Spring Farm Public School

Parent Support Kit

Numeracy Expectations

For Stage Three Children

CONTENTS

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Introduction to Parent Support Kit in Numeracy

Maths is everywhere! This kit can help you and your child to make real-life connections to what they're learning in the classroom. When children see, hear and use maths in real life, it gives their learning purpose. Use maths whenever you see the chance! Play maths games in the car. Involve the kids when you're cooking, shopping or budgeting. Add up the footy and cricket scores together. Talk about fractions as you serve food.

This parent support kit in numeracy is designed to help parents understand what children learn in each grade. At school, teaching is adjusted for the needs of each student. Children who show they have the skills listed in this kit will be working at grade level and assessed as sound. This parent support kit uses parent-friendly language to explain the skills that children work to achieve by the end of each grade. We hope it empowers parents to help their children, and to participate in their child's education.

We know that every family is busy! The activities here are simple and straightforward. Any numeracy work you do at home with your child will help them in their learning. Your child's education is a partnership. Let's work together ...

How to use this kit

This parent support kit:

- lists and explains the skills of children working towards a sound level
- shows ways to develop that skill with your child, including links to online resources like videos and games.

Watch the videos to gain a deeper understanding of the skill. Work through the activities with your child. The suggestions here are a drop in the ocean – the internet has thousands! Use these as a starting point, and change them as you like.

Use the kit whenever and however you can! Your child will be working towards these skills all year. You might like to review the kit each term, or more regularly. If you have any questions about your child's learning, always talk to their teacher. Remember – we're all in this together!

Where do I learn more?

The key skills listed in this parent support kit are taken from the NSW Standards and Education Authority's (NESA's) Mathematics K-6 continuum of key ideas. You can find the complete mathematics syllabus for every grade at the NESA website.

Icon Key

Definitions are indicated by this icon throughout the kit. Lots of the definitions we use come from School A to Z

Why is it important? Next to this icon, you'll see 2 types of explanations:
1. Why this particular skill is important in the real world or for what children will be learning later on
2. Tips to help with learning

A closer look: This icon points the way to:

- an activity to help develop the skill or concept using familiar language for your child
- handy tricks to help remember skills

WEB link This icon points the way to online resources you can use at home, like games, videos and further explanations.

Notes: Learning maths: connecting school and home
Video: Helping your child with primary school maths
Notes: Talk Moves: supporting mathematical discussions with your child

Stage Three Parent Checklist

In Stage Three, children work towards the following key skills. How confident is your child with the skills on this checklist? If you would like to help your child with these skills, you have come to the right place!

Your child will be learning the skills on this checklist throughout the year. There is no specific order to learning them and you can revisit them at any time. While our school teaches students in stage classes, these checklists provide parents with a guide to support your child depending on which grade they are in within the stage.

Year 5

Whole Numbers

- ○ 1. Deal with numbers as big as 10 million by reading, writing, ordering and stating the place value of digits
- ○ 2. Record numbers using expanded notation
- ○ 3. Find all the factors of a number
- ○ 4. Show that numbers can be added in any order to arrive at the same total. This is the associative law

Addition and Subtraction

- ○ 5. Use mental strategies to add and subtract 2 or more numbers
- ○ 6. Use the formal algorithm to add and subtract 2 or more numbers
- ○ 7. Use a calculator to add and subtract 2 or more numbers of any size
- ○ 8. Use rounding to estimate the answer to addition and subtraction problems
- ○ 9. Solve word problems and record the strategy used

Year 6

Whole Numbers

- ○ 1. Find negative numbers on a number line
- ○ 2. Identify and describe prime numbers and composite numbers
- ○ 3. Create and describe square numbers and triangular numbers

Addition and Subtraction

- ○ 4. Solve addition and subtraction word problems

Multiplication and Division

- ○ 10. Use and record a range of mental and written strategies to multiply by 1-digit and 2-digit operators
- ○ 11. Use the formal algorithm to multiply a 2-digit or 3-digit number by a 1-digit number
- ○ 12. Use mental and written strategies to divide numbers with 3 or more digits by a 1-digit operator, including remainders
- ○ 13. Solve word problems and record the strategy used
- ○ 14. Explain remainders in division problems
- ○ 15. Use rounding to estimate answers and check the calculation

Multiplication and Division

- ○ 5. Solve multiplication and division word problems
- ○ 6. Identify and use grouping symbols
- ○ 7. Apply the order of operations

Fractions and Decimals

- ○ 16. Compare and order fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12 and 100
- ○ 17. Convert a mixed numeral to an improper fraction and vice versa
- ○ 18. Add and subtract fractions with the same denominator
- ○ 19. State the place value of digits up to 3 decimal places
- ○ 20. Compare, order and write decimals with up to 3 decimal places

Fractions and Decimals

- ○ 8. Show, compare and order fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12 and 100
- ○ 9. Find, create and write equivalent fractions
- ○ 10. Write fractions in their simplest form
- ○ 11. Add and subtract fractions, including mixed numerals, with the same denominators
- ○ 12. Find a simple fraction of a group
- ○ 13. Add and subtract decimals up to 3 decimal places
- ○ 14. Multiply and divide decimals by 1-digit and 2-digit whole numbers
- ○ 15. Multiply and divide decimals by 10, 100 and 1000
- ○ 16. Solve word problems involving fractions, decimals and money problems

- ○ 17. Convert between equivalent percentages, fractions and decimals
- ○ 18. Calculate 10%, 25% and 50% of amounts, including as discounts

Patterns and Algebra

- ○ 21. Identify, describe, continue and create number patterns with whole numbers, fractions or decimals
- ○ 22. Find missing numbers in number sentences (equations) involving addition, subtraction, multiplication or division on both sides of the equals sign

Patterns and Algebra

- ○ 19. Find and apply the rule for geometric patterns and number patterns
- ○ 20. Locate and record the coordinates of points in all 4 quadrants of the Cartesian plane

Whole Numbers: Key Skill 1

Deal with numbers as big as 10 million by reading, writing, ordering and stating the place value of digits

Year 5

Place value shows the amount a digit is worth due to its position in a number – ones, tens, hundreds, thousands etc.

Dealing with big numbers builds mathematical confidence. Being able to read big numbers easily and quickly helps children to work with them later on. For example, when we see a number with 6 zeros on the end, we know it's in the millions, and we can think of it as 1 million or 1 000 000.

Big numbers are important in everyday life when it comes to budgeting, especially incomes and mortgages.

Write these numbers from smallest to largest: 2 067 234, 68 998, 67 401 682 *Answer:* 68 998, 2 067 234, 67 401 682

Write this number in words: 1 345 067
Answer: one million, three hundred and forty-five thousand and sixty seven

State the place value of 7 in these numbers: 89 678 *Answer:* tens
270 891 *Answer:* ten thousands
1 348 790 *Answer:* hundreds

Check out the number of views on YouTube clips. Read the numbers out loud. Compare them to similar clips. You could even make a list of your favourites, from biggest to smallest.

Read the books "If ... " or "If the World Were a Village" by David J Smith and compare the numbers in the story.

WEB LINKS go to:

Video: Reading large numbers
Video: Place value up to 10 million
Video: Place value

Whole Numbers: Key Skill 2

Record numbers using expanded notation

Year 5

Expanded notation shows the amount each digit is worth because of its place in a number. For example, in 287 we know that there are 2 lots of 100, because the 2 is in the hundreds position.

Expanding numbers helps children to understand numbers better and helps build confidence in doing calculations in their head.

Write 56 276 in expanded notation *Answer:* 50 000 + 6 000 + 200 + 70 + 6

Write 142 081 in expanded notation *Answer:* 100 000 + 40 000 + 2 000 + 80 + 1

Make an expanded notation machine with cups or a paper snake

Remember to use numbers where the 0 is being used as a place holder. Numbers like 3 085 where there are 3 thousands, no hundreds, 8 tens and 5 ones.

WEB LINKS go to:

Video: Writing a number in expanded notation
Video: Expanded notation cups

Whole Numbers: Key Skill 3

Find all the factors of a number

Year 5

A factor is a whole number that can be divided exactly into a whole number. For example, the factors of 12 are 12, 6, 4, 3, 2 and 1 (because 12 x 1 is 12, 3 x 4 is 12 and 6 x 2 is 12).

