

## Working at level 3 in maths

Children will be able to do many of the following:

- try different approaches when solving problems
- test if a general statement is 'always true', 'sometimes true' or 'never true'. For instance, they can use examples to test if 'all numbers that end in 4 can be divided by 4'
- understand what each digit in a number represents, for example, understanding that in the number 325, the digit 2 represents 20
- deal confidently with whole numbers up to 1000 and can add and subtract them
- begin to understand about numbers which contain a decimal point
- know multiplication tables for 2, 3, 4, 5 and 10 and use them to solve practical problems. For example, if 20 cakes are needed for a party and cakes are sold in packs of four, how many packs of cakes should I buy?
- talk about simple fractions in everyday life
- recognise mirror/reflection symmetry in everyday objects, for example, they can make paper aeroplanes and explain the symmetry of the folding
- find out the perimeter by working out the distance around simple shapes
- use metric measures for length (centimetres and metres), capacity (litres and millilitres) and mass (kilograms and grams)
- read commonly used times, for example, half past and quarter to the hour
- use and interpret diagrams that represent information, such as bar charts.



## What you can do at home to help your child make progress

- make a calculation:
  - from a pack of cards (without the tens, the Jacks, the Queens and the Kings) play a game where each player is dealt four cards and everyone has 1 minute to make up a calculation using cards they have in their hand so the answer is the value of the next card turned over
  - a scoring system can be used such as 1 point for using two cards, 2 points for using three cards and 3 points for using all four cards
- dice bingo:
  - throw 2 dice and multiply the numbers together
  - cross off the numbers on a 'Bingo' card, such as:
- talk about numbers that you see on packets or tins of food. This could include talking about how healthy different foods are
- identify symmetrical objects, for example, look for symmetrical wheel trims on cars
- find out how many millilitres different containers hold, such as a cup, perhaps estimating answers first then using a measuring jug to check the estimates
- use a real clock to talk about the times certain events happen at home, for example, getting up in the morning, meal times, when the post arrives. Also, you could talk about times when certain television or radio programmes begin and end, and how long they last for
- help when cooking by measuring ingredients and using the timer.

10	5	9
6	15	20
8	12	4

## Working at level 4 in maths

Children will be able to do many of the following:

- develop their own approaches for solving problems
- select appropriate strategies for addition, subtraction, multiplication and division
- decide when and if to use ICT, for example, they might recognise that it's easiest to do division and multiplication calculations up to 10 by 10 mentally, but estimating the family travel costs for a week could be done with a calculator or spreadsheet
- use a computer to produce numerical and geometric patterns, such as tiling designs
- understand simple fractions that emerge in everyday contexts. For example, they know that

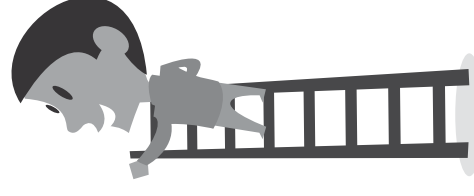
$$\frac{1}{3} \text{ and } \frac{2}{6}$$

- of a pizza are the same
- identify and explain patterns, for example, in a sequence of numbers give the next number in the sequence or explain how they created a geometric design



## What you can do at home to help your child make progress

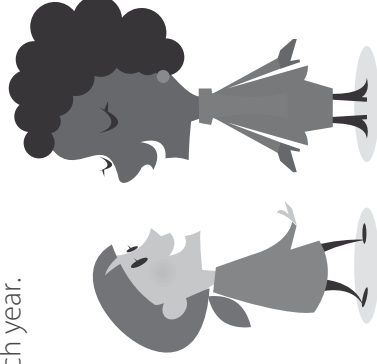
- discuss how you might work out the cost of a week's food for the family. Encourage your child to estimate the shopping bill by keeping a running total while you shop
- try to find examples of numbers that contain fractions or decimals in a daily newspaper, a magazine or on food containers
- make a list of calculations where the answer is the same. What is the hardest calculation that can be made?
- use pieces of card to make a three dimensional model of a room to a sensible scale
- work out how much time, on average, different people spend doing different things at home, for example, eating, tidying up, cooking, playing, watching television, using a computer, sleeping
- measure ingredients when cooking
- take opportunities to discuss weights written on packets of food and what they mean in terms of grams and kilograms
- look at maps of different scales of your local area, for example, a road atlas and a web map, and discuss how far it is from your home city, town or village to other nearby places.



## Working at level 5 in maths

Children will be able to do many of the following:

- identify and obtain information and select the mathematical tools needed to tackle a problem
- use mathematical language, symbols and diagrams accurately
- understand connections between fractions, decimals and percentages
- solve ratio problems, for example, adapting a recipe for 4 to feed 6
- understand how percentages can be used to compare different proportions and find simple percentages mentally. For example, they could work out 20% of £16 by finding 10% (£1.60) and doubling it
- construct and use simple formulae to find the answer to problems, such as working out how many texts and minutes you would get for a £10 top-up with different mobile phone network providers
- know facts about angles, such as the sum of the angles of a triangle ( $180^\circ$ ) and the sum of angles around a point ( $360^\circ$ )
- construct diagrams using mathematical approaches and equipment, for example, they can create scale drawings or plots graphs of data
- convert between different metric measures, for example, understand that 1.04kg is 1040g
- understand probability, for example they understand that when throwing a six-sided dice, all numbers are equally likely – but that doesn't mean that if you roll the dice six times you'll get each of these numbers
- use data to assess likelihood and risk in simple situations, for example, if a newspaper headline reports '50% more people likely to die from flu' but the chance of dying from flu is 1 in 5000 each year.



