Times Tables and Multiplication Pack

INSPIREMATHS

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Introduction

This pack contains relevant *Inspire Maths Online* content that supports the teaching and learning of multiplication and times tables. The resources include selected National Curriculum 2014 Additional Activities; these activities can be introduced through a daily 'Maths meeting' or integrated into your teaching sequence. We have also included relevant Home Activities, which provide opportunities for children to develop their multiplication skills further outside the classroom. Each Home Activity contains a practical activity to be completed using the activity sheets provided or using common household items

Finally, you will find a list of Simmering Skills activities that can be accessed via a subscription to *Inspire Maths Online*. The activities selected are designed for front-of-class use to keep children's multiplication skills 'bubbling away' throughout the year.

National Curriculum Additional Activities

Year 2: Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers

What you will need

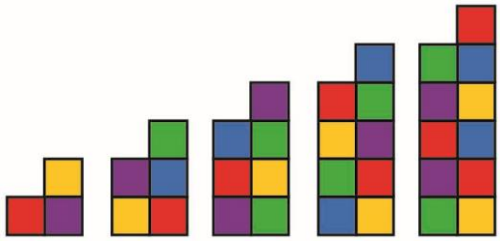
- Cubes
- Numicon Shapes
- PB2A

Teaching sequence

- Use cubes to make this sequence of shapes. Ask pupils how they could carry on the sequence.

- Explain that we call these numbers even numbers. Show how the sequence continues. Match each shape to the number it represents.

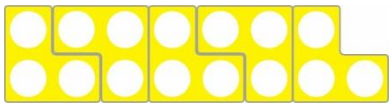
- Now add one more cube to each of the even number patterns.



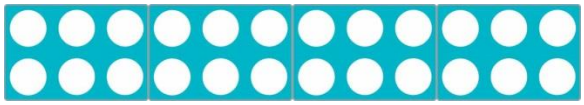
- Ask pupils how they could carry on this sequence. Match each shape to the number it represents.
- Ask pupils what they notice about all of these numbers.
- Explain that we call these numbers odd numbers.
- Encourage pupils to describe where to place the number 1 in this sequence.

- Remind pupils of the multiples of 2 patterns on PB2A, p89-93.
- Explain to pupils that all of these numbers are in the 2 times table. They are all even numbers.
- Guide pupils to notice that when they count in twos, they say every second number. Explain that every number counted is called an ‘even’ number and every number in between is an ‘odd’ number.
- Ask pupils how they can tell that a number is even without using cubes or drawing it. Ask how they can tell that a number is odd.
- Give examples of numbers for pupils to identify whether they are odd or even.
- Refer to PB2A, p91 for more questions about even numbers and multiples of 2.
- Adapt this page to also introduce odd numbers. For example, ask how many socks there are altogether. Encourage pupils to count the multiples of 2 and then add the extra 1.

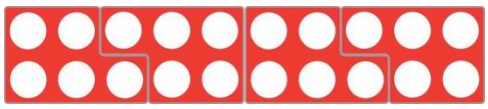
- Numicon Shapes can also be a useful concrete and visual aid to demonstrate odd and even numbers. Show several even numbers and one odd number. Ask which number looks different to all the others and why it is different.
- You can also ask pupils to investigate making numbers with Numicon Shapes where you have to show ☐ groups of ☐, and then explain whether the number is odd or even.
- For example, this shows 5 groups of 3 or 5 × 3. This number is odd.



- This shows 4 groups of 6 or 4 × 6. This number is even.



- This shows 4 groups of 5 or 4 × 5. This number is even.



- Challenge pupils to make an odd number using groups of the same shape and to make an even number using groups of the same shape.
- If pupils are confident, ask them to write a generalisation explaining what they have found.
- Refer to TG2A, p148 and adapt it to introduce multiplying by 0.
- Discuss a situation where each group has 2 scooters, but there are 0 groups.
- Guide pupils to recognise that this means there are no scooters so 0 × 2 = 0.

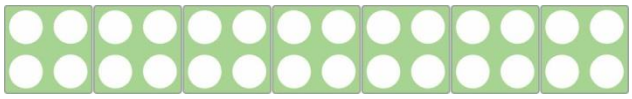
Year 2: Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot

What you will need

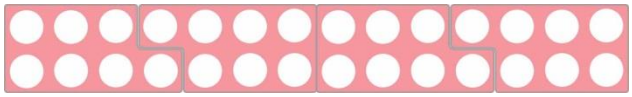
- Numicon Shapes, Cuisenaire rods or cubes
- TG2A
- PB2A
- PB2B

Teaching sequence

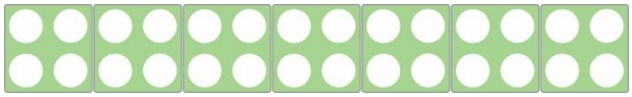
- Use Numicon Shapes, Cuisenaire rods or cubes to demonstrate that multiplication is commutative.
- Combine the shapes or cubes to show 7 groups of 4 or 7 × 4 and explain that this is 28.

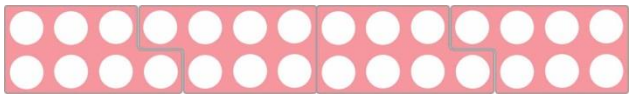


- Ask pupils what this shows.



- Encourage pupils to compare both and to explain what they notice.





- Repeat with 4 × 3 and 3 × 4, 2 × 7 and 7 × 2, 4 × 1 and 1 × 4.
- Ask pupils if it is true that 4 × 3 = 3 × 4.
- Explain to pupils that we can write all the pairs like this, using an = sign.
- Use the shapes or cubes to show 3 × 5.
- Write 3 × 5 = ☐ × ☐ and ask pupils to show another way to make the same answer.
- Then ask them to write some other pairs of numbers which are equal.

☐ × ☐ = ☐ × ☐

- Refer to TG2A, p224-228 and PB2A, p132-136 and adapt them to help develop an understanding of the commutativity of multiplication.

- Ask pupils to turn each question around and consider the comparable problems. What do they notice? For example:

  Millie has three plates. She has four pieces of fruit on each plate. How many pieces of fruit are there altogether?

  Eight people bought two pizzas each. How many pizzas did they buy altogether?

  A baker uses four eggs to make a cake. He makes 10 cakes. How many eggs does he use altogether?

- Refer to PB2B, p134, Q1 to introduce the idea that division is not commutative.
- Turn the question around and ask pupils what they think will happen if Hardeep buys three pears and puts an equal number of pears into 12 boxes. How many pears are there in each box? Clarify that there is less than one pear in each box.
- So $3 \div 12 \neq 12 \div 3$. Unlike multiplication, if you change the order of the two numbers in a division problem, you usually change the answer.
- Extend this by explaining to pupils that there are some instances where you can change the order of the numbers in a division question and still get the same answer. Challenge pupils to find examples of this.