Determining or finding the factors of a given number helps children to work with the division of numbers. It also helps them when working with fractions. We need to find common factors when adding or subtracting fractions.

Times tables really help children with multiples and factors. A times tables chart in the toilet will help, as will songs, CDs, quizzes, competitions.

What are the factors of 24? *Answer:* 24, 12, 8, 6, 4, 3, 2 and 1

Use the concept of the 'Factor Ninja' who chops numbers up to help your child to remember how to find factors.

WEB LINKS go to:

Notes: Factor ninja and multiple monster
Notes: How to find factors
Game: Factor families
Game: Factors and multiples

Whole Numbers: Key Skill 4

Find the multiples of a number

Year 5

A multiple is the result of multiplying a number by another number. For example, the multiples of 3 are 3, 6, 9, 12, 15, 18, 21 etc. (times tables can help here: 3 x 1 is 3, 3 x 2 is 6, 3 x 3 is 9, 3 x 4 is 12 etc.)

The first multiple of a number is always the number itself (because it can be multiplied by 1).

When children understand multiples, they find it easier and faster to work with numbers. Multiples help with fractions, decimals, multiplication, division and much more.

Times tables really help children with multiples and factors. A times tables chart in the toilet will help, as will songs, CDs, quizzes and competitions.

What are the first 6 multiples of 4?
4, 8, 12, 16, 20, 24 This is the same as skip counting.

Taking turns skip counting out loud can be a fun car game. See how high you can go!

Use the concept of the 'Multiple Monster' who makes numbers bigger to help your child to remember how to find multiples.

WEB LINKS go to:

Notes: Factor ninja and multiple monster
Game: Bike racing factors
Game: Factors and multiples
Games: Multiplication and division games

Addition and Subtraction: Key Skill 5

Use mental strategies to add and subtract 2 or more numbers

Year 5

Children use mental strategies to figure out the maths in their head, without writing anything down.

Children will have learned a range of strategies they can use to add and subtract numbers in their head, including the jump strategy, split strategy and compensation strategy. The key is to use the best strategy for the numbers. For example, compensation is the best strategy when numbers are close to 10, 100 or 1 000.

Split – when no trading is needed
Jump – when trading is needed
Compensation – when 1 of the numbers is close to 10s or 100s

To find 456 + 207, children might use:

- jump strategy (456 + 200 + 7)
- split strategy (400 + 200 + 50 + 6 + 7).

To find 456 – 207, children might use:

- jump strategy (456 – 200 – 7)
- compensation strategy (456 – 207 = 449 – 200).

WEB LINKS go to:

Video: Jump strategy
Video: Split strategy
Video: Compensation strategy

Addition and Subtraction: Key Skill 6

Use the formal algorithm to add and subtract 2 or more numbers

Year 5

The formal algorithm is a step-by-step process to solving addition and subtraction problems. Formal algorithm and vertical algorithm mean the same thing.

The formal algorithm uses the same steps in the same order every time to find the answer and is essential for more complex questions.

Before they use the formal algorithm, children should be encouraged to estimate an answer first by using rounding. This can help them to limit simple errors in calculations. If there is no operation written next to the question, it is always an addition question. It is important to practice questions where trading across 2 place values is needed as children find it the most difficult. Use questions where 0s are needed.

Examples without trading:

14 85 + 99	21 23 50 94	89 – 54 35	97 – 23 31 43

Examples with trading:

95 + 48 143	34 57 62 153	60 – 39 21	72 – 34 11 27

Examples where trading across 2 place values is needed:

299 + 498 24 821	400 – 327 73

Addition Poem

Adds up to 9,
Everything is fine.
10 or more,
take the extra next door!

Subtraction Poem

More on top?
No need to stop!
More on the floor?
Go next door and get ten more! Numbers the same?
Zero's the game!

WEB LINKS go to:

Notes: Adding and subtracting
Video: Written addition methods
Video: Written subtraction methods
Games: Addition and subtraction

Addition and Subtraction: Key Skill 7

Use a calculator to add and subtract numbers of any size

Year 5

Calculators are used in class for the first time this year. Children use it to find and check answers. Basic calculators are used in primary school (not scientific calculators like high school).

To find the answer to 194 x 5, press the buttons 1, 9 and 4. Then press x (for multiply) and then 5.
Now press = (equals).
The result should be 790.

Use the calculator to help check answers after other addition and subtraction strategies have been applied to find an answer.

WEB LINKS go to:

Game: Bamzooki – using a calculator

Addition and Subtraction: Key Skill 8

Use rounding to estimate the answer to addition and subtraction problems

Year 5

Rounding means to increase or decrease to the nearest 10, 100, 1 000 etc. For 1, 2, 3, 4 we round down to 0. For 5, 6, 7, 8, 9 we round up to 10.

Rounding helps children check their answers, or come up with a rough answer they can work towards. For example, 416 x 23 is roughly 400 x 20. So the answer should be around 8 000.

We estimate by rounding the numbers to the nearest 10 or 100:

- 38 rounded to the nearest 10 is 40.
- 623 rounded other the nearest 100 is 600.
- $7.99 rounds to $8.
- 121⁄4 is rounded to 12

To estimate 456 + 207, round both numbers to the nearest 10 (460 + 200). This gives an estimate of 660.
Another example rounding to 10s 843–127=840 –130 =110

Rounding Poem
Underline the digit, Look next door.
If it's 5 or greater, Add one more.
If it's less than 5,
Leave it for sure. Everything after is a zero, not more.

WEB LINKS go to:

Video: Using rounding for estimation

Addition and Subtraction: Key Skill 9

Solve word problems and record the strategy used

Year 5

For word problems, children read a story about a problem (often a real-life problem!), and then figure out what operations are needed to reach the answer.

To record the strategy used, children show their working or talk about how they got their answer.

Word problems are important because children must be able to choose and apply a strategy, estimate, solve it and check their answer. Most children will have difficulties in understanding what they need to do. Ask them to read the question carefully and decide what the most important information is and what operation they need to solve the question.

Try using the CUBES strategy for problem solving:

C Circle the numbers
U Underline the question
B Box the keywords
E Eliminate information not needed S Solve by showing your working out

Newman's Analysis is another strategy to help with word problems.

1 Read the question to me.
2 Tell me what the question is asking you to do.
3 Tell me how you are going to find the answer.
4 Show me what to do to get the answer.
5 Now, write down your answer.

Isaac had $42. He was then given $156 and found another $345. How much money does Isaac have now? *Answer:* $42 + $156 + $345 = $543 Isaac now has $543.

Annabel had 670 sheep. He sold 256. How many sheep are left? *Answer:* 670 – 256 = 414 Annabel had 414 sheep left.

WEB LINKS go to:

Video: Math word problems, easier
Video: Math word problems, harder
Video: Newmans explained

Multiplication and Division: Key Skill 10

Use and record a range of mental and written strategies to multiply by 1-digit and 2-digit operators

Year 5

Children use mental strategies to figure out the maths problem in their head, without writing anything down.

Using a written strategy means to show your way of working something out using known relationships, patterns and operations.

Operators are the numbers that you multiply by. For example in 345 x 6, the operator is 6.

There are lots of mental strategies that children can use for division and multiplication. Encourage your child to become familiar with a range of different strategies. Look for your child developing strategies that suit them best, and to communicate how they used that strategy. Examples include doubling, halving and estimation. Written strategies include area and distributive multiplication.

To find 45 x 3, children might:

- estimate (50 x 3 = 150, so the answer will be around 150)
- use the skip count strategy (45 + 45 + 45 = 135)
- use the split strategy (40 x 3 + 5 x 3 = 120 + 15 = 135)
- use doubling (45 doubled is 90) 90 + 45 =135
- use the area model (40 x 3) + (5 x 3) = 120 + 15 = 135
- use the distributive method (3 x 40) + (3 x 5) = 120 + 15 = 135

WEB LINKS go to:

Video: Mental strategies
Video: Chinese multiplication
Video: Lattice multiplication
Video: Distributive property
Video: Written strategies for multiplication
Games: Multiplication and division games

Multiplication and division: Key Skill 11

Use the formal algorithm to multiply a 2-digit or 3-digit number by a 1-digit number

Year 5

The formal algorithm is a step-by-step process to solving multiplication and division problems. Formal algorithm and vertical algorithm mean the same thing.

