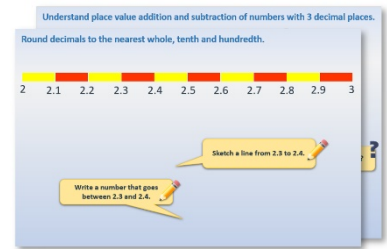


Week 10, Day 1

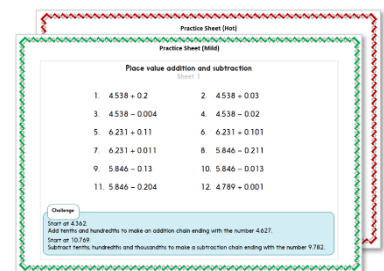
Use mental strategies to multiply. Solve scaling problems.

Each day covers one maths topic. It should take you about 1 hour or just a little more.

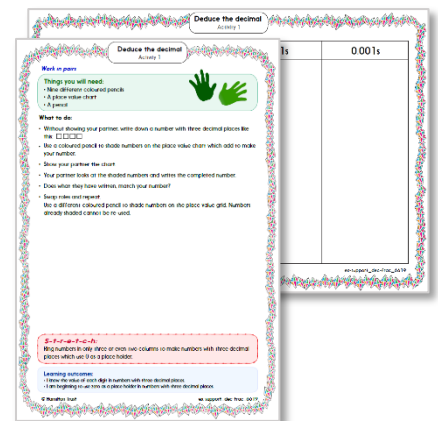
1. Start by reading through the **Learning Reminders**. They come from our *PowerPoint* slides.



2. Tackle the questions on the **Practice Sheet**. There might be a choice of either **Mild** (easier) or **Hot** (harder)! Check the answers.



3. Finding it tricky? That's OK... have a go with a grown-up at **A Bit Stuck?**



4. Think you've cracked it? Whizzed through the Practice Sheets? Have a go at the **Investigation**...

Learning Reminders

Use mental strategies (factors and multiples) to multiply by 5, 20, 6, 4 and 8.

$$84 \times 10 = 840$$

$$84 \times 5 = 420$$


$$84 \times 20 = 1680$$

How can we use $84 \times 10 = 840$ to work out the answer to 84×5 ?

We can multiply numbers by 5 by multiplying by 10, and then halving.

What do we already know that we can use to help work out the answer to 84×20 ?

We can double the answer to 84×10 .



Choose four other 2-digit numbers to multiply by 5 and 20 using the strategy of multiplying by 10 then either halving or doubling.

$$36 \times 10 = 360$$

$$36 \times 5 = 180$$

$$36 \times 20 = 720$$

$$42 \times 10 = 420$$

$$42 \times 5 = 210$$

$$42 \times 20 = 840$$

$$75 \times 10 = 750$$

$$75 \times 5 = 375$$

$$75 \times 20 = 1500$$

$$68 \times 10 = 680$$

$$68 \times 5 = 340$$

$$68 \times 20 = 1360$$

Learning Reminders

Use mental strategies (factors and multiples) to multiply by 5, 20, 6, 4 and 8.

Work out 43×3 .

How can we use $43 \times 3 = 129$ to work out the answer to 43×6 ?

One way to multiply a number by 6 is to multiply by 3, and then by 2. We are using a pair of **factors** of 6.

$$43 \times 6 = 258$$

Use this strategy to **multiply 18 and 72 by 6**. Also multiply each of these numbers by 6 using partitioning, e.g. $(6 \times 10) + (6 \times 8)$.

18×6 so,

$18 \times 3 = 54$	$18 \times 6 = 108$
$(6 \times 10) + (6 \times 8) = 60 + 48 = 108$	


72×6

$72 \times 3 = 216$	$72 \times 6 = 432$
$(6 \times 70) + (6 \times 2) = 420 + 12 = 432$	

Which method did you prefer for each number?

Learning Reminders

Use mental strategies (factors and multiples) to multiply by 5, 20, 6, 4 and 8.




Discuss how you could work out 43×8 .

Doubling three times
Double 43, double the answer, then double again.

or Partitioning
 $(8 \times 40) + (8 \times 3)$

Try both methods and decide which you preferred.



43×8

double 43 is 86

double 86 is 172

double 172 is 344

$(8 \times 40) + (8 \times 3)$

= 320 + 24

= 344

Learning Reminders

Use mental strategies to multiply by 20; Solve scaling problems.