Year 3: Solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects

What you will need

- Cubes or Cuisenaire rods
- Place value arrow cards or digit cards

Teaching sequence

- Make up two lots of 6 cubes linked together and lay them out in a line.
- Explain to pupils that 2 lots of 6 makes 12, that 6 multiplied twice makes 12, etc.
- Lay a second line of cubes out on the tables.
- Explain to pupils that 4 lots of 6 makes 24, that 6 multiplied four times makes 24, etc.
- Compare the two lines, and show pupils that 12 is half of 24 and that 24 can be described as twice as large as 12.
- Repeat this activity with:
    - 4 groups of 6 cubes and 8 groups of 6 cubes
    - 3 groups of 6 cubes and 6 groups of 6 cubes
    - 6 groups of 6 cubes and 12 groups of 6 cubes
    - 5 groups of 6 cubes and 10 groups of 6 cubes
- Repeat this work using the same size of numbers (as listed above) but this time showing an array rather than a line.
- Working in this way will support and structure thinking, helping pupils to recognise the relationships between counting in: 2s and 4s; 3s and 6s; 5s and 10s.

Further practice could include:

- Extending this to larger numbers by grouping into 5s and 10s, or 10s and 20s.
- Giving pupils missing number problems such as,

$3 \times 12 = 36$	$6 \times 12 = ?$
$4 \times 8 = 32$	$? \times 8 = 64$
$5 \times 9 = 45$	$? \times 9 = 90$

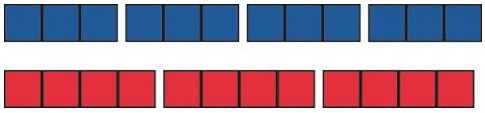
Year 4: Recall multiplication and division facts for multiplication tables up to 12 × 12

What you will need

- Counting stick or strip of card marked off in 12 equal segments
- Number cards, sticky notes and repositional adhesive
- Cuisenaire rods, Numicon Shapes, counters or cubes
- Number balance or rocker balance (if you have one)

Teaching sequence

- Recap on the 'commutative law' of mathematics using resources such as cubes, a number balance or Numicon Shapes, along with a rocker balance. For example, 3 × 4 will give the same product as 4 × 3.



- Now show the inverse operation, division. For example, the total is 12 and the red model above shows that there are 3 equal groups of 4 in 12, or the total is 12 and the blue model shows that there are 4 equal groups of 3 in 12.
- Explain to pupils that you are going to look at multiplication and how to derive multiplication facts by easier known facts. Prepare a counting stick with steps of 4 on the reverse of the stick, out of sight of your pupils.
- Ask pupils to count in equal steps of 2. As they do this, place sticky notes or number cards stuck to the stick by using repositional adhesive. Ensure that the counting stick has 12 segments.
- Using the counting stick, ask the pupils if they can see a pattern or anything to help them. Listen out for *"4 is double 2"*, *"8 is double 4"*, *"20 is ten times 2"*, *"10 is half of 20"* etc.
- Ask pupils for things to say to help their classmates with the values of 22 and 24. For example the 11th segment is equal to 10 × 2 added to 1 × 2, or the 12th segment is double the value of the 6th.
- Rotate the counting stick to reveal counting in equal steps of 4.
- Explain to pupils that if they know the 2 times table, by doubling the answer they 'know or can derive' the 4 times table. So by doubling the 4 times table they 'will know or can derive' the 8 times table, etc. Encourage pupils to give other examples.
- Take the counting stick and, using the numerals for the 6 times table, place them on the counting stick.
- To show the link with division, ask the pupils to count with you. *"There is one six in six. There are two sixes in twelve. There are three sixes in eighteen…*"
- Ask pupils what is the same and what is different about their counting with the counting stick the first time and the last time. Elicit that the first time they were counting up in equal steps of 2 or 4 and the last time they were describing how many sixes there were in a particular number on the stick.
- Using some blocks of the same coloured cubes, Cuisenaire rods or Numicon Shapes, support your pupils in building and seeing patterns when multiplying by 11 and 12.

- Model that 12 × 7 can be derived by counting on in equal groups of 7 from 10, or adding together two known facts 10 × 7 and 2 × 7.
- Repeat this with other 11× and 12× questions using concrete apparatus.
- Allow pupils time to explore the patterns. Some pupils will naturally want to move to higher numbers such as 7 × 15 = 10 × 7 and 5 × 7 added together.
- Draw pupils' attention to questions such as 84 ÷ 7 and ask "*What known facts can help us quickly work out the answer to this question?"* Listen for pupils identifying quickly that 7 × 10 = 70, that 84 - 70 leaves 14 and that 2 × 7 = 14, therefore there are 12 sevens in 84.
- Working in pairs or on their own, give pupils time to practice this skill by inviting them to solve similar questions.

Year 4: Using place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers

What you will need

- Six standard dice (1 to 6)
- One set of six numbers
- Six counters
- Set of digit cards
- Counters or cubes

Teaching sequence

The effect of multiplying or dividing by 1

- Give pupils the opportunity to discover that multiplying or dividing by 1 will not change the answer, for example 12 ÷ 1 = 12, 7 × 1 = 7
- Give the pupils a range of equipment such as interlocking cubes, Numicon Shapes or counters. Give them a starting number and ask them to multiply it by 1.
- Repeat the activity, asking this time for the pupils to divide the number by 1.
- Give the pupils a chance to apply this new knowledge to a simple game.
- Give each pair of pupils six standard dice, six counters and six numbers (one of the sets of numbers shown below):

Set 1	1	7	13	19	25	31
Set 2	3	9	15	21	27	33
Set 3	5	11	17	23	29	35

- The pupils roll the dice, and using +, -, × and ÷ they have to make one of the six target numbers and cover it with a counter. Record the mathematics used on paper.
- Repeat by rolling the dice again, making a second target number and covering it with a counter.
- Can the pupils cover all six numbers? Did they find using divide or multiply by 1 useful?

Effect of multiplying or dividing by 0

Multiplication

- Once pupils have seen the effect of multiplying or dividing by 1, move onto showing the effect of multiplying or dividing by 0.

- Using concrete apparatus, model multiplying by 0. Most pupils believe that by multiplying by 0 that the number stays the same, for example 5 × 0 = 5, but this is a common misconception.
- Write down the calculation 5 × 0 on the board. Explain to pupils that the first number in the number sentence is the number you will take from the box (this could be the Numicon Shape for 5 or 5 linked cubes), the second number in the number sentence is the number of times you will repeatedly take it from the box.
- You will take 5 from the box, but the zero means you won't be taking a 5 from the box. So the answer is zero.

Division

- Dividing by 0 results in an undefined answer. Show and remind pupils the links between multiplication and division, for example:

5 × 2 = 10
2 × 5 = 10
10 ÷ 2 = 5
10 ÷ 5 = 2

- If you divide 10 by 2 the answer is 5 because 5 times 2 is 10.
- If you divide 10 by 0, then you are asking the question, *"What number times zero gives 10?"* From the previous activity, the pupils will be aware that by multiplying by 0 will give an answer of 0, so we cannot answer the question.

Multiplying three numbers together

- In the Unit 2 the materials give examples of two 2-digit numbers to multiply together, for example 37 × 20.
- To make this multiplication easier, pupils are asked to split the calculation into three easier numbers to multiply, for example 37 × 2 × 10.
- Provide pupils with additional practice with similar sized numbers.
- Ask them to break the numbers into 3 or more numbers to multiply. For example 37 × 20 = 37 × 5 × 2 × 2. Will the answer be the same? Why is this?