A digit is a symbol used to write a numeral. The digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 are used to write all the numbers in our number system. A 3-digit number can be made from any 3 digits, e.g. 584 or 109.

The formal algorithm uses the same steps in the same order every time to find the answer. The formal algorithm is essential for more complex questions. Start with questions that don't need trading first because they are easier.

Practice this skill over and over with lots of different questions to build confidence. Mulitply with smaller numbers first, and then work up to larger numbers. Here are some examples.

45	124	134
x 3	x 5	x 7
135	620	938

WEB LINKS go to:

Video: Mulitplying with the formal algorithm
Games: Multiplication and division games

Multiplication and Division: Key Skill 12

Use mental and written strategies to divide numbers with 3 or more digits by a 1-digit operator, including remainders

Year 5

A remainder is the number left over when the problem cannot be divided equally. Children use mental strategies to figure out the maths in their head, without writing anything down. Using a written strategy means to show your way of working something out using known relationships, patterns and operations.

A fact family is a group of related facts in addition and subtraction, and multiplication and division. It helps children understand the relationship between operations. Eg. 4 x 5 = 20 5 x 4 = 20 20 ÷ 4 = 5 20 ÷ 5 = 4

For division, it is important to remember the fact family. Strong multiplication skills and strategies help with division. There are divisibility tests that children can learn as a quick way to see if a large number can be divided by a 1 digit number without a remainder.

There are lots of different methods to solve division and all are acceptable. Children can choose which one they like best to use.

Let's solve 248 ÷ 4 = ? and try the divisibility test for 4.
The Rule for 4: If the last 2 digits of a whole number are divisible by 4, then the entire number is divisible by 4. So in 248, 48 is divisible by 4 without any left over.
To divide 248 by 4, children might use the split strategy (200 + 40 + 8) ÷ 4 =
200 ÷ 4 = 50 40 ÷ 4 = 10
8÷ 4 = 2 50 + 10 + 2 = 62

Using a fact family, let's split 248 and work with 240 and 8.
A With 240, 4 x 6 = 24, so 4 x 60 = 240 and therefore: 240 ÷ 4 = 60
B With 8, 4 x 2 therefore: 8 ÷ 4 = 2
C Add A and B together so 60 + 2 = 62 248 ÷ 4 = 62

WEB LINKS go to:

Video: Written methods for division
Video: Long division method explained
Video: Long division rap
Game: Multiplication and division games
Video: Big 7 long division
Video: Divisibility rap – class
Video: Area division
Video: Divisibility tests
Game: Bamzooki – mental multiplication

Multiplication and Division: Key Skill 13

Solve word problems and record the strategy used

Year 5

For word problems, children need to read a story about a problem (often a real-life problem!) and then figure out what operations are needed to reach the answer.

To record the strategy used, children show their working or talk about how they got their answer.

Word problems are important because children must be able to choose and apply a strategy, estimate, solve it and check their answer. Most children will have difficulties in understanding what they need to do. Ask them to read the question carefully and decide what the most important information is and what operation they need to solve the question.

Try using the CUBES strategy for problem solving:

C Circle the numbers
U Underline the question
B Box the keywords
E Eliminate information not needed
S Solve by showing your working out

Newman's Analysis is another strategy to help with word problems.

1 Read the question to me.
2 Tell me what the question is asking you to do.
3 Tell me how you are going to find the answer.
4 Show me what to do to get the answer.
5 Now, write down your answer.

171 people visit The Great Gardens each day. How many would visit each week? *Answer:* 171 x 7 = 1 197 1 197 people visit The Great Gardens each week.

There are 240 children travelling on 6 buses. How many children are on each bus? *Answer:* 240 ÷ 6 = 40 There are 40 children on each bus.

WEB LINKS go to:

Video: Math word problems, easier
Video: Math word problems, harder
Video: Newmans explained

Multiplication and Division: Key Skill 14

Explain remainders in division problems

Year 5

A remainder is the number left over when the problem cannot be divided equally. For example, if we want to divide 12 slices of cake among 5 people, each person would get 2 slices each and there would be 2 pieces left over – these are the remainder.

There are divisibility tests that children can learn as a quick way to see if a number can be divided by a number without a remainder.

We write the remainder as an 'r' so 5 remainder 2 is written as 5 r2.

How many 5-seater cars are needed to take 47 people to the beach? Using the divisibility test for 5.

The Rule for 5: If the last digit of a whole number ends in 5 or 0, then the entire number is divisible by 5. So 47 does not end in a 5 or a 0, so it is not divisible by 5 and will have a remainder.

Answer: 47 ÷ 5 = 9 r 2 10 cars are needed.

If I can fit a maximum of 7 cupcakes in a box, how many boxes do I need for 15 cupcakes?

Answer: 15 ÷ 7 = 2 r 1
3 boxes are needed for 15 cupcakes.

WEB LINKS go to:

Video: Long division with remainders, easier
Video: Short division explained
Video: Dividing numbers with remainders
Video: Divisibility rap – class

Multiplication and Division: Key Skill 15

Use rounding to estimate answers and check the calculation

Year 5

Rounding is to increase or decrease to the nearest 10, 100, 1 000 etc. For 1, 2, 3, 4 go down to 0.
For 5, 6, 7, 8, 9 go up to 10. With fractions, rounding is to go to the nearest whole number. Nearest whole number and rounding mean the same thing.

Estimating is rounding numbers to make an educated guess close to the answer.

Children are encouraged to estimate to give them a guide as to what a reasonable answer would be. They

also help to avoid simple mistakes. Always round and estimate before attempting to answer a question.

To estimate 12 x 253, round both numbers to the nearest 10 (10 x 250). This gives an estimate of 2 500. Children should be looking for an answer that is close to 2 500. If you're answer is not close to this check your calculations.

294 ÷ 9 = 300 ÷ 10 = 30 as an estimate
Children should be looking for an answer that is close to 30

Rounding Poem
Underline the digit, Look next door.
If it's 5 or greater, Add one more.
If it's less than 5, Leave it for sure.
Everything after is a zero, not more.

WEB LINKS go to:

Video: Using rounding

Fractions and Decimals: Key Skill 16

Compare and order fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12 and 100

Year 5

A numerator is the number above the line in a fraction which shows how many parts are being considered.

A denominator is the number below the line in a fraction. It shows the number of parts a whole has been divided into.

The line in between the numerator and the denominator is called the fraction bar. Division bar and vinculum mean the same thing.

Pictures are hugely helpful in understanding fractions. A common mistake is thinking the larger denominator creates the larger fraction. It is the opposite for fractions. The smaller the denominator, the larger the fraction.

In Year 5, children start to play with fractions where the numerator changes the size of the fraction too. For example, $\frac{7}{8}$ is larger than $\frac{1}{2}$

Placing fractions on a number line helps children to see fractions as a (smaller) number in their own right. This is important for learning multiply and divide fractions in later years.

Try making fraction strips and number lines to help show that fractions are part of a whole. Create pictures of different fractions from the same size whole and compare them.

Have a go at placing different fractions on the same number line! The following exercise shows fractions being ordered from smallest to biggest.

$\frac{8}{12}\ \frac{1}{2}\ \frac{2}{6} \longrightarrow \frac{2}{6}\ \frac{1}{2}\ \frac{8}{12}$

$\frac{1}{4}\ \frac{2}{5}\ \frac{1}{8} \longrightarrow \frac{1}{8}\ \frac{2}{5}\ \frac{1}{4}$

$\frac{3}{4}\ \frac{1}{2}\ \frac{5}{12} \longrightarrow \frac{5}{12}\ \frac{1}{2}\ \frac{3}{4}$

WEB LINKS go to:

Notes: Fractions on a number line
Video: Using a number line to order fractions
Game: Fraction fiddle

Fractions and Decimals: Key Skill 17

Convert a mixed numeral to an improper fraction and vice versa

Year 5

A fraction is part of a whole that has been broken into equal parts. It has a:

- numerator (top number: how many parts we have)
- denominator (bottom number: how many parts the whole has been broken up into)
- fraction bar (the line in between).

