Arithmetic 1

Block 3 Term 1
Weeks 1 to 10
MONDAYS

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Making Maths Make Sense - Richard Dunne

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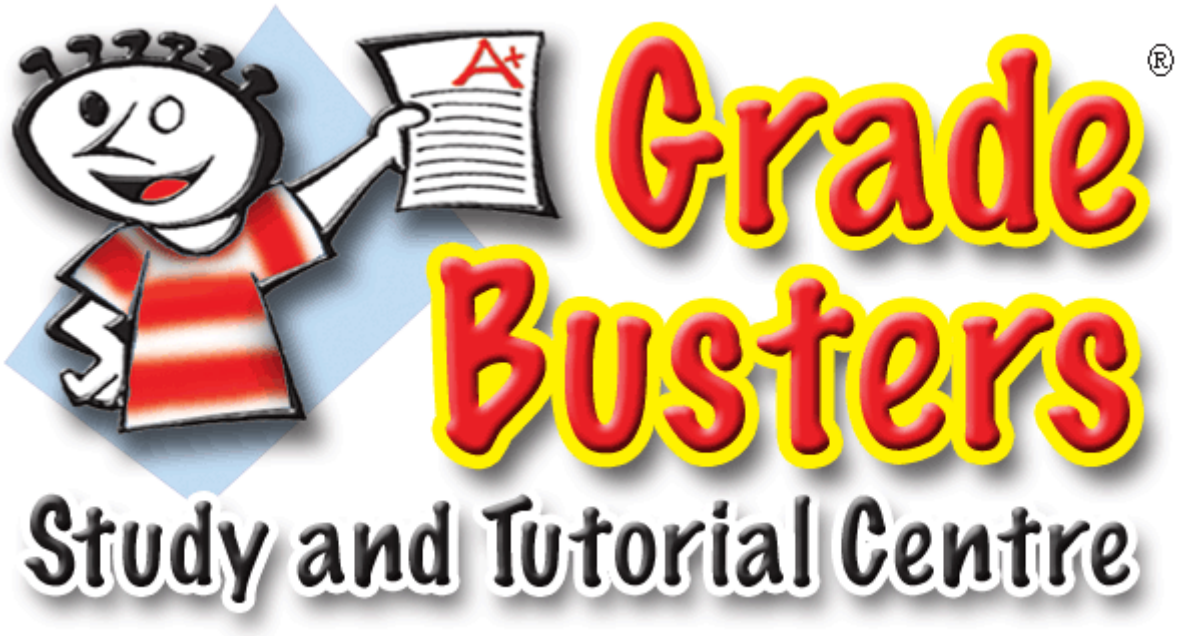
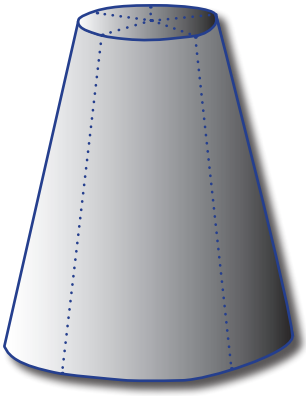


Parent's Toolkit

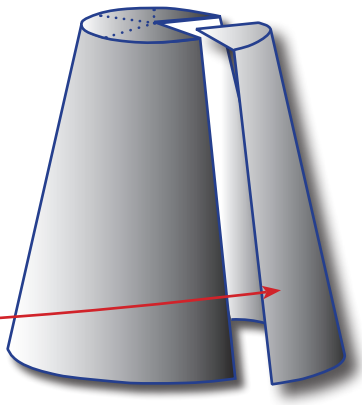
Primary Maths

± , × & ÷ Vulgar Fractions including $^1/_5$, $^1/_6$ & $^1/_7$
± Numbers with up to 4 Digits
× & ÷ Using Grids & Fact Sheets