Year 4: Recognise and use factor pairs and commutativity in mental calculations

What you will need

- TG3A
- PB3A
- Cuisenaire rods, cubes of the same colour or Numicon Shapes

Teaching sequence

- Pupils will need to explore and find patterns in number using concrete apparatus such as Cuisenaire rods, same colour blocks of cubes and Numicon Shapes. In order to explore factor pairs, pupils will need to explore and find factors of a given number.
- Give the example of 12 – the factors of 12 are 1, 2, 3, 4, 6 and 12.
- Explain to pupils that factor pairs are two numbers that, when multiplied together, give another number.
- Further explain that if we multiply pairs of these numbers together, they will give the total or product of 12, for example 3 × 4, 4 × 3, 2 × 6, 1 × 12 etc. This example will provide pupils with an excellent way to explore factor pairs practically before recording them.

Year 4: Solve problems involving multiplying and adding, including using the distributive law to multiply 2-digit numbers by 1-digit, integer scaling problems and harder correspondence problems such as *n* objects are connected to *m* objects.

What you will need

- Linking cubes or 2.5 cm squares
- Sorting fruits
- Small baskets, bowls or similar plastic bowl
- Scaling recipe for salt dough
- Scaling recipe for fruit punch

Teaching sequence

Cube problem

- Show pupils 6 blue cubes and 6 red cubes. Ask: "*I have one red cube for every blue one. If I have 12 cubes altogether, how many of each colour do you have?"*
- Change the amount to 1 red cube for every 2 blue cubes. Ask: "*I have 15 cubes altogether, how many red cubes do I have? How do you know?"*

Fruit basket

- Explain to pupils that you have a fruit basket containing the following fruit:
  - two apples
  - two pears
  - one banana

- Explain to pupils that you would like to give identical fruit baskets to two of your friends. Ask: "*How many of each fruit will I need to make up two fruit baskets?"*
- Show pupils how to double the amount of fruit.
- Explain that for every one banana there are two pears and two apples, therefore for every two bananas, there will be four pears and four apples.
- Pose similar fruit basket problems for the pupils to solve practically, using the sorting fruits to help them.
- Allow pupils to work in pairs or small groups to solve these problems.

Dough

- Read the following recipe to pupils. Explain that it is a recipe for dough:

- a cup of salt
- a cup of flour
- 1 cup of water

- Ask pupils the following word problems: "*We need twice as much dough. How much of each ingredient do we need?", "We need 4 times the amount of dough. How much of each ingredient will I need?"*

Mixed fruit juice

- Read the following recipe to pupils. Explain that it is a recipe for mixed fruit juice:
  - 500 ml apple juice
  - 300 ml orange juice
  - 100 ml pineapple juice
  - 100 g strawberries
  - a sprig of mint
  - large handful of ice cubes

- Explain to pupils that lots of people are arriving for a family barbeque. Ask: "*We need three times as much juice. How much of each ingredient do we need?"*
- More people have arrived. Ask: "*We need five times as much juice. How much of each ingredient do we need?"*
- Pose the question to pupils: "*What would you have to do if I only needed half the amount of juice?"*

Chris the DJ

- Explain to pupils that Chris is a DJ at a local radio station. He plays one rock record for every two pop records. This morning he has played 21 tracks. Ask: "*How many pop records has Chris played this morning?"*

Year 5: Multiply numbers up to 4 digits by a 1- or 2-digit number using a formal written method, including long multiplication for two-digit numbers

What you will need

- TG4A

Teaching sequence

- Building on the work from PB 4A Unit 3, extend the multiplicand from 3 digits to 4 digits. In particular refer to p52 - 56 (TG4A p74 - 78).
- Extend the idea in question 10 on p53 of PB4A (TG4A p75), referring to question 8 on p52 of PB4A (TG4A p74).
- Provide pupils with questions to practise this skill.

Year 5: Multiply and divide numbers mentally drawing upon known facts

What you will need

- TG3A

Teaching sequence

- This task provides extra practice for pupils to mentally multiply and divide with increasingly larger numbers.
- With pupils, revise the methods from Unit 9 in PB3A. Check that they are secure with the following multiplication strategies:
  - Using the associative, distributive and commutative laws where:
    $7 \times 400 = 7 \times 4 \times 100 = 28 \times 100 = 2\,800$
    $38 \times 400 = 38 \times 4 \times 100 = 38 \times 2 \times 2 \times 100 = 76 \times 2 \times 100 = 152 \times 100 = 15\,200$
  - In words we split the 400 into 4 lots of 100 and then treat the 4 as 2 lots of 2 which means we double and then double again
  - $98 \times 400 = 400 \times 98 = 400 \times (100 – 2) = 400 \times 100 - 400 \times 2 = 40\,000 – 800 = 39\,200$. In words this means we find out 100 lots of 400 and then subtract 2 lots of 400. In number terms, $98 \times 400 = 100 \times 400 - 2 \times 400 = 40\,000 - 800 = 39\,200$
  - To multiply by 5, multiply by 10 and then halve. To multiply by 50, multiply by 100 then halve.
- Check that pupils are also secure with the following division strategies:
  - Splitting the dividend into separate parts before dividing:
    $4\,200 \div 7$ = 42 lots of hundred $\div 7$ = 6 lots of hundred = 600
  - To divide by 4, you can halve then halve again:
    $764 \div 4 = 382 \div 2 = 191$
- The same ideas can be developed for bigger numbers.
- Ask pupils to practise these methods with the following calculations:

28×400	98×700	198×400	13×400	13×800	$13 \times 1\,600$
$5\,600 \div 7$	$8\,100 \div 9$	$8\,181 \div 9$	$5\,000 \div 4$	$5\,000 \div 8$	99×72
560×5	86×5	84×50	78×50	62×500	62×501

- For division problems, it is often useful to express the quotient as a fraction and then cancel common factors of the numerator and denominator. This is the same idea as halving and halving again as a quick way to divide by 4.
  For example $720 \div 18 = \frac{720}{18} = \frac{360}{9} = \frac{36 \times 10}{9} = 4 \times 10 = 40$
- Or a harder example $960 \div 36 = \frac{960}{36} = \frac{480}{18} = \frac{240}{9} = \frac{80}{3} = 26\frac{2}{3}$
- Ask pupils to practise these methods with the following calculations:

$720 \div 24$	$196 \div 28$	$196 \div 24$	$480 \div 160$	$720 \div 300$	$7200 \div 84$

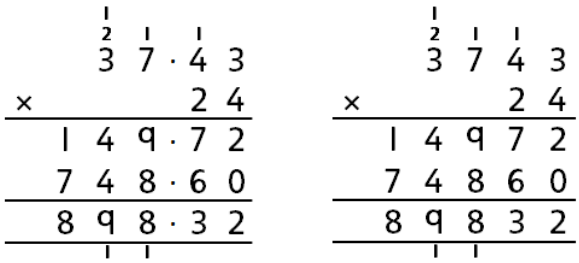
Year 6: Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication

Teaching sequence

1. Find the value of 37·43 × 24

Explain that this multiplication involves the same procedures pupils have already mastered for multiplying a whole number by a 2-digit whole number and multiplying a decimal by a 1-digit whole number.

Demonstrate the procedure for the multiplication. Compare it with 3743 × 24, showing that both calculations involve the same strategies:



Emphasise the importance of positioning digits in the correct columns and that the decimal point is in the same place in each line.