A mixed numeral is a number made up of a whole number and a proper fraction.
An improper fraction is a fraction where the numerator is equal to, or larger than, the denominator.

This is an important skill needed to work in areas of fractions. Knowing your times tables helps children convert mixed numeral and improper fractions easily. Drawing pictures of fractions helps show the mixed numeral or improper fraction for children who are learning this skill. Use circles for odd denominators and rectangles for even denominators.

To convert a mixed numeral to an improper fraction try using MAD:
M Multiply the whole number by the denominator
A Add the numerator and your answer for M – this is the new numerator!
D Denominator stays the same

$1\frac{1}{3} = \frac{4}{3}$

$2\frac{1}{3} = \frac{7}{3}$

$3\frac{1}{2} = \frac{7}{2}$

M 1 x 3 = 3 (whole number x denominator)
A 1 + 3 = 4 (numerator + answer to M)
D 3 (denominator stays the same)

Answer: $\frac{4}{3}$

To convert an improper fraction to a mixed numeral try DWD:
D Divide the numerator by the denominator
W Write your answer as the whole number and the remainder as the numerator
D Denominator stays the same.

$\frac{7}{4} = 1\frac{3}{4}$

$\frac{5}{2} = 2\frac{1}{2}$

$\frac{6}{5} = 1\frac{1}{5}$

D $\frac{7}{4}$ = 1 with 3 remainder (numerator ÷ denominator)
W 1 = whole and 3 = numerator (write 1 as the whole, 3 as the numerator)
D 4 (denominator stays the same)

Answer: $\frac{4}{3}$

WEB LINKS go to:

Video: Converting mixed numerals
Notes: Mixed fractions
Video: Mixed numbers: changing from an improper fraction

Fractions and Decimals: Key Skill 18

Add and subtract fractions with the same denominator

Year 5

A numerator is the number above the fraction bar which shows how many parts you have.
A denominator is the number below the fraction bar. It shows the number of parts a whole has been divided into.

The line in between the numerator and the denominator is called the fraction bar. Division bar and vinculum mean the same thing.

When we add or subtract fractions with the same denominator (bottom number), we only add or subtract the numerator (top number).

Pictures are hugely helpful in working out how to add and subtract fractions. Use circles for odd denominators and rectangles for even denominators.

Start adding and subtracting fractions with answers smaller than a whole number, then try questions where a conversion is needed! (Key Skill 17)

Level 1: Simple adding and subtracting of fractions. $\frac{1}{3}$ of the kids in Bailey's class played basketball at recess. $\frac{1}{3}$ of the kids played handball. $\frac{1}{3}$ of the kids sat under the tree.
What fraction of kids played sport?

Working out: $\frac{1}{3} + \frac{1}{3} = \frac{2}{3}$

$\frac{2}{3}$ of the kids in Bailey's class played sport.

$\frac{5}{6} - \frac{2}{6} = \frac{3}{6}$

Level 2: Where converting improper fractions and mixed numerals is needed. (Key Skill 17)

$\frac{3}{4} + \frac{3}{4} = \frac{6}{4}$

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

$1\frac{1}{4} - \frac{2}{4} = \frac{5}{4} - \frac{2}{4}$

$= \frac{3}{4}$

WEB LINKS go to:

Video: Adding and subtracting fractions
Video: Adding and subtracting common denominator fractions
Game: Adding and subtracting fractions
Game: Shoot the hoop

Fractions and Decimals: Key Skill 19

State the place value of digits up to 3 decimal places

Year 5

Decimal places are the numbers after (to the right of) the decimal point. Understanding decimal place value is essential for children to work with decimals.

Decimals are part of a whole – that is, 0.1 means $\frac{1}{10}$ of a whole number, and 0.01 means $\frac{1}{100}$ of a whole number.

When we read decimals out loud, we read each digit on the right of the decimal point as single digits. So 1.62 is read as 'one point six two' not 'one point sixty-two' and 354.509 is read as 'three hundred and fifty four point five zero nine'.

When children can write decimals on number lines, it helps them to use mental strategies (such as the jump strategy) to solve problems involving decimals. Number lines also reinforce their knowledge of decimal place value.

What is the place value of the bold digits in these numbers?:

45.068 = 8 thousandths or 0.008 4.92 = 9 tenths or 0.9
0.106 = 6 thousandths or 0.006 999.567 = 6 hundredths or 0.06

Try and plot a group of decimals on a number line. Have competitions to see who can be the fastest and most accurate!

WEB LINKS go to:

Notes: Place value chart
Notes: Decimal place value
Game: Decimal place value

Fractions and Decimals: Key Skill 20

Compare, order and write decimals with up to 3 decimal places

Year 5

Decimals are a fraction that is made by dividing a whole into tenths (10 equal parts) or hundredths (100 equal parts). Uses a decimal point when written.

Decimal and decimal fraction mean the same thing.

Comparing and ordering decimals helps children to improve their number sense. A common mistake here is that children think a shorter number must be smaller. This is not always the case with decimals e.g. 4.3 is bigger than 4.123.

5.6 can be read as 5.60 and even 5.600! This is because the 0s are acting as place holders and don't change the size of the number.

Play a card game. Give 2 players half the deck each, and place the 2 piles face down. Turn over 1 card and place it in the middle – that stands for the whole number. Turn over 3 more cards and place them under the whole number – they stand for your 3 decimal places. The player with the biggest number wins the cards. Keep playing again until all the cards are with 1 player.

Write these decimals from smallest to largest: 5.369, 5.055, 5.923 and 5.926 *Answer:* 5.055, 5.369, 5.923, 5.926

Write these decimals from largest to smallest: 7.001, 7.035, 7.648 and 7.5 *Answer:* 7.648, 7.5 (7.500), 7.035, 7.001

WEB LINKS go to:

Notes: Ordering decimals
Video: Comparing decimal value
Video: Comparing 3-digit decimals
Video: Ordering decimals

Patterns and Algebra: Key Skill 21

Identify, describe, continue and create number patterns with whole numbers, fractions or decimals

Year 5

Number patterns are patterns created by numbers.

Patterns are formed by rules. A rule is used to work out any number further along in the pattern. Rules also help children to continue patterns.

Patterns help children to apply rules, check answers, and see relationships between numbers.

Children learn a lot about numbers and build strong operation skills when working with patterns.

Here are some examples of number patterns.

5 $5\frac{1}{2}$ 6 $6\frac{1}{2}$ 7 $7\frac{1}{2}$ (the number increases by a half)
4 4.5 5 5.5 6 6.5 (the number increases by 0.5)
5.6 4.6 3.6 2.6 1.6 (the number decreases by 1)
0.40 0.45 0.50 0.55 0.60 (the number increases by 0.05)

Use rhythm challenges to help learn times tables and explore patterns (check out the cup song, or some drumming games).

WEB LINKS go to:

Video: fraction counting patterns
Video: Cup song

Patterns and Algebra: Key Skill 22

Find missing numbers in number sentences (equations) involving addition, subtraction, multiplication or division on both sides of the equals sign

Year 5

A number sentence is an equation. It uses numbers and symbols to describe a maths problem.

A fact family is a group of related facts in addition and subtraction, and multiplication and division. It helps children understand the relationship between operations.

4 + □□= 10 □□+ 4 = 10 10 – 4 = □□□□□□□□□□10 – □□= 4

20 x 5 = □□□□□□□□□□5 x 20 = □□□□□□□□□□□÷ 5 = 20 □□÷ 20 = 5

These skills will be used by the children for the rest of their maths careers! To find missing numbers, we focus on the idea of ***equivalence*** and the role of the equals (=) sign. Remembering that the equals sign means 'the same on both sides' makes it easier to find missing numbers. Children use their knowledge of numbers to find what is missing. Strategies include:

- guess what the missing number is, and test it to see if the equation works with that number
- use the fact family to help solve the question.