## What you can do at home to help your child make progress

- look at the weather page in a local newspaper or website and find out what all the different sets of numbers/pieces of information mean
- look for and discuss the use of percentages in articles in a newspaper or on the television or discuss the per cent (%) interest on a savings account
- talk about supermarket offers, for example, "3 for the price of 2", "Buy 1 get 1 free", "Two for £2", "Buy one get one half price". Work out together which is the cheapest or best value
- calculate percentage sales discounts
- adapt recipe amounts for different numbers of people
- play the 'estimate the size of the shopping bill' game, that is, round every item to the nearest 50p and see how the estimated bill compares to the actual cost
- consider the probabilities of certain events happening when playing simple games with dice, for example, the chance of gaining a particular total when two dice are thrown
- read timetables and maps when planning a journey
- look at local ordinance survey maps and talk about how bearings are measured from your city, town or village to other nearby places.



## Working at level 6 in maths

Children will be able to do many of the following:

- devise their own strategies for working on mathematical tasks and problems, for example, break down complex problems into smaller, manageable tasks
- construct an argument using mathematical symbols, diagrams and language correctly
- convert between fractions, decimals and percentages
- add and subtract fractions
- investigate and explain number patterns by drawing graphs and using algebra to represent them, for example, by using algebra to explain the pattern 3, 7, 11, 15 as  $4n - 1$  ( $4 \times 1 - 1 = 3$ ,  $4 \times 2 - 1 = 7$  etc.)
- know about different quadrilaterals (four-sided closed shapes) and their properties
- understand formulae for calculating the circumference and the area of a circle
- work out the volume of a cuboid, for example, the volume of water needed to fill a rectangular water tank

- use ICT to explore transformations of shapes (reflection, rotation, translation, enlargement)
- understand how to construct a pie chart
- calculate the probability of different outcomes, for example, getting a head and a tail when tossing two coins.

At level 6 and beyond, mathematical activity becomes more abstract and uses more algebra. Some of the best ways that parents can support their child's progress at this level are by looking for opportunities to extend their experience of maths in the wider world. For ideas see page 17.

If your child is in Key Stage 2 working at level 6, they are likely to be supported by gifted and talented provision in school or elsewhere. Talk to your child's teachers to find out more.

## What you can do at home to help your child make progress beyond level 6

At level 6 and above the nature of maths becomes more algebraic and abstract. This involves making and using formulae and developing knowledge of sequences and graphs. You could ask your child to explain their understanding of some of the maths problems they are working on and solving at school. This will help reinforce and consolidate what they know.

You could also encourage your child to:

- attend a maths event at school with you
- work out the best value for money when shopping
- watch documentaries and discuss the maths involved in climate change or other environmental concerns
- talk about their work with reference to a textbook or online resource such as BBC Bitesize or MyMaths
- watch the Royal Institution (RI) Christmas Mathematics Lectures, designed for children and young

people, that offer exciting ways of looking at maths problems

- listen to maths programmes such as 5 numbers, Pi, Golden Ratio, Imaginary number, Infinity.

Higher attaining children could be encouraged to:

- consider the maths involved in modelling real-life situations, such as building a bridge or the arc a ball makes when thrown
- find out why gambling is likely to cost you money
- explore the interest earned on a range of savings accounts, the cost of obtaining money for a mortgage or the cost involved in using credit, for example, children can be encouraged to use an ICT spreadsheet to calculate and compare interest rates
- join a maths club (at school or online, for example, NRICH), or take part in master classes (for example, RI) and other enrichment activities.

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## Working at level 7 in maths

Children working at level 7 and beyond are likely to achieve GCSE grade C or above. At this level, mathematics lays the foundations for progression to AS Level or A Level. Children at level 7 will be able to do many of the following:

- justify their solutions to problems and look for connections with other problems
- they begin to appreciate the power of proof, such as justifying 'the square of all odd numbers is odd'
- explore problems by controlling and changing variables, for example, in science when investigating pressure, volume and temperature of gases, they keep one variable fixed and collect data about two others
- calculate percentage increase or decrease using multiplication only, for example, an increase of 20% can be found by multiplying by 1.2
- understand what a quadratic sequence is and how to describe the  $n$ th term, for example  $1, 4, 9, 16, 25, \dots, n^2$  ( $1 \times 1 = 1, 2 \times 2 = 4, 3 \times 3 = 9$  therefore this sequence can be expressed as  $n^2$ )
- solve simultaneous linear equations using graphs and algebraic methods, for example, 'Two coffees and a cake cost £2.50, one coffee and cake cost £1.75. How much does each cake and each coffee cost?'
- apply Pythagoras' theorem to a range of problems
- find the locus of a point moving according to a given rule
- use ICT to draw graphs, solve equations and create geometric patterns
- understand and use compound measures such as speed (distance travelled in a particular time interval) and density (mass of a particular volume)
- understand that all measurements are approximate
- design experiments and gather data to test hypotheses, such as 'if you are good at English, you are also good at history'.

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