Check for reasonableness by estimating the answer.

2. a Find the value of 28·37 × 54.

Ask pupils to work in pairs to practise the strategy for multiplying a number with 2 decimal places by a 2-digit whole number.

2. b-c Multiply

b 41·35 × 65

c 71·88 × 37

Pupils should work individually on these questions.

3.

For extension, ask pupils to explain whether the product of a number with 2 decimal places and a 2-digit whole number is always a number with 2 decimal places.

Year 6: Identify common factors, common multiples and prime numbers

Teaching sequence

1

- Check that pupils can describe what prime numbers are and give examples. For example, ask them to:
  - write down prime numbers in any given interval up to 100
  - explain why 91 is not a prime number.
- Check that pupils can describe what factors are and give examples. Recall with them how common factors are used to simplify fractions.
- Check that pupils can describe what multiples are and give examples. Recall with them how common multiples are used to add and subtract fractions with different denominators.

2

a **A beacon flashes every 12 seconds. Another beacon flashes every 15 seconds. Both flash at 9:00 pm exactly. When do both beacons next flash at the same time? How often do they flash at the same time?**

- Guide pupils to see that the problem can be solved by finding common multiples of 12 and 15.
- Ask pupils to list the first few multiples of 12 and 15 until they find a common multiple. Identify the lowest common multiple as 60 (5 × 12 = 60, 4 × 15 = 60).
- Guide pupils to use their list of multiples to name the times at which each beacon will flash. Agree with pupils that they will flash together for the first time at 9:01 pm, then every minute.

b **Anita's car overtakes Chantal's every 6 laps of a race. Liam's car overtakes Chantal's every 7 laps. How often will Anita and Liam overtake Chantal at the same time?**

c **Bob plays a note every 4 beats, Gloria every 5 beats and Imaan every 6 beats. How often will Bob and Gloria play a note together? How often will they all play together?**

- Use the questions to check whether pupils have understood the concept and procedure for using common multiples to solve this type of problem.

3 **Find the value of 437 × 24.**

- Explain that multiplication by a 2-digit number can be broken down into separate steps by writing the 2-digit number as a product of a 'pair' of factors:
  24 = 6 × 4 or 24 = 8 × 3
  Multiplying by each factor in turn:

$$\begin{array}{r} {}^{2}\,{}^{4}\;\;\;\; \\ 437 \\ \times\quad 6 \\ \hline 2622 \\ \times\quad 4 \\ \hline 10488 \\ \hline {}^{2}\;\;\;\;\;\; \end{array} \qquad \begin{array}{r} {}^{2}\,{}^{5}\;\;\;\; \\ 437 \\ \times\quad 8 \\ \hline 3496 \\ \times\quad 3 \\ \hline 10488 \\ \hline {}^{1}\,{}^{2}\,{}^{1}\;\;\;\; \end{array}$$

436 × 24 = 10 488

- Explain that this is an application of the associative law of multiplication where, for example, 437 × (6 × 4) = (437 × 6) × 4.
- Point out that the order of multiplication can be reversed:

$$\begin{array}{r} {}^{1}\,{}^{2} \\ 437 \\ \times \quad 4 \\ \hline 1748 \\ \times \quad 6 \\ \hline 10488 \\ \hline {}_{4}\,{}_{2}\,{}_{4} \end{array} \qquad \begin{array}{r} {}^{1}\,{}^{2} \\ 437 \\ \times \quad 3 \\ \hline 1311 \\ \times \quad 8 \\ \hline 10488 \\ \hline {}_{2} \end{array}$$

- Explain to pupils that this is an application of the commutative law of multiplication where, for example, 437 × 6 × 4 = 437 × 4 × 6.
- Show that the approach can be applied with more than two factors. For example, splitting 24 into its prime factors so that the multipliers are as small as possible:
  24 = 2 × 2 × 2 × 3

$$\begin{array}{r} {}^{1} \\ 437 \\ \times \quad 2 \\ \hline 874 \\ \times \quad 2 \\ \hline {}^{1} \\ 1748 \\ \times \quad 2 \\ \hline {}^{1}\,{}^{1} \\ 3496 \\ \times \quad 3 \\ \hline 10488 \\ \hline {}_{1}\,{}_{2}\,{}_{1} \end{array}$$

4 Find the value of 7537 ÷ 15 correct to the nearest tenth or 1 decimal place.

- Explain to pupils that division by a 2-digit number can be approached in the same way, breaking the calculation down into separate steps by writing the 2-digit divisor as a product of factors:
  15 = 5 × 3 or 3 × 5
  Dividing by each factor in turn:

$$\begin{array}{r} 1\;5\;0\;7\cdot4 \\ 5\overline{)7\;{}^{2}5\;3\;{}^{3}7\cdot{}^{2}0} \end{array} \qquad \begin{array}{r} 2\;5\;1\;2\cdot3\;3\ldots \\ 3\overline{)7\;{}^{1}5\;3\;7\cdot{}^{1}0\;{}^{1}0\ldots} \end{array}$$

or

$$\begin{array}{r} 5\;0\;2\cdot4\;6\ldots \\ 3\overline{)1\;5\;0\;7\cdot{}^{1}4\;{}^{2}0\ldots} \end{array} \qquad \begin{array}{r} 5\;0\;2\cdot4\;6\ldots \\ 5\overline{)2\;5\;1\;{}^{1}2\cdot{}^{2}3\;{}^{3}3\ldots} \end{array}$$

  7537 ÷ 15 = 502·5 correct to 1 decimal place.
- Explain that this is an application of the fact that 7537 ÷ 15 = (7537 ÷ 5) ÷ 3 or (7537 ÷ 3) ÷ 5. Expressing the same in terms of fractions: $\frac{7537}{15} = \frac{7537}{5} \times \frac{1}{3}$ = (7537 ÷ 5) ÷ 3 or $\frac{7537}{15} = \frac{7537}{3} \times \frac{1}{5}$ = (7537 ÷ 3) ÷ 5.

Home Activities

Year 1: Multiplication

This activity will help your child understand the idea of multiplication.

Important words and phrases:

- There are … groups. Each group has … .
- … twos equal …
- twos, threes, fours, fives, sixes, sevens, eights, nines
- … groups of … equals …
- … times … equals …
- multiplication sentence
- times

You will need:

- 10 pairs of socks

What to do:

- Work with your child to make 3 pairs of socks.
- Ask: *"How many groups of socks are there?"* (3) *"How many socks are there in each group?"* (2)
- Ask: *"How many socks are there altogether?"* Encourage your child to add together the number in each group: 2 + 2 + 2 = 6.
- Point out that we add 2 three times. Talk about how this is the same as 3 twos = 6 or 3 groups of 2 = 6. Say the multiplication sentence together: *"3 times 2 equals 6."*
- Repeat for other numbers of pairs of socks.
- Next make, for example, 4 groups of socks, but vary the number of socks in each group (for example, make a group of 3 socks, a group of 4 socks and 2 groups of 2 socks). Encourage your child to see that in this case we can't add the same number each time, so 4 × 2, for example, does not match the groups. Guide your child to see that for multiplication, there should be the same number of items in each group.
- Now make other groups of equal size, for example 4 groups of 3 socks. (You could say these are for aliens with 3 feet, so they have to keep their socks in groups of 3.)
- Ask: *"How many groups of socks are there? How many socks are there in each group? How many socks are there altogether?"*
- You can help your child by asking them to work out the total number of socks by adding: 3 + 3 + 3 + 3 = 12.
- Repeat the activity for other numbers of groups and groups of different sizes. For example: 3 groups of 5 socks, 5 groups of 4 socks, 2 groups of 8 socks.