The key is to be able to explain ***how*** they got their answer (show working out).

Here is an example of an equation with missing numbers.

4 + □□= 16 18 – □□= 5 25 = □□+ 21 75 = 13 ÷ □□

Jack had a piece of rope and cut off 70 metres. He was left with 38 metres. How long was the rope?
□□– 70m = 38m (remembering the fact family) 70m + 38m = □
70m + 38m = 108m
□□= 108m =Jack's rope was 108m long before it was cut.

WEB LINKS go to:

Video: Missing numbers: addition and subtraction
Video: Missing numbers: multiplication and division

Whole Numbers: Key Skill 1

Find negative numbers on a number line

Year 6

Negative numbers mean numbers that are less than 0. They are on the left of 0 when we look at a number line.

A number line is a line of any length that can be used to show the position of numbers in relation to each other. The line can start and end on any number. Number lines use measurements to locate the place of numbers.

Negative numbers are used in real life to show something is less than 0. Number lines are helpful for explaining negative numbers. Use real life examples involving temperature and money to help your child understand negative numbers.

Map the temperatures over winter of a cold place like Antarctica, Russia or Canada. Graph your results.

Some liquids freeze at a temperature lower than 0 degrees celcius. Explore what liquids freeze at a lower temperature and see if you can find their freezing point.

Use a number line to jump over the 0 as you solve the questions. See who can make the trickiest question with the most jumps over 0.
5 + 2 –8 – 2 + 4 = 1
4 – 10 + 5 – 6 + 9 = 2
–7 + 4 + 8 – 7= –2

Here are some examples of negative number questions:
- If an undersea valley is 64m below sea level and the nearby mountain is 26m above sea level, what is the distance between the depth of the valley and the top of the mountain? *Answer*: 90m
- I want to buy a phone. The phone costs $128 but I have to pay my parents $50 that I owe.. How much money do I need to save? *Answer*: $178

WEB LINKS go to:

Notes: Empty number lines
Video: Negative numbers
Video: Explanation of negative numbers
Game: Negative numbers

Whole Numbers: Key Skill 2

Identify and describe prime numbers and composite numbers

Year 6

A prime number has 2 factors (1 and the number itself).

A composite number has more than 2 factors.

A factor is a whole number that can be divided exactly into another whole number. For example, the factors of 12 are 12, 6, 4, 3, 2 and 1.

Knowing prime and composite numbers helps children to divide larger numbers and work with fractions. It helps when simplifying fractions. 1 is neither prime nor composite. It has only 1 factor: itself.

Create factor trees for numbers to find if they are prime or composite.

Use playing cards to make a game. Flip a card, and ask your child whether it is a prime or composite number, and why. Flip 2 cards to create bigger numbers. See who can get the most right in a row.

We can explain whether a whole number is prime, composite or neither by finding its factors: 13 has 2 factors (1 and 13). Therefore, 13 is a prime number. 21 has more than 2 factors (1, 3, 7, 21). Therefore, 21 is a composite number.

WEB LINKS go to:

Video: Factor tree demonstration
Video: Prime and composite numbers
Video: What are factors?
Game: Prime numbers
Game: Number factors
Game: Factor trees

Whole Numbers: Key Skill 3

Create and describe square numbers and triangular numbers

Year 6

Square numbers are the result of multiplying a number by itself. The first 10 square numbers are 1, 4, 9, 16, 25, 36, 49, 64, 81, 100.

Triangular numbers can be represented by a triangular pattern of dots. The first triangular number is 1, followed by 3, 6, 10, 15, 21... Notice that the difference between 2 numbers increases by 1 each time.

1 → 3 = 2 3 → 6 = 3 6 → 10 = 4

Working with square and triangular number patterns helps to find patterns.

Build arrays that show that triangular numbers are made by forming triangles that are even on all 3 sides. Work together to add the amounts of items used to build a bigger triangle. Can you find the pattern? This can also be done with square numbers, only with a square shape!

Use a multiplication grid to find all the square numbers and colour them in. Can you see a pattern? (Here's a multiplication grid you can print).

2 consecutive triangular numbers can be added to create a square number. Test this theory and see if it works.

Work together to find;
The next triangular number after 10? *Answer*: 15
The square number before 64? *Answer*: 49

WEB LINKS go to:

Video: Explanation of square and triangular numbers
Game: Magic triangle

Addition and Subtraction: Key Skill 4

Solve addition and subtraction word problems

Year 6

For word problems, children need to read a story about a problem (often a real-life problem!) and then figure out what operations are needed to reach the answer.

Word problems are important because children must be able to choose and apply a strategy, estimate, solve it and check their answer. Most children will have difficulties in understanding what they need to do. Ask them to read the question carefully and decide what the most important information is and what operation they need to solve the question.

Try using the CUBES strategy for problem solving:

C Circle the numbers
U Underline the question
B Box the keywords
E Eliminate information not needed S Solve by showing your working out

Newman's Analysis is another strategy to help with word problems.

1 Read the question to me.
2 Tell me what the question is asking you to do.
3 Tell me how you are going to find the answer.
4 Show me what to do to get the answer.
5 Now, write down your answer.

- At the shops, give your children problems to work out like; I have $10. I need to buy milk, bread and some apples. Help me work out how many apples I'll be able to buy after I buy the milk and bread.
- Isla scored 134 in her first test, 56 in her second and 389 in her third. What was her total score for the 3 tests?
134 + 56 + 389 = 579
Isla scored 579 in total for 3 tests.

WEB LINKS go to:

Video: How to solve word problems using Newman's error analysis
Video: Explanation of Newman's prompts
Games: Logic and problem-solving

Multiplication and Division: Key Skill 5

Solve multiplication and division word problems

Year 6

For word problems, children need to read a story about a problem (often a real-life problem!) and then figure out what operations are needed to reach the answer.

Word problems are important because children must be able to choose and apply a strategy, estimate, solve it and check their answer. Most children will have difficulties in understanding what they need to do. Ask them to read the question carefully and decide what the most important information is and what operation they need to solve the question.

Here's an example question and some different strategies to solve it.
I earned $126 per day for 7 days of work. How much money did I earn in total?
Area model. This involves drawing the multiplication problem as rectangular areas (see Notes: Area model of multiplication).
Split strategy. This involves splitting the question into its place values
7 x 126 = (7 x 100) + (7 x 20) + (7 x 6) = 700 + 140 + 42 = 882

Newman's Analysis is another strategy to help with word problems.
1 Read the question to me.
2 Tell me what the question is asking you to do.
3 Tell me how you are going to find the answer.
4 Show me what to do to get the answer.
5 Now, write down your answer.

Extended multiplication	**Contracted multiplication**	**Short division** (different question)
126 x 7 42 140 + 700 882	126 x 7 882	126 ÷ 7 = 18 7) 126

WEB LINKS go to:

Notes: Area model of multiplication
Video: Mental strategies
Video: Split strategy for multiplication
Video: Multiplication written methods
Video: Short division with remainders
Video: Short division with a decimal remainder

Multiplication and Division: Key Skill 6

Identify and use grouping symbols

Year 6

Grouping symbols, i.e. ( ), [ ], are used to separate operations (+, –, x, ÷) in an equation. Always do the operation inside the grouping symbols first, then any operations outside the grouping symbols. Parentheses and brackets mean the same thing.

An equation is a number sentence. It uses numbers and symbols to describe a maths problem.

When an equation contains more than 1 operation, grouping symbols help us to know which order to

work in. This skill is important to help with the order of operations and high school algebra. When there is more than 1 grouping symbol, start with the one in the middle

e.g. 3 + [20 ÷ (9 – 5)] = 3 + [20 ÷ 4] → 9 – 5 was done first = 3+ 5 =8

Practice this skill often but for a short amount of time for maximum impact.

Explore maths questions with 2 operations and play around with moving the brackets. How do the brackets change the answer?