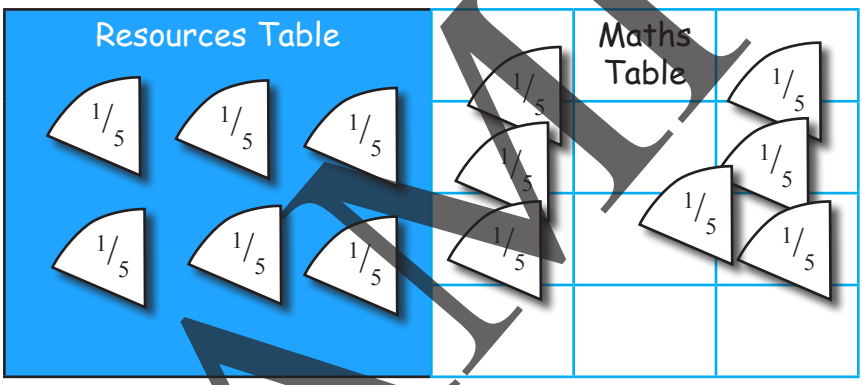
+ − × ÷ = With Fractions



a fifth	one fifth	$\frac{1}{5}$	$1/5$



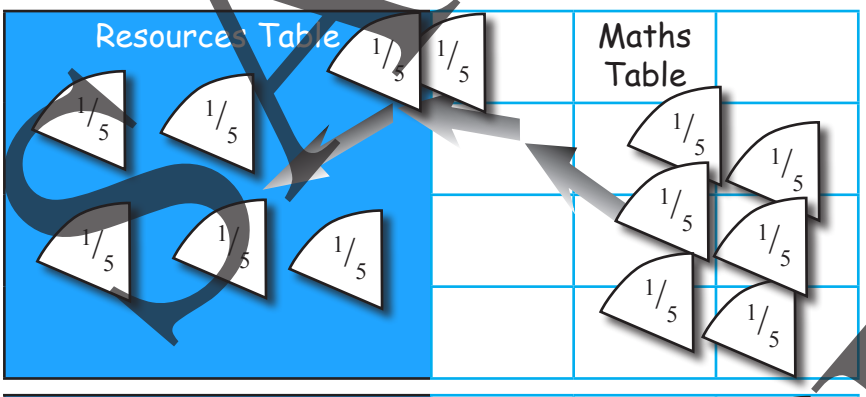
Note that a fifth is a small bit of a cup, that has been made by taking one cup and cutting it up into five equal sized pieces.



(A) Addition

$^3/_5 + {}^4/_5 = {}^7/_5$

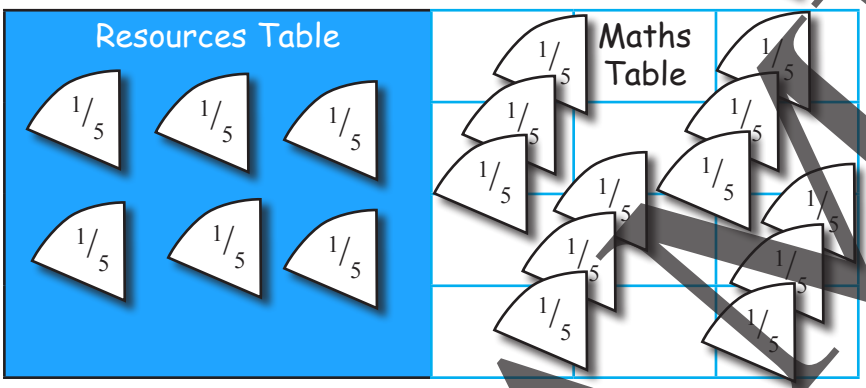
① Start by putting 3 fifths on the MT.
② Get ready to get some more.
③ Get 4 fifths.
④ Finish acting the Real Story.
⑤ Put the Equals Symbol in to the MS.
⑥ Look at the MT and count how much is there.



(B) Subtraction

$^8/_5 - {}^2/_5 = {}^6/_5$

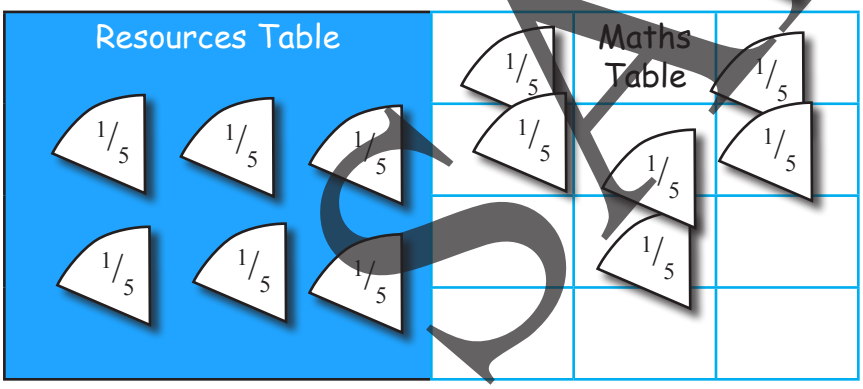
① Start by putting 8 fifths on the MT.
② Get ready to take some away.
③ Take 2 fifths away.
④ Finish acting the Real Story.
⑤ Put the Equals Symbol in to the MS.
⑥ Look at the MT and count how much is there.