Talk about:

Use everyday opportunities where there are equal groups to make up 'multiplication stories' with your child. For example:

- *"There are 5 pairs of gloves/shoes/boots. There are 2 in each pair. There are 10 gloves/shoes/boots altogether."*
- *"There are 4 groups of coins. There are 5 coins in each group. There are 20 coins altogether."*
- *"There are 3 packs of yoghurts. There are 4 yoghurts in each pack. There are 12 yoghurts altogether."*

Year 2: Twos and Threes

This activity will help your child to practise counting in twos and threes ('skip-counting') and to learn two and three times tables facts.

Important words and phrases:

- multiplication
- skip-counting
- count in twos, count in threes
- How many groups of … are there? How many … are in each group?
- … times … equals …

You will need:

- 15 pairs of socks

What to do:

- Spread 20 (unpaired) socks in front of your child (without telling them how many there are) and work together to put them into pairs. Count the pairs, one by one, as you go.
- Ask: "*How many groups of socks are there?"* (10) "*How many socks are in each group?"* (2)
- Say: "*How many socks are there altogether? Let's count in twos.*"
- Together 'skip-count' in twos. Encourage your child to use their fingers to count, raising each in turn, with each one representing a group of 2 socks: "*2, 4, 6, 8, 10, 12, 14, 16, 18, 20."*
- Encourage your child to say the multiplication sentence and to give the answer as a sentence: "*10 times 2 equals 20. There are 20 socks."*
- Repeat this with 30 socks, making them into groups of 3 (imagine this is for aliens with 3 feet, who keep their socks in groups of 3).
- Ask: "*How many groups of socks are there?"* (10) "*How many socks are there in each group?"* (3)
- Say: "*How many socks are there altogether? Let's count in threes: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30."*
- Encourage your child to say the multiplication sentence and to give the answer as a sentence: "*10 times 3 equals 30. There are 30 socks.*"
- Now spread, say, 8 socks in front of your child. First ask them to estimate how many socks there are altogether. Then ask them to check by putting the socks in groups of 2 and skip-counting in twos: "*2, 4, 6, 8.*"
- As before, encourage them to say the multiplication sentence and to give the answer as a sentence: "*4 times 2 equals 8. There are 8 socks."*
- Repeat this for other numbers of socks: either multiples of 2 up to 20 or multiples of 3 up to 30.
    - For multiples of 2, ask your child to make and count groups of 2 socks. For multiples of 3, ask them to make and count groups of 3 socks. (If you need to, you can make a quick adjustment to the number of socks as you go, so that it divides into equal groups with none left over.)

Talk about:

- Use everyday opportunities to count in twos with your child. For example:
    - count the number of people in a bus or train carriage where all the seats are full
    - count the number of shoes when they're arranged in pairs, the number of eggs in an egg box.

- Try to use everyday opportunities to count in threes with your child. Everyday opportunities are harder to find than for twos, but you might, for example:
    - count the number of items of cutlery where each place is set with (say) a knife, fork and spoon
    - count a group of items by putting them in groups of 3.

Year 2: Fours and Fives

This activity will help your child to practise counting in fours and fives ('skip-counting') and to learn four and five times tables facts.

Important words and phrases:

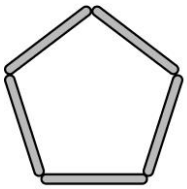
- multiplication
- skip-counting
- count in fours, count in fives
- How many groups of … are there? How many … are in each group?
- … times … equals …

You will need:

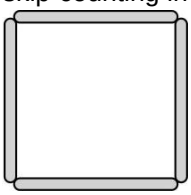
- craft sticks of equal length (or an equivalent, for example lolly sticks, straws, pipe cleaners)
- a large piece of paper
- glue (optional)
- paint (optional)

What to do:

- Ask your child to count out 5 sticks and to make a shape with 5 sides.



- Now give your child 10 sticks (without telling them how many there are). Ask them to make as many of the same shapes as they can.
- Ask: "*How many shapes are there?"* (2) "*How many sticks are in each shape?"* (5) "*How many sticks are there altogether? Count in fives."*
- Together 'skip-count' in fives. Encourage your child to use their fingers to count, raising each in turn, with each one representing another group of 5 sticks: "*5, 10."*
- Help your child to say the multiplication sentence and to give the answer as a sentence: "*2 times 5 equals 10. There are 10 sticks."*
- Now ask: "*How many sticks will you use if you make 4 of these shapes?"* Encourage your child to work this out without first making the shapes. Agree there are 4 groups of 5 or 4 times 5 sticks, altogether.
    - Your child may recall the multiplication fact 4 × 5 = 20 or use skip-counting to work out the answer, counting on four fingers: "*5, 10, 15, 20."*
- Ask your child to say the multiplication sentence and to give the answer as a sentence: "*4 times 5 equals 20. There are 20 sticks."* Ask your child to check their answer by making the 4 shapes and skip-counting in fives.



- Repeat this for other numbers of shapes, up to 10. Then repeat for a shape made with 4 sticks, for your child to practise four times table facts.
- Ask your child to use sticks to lay out a picture or pattern made with their 4- and 5-sided shapes on a large piece of paper. Your child may like to glue down the shapes and paint them.

- Once they have finished their picture, ask: *"How many sticks are there altogether in the shapes with 4 sticks? How many sticks are there altogether in the shapes with 5 sticks? How many sticks are there altogether?"*
- Encourage them to use their times tables knowledge to work out the answers, then check their answer together, by counting.

Talk about:

- If you display the stick art your child has made, use it to ask questions. For example: "*How many sticks would there be if you had 3 of these shapes and 6 of those shapes?"*
- Practise the four and five times tables with your child. Vary the language you use.
  For example, ask:
  - *"What's 3 times 5?"*
  - *"What's 4 multiplied by 6?"*
  - *"How many fours make 24?"*

Year 2: Modelling Multiplication and Division

This activity will help your child practise solving word problems using models, this time for situations involving multiplication and division.