(5 + 6) x 3 = 11 x 3
= 33

5 + (6 x 3) = 5 + 18
= 23

WEB LINKS go to:

Video: Grouping symbols
Video: Parentheses worked examples

Multiplication and Division: Key Skill 7

Apply the order of operations

Year 6

The order of operations is a step by step method to solve complex calculations.
Exponents – A small number placed to the upper right of number which shows how many copies of the number are multiplied together. Indices and ordinals mean the same thing.

e.g. $5^2 = 5 \times 5 = 25$ $6^4 = 6 \times 6 \times 6 \times 6 = 1296$

The order of operations is a mathematical law that makes sure equations are solved correctly. We use acronyms to help us remember the order of operations. They all mean the same thing; they're just different ways of explaining it.
BODMAS – Brackets, Ordinals, Division, Multiplication, Addition, Subtraction
PEDMAS – Parentheses, Exponents, Division, Multiplication, Addition, Subtraction
PIDMAS – Parentheses, Indices, Division, Multiplication, Addition, Subtraction
BIDMAS – Brackets, Indices, Division, Multiplication, Addition, Subtraction
Remember to work from left to right if there is a division and multiplication grouped together, and addition and subtraction grouped together. Children will often be unaware that they have used the order of operations in the wrong order and have the wrong answer. Practice this skill often but for a short amount of time for maximum impact.

Using word problems can help children to apply the order of operations. For example: I buy 6 goldfish costing $10 each and 2 water plants costing $4 each. What is the total cost? This can be written as the number sentence 6 x 10 + 2 x 4.

Right (multiply 1st) – 6 x 10 + 2 x 4 = 60 + 8 = 68 Wrong (add 1st) – 6 x 10 + 2 x 4 = 6 x 12 x 4 = 68 = 288

Give your child lots of opportunities to apply the order of operations. Write out equations with multiple operations, grouping symbols and exponents. This skill needs lots of practice!
2 x 5 – (3+7) = 14 – 2 x 3 ÷ 2 =

WEB LINKS go to:

Notes: Order of operations with worked examples
Video: Order of operations explained
Video: Order of operations – introduction
Video: BODMAS with examples
Video: PEDMAS with examples
Video: BODMAS song

Fractions and Decimals: Key Skill 8

Show, compare and order fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12 and 100

Year 6

A numerator is the number above the line in a fraction which shows how many parts are being considered.

A denominator is the number below the line in a fraction. It shows the number of parts a whole has been divided into.

The line in between the numerator and the denominator is called the fraction bar. Division bar and vinculum mean the same thing.

Pictures are hugely helpful in understanding fractions. A common mistake is thinking the larger denominator creates a larger fraction. It is the opposite for fractions. The smaller the denominator, the larger the fraction.

From Year 5, children start working with fractions where the numerator changes the size of the fraction too. For example $\frac{7}{8}$ is larger than $\frac{1}{2}$

Plotting fractions on a number line helps children to see fractions as a (smaller) number in their own right. This is important for learning to multiply and divide fractions in later years.

Write a group of fractions out and work together to plot them on a number line. This can be trickier than it seems!

Ask your child to write down 15 fractions between 3 and 4. Look for your child using only $\frac{1}{2}$ and $\frac{1}{4}$

Use drawings or a number line to show how this is possible and what answers there could be. There are lots of different answers you can make!

Play a game of Less than, more than. Use Uno cards to draw 4 cards and then work together to make number sentences true. There are lots of different questions that can be asked and solutions created. You can choose to move the greater than or less than symbols or challenge yourselves to keep them as they are!

WEB LINKS go to:

Notes: Empty number lines
Game: The legend of dick and dom comparing fractions
Game: Fraction monkeys

Fractions and Decimals: Key Skill 9

Find, create and write equivalent fractions

Year 6

Equivalent fractions are fractions that are equal in value, but have different names e.g. $\frac{4}{8} = \frac{1}{2}$

It's important to remember that fractions represent equal parts of a whole. To help children to find equivalence between fractions use number lines or pictures.

This key idea focuses on the denominators:

- 2, 4 and 8, e.g. $\frac{1}{2} = \frac{2}{4} = \frac{4}{8}$
- 3 and 6, e.g. $\frac{1}{3} = \frac{2}{6}$ or $\frac{2}{3} = \frac{4}{6}$
- 5, 10 and 100, e.g. $\frac{1}{5} = \frac{2}{10} = \frac{20}{100}$ or $\frac{3}{5} = \frac{6}{10} = \frac{60}{100}$

Children find it easier to double to find equivalent fractions than to reduce.

To create equivalent fractions

Larger – multiply the numerator and denominator by the same number

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

$\frac{3}{4} \times \frac{3}{3} = \frac{9}{12}$

Smaller – divide the numerator and denominator by the same number.

$\frac{6}{12} \div \frac{3}{3} = \frac{2}{6}$

$\frac{25}{100} \div \frac{5}{5} = \frac{5}{20}$

WEB LINKS go to:

Video: Equivalent fractions on a number line
Game: Equivalent fractions easy
Game: Equivalent fractions
Game: Equivalent fractions baseball

Fractions and Decimals: Key Skill 10

Write fractions in their simplest form

Year 6

A fraction is in its simplest form when the denominator is the smallest it can possibly be (while still being a whole number). It is never an improper fraction but can be a mixed numeral.

Highest common factor (HCF) of 2 or more whole numbers is the largest number that will divide exactly into each of the numbers.

Reducing fractions to their simplest form makes fractions easier to work with especially when learning algebra in high school. Knowing your times tables helps children to find the highest common factors and simplify fractions easily.

Knowledge of factors and multiples, equivalent fractions and converting improper fractions to mixed numerals is essential for this skill. (See video: HCF with factor tree)

When simplifying fractions:

1. 1 Convert any improper fractions to mixed numerals.
2. 2 What are the factors of the numerator?
3. 3 Does the denominator share any of those factors? (If yes, then it can be reduced!)
4. 4 Use the HCF and divide both the numerator and denominator by that number.

Here are some examples:

$\frac{3}{9}$ Factors of 3 are 1, **3**

Factors of 9, 1, **3**, 9 (3 is the HCF)

$\frac{3}{9} \div \frac{3}{3} = \frac{1}{3}$

$\frac{3}{9} = \frac{1}{3}$

$\frac{5}{20}$ Factors of 5 are 1, **5**

Factors of 20 are 1, 20, 2, 10, **5**, 4 (5 is the HCF)

$\frac{5}{20} \div \frac{5}{5} = \frac{1}{4}$

$\frac{24}{18} = 1\frac{6}{18}$ Factors of 6 = 1, **6**, 2, 3

Factors of 18 = 1, 18, 2, 9, 3, **6** (6 is the HCF)

$\frac{6}{18} \div \frac{6}{6} = \frac{1}{3}$

$\frac{24}{18} = 1\frac{1}{3}$

WEB LINKS go to:

Notes: Converting fractions
Video: HCF with factor tree
Video: HCF
Video: Simplifying fractions
Video: Simplifying fractions song
Game: Simplifying fractions

Multiplication and Division: Key Skill 11

Add and subtract fractions, including mixed numerals, with the same denominators

Year 6

A mixed numeral is a number made up of a whole number and a proper fraction.

A denominator is the number below the line in a fraction. It that shows the number of parts a whole has been divided into.

When adding and subtracting with the same denominator, the numerator is added or subtracted and the denominator stays the same. With mixed numerals, the whole numbers are added or subtracted together and the fractions are added and subtracted together, then the whole numbers and fractions are added together. Show answers in their simplest form.

