Updated December 2017

Year 5

Small Steps Guidance and Examples

Block 4: Multiplication & Division

White Rose Maths

Multiples

Notes and Guidance

Building on their times tables knowledge, children will find multiples of whole numbers. Children build multiples of a number using concrete and pictorial representations e.g. in an array.

Mathematical Talk

What do you notice about the multiples of 2? What is the same about them, what is different?

Look at multiples of other numbers; is there a rule that links them?

Varied Fluency

1 Circle the multiples of 5.

25 32 54 40 175 3000

What do you notice about the multiples of 5?

.

2 Write all the multiples of 4 between 20 and 80.

3 Roll 2 die (1-6), multiply the numbers.
What is the number a multiple of?
Is it a multiple of more than one number?

How many different numbers can you make multiples of? Can you make multiples of all numbers up to 10? Can you make multiples of all numbers up to 20?
Use a table to show your results. Multiply the numbers you roll to complete the table. An example is shown below

Multiples

Reasoning and Problem Solving

Use the digits 0 – 9. Choose 2 digits. Multiply them together.

What is your number a multiple of?

Is it a multiple of more than one number?

Can you find all the numbers you could make?

Use the table below to help.

	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6										
7										
8										
9										

Always, Sometimes, Never

The product of two even numbers is a multiple of an odd number.

The product of two odd numbers is a multiple of an even number.

Always- Two even numbers multiplied together are all multiples of 1.

Never- Two odd numbers multiplied together are always a multiple of an odd number. You cannot make a multiple of an even number.

Clare's age is a multiple of 7 and is 3 less than a multiple of 8.
She is younger than 40.

How old is Clare?

Clare is 21 years old,

Factors

Notes and Guidance

Children understand the relationship between multiplication and division and can use arrays to show the relationship between them. They know that division means sharing and finding equal groups of amounts. Children learn that a factor of a number is the number you get when you divide a whole number by another whole number and that factors come in pairs.

(factor × factor = product).

Mathematical Talk

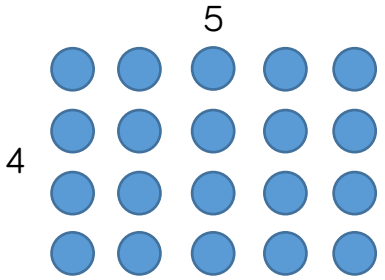
How can work in a systematic way to prove you have found all the factors?

Do factors always come in pairs?

How can we use our multiplication and division facts to find factors?

Varied Fluency

1 If you have twenty counters, how many different ways of arranging them can you find? How many factors of twenty have you found? E.g. A pair of factors of 20 are 4 and 5.



2 Circle the factors of 60

9, 6, 8, 4, 12, 5, 60, 15, 45,

Which factors of 60 are not shown?

3 Fill in the missing factors of 24

$1 \times \square$ $\square \times 12$

$3 \times \square$ $\square \times \square$

What do you notice about the order of the factors?

Use this method to find the factors of 42

Factors

Reasoning and Problem Solving

Here is Kayla's method for finding factor pairs:

1	36
2	18
3	12
4	9
5	X
6	6

Use Kayla's method to find the factors of 64

When do you put a cross next to a number?

What do you do if a number appears twice?

To find the factors of a number, you have to find all the pairs of numbers that multiply together to give that number.
Factors of 12 = 1, 2, 3, 4, 6, 12
If we leave the number we started with (12) and add all the other factors together we get 16.

12 is called an abundant number because 12 is less than the sum of its factors.
How many abundant numbers can you find between 1-40? Start with the number 1 and work systematically to 40.

18, 20, 24, 30, 36, 40.

Sometimes, Always, Never: An even number has an even amount of factors

Sometimes, Always, Never: An odd number has an odd amount of factors

Sometimes e.g. 6 has four factors but 36 has 9

Sometimes. E.g. 21 has 4 factors but 25 has an odd number (3),

True or False? The bigger the number, the more factors it has. .

This is false e.g. 12 has 6 factors but 97 only has 2.