Important words and phrases:

- model
- word problem
- bar diagram
- multiplication, division
- equal groups
- sharing equally

You will need:

- Activity sheet 3

What to do:

- Together read question 1 on Activity sheet 3 and look at the model.
- Talk about the links between the problem and the model: the 5 rectangles represent 5 groups (jars) and each rectangle represents 3 items (insects).
- Help your child to write the multiplication sentence (5 × 3 = 15) and complete the answer statement. Read it together: "*Ella puts 15 insects into the 5 jars*."
- Now read question 2 and look at the model.
- Together link the problem with the model: each rectangle represents 4 items (stickers) and the total number of items is 32; the dotted lines show that we do not know the number of groups (pages).
- Help your child to write the division sentence (32 ÷ 4 = 8) and complete the answer statement. Read it together: "*Jack puts stickers on 8 pages altogether."*
- Now read question 3 and look at the model.
- Encourage your child to explain how the model represents the problem in terms of groups and items: the 4 rectangles represent 4 groups (boxes) and there are 24 items (apples) altogether.
- Help your child to write the division sentence (24 ÷ 4 = 6) and complete the answer statement. Read it together: "*There are 6 apples in each box."*

Talk about:

Use everyday opportunities to solve problems by multiplying or dividing. For example:

- *"There are 5 packets of rolls. There are 4 rolls in each packet. How many rolls are there in 5 packets altogether?"* (5 × 4 = 20)
- *"I want to buy 16 rolls. How many packets should I buy?"* (16 ÷ 4 = 4)

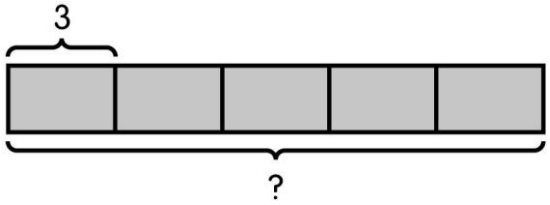
Encourage your child to answer with a sentence. For example:

- *"There are 20 rolls in 5 packets."*
- *"You should buy 4 packets."*

Activity sheet 3

This activity sheet is for use with Y2 Home Activity 7

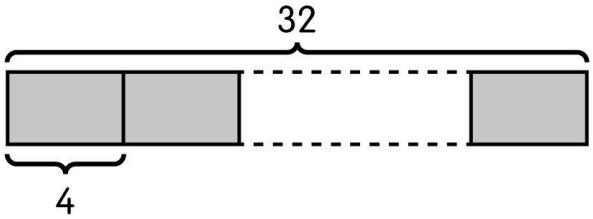
1 Ella puts 3 insects into each collecting jar.
She has 5 jars.
How many insects does Ella put into the 5 jars altogether?



_____ × _____ = _____

Ella puts _____ insects into the 5 jars.

2 Jack has 32 stickers. He puts 4 stickers on each page of a scrapbook. How many pages does Jack put stickers on altogether?



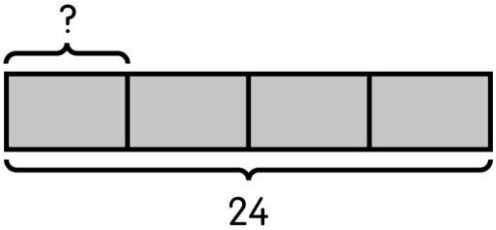
_____ ÷ _____ = _____

Jack puts stickers on _____ pages altogether.

3 Farha has 24 apples.

She puts an equal number of apples into 4 boxes.

How many apples are there in each box?



_____ ÷ _____ = _____

There are _____ apples in each box.

Year 3: Multiplying by Grouping and Regrouping

This activity will help your child to practise their 6, 7, 8 and 9 times tables. It helps to introduce and strengthen some important ideas: how multiplication and division are related, that multiplication can be done in any order, and what particular pairs of numbers make, when multiplied together.

Important words and phrases:

- group
- tens, ones
- sixes, sevens, eights, nines
- divide
- equal groups
- multiply

You will need:

- at least 72 small objects (counters, beads, coins or pasta shapes)

What to do:

- Discuss the best way to count out 42 objects. Ask: *"How many tens do you need? How many ones do you need?"*
- Help your child to count out 42 objects, for example counters. You can arrange them in 4 rows of 10 (each row is two 5s, which can make the counting easier) and 2 spare counters. If your child suggests another way, you can use that instead.
- Now ask your child to arrange the 42 counters into groups of 6. Ask***: "****How many groups of 6 are there? Are there any counters left over?****"***
- Next ask how many groups of 7 there would be. Say*: "Arrange the counters into groups of 7. Were you right?"*
- Ask your child to suggest how to count out 48 counters. They will probably suggest 4 tens and 8 ones; if they suggest another way, you can use that instead. Ask: *"How many groups of 6 will there be? How many groups of 8? Check and see."*
- If you have enough objects, work with 56 (groups of 7 and 8), 54 (groups of 6 and 9), 63 (groups of 7 and 9) and 72 (groups of 8 and 9). Ask your child what groups they can make.
- Keep the discussion open. Your child might suggest some other groups (for example, 56 might be 14 groups of 4), but they will probably need you to suggest the groups*, for example: "There are 56 counters. How many groups of 7 can you make?"*

Talk about:

- Ask your child to use skip-counting, counting in 8s: 8, 16, 24, 32…
- Ask your child how you could use skip-counting to count a large number of objects. For example, *"Count the cars passing the house. Each time you have counted 8 cars, put up a finger. When you get to 10 fingers, how many cars have you counted? What would you get if you skip-counted in 8s? Do you know another way to work out 8 times 10?"*

Year 3: Mental Calculations

This activity will help your child practise adding, subtracting, multiplying and dividing mentally.

Important words and phrases:

- add, addition
- subtract, subtraction
- multiply, multiplication
- divide, division

You will need:

- paper and pencil

What to do:

- Together, think of a number between 11 and 99, for example, 47. Write it down.
- Now ask your child to think of another number between 11 and 99, and to write it down without showing you.
- Say: "*Now add your number to the one we both thought of. What is your answer?"*
- Tell your child you will now work out the number they thought of. For example, if the answer is 93, you will work out 93 – 47 = 46. Say: "*I think your number was 46. Is that right?"*
- Discuss with your child how you worked out the number they thought of.
- Now choose another number together, and this time you will think of a second secret number.
- Add the numbers and tell your child the total. Can your child work out your secret number?
- You can also play using multiplication: first, think of a number between 2 and 10 together. One of you then thinks of a secret number between 2 and 10, multiplies the two numbers together and gives the answer. The other person divides the answer by the first number to find the secret number.

Talk about:

- Use everyday opportunities to test your child's mental mathematics, for example adding up prices in shops, or making up questions connected to things that you see.
- Ask your child:
- *"How many ways can you think of to add to numbers to make 40?"* (For example: 32 + 8, 1 + 39, 35 + 5…)
- *"How many ways can you think of to add to numbers to make 100?"*

Look out for:

- Your child's mental maths will be stronger when they know their times tables well, but there are other number facts that can be useful. For example, pairs of numbers that add up to ten, and pairs of multiples of 10 that add up to 100 (e.g. 10 + 90; 20 + 80 and so on).

Year 4: Multiplying Whole Numbers

This activity will give your child practice adding and multiplying numbers in calculations with several steps, while solving a problem.

Important words and phrases:

- altogether
- each
- cost

You will need:

- Activity sheet 3

What to do:

- Talk to your child about any school trips they have been on, or perhaps school trips that are coming up.
- Read the introductory text on Activity sheet 3. Ask your child a few questions, for example: "*How many children are going on the trip? How many adults? How many people altogether?"*
- Help your child to work out how much the trip would cost if everyone did every activity.
- Explain that there is a maximum amount of money that can be spent. This amount is £500. What could the class do? Note that if everyone did every activity then the total cost would be £666.50.
- Discuss the choices your child makes. Some things are essential (the coach, lunch) and others are not.
- Suggest that everyone on the trip should do at least one activity. Your child might suggest the class splits to do different activities – you can discuss this.

Talk about:

- Discuss the cost of activities you do together, for example: *"How much is an adult ticket? How much is a child ticket? How much will it cost us all to take the bus?"*
- Your child could help you plan a family visit to a theme park or other local attraction.