Level 1 Adding and subtracting

$\frac{2}{6} + \frac{2}{6} = \frac{4}{6}$ $\quad \frac{3}{8} + \frac{4}{8} = \frac{7}{8}$ $\quad \frac{8}{9} - \frac{5}{9} = \frac{3}{9}$ $\quad \frac{5}{10} - \frac{3}{10} = \frac{2}{10}$

Level 2 Adding and subtracting with mixed numerals

$1\frac{2}{5} + 2\frac{1}{5} = (1+2) + (\frac{2}{5} + \frac{1}{5})$

$= 3 + \frac{3}{5}$

$= 3\frac{3}{5}$

$7\frac{3}{6} - 4\frac{2}{6} = (7-4) + (\frac{3}{6} - \frac{2}{6})$

$= 3 + \frac{1}{6}$

$= 3\frac{1}{6}$

Level 3 Adding and subtracting when conversions are needed

$\frac{4}{5} + \frac{4}{5} = \frac{8}{5} = 1\frac{3}{5}$ $\quad \frac{4}{6} + \frac{5}{6} = \frac{9}{6} = 1\frac{3}{6}$

$1\frac{1}{5} - \frac{4}{5} = \frac{6}{5} - \frac{4}{5} = \frac{2}{5}$ $\quad 1\frac{2}{4} - \frac{3}{4} = \frac{6}{4} - \frac{3}{4} = \frac{3}{4}$

Level 4 Adding and subtracting with mixed numerals when conversions are needed

$1\frac{5}{7} + 3\frac{4}{7} = (1+3) + (\frac{5}{7} + \frac{4}{7})$

$= 4 + \frac{9}{7}$

$= 4 + 1\frac{2}{7}$

$= 5\frac{2}{7}$

$3\frac{1}{8} - 1\frac{5}{8} = 2\frac{9}{8} - 1\frac{5}{8}$

$= (2-1) + (\frac{9}{8} - \frac{5}{8})$

$= 1 + \frac{4}{8}$

$= 1\frac{4}{8}$

WEB LINKS go to:

Video: Add and subtract fractions with same denominator
Video: Add and subtract fractions of different denominators
Video: Add and subtract uncommon denominators with Mario
Game: Computation adding fractions
Game: Fraction word problems
Game: Adding and subtracting fractions
Game: Adding and subtracting fractions with different denominators

Fractions and Decimals: Key Skill 12

Find a simple fraction of a group

Year 6

Fraction of a group is the same as the fraction of a whole. We find a fraction of a group of objects. So to find $\frac{1}{2}$ of 10 objects is 5 objects. Fractions of a quantity and fractions of a collection mean the same thing.

Multiplying fractions is the main way to find a fraction of a quantity. That is, if we need to find $\frac{1}{5}$ of 50, we can calculate $\frac{1}{2}$ x 50 = 25. Fractions of a group or fractions of a collection mean the same thing. Start by multiplying fractions where the numerator is 1. When the numerator changes to more than 1, questions become harder e.g. $\frac{1}{3}$ of 12 first, then try $\frac{2}{3}$ of 12. Use the multiplication symbol (x) and the word 'of ' to multiply fractions by whole numbers. $\frac{2}{6}$ of 12 and $\frac{2}{6}$ x 12 mean the same thing.

The simplest way of multiplying a fraction by a whole number is to use the inverse operation. When we look at the example of $\frac{1}{2}$ x 50, we think 'How many times does 2 fit into 50?' (That is, 50 divided by 2 equals 25). Therefore $\frac{1}{2}$ x 50 = 25. Another way is to:
- divide the whole number by the denominator
- then times the answer by the numerator.

Level 1

$\frac{1}{4}$ x 20 = 20 ÷ 4 (divide whole number by denominator)

= 5 x 1 (times answer by numerator)

= 5

Level 2

$\frac{3}{5}$ of 30 = 30 ÷ 5 (divide whole number by denominator)

= 6 x 3 (times answer by numerator)

= 18

Ask your child to find fractions of different amounts in daily life, e.g. Our shopping cost $125. What is $\frac{1}{4}$ of this?

WEB LINKS go to:

Video: Multiplying fractions by whole numbers visual
Video: Multiplying fractions by whole numbers
Game: Multiplying fractions

Fractions and Decimals: Key Skill 13

Add and subtract decimals up to 3 decimal places

Year 6

Decimal places are the numbers after (to the right of) the decimal point.

When working with decimals, it is important children estimate before working out an answer. This will help them remember the decimal and put it in the right place.

When adding or subtracting decimals mentally, children can use the split, jump or compensation strategy (Year 3 Key Skills 5–7)

When we add or subtract decimals using a written strategy, we do it the same way as with whole numbers with and without trading (Year 4 Key Skill 7). When adding and subtracting – the decimal point never moves! Remember to include decimals where 0s are needed. If you have 1 decimal that is longer than the other, you can make them the same by adding 0s to the end. This is especially important in subtraction.

Without trading		With trading		When to add 0s	
4.9	8.65 –	6.795	4.823 –	4.6 –	4.600
6.4 +	5.43	4.556 +	2.798	3.456	3.456
11.3	3.22	11.351	2.025	1.144	1.144

Split – when no trading is needed 4.9 + 6.4 = (4 + 6) + (0.9 + 0.4)
= 10 + 1.3
= 11.3
Jump – when trading is needed
6.4 – 3.5 = 6.4 – 0.5
= 5.9 – 3
= 2.9
Compensation – when you can round 1 of the numbers easily.
9.999 – 4.576
= 10 – 4.576 (+0.001)
= 5.424 (– 0.001)
= 5.423

WEB LINKS go to:

Video: Adding decimals
Video: Subtracting decimals
Game: Adding and subtracting decimals

Fractions and Decimals: Key Skill 14

Multiply and divide decimals by 1-digit and 2-digit whole numbers

Year 6

We use these skills every day when working with money! Estimating answers first and then using inverse operations to check answers are excellent maths habits to adopt. They also help to avoid simple mistakes.

When **multiplying with decimal questions**, the number of numerals behind the decimal point in the question is how many are behind the decimal point in the answer. So multiply ignoring the decimal point, then at the end, count how many numerals are behind the decimal point in the question, and then count in from the right to that number to place your decimal. Here is an example:

8.3602 x 9 = ?

1 Round and estimate 9 x 8 = 72 (look for an answer around 72)

2 83602 x 9 = 752428

3 Solve 8.3602 x 9 = 75.2428 (4 numbers behind the decimal point in the question and answer)

When **dividing with decimal questions** using long division, the decimal point never moves. If you find a remainder, add as many 0s as you need to the end of the decimal until you no longer have a remainder. If you find a repeating pattern, stop after the second set. We place a dot above the first and last number in the pattern to show that the pattern repeats eg.

e.g. 4.235235 is written as $4.\dot{2}3\dot{5}$.

The same is with a recurring decimal e.g. 4.333333333333. We write $4.\dot{3}$ to show it continues forever.

Here are some examples:

16. 934 ÷ 5 = ?

1 Round and estimate – 17 ÷ 5 = $3\frac{2}{5}$ or 3.4 (look for an answer around 3.4)

2 Solve 16.934 ÷ 5 = $5\overline{)16.9340}$ 3.3868

= 3.3868

9.58 ÷ 3 = ?

1 Round and estimate – 9 ÷ 3 = 3 (look for an answer around 3)

2 Solve 9.58 ÷ 3 = $3\overline{)9.580000}$ 3.193333

$= 3.19\dot{3}$

WEB LINKS go to:

Video: Multiplying decimals
Game: Dividing decimals by whole numbers

Video: Dividing decimals (long division)
Game: Multiplying decimals by whole numbers

Fractions and Decimals: Key Skill 15

Multiply and divide decimals by 10, 100 and 1000

Year 6

Decimal places are the numbers after (to the right of) the decimal point.

Children need to know how to multiply decimals by 10, 100 and 1000 because it helps them to estimate answers, find percentages and better understand decimal place value. This helps children to solve problems involving decimal numbers.

There is a rule for powers of 10 (10, 100, 1 000, 10 000 etc)

To multiply, we teach the children to move the decimal point to the right 1 place when we multiply by 10, 2 places when we multiply by 100 and 3 places when we multiply by 1000.

e.g. 3.4 x 10 = 34 3.4 x 100 = 340 3.4 x 1000 = 3400

To divide, we teach the children to move the decimal point to the left 1 place when we divide by 10, 2 places when we divide by 100 and 3 places when we divide by 1000.

e.g. 356.2 ÷ 10 = 35.62 356.2 ÷ 100 = 3.562 356.2 ÷ 1000 = 0.3562

WEB LINKS go to:

Notes: Multiplying and dividing decimals by powers of 10
Video: Multiplying decimals by powers of 10
Video: Dividing decimals by powers of 10
Game: Divide decimals by 10 and 100
Game: Place value headings
Game: Bingo – times or divide

Fractions and Decimals: Key Skill 16

Solve word problems involving fractions, decimals and money problems

Year 6

For word problems, children need to read a story about a problem (often a real-life problem!) and then figure out what operations are needed to reach the answer.