Common Factors

Notes and Guidance

Using their knowledge of factors, children find the common factors of two numbers.

They use arrays to compare the factors of a number and use a Venn diagram to show their results.

Mathematical Talk

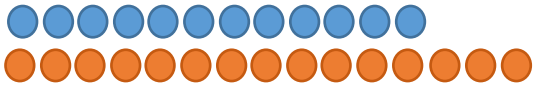
How can we find the common factors systematically?

Which number is a common factor of any pair of numbers?

How does a Venn diagram help to find common factors? Where are the common factors?

Varied Fluency

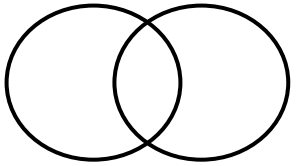
1 Use arrays to find the common factors of 12 and 15
Can we arrange the counters in one row?



Yes- so they have a common factor of one.
Can we arrange the counters in two equal rows?

2 is a factor of 12 but not of 15 so 2 is not a common factor.
Continue to work through the factors systematically until you find all the common factors.

2 Fill in the Venn diagram to find the factors of 20 and 24.



Where are the common factors of 20 and 24? Can you use a Venn diagram to find the common factors of 9 and 15?

Common Factors

Reasoning and Problem Solving

True or False?

1 is a factor of every number.

1 is a multiple of every number

0 is a factor if every number

0 is a multiple of every number

True 1 is a factor of every number

False 1 is only a multiple of 1

False 0 is only a factor of 0

True 0 multiplied by any number equals 0.

.

I am thinking of two 2-digit numbers.

Both of the numbers have a digit total of 6

Their common factors are 1, 2, 3, 4, 6, & 12

What are the numbers?

The numbers are 24 & 60.

Prime Numbers

Notes and Guidance

Using their knowledge of factors, children see that some numbers only have 2 factors and these are special numbers called Prime Numbers. They also learn that non-primes are called composite numbers. Children can recall primes up to 19 and are able to establish whether a number is prime up to 100.

Using primes, they break a number down into its prime factors.

Mathematical Talk

How many factors does each number have?

How many other numbers can you find that have this number of factors?

What is a prime number?

What is a composite number?

How many factors does a prime number have?

Varied Fluency

1 Use counters to find the factors of the following numbers.

5, 13, 17, 23

What do you notice about the arrays?

2 A prime number has 2 factors, one and itself. A composite number can be divided by numbers other than 1 and itself. Sort the numbers into the table.

5	15	9	12	3	27	24	30

	Prime	Composite
2 factors (1 & itself)		
More than 2 factors		

Put two of your own numbers into the table. Why are two of the boxes empty?

Where would 1 go in the table? Would it fit in at all?

Prime Numbers

Reasoning and Problem Solving

Find all the prime number between 10 and 100, Sort them in the table below.

End in a 1	End in a 3	End in a 7	End in a 9

What is the same about the groups?

Why do no two-digit prime numbers end in an even number?

Why do no two-digit prime numbers end in a 5?

End in a 1	End in a 3
11, 31, 41, 61, 71,	13, 23, 43, 53, 73, 83
End in a 7	End in a 9
17, 37, 47, 67, 97	19, 29, 59, 79, 89

No 2-digit primes end in an even number because 2-digit even numbers are divisible by 2.
No 2- digit prime numbers end in a 5 because they are divisible by 5 as well as 1 and itself.

Katie says all prime numbers have to be odd.

Her friend Abdul That means 9, 27 and 45 are prime numbers.

Explain Abdul and Katie's mistakes and correct them.

2 is a prime number so Katie is wrong.
Abdul thinks all odd numbers are prime but he is wrong as the numbers he has chosen have more than 2 factors.
9= 1, 3 & 9 as factors
27 = 1, 3, 9 & 27
45 = 1, 3, 5, 9, 15 & 45

Always, sometimes, never

The sum of two prime numbers is even.

Sometimes: The sum of any 2 odd prime numbers is even. However if you add 2 and another prime number your answer is odd.