A group of people have made a scale model of a prehistoric scene to show relative sizes of different dinosaurs.

Scaling up

Each dimension of the model dinosaur is $\frac{1}{20}$ of what is thought to have been the actual size.
Work out the real height and length of each dinosaur.

Dinosaur	Model height	Actual height	Model length	Actual length
Tyrannosaurus Rex	35cm		76cm	
Brachiosaurus	76cm		1.52m	
Velociraptor	3cm		9cm	
Diplodocus	37cm		1.35m	
Plateosaurus	11cm		39cm	

? How can we work out the full size of each dinosaur?

Multiply by 20.
Watch your units!

Practice Sheet Mild

Scaling up

Each dimension of the model dinosaur is $\frac{1}{20}$ of what is thought to have been the actual size.
Calculate the actual height and length of each dinosaur.

Dinosaur	Model height	Actual height	Model length	Actual length
Tyrannosaurus Rex	35cm		76cm	
Brachiosaurus	41cm		76cm	
Velociraptor	3cm		9cm	
Diplodocus	37cm		135cm	
Plateosaurus	11cm		39cm	

Practice Sheet Hot

Scaling up

An architect has made a scale model of a house. Each dimension in the table is $\frac{1}{8}$ of what will be the actual size. Calculate the length and width of each room.

Room	Model width	Actual width	Model length	Actual length
Kitchen	43cm		52cm	
Living room	63cm		67cm	
Bedroom 1	46cm		54cm	
Bedroom 2	39cm		44cm	
Bathroom	28cm		34cm	

Practice Sheets Answers

Scaling up (mild)

Dinosaur	Model height	Actual height	Model length	Actual length
Tyrannosaurus Rex	35cm	7m	76cm	15.2m
Brachiosaurus	41cm	8.2m	76cm	15.2m
Velociraptor	3cm	0.6m	9cm	1.8m
Diplodocus	37cm	7.4m	1.35cm	27m
Plateosaurus	11cm	2.2m	39cm	7.8m

Scaling up (hot)

Room	Model width	Actual width	Model length	Actual length
Kitchen	43cm	3.44m	52cm	4.16m
Living room	63cm	5.04m	67cm	5.36m
Bedroom 1	46cm	3.68m	54cm	4.32m
Bedroom 2	39cm	3.12m	44cm	3.52m
Bathroom	28cm	2.24m	34cm	2.72m

A Bit Stuck? Hogwart's new classroom

At Magic School, a class of children are now 5 times their size due to a Maximus spell!

A new classroom must be created until the spell can be reversed...

- Ask an adult to help you to measure your height in metres to the nearest 10cm.
- Multiply this measurement by 5. You can do this by multiplying by 10, and then halving.
This will be your new height for Hogwarts classroom.
- Repeat for your handspan and head circumference, measuring to the nearest centimetre.
- Calculate the necessary size of some objects in the classroom, e.g. height and length of tables, chairs, pencils, books.

Item to be measured	Measurement now	Measurement for Hogwarts classroom
My height		
My handspan		
My head circumference		
Length of pencil		
Height of chair		
Height of table		
Length of book		

Investigation

Get to the root

1. Spread the multiplier cards out face up.
2. One person writes a 2-digit number.
3. Their partner chooses a multiplier card.
4. Each multiply these two numbers and agree an answer.
5. Write the digital root of your original number.

To find this, you add the digits.
If the answer still has 2 digits, add these digits.
6. Multiply this digital root by your multiplier card and find the digital root of the answer.
7. Now find the digital root of the answer to your original multiplication.
8. Compare the answer to step 5 with the answer to step 6.

○	
○	
○	My number is 29
○	I choose multiplier 5
○	$5 \times 29 = 145$
○	
○	Digital root 29 is 2
○	$(2 + 9 = 11 \text{ and } 1 + 1 = 2)$
○	
○	$2 \times 5 = 10 \text{ and } 1 + 0 = 1$
○	
○	Digital root of 145 is 1
○	$(1 + 4 + 5 = 10 \text{ and } 1 + 0 = 1)$
○	

Repeat steps 2 to 8 at least six times taking different starting numbers.

What do you notice?

What happens if you start with a 3-digit number, e.g. 246×4

Challenge

Can you think how this could be used to help people check whether their calculations are correct?

Investigation

Get to the root