Word problems are important because children must be able to choose and apply a strategy, estimate, solve it and check their answer. Most children will have difficulties in understanding what they need to do. Ask them to read the question carefully and decide what the most important information is and what operation they need to solve the question.

Try using the CUBES strategy for problem solving:

C Circle the numbers
U Underline the question
B Box the keywords
E Eliminate information not needed S Solve by showing your working out

Newman's Analysis is another strategy to help with word problems.

1 Read the question to me.
2 Tell me what the question is asking you to do.
3 Tell me how you are going to find the answer.
4 Show me what to do to get the answer.
5 Now, write down your answer.

Real-life money problems are always helpful. For example:

- Add the cost of each item in a shopping list to create a shopping budget.
- What is 10% off the cost of items at the supermarket?
- If you eat $\frac{1}{6}$ of a pizza and a friend eats $\frac{1}{5}$ how much is left?

WEB LINKS go to:

Notes: Money smart workbook
Video: Super cyril's circus supplies
Game: Running the school canteen
Game: Fraction word problems
Game: Add and subtract money word problems

Fractions and Decimals: Key Skill 17

Convert between equivalent percentages, fractions and decimals

Year 6

Percentages, fractions and decimals can all can mean the same thing, they represent a part of a whole number. That is, ½ = 0.5 = 50%. Also, ¼= 0.25 = 25%.

It is important children can swap between decimals, percentages and fractions to solve questions. Children will find converting decimals to percentages and vice versa the easiest with converting to and from fractions the hardest.

Percentages to decimals
Pepper Dr – The name Pepper Dr shows which way to move the decimal point. Dr always moves 2 decimal places towards Pepper (in this case left). 58% as a decimal is 0.58

Decimals to percentages
Dr Pepper – The name Dr Pepper shows which way to move the decimal point. Dr always moves 2 decimal places towards Pepper (in this case right). 0.43 as a % is 43%

Fractions to decimals
Cowboy Method – This story helps to set your working out correctly. It is also easy to remember! **Cowboy Story** – The cowboy rides the horse. The cowboy goes inside the house. Takes off his boots, hangs up his hat and eats 3 donuts. The horse stays outside the house. The cowboy is the numerator, the horse is the denominator. The cowboy goes into his house (the long division symbol) and the horse stays outside (the left of the long division symbol.) His boots and hat are the 2 decimal points (1 inside the question next to your numerator and 1 on top in the same place) and the 3 donuts are 0s added to the right of the decimal point after the cowboy. Then solve the division question (see Video: Cowboy method).

$\frac{3}{5} = 5\overline{)3.000}^{0.600}$

$\frac{3}{5} = 0.6$

Fractions to Percentages
Free Dr Pepper – To convert fractions to percentages, we convert fractions to decimals, and then decimals to percentages.

Here are some examples:

$\frac{1}{4} = \frac{25}{100} = 0.25 = 25\%$ $\quad\quad$ $\frac{4}{5} = \frac{80}{100} = 0.80 = 80\%$

Percentages to Fractions
Reverse Free Doctor Pepper and change percentage to a decimal, then the decimal to a fraction.

WEB LINKS go to:

Notes: Decimal fractions
Video: Converting percents to decimals and fractions
Video: Fraction, decimal, and percent visual model
Game: Fractions, decimals and percentages
Game: Fractions and decimals
Video: Cowboy method

Fractions and Decimals: Key Skill 18

Calculate 10%, 25% and 50% of amounts, including as discounts

Year 6

Calculating percentages is a skill that is used in everyday life. We use this skill to find statistics in sport, compare growth and in money.

Here are some examples:

Ena gets 32 out of 40 shots in during her netball match. Using a calculator, what is her shooting percentage?
32 ÷ 40 = 0.8 x 100 = 80 *Answer*: Ena's shooting percentage is 80%

It's 25% off all DVDs at JB Hi-Fi. The DVD Emily wants is $20. How much will she save?

To find 25% of a quantity, we divide it by 4, because 25% = $\frac{1}{4}$
25% of 20 = 20 ÷ 4 = 5. *Answer*: Emily sill save $5

Lisa's bank account has halved over this month. It started at $20. How much is in her back account now?
To find 50% of a quantity, we divide it by 2, because 50% = $\frac{1}{2}$
50% of 20 = 20 ÷ 2 =10 *Answer*: There is $10 left in Lisa's bank account.

Children also need to know how to calculate a discounted price. We do this by finding the dollar amount of the percentage discount, and subtracting it from the original price. Here are some examples:

For example, to calculate 25% off $40 we would find ¼ x $40 (25%) Then subtract the answer from $40.
$40 ÷ 4 = $10. So $40 – $10 = $30 The new price is $30.

WEB LINKS go to:

Video: Find a percent
Game: Percent shopping
Game: Legend of dick and dom
Game: Balloon invaders

Patterns and Algebra: Key Skill 19

Find and apply the rule for geometric patterns and number patterns.

Year 6

Geometric patterns are patterns created by shapes and number patterns by numbers.
A rule works out the value of any part of the pattern. Rules help to continue patterns. Term is one of the numbers in a sequence e.g. in 2, 4, 6, the 3 terms are 2, 4, and 6.

Finding and applying patterns are vital for children in algebra in Year 7.

The function rule finds the value of *any* term in a pattern. Look for an operation that finds the bottom number every time. Both the top and bottom numbers must follow this pattern for every term.

To find a pattern we:
1 Work out what happens to the top number to get the bottom number.
2 Check it works for the next term.
3 If yes, you have found your function rule! Apply it to find your missing number.
4 If no, try something else and start the process again. You may have used the wrong operation.
Here are some examples:

24	21	18	15	6
19	16	13	10	

1 To get from 24 to 19, you can –5. 24 – 19 = 5
2 21 – 5 = 16.
3 It works! The function rule is –5. 6 – 5 = 1. The missing number is 1

George earned $2 for each hour he worked. How much did he earn in 10 hours?

Hours	1	2	3	4	10
$ Earned	$2	$4	$6	$8	

1 To get from 1 to 2, you can +1. 1 + 1 = 2
2 2 + 1 = 3, we needed 4 to be our answer.

WEB LINKS go to:

Video: Finding function rules

Patterns and Algebra: Key Skill 20

Locate and record the coordinates of points in all 4 quadrants of the Cartesian plane

Year 6

The Cartesian plane is 2 number lines that cross at 0; 1 line is horizontal and the other is vertical.
It is used to plot points. Negative numbers are to the left of or below 0; positive numbers are to the right of or above 0. Cartesian plane, number plane and coordinate plane mean the same thing.

The Cartesian plane is an extension of a number line. The concept helps us to describe and visualise algebraic relationships and to better understand algebra. It is an important concept for all areas of high school maths. Children find finding and reading a point on a plane easier and plotting on a plane harder.

Children work from 1st quadrant (+, +), to 2nd quadrant (+, – and 3rd (–, +) and 4th (–, –) quadrants last (see Video: Coordinate Plan).

Play Battleships.

When we work with maps, we use coordinates. This is very similar to the Cartesian plane so any opportunity to read and use maps helps children to understand the Cartesian plane. Use a map when you go for a drive or a bushwalk. Work together to read the map as you make your journey.

Read maps in an atlas and use coordinates to find countries or places of interest. Have a race to see who can find a location in an atlas the fastest. Start with the book closed and use the index to find the coordinates of the place and page number.

Create a shape or a picture on the Cartesian plane and then work together to write the coordinates out so that someone can copy your shape or picture on another plane perfectly.

WEB LINKS go to:

Notes: Importance of cartesian plane
Video: Coordinate plane
Video: The cartesian plane
Video: Cartesian plane song
Game: Stock the shelves
Game: Cartesian coordinates printable games
Game: Cartesian plane online games