Remember

- When dividing by 10, the remainder will be tenths. A remainder of 7 can be represented as $\frac{7}{10}$ or 0.7.
- When dividing by 2, any remainder is 1, represented as $\frac{1}{2}$ or 0.5.
- When dividing by 4, the remainder will be quarters. A remainder of 1 can be represented as $\frac{1}{4}$ or 0.25, and of 3 as $\frac{3}{4}$ or 0.75.