Square Numbers

Notes and Guidance

Children will need to be able to find factors of whole numbers. Square numbers have an odd number of factors and are the result of multiplying a number by itself.

They learn the notation for squared is ^{2}.

Mathematical Talk

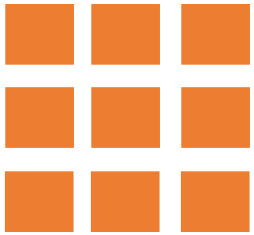
Why are square numbers called 'square numbers?

Is there a pattern between the numbers?

True or False: The square of an even number is even and the square of an odd number is odd

Varied Fluency

1 What does this array show you?.
Why is it square?



2 How many ways are there of arranging 36 counters?
Explain what you notice about the different arrays.
How many different squares can you make using counters?
What do you notice?
Are there any patterns?

3 Find the first 12 square numbers.
Prove that they are square numbers.

Square Numbers

Reasoning and Problem Solving

Chris says

Factors come in pairs so all whole numbers must have an even number of factors.

Do you agree?
Explain your reasoning.

Children will find that some numbers don't have an even number of factors e.g. 25.
Square numbers have an odd number of factors.

How many square numbers can you make by adding prime numbers together?

Here's one to get you started:

2 + 2 = 4.

Solutions include:
2 + 2 = 4
2 + 7 = 9
11 + 5 = 16
23 + 2 = 25
29 + 7 = 36

Julian thinks that 4^2 is equal to 16.
Do you agree?

Convince me.

He also thinks that 6^2 is equal to 12.

Do you agree?

Explain what you have noticed.

Children may use concrete materials or draw pictures of to prove it.

Children should spot that 6 has been multiplied by 2.

They may create the array to prove that $6^2 = 36$ and $6 \times 2 = 12$

Always, Sometimes, Never:

A square number has an even number of factors.

Never. Square numbers have an odd number of factors.

Cube Numbers

Notes and Guidance

Children learn that a cubed number is the product of three numbers which are the same.

If you multiply a number by itself, then itself again the result is a cubed number.

They learn the notation for cubed is ^{3}

Mathematical Talk

How are squared and cubed numbers the same?

How are they different?

True or False: Cubes of even numbers are even and cubes of odd numbers are odd

Varied Fluency

1 Use multilink cubes and investigate how many are needed to make different sized cubes.

How many multilink cubes are required to make the first cubed number? The second? Third?

Can you predict what the tenth cubed number is going to be?

2 Complete the following table.

3^3	$3 \times 3 \times 3$	27
5^3	$5 \times 5 \times 5$	
	$6 \times 6 \times 6$	
4^3		
		8

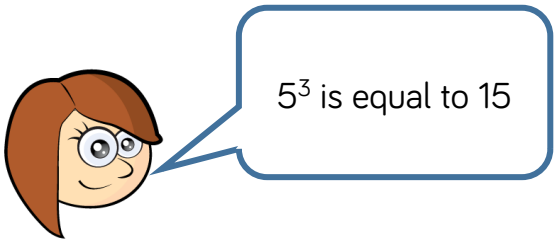
3 Calculate:

$3^3 =$ $5^3 =$

4 cubed= 6 cubed=

Cube Numbers

Reasoning and Problem Solving

Lisa says.  Is she correct?	No- She has multiplied 5 times three rather than 5 times 5 times 5
Here are 3 number cards A B C Each number card is a cubed number. Use the following information to find each number A × A = B B + B − 3 = C Digit total of C = A	A = 8 B = 64 C = 125

Jenny is thinking of a two-digit number that is both a square and a cubed number. What number is she thinking of?	64
Caroline's daughter has an age that is a cubed number. Next year her age will be a squared number. How old is she now?	8
The sum of a cubed number and a square number is 150. What are the two numbers?	125 & 25

Multiplying by 10, 100 & 1000

Notes and Guidance

Children recap multiplying by 10 and 100 before moving on to multiplying by 1000. They look at numbers in a place value grid and discuss how many places to the left digits move when you multiply by different multiples of 10.

Mathematical Talk

Which direction do the digits move when you multiply by 10, 100 or 1000?