(C) Multiplication

$^3/_5 \times 4 = {}^{12}/_5$

① Start by putting 3 fifths on the MT.
② I liked it so much I'm going to do the same thing lots & lots of times.
③ Get 3 fifths again and again, 4 journeys in total.
④ Finish acting the Real Story.
⑤ Put the Equals Symbol in to the MS.
⑥ Look at the MT and count how much is there.



(D) Division

$^6/_5 \div {}^2/_5 = 3$

① Start by putting 6 fifths on the MT
② Look and wonder about piles of $^2/_5$.
③ Make piles of $^2/_5$.
④ Finish acting the Real Story.
⑤ Put the Equals Symbol in to the MS.
⑥ Look at the MT and count how many piles of $^2/_5$ there are.

ITEMS FOR WEEK 1

REMEMBER TO EITHER ACT THESE ITEMS OUT SO THE PUPILS CAN WRITE THE MATHS STORY, DICTATE THEM TO BE RECORDED OR WRITE THEM ON THE BOARD TO BE COPIED DOWN.

I1	$\frac{2}{5} \times 3 =$	$\frac{6}{5}$	I16	$\frac{7}{5} \times 3 =$	$\frac{21}{5}$
I2	$\frac{8}{5} \div \frac{4}{5} =$	2	I17	$\frac{18}{5} \div \frac{2}{5} =$	9
I3	$\frac{3}{5} - \frac{1}{5} =$	$\frac{2}{5}$	I18	$\frac{3}{5} - \frac{2}{5} + \frac{4}{5} - \frac{1}{5} =$	$\frac{4}{5}$
I4	$\frac{8}{5} + \frac{1}{5} =$	$\frac{9}{5}$	I19	$\frac{8}{5} + \frac{1}{5} - \frac{3}{5} - \frac{6}{5} =$	$\frac{0}{5}$
I5	$\frac{3}{5} \times 2 =$	$\frac{6}{5}$	I20	$\frac{3}{5} \times 4 - \frac{6}{5} =$	$\frac{6}{5}$
I6	$\frac{6}{5} \div \frac{3}{5} =$	2	I21	$\frac{21}{5} \div \frac{3}{5} =$	7
I7	$\frac{3}{5} + \frac{4}{5} =$	$\frac{7}{5}$	I22	$\frac{3}{5} + \frac{4}{5} \times 4 - \frac{2}{5} =$	$\frac{17}{5}$
I8	$\frac{7}{5} - \frac{2}{5} \times 3 =$	$\frac{1}{5}$	I23	$\frac{8}{5} + \frac{1}{5} - \frac{2}{5} \times 3 =$	$\frac{3}{5}$
I9	$\frac{8}{5} \div \frac{8}{5} =$	1	I24	$\frac{16}{5} \div \frac{4}{5} =$	4
I10	$\frac{3}{5} \times 5 =$	$\frac{15}{5}$	I25	$\frac{3}{5} \times 3 - \frac{2}{5} \times 3 =$	$\frac{3}{5}$
I11	$\frac{3}{5} + \frac{2}{5} + \frac{4}{5} =$	$\frac{9}{5}$	I26	$\frac{7}{5} \times 3 + \frac{4}{5} \times 4 =$	$\frac{37}{5}$
I12	$\frac{8}{5} - \frac{1}{5} - \frac{3}{5} =$	$\frac{4}{5}$	I27	$\frac{30}{5} \div \frac{6}{5} =$	5
I13	$\frac{3}{5} \times 4 =$	$\frac{12}{5}$	I28	$\frac{7}{5} + \frac{4}{5} - \frac{2}{5} \times 4 =$	$\frac{3}{5}$
I14	$\frac{12}{5} \div \frac{2}{5} =$	6	I29	$\frac{2}{5} \times 4 + \frac{7}{5} \times 3 - \frac{1}{5} \times 6 =$	$\frac{23}{5}$
I15	$\frac{3}{5} + \frac{4}{5} - \frac{2}{5} =$	$\frac{5}{5}$	I30	$\frac{42}{5} \div \frac{7}{5} =$	6