Activity sheet 3

This activity sheet is for use with Y4 Home Activity 3

There are 28 children on the school trip. There are 2 teachers and 5 parent helpers.

The school has found out the cost of the things that they need for the school trip, and for things they would like to do.

Item	Cost
Coach	£180 for the day
Lunch	£2 for each child £3 for each adult
Morning coffee or tea	£1.50 for each adult
Entrance to the castle	£2.50 for each child Adults free
Ice cream as a treat	£1.20 for each person
Trip to Aqua Land	£4 for each child £7 for each adult
Trip to Adventure Quest	£4.50 for each child Adults free

Year 5: Doubling Whole Numbers

This activity will give your child practice in doubling (multiplying by 2), in reading and writing very large numbers, and in estimating.

Important words and phrases:

- double
- twice as much

You will need:

- Activity sheet 1
- packet of rice
- chessboard (optional)

What to do:

- Read the story of the Emperor and the Advisor on Activity sheet 1. Ask: "*What reward would you ask for from a king or emperor? Do you think the advisor made a good choice? Why?"*
- Start to count out grains of rice onto a chessboard, following the advisor's request. You can use a real chess or draughts board, or the start of the chessboard on the activity sheet. After three or four squares, ask: *"How much of the packet would we need to fill the whole board? Do you think this one will do, or will we need another one too?"* The first fact in the 'Look out for' section below may help your child to estimate the answer to this question.
- Let your child get to 5 or 6 squares. When things get difficult, discuss what's happening. Say: *"There's a lot of rice on each new square now! How many packets do you think we'd need for the whole board?"*
- Ask your child how many squares are on a full chessboard. They should multiply 8 by 8 to find there are 64. Suggest that your child writes in how many grains of rice are needed on each square of the board, instead of counting out grains of rice. Start with '*1*' on the first square.
- After 24 squares, they will be dealing with numbers greater than 10 million. They can stop!

Talk about:

- Discuss how it's much easier to write down the numbers – even the very large ones – than it is to count out the grains of rice.
- Looking at the numbers on the chessboard, ask your child the following questions: *"By which square would it no longer be possible to pile all the grains of rice onto the square? By which square would all the rice in Britain have run out? By which square would all the rice in the world have run out?"* Some of the facts and figures given in the 'Look out for' section below may help your child to estimate the answers to these questions.

Look out for:

- Here are some useful figures:
  - There are about 50 000 grains of rice in a kilogram.
  - There are about 65 million people in Britain.
  - The average person in Britain eats about 5 kilograms of rice per year.
  - The world produces about 476 million tonnes of rice per year. There are one thousand kilograms in 1 tonne.

Activity sheet 1

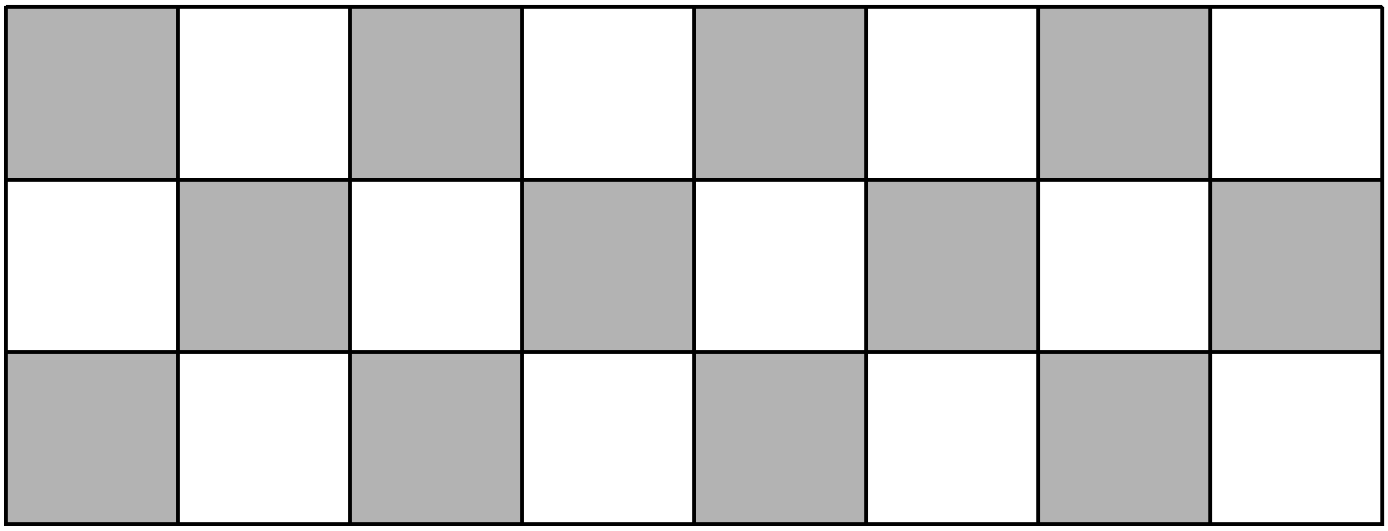
This activity sheet is for use with Y5 Home Activity 1

An emperor called an advisor to help him solve an important problem. The emperor was so grateful that he asked the advisor to name his own reward.

There was a chessboard between them, and the advisor said, “Look at the chessboard. I would like one grain of rice on the first square, two on the second, four on the third, eight on the fourth, and so on. Each new square must have twice as many grains as the last, until the board is full.”

The emperor laughed. “Is that all? I would have given you your weight in gold!”

The advisor smiled. “When I leave today, I will be richer than you.”



Year 5: Order of Operations with Whole Numbers

This activity will help your child learn and apply the rules for the order of operations and use of brackets. It involves problem solving and mathematical strategy.

Important words and phrases:

- expression
- operation
- addition
- subtraction
- multiplication
- division
- order of operations

You will need:

- Activity sheet 2, cut into cards
- two players
- calculator (optional)

What to do:

- Each player takes one of each of the operation cards (add, subtract, multiply, divide and equals) from Activity sheet 2. Do not use the bracket cards to begin with.
- Each round, before the digit cards are given out, players take turns to decide whether to make the greatest possible number or the smallest possible number.
- Shuffle the digit cards and place them face down. Each player takes five digit cards.
- After the digit cards are given out, ask your child to look quickly at each player's cards and predict who will win. Discuss how easy it is to make this prediction.
- Using their five digit cards and five operation cards, each player makes an expression (a combination of numbers and operations, for example '123 + 45 ='). When both players are happy with the expression they have made, calculate the value of each expression.
- The winner of the round is the player whose expression has the greater value (if you were aiming to make the greatest possible number) or the smaller value (if you were aiming to make the smallest possible number).
- After you have played several rounds of the game, you can introduce the bracket cards, with each player taking one pair of brackets. Discuss with your child how using the brackets affects the calculations.

Talk about:

- Your child has also been learning to use rounding and estimation to calculate with large numbers. Give them opportunities to practise this by asking questions such as: *"How many cars do you think there are in this car park? If three people arrived in each car, how many people came by car? How many fingers do all those people have? How many fingers and toes?"*

Look out for:

- The order of operations gives a standard order that operations (add, subtract, multiply, divide) should be carried out in a calculation to get the right answer.
- Some calculators know about the order of operations, and some don't. Your child has learned the following rules for the order of operations:
    - Step 1: work out the value of expressions in brackets (using the rules below).
    - Step 2: do all the division then multiplication operations.
    - Step 3: do all the addition then subtraction operations.