How many places do you move to the left?

When we have an empty place value column to the right of our digits what number do we use as a place holder?

Can you use multiplying by 100 to help you multiply by 1000? Explain why.

Varied Fluency

1 Make the number 234 on the place value grid using counters.

HTh	TTh	Th	H	T	O
			● ●	● ●	● ●

When I multiply my number by 10, where will I move my counters?

Remember when we multiply by 10, 100, 1000, we move the digits to the left and use zero as a place holder.

2 Complete the following questions using counters and a place value grid.

234 × 100 =

100 × 36 =

45,020 × 10 =

324 × 100 =

1,000 × 207 =

_____ = 3,456 × 1,000

3 Use < ,> or = to complete the sentences.

62 × 1,000 ☐ 62 × 100

100 × 32 ☐ 32 × 100

48 × 100 ☐ 48 × 10 × 10 × 10

Multiplying by 10, 100 & 1000

Reasoning and Problem Solving

Rosie has £300 in her bank account. Louis has 100 times more than Rosie in his bank account. How much more money does Louis have than Rosie?	Rosie has £300 Louis has £30,000 Louis has £27,700 more than Rosie.
Emily has £1020 in her bank account and Philip has £120 in his bank account. Emily says, 'I have ten times more money than you.' Is Emily correct? Explain your reasoning.	No. Emily would have £1200 if this was the case.

Jack is thinking of a 3-digit number. When he multiplies his number by 100, the ten thousands and hundreds digit are the same. The sum of the digits is 10. What number could Jack be thinking of?	181, 262, 343, 424, 505

Dividing by 10, 100 & 1000

Notes and Guidance

Children look at dividing by 10, 100 and 1000 using a place value chart. They use counters and digits to learn that the digits move to the right when dividing by powers of ten.

Mathematical Talk

What happens to the digits?

How are dividing by 10, 100 and 1,000 related to each other?

How are dividing by 10, 100 and 1,000 linked to multiplying by 10, 100 and 1,000?

What does 'inverse' mean?

Varied Fluency

1

HTh	TTh	Th	H	T	O
	●	● ●	● ● ●		

What number is represented in the place value grid?
Divide the number by 100.
Which direction do the counters move?
How many columns do they move?
What number do we have now?

2 Complete the following using the place value grid.
Divide 460 by 10 Divide 5,300 by 100
Divide 62,000 by 1000

Divide the following numbers by 10, 100 and 1000
80,000 300,000 547,000

3 Calculate 45,000 ÷ 10 ÷ 10
How else could you write this?

Dividing by 10, 100 & 1000

Reasoning and Problem Solving

David has £357,000 in his bank. He divides the amount by 1,000 and takes that much money out of the bank. Using the money he has taken out he spends £269 on furniture for his new house.

How much money does David have left from the money he took out?

Show your workings out.

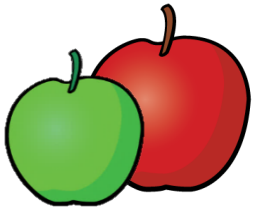
357,00 ÷ 1,000 = 357

If you subtract £269, he is left with £88

Apples weigh about 160g each.

How many apples would you expect to get in a 2kg bag?

Explain your reasoning.



Children need to be able to use knowledge of equivalent measures to convert 2kg to 2,000g.
There are approximately 12 apples.

Here are the answers to some problems:

5700	405	397	6,203

Can you write at least two questions for each answer involving dividing by 10, 100 or 1000?

Possible solutions could be:
3970 ÷10 = 397
57,000 ÷10 = 5,700
397,000 ÷ 1000 = 397
40,500 ÷ 100 = 405
620,300 ÷ 100 = 6,203

Match the calculation to the answer:

64, 640, 6,400

64,000 ÷ 10	640 ÷ 10
640,000 ÷ 1000	6,400 ÷ 100
6400 ÷ 10	64,000 ÷ 1000
64,000 ÷ 100	640,000 ÷ 10

How do you know? Do any of the calculations have the same answers? Is there an answer missed out? Explain what you have found.

The missing answer is 64,000. Children could use place value grids to demonstrate the digits moving columns.

Multiples of 10, 100 & 1000

Notes and Guidance

Children have been taught how to multiply and divide by 10, 100 and 1000. They now use knowledge of other multiples to calculate related questions.

Mathematical Talk

If we are multiplying by 20, can we break it down into two steps and use our knowledge of multiplying by 10?

How does using multiplication and division as inverses help us use known facts?

Varied Fluency

1 $36 \times 5 = 180$

Use this fact to solve the following questions:

$36 \times 50 =$ ☐ $\quad 500 \times 36 =$ ☐ $\quad 180 \div 5 =$ ☐

$5 \times 360 =$ ☐ $\quad 360 \times 500 =$ ☐ $\quad 1800 \div 5 =$ ☐

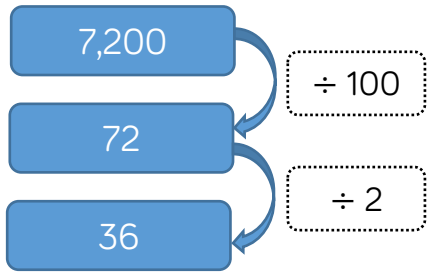
2 Here are two methods to solve 24×20

Method 1	Method 2
$24 \times 10 \times 2$ $= 240 \times 2$ $= 480$	$24 \times 2 \times 10$ $= 48 \times 10$ $= 480$

What is the same about the methods, what is different?

3 Use the division diagram to help solve the calculations.

$7{,}200 \div 200 = 36$



$3{,}600 \div 200 =$ ☐

$18{,}000 \div 200 =$ ☐

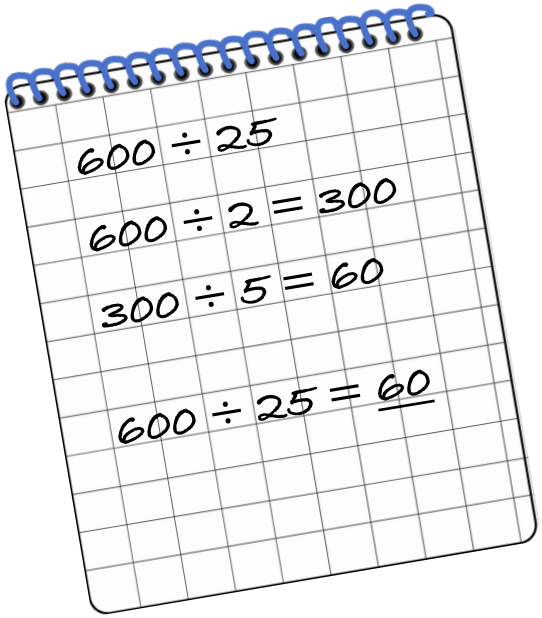
$5{,}400 \div$ ☐ $= 27$

☐ $= 6{,}600 \div 200$

Multiples of 10, 100 & 1000

Reasoning and Problem Solving

Tim has answered a question. Here is his working out.



Is he correct?

Explain your answer.

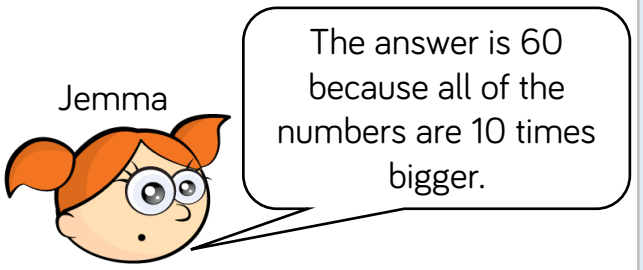
Tim is not correct as he has partitioned 25 incorrectly.

He could have divided by 5 twice.

The correct answer should be 24

$6 \times 7 = 42$

$420 \div 70 = \square$



Do you agree with Jemma?

Explain your answer.

Jemma is wrong because

$60 \times 70 = 4200$

and

$6 \times 70 = 420$

So the answer should be 6