- Brackets round a part of an expression tell you which part of the expression to work out first. For example, in the expression 3 + 7 × 2, a simple calculator would read from left to right and work out 3 + 7 = 10, 10 × 2 = 20, and so give the answer of 20. If brackets are included in the calculation, for example 3 + (7 × 2), the calculator would work out the bracket calculation first, 7 × 2 = 14, and then the addition calculation, 14 + 3 = 17.

Activity sheet 2

This activity sheet is for use with Y5 Home Activity 2

1	2
3	4
5	6
7	8
9	0

+	+
-	-
÷	÷
×	×
(	(
)	)
=	=

Year 5: Fraction Multiplication

This activity will give your child practice in multiplying fractions and finding fractions of whole numbers.

Important words and phrases:

- multiply
- divide
- fraction
- numerator
- denominator

You will need:

- three players
- Activity sheet 4, cut into three fraction function cards
- glue or sticky tape (optional)
- up to 48 counters, coins or pasta shapes

What to do:

- Cut out the three fraction cards from Activity sheet 4 along the dotted lines. The two cards on the activity sheet that show thirds and quarters should be folded along the solid grey fold line. If you can, stick each card together to make it double-sided. Place 24 counters in the middle of the table.
- Each person takes a card, and places it face-up on the table. If the card is double-sided, they choose which way up to place it. If there are only two of you, decide who will stand in for the third player.
- The first player looks at their card, and takes that fraction of the counters. For example, if they have the ‘ $\times\frac{1}{3}$ ’ card, they take 8 counters, because 8 the starting number of counters (24) multiplied by one third. They put these in front of them.
- The player to the right of the first player takes their fraction of counters from the first player. For example, if the second player has the ‘ $\times\frac{1}{2}$ ’ card, they take 4 of the first player’s 8 counters.
- The player to the right of the second player takes their fraction of counters from the second player. For example, if they have the ‘ $\times\frac{3}{4}$ ’ card, they take 3 of the second player’s 4 counters.
- Start again with 36 or 48 counters. Everyone keeps the same card, but now the counters move from right to left. Ask: *“How many counters do you think the player on the left will finish with?”* Try other rules for moving the counters, still using the same fractions.
- After a few goes, you can change the fractions that are being used by turning over the double-sided cards.
- You could ask your child some more questions**,** such as: *“How can the first player work out how many counters they will have left after the second player has taken their share? How can the second player work out how many counters they will have left after the third player has taken their share?”*

Talk about:

Give your child practice in multiplying fractions in practical situations. For example:

- *“If five people share a cake, how much cake does each person get?”* ($\frac{1}{5}$)
- *“What if they share* $\frac{1}{2}$ *a cake?”* ($\frac{1}{10}$) *“What if they share* $\frac{1}{3}$ *of a cake?”* ($\frac{1}{15}$)

Activity sheet 4

This activity sheet is for use with Y5 Home Activity 4

$\times \frac{2}{3}$	$\times \frac{3}{4}$	$\times \frac{1}{2}$
$\times \frac{1}{3}$	$\times \frac{1}{4}$	

Year 5: Decimal Prices

This activity will help your child practise multiplying and dividing decimals. This is done in the context of solving a multi-step problem.

Important words and phrases:

- bulk discount
- decimals
- divide
- multiply

You will need:

- Activity sheet 7

What to do:

- Activity sheet 7 shows a catalogue page. Talk to your child about how the 'bulk discount' works. Companies often sell things cheaper if you are prepared to buy several at once.
- Activity sheet 7 also shows a shopping list for someone who is building a shed. Ask: *"What is the cheapest way of buying the materials for the shed? How much will all the materials cost to build the shed?"* This may mean buying more items than they need to benefit from the bulk offers.
- Ask your child to compare the prices for single items and multiple items in the catalogue and fill in the appropriate 'Quantity' boxes for each item.

Talk about:

- Discuss why companies might offer bulk discounts. Look for everyday examples of bulk discounts, for example multipacks of crisps, yoghurts or soft drinks. When you see these, ask your child to compare the price of one item from the multipack to buying the single product on its own.

INSPIREMATHS

Activity sheet 7

This activity sheet is for use with Y5 Home Activity 7

Long nails

1			10			100		
7p	Quantity:		60p	Quantity:		£5.00	Quantity:	

Short nails

1			10			100		
6p	Quantity:		50p	Quantity:		£4.00	Quantity:	

Screws

1			10			100		
6p	Quantity:		50p	Quantity:		£4.00	Quantity:	

Wood glue (325ml per bottle)

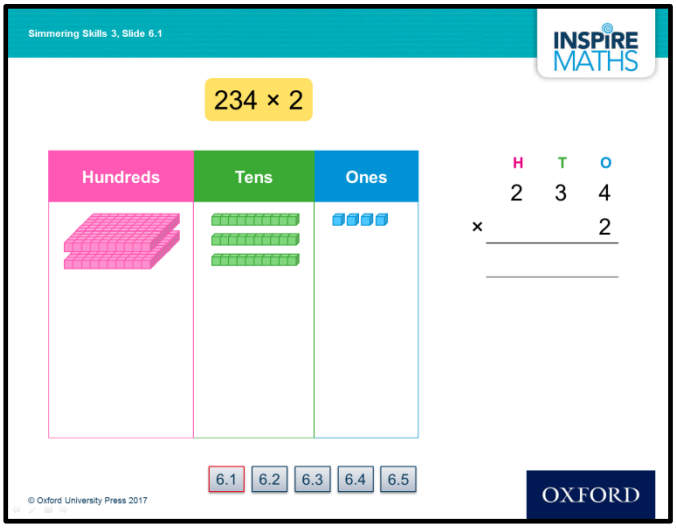
1			10			100		
£3.99	Quantity:		£37	Quantity:		£280	Quantity:	

Wooden slats (120cm by 25cm)

1			10			100		
£4.50	Quantity:		£40	Quantity:		£300	Quantity:	

Simmering Skills

These activities can be accessed via a subscription to *Inspire Maths Online* on Oxford OWL.
The teaching notes and the activity numbers below are hyperlinked to the relevant resource online.



Year 1

- Teaching Notes

Activity 18: Multiplication Concepts

Year 2

- Teaching Notes

Activity 12: Multiplication

Activity 15: Multiplication: 'Connecting Fact' Strategy

Year 3

- Teaching Notes

Activity 6: Multiplication without Regrouping

Activity 7: Multiplication with Regrouping in Ones, Tens and Hundreds

Activity 8: Multiplication with Regrouping in Ones, Tens, Hundreds and Thousands

Activity 11: Multiplication: One-Step Problems

Activity 12: Multiplication and Division: One-Step Word Problems (the unitary method)

Year 4

- Teaching Notes

Activity 3: Whole Numbers: Factors and Multiples

Activity 4: Whole Numbers: Multiplying by Tens

Activity 5: Whole Numbers: Multiplying by a 2-Digit Number

Activity 19: Decimals: Multiplying by a 1-Digit Whole Number