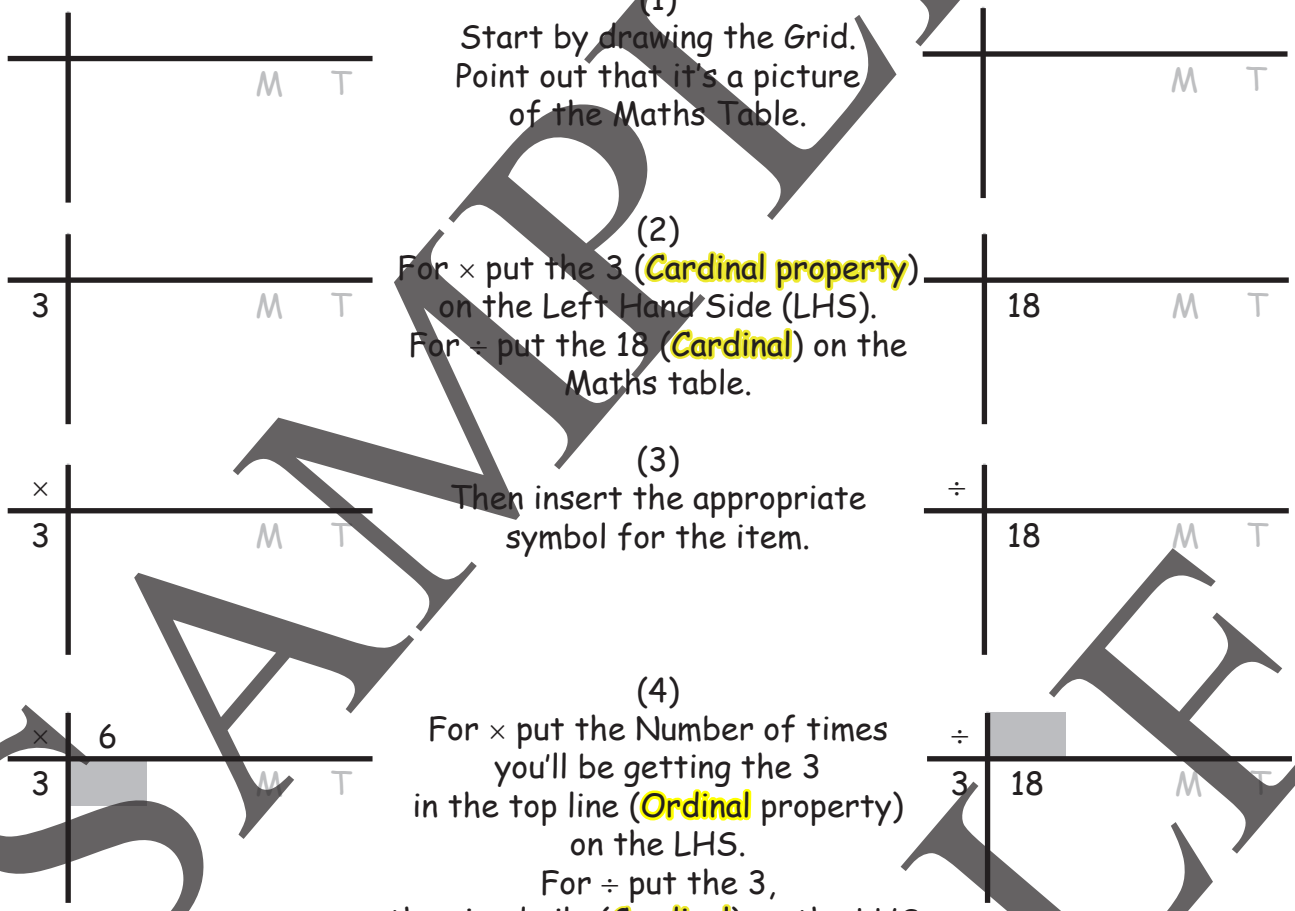
A Fifth	One Fifth	1/5	$\frac{1}{5}$	A Fifth	One Fifth	1/5	$\frac{1}{5}$	A Fifth	One Fifth	1/5	$\frac{1}{5}$	1/5	$\frac{1}{5}$	$\frac{1}{5}$
A Fifth	One Fifth	1/5	$\frac{1}{5}$	A Fifth	One Fifth	1/5	$\frac{1}{5}$	A Fifth	One Fifth	1/5	$\frac{1}{5}$	1/5	$\frac{1}{5}$	$\frac{1}{5}$

× ÷ Using a Grid

Remember that the "grid" is a picture of the Maths Table and as such continues to be an important pedagogic tool. Follow steps 1 to 5 below;

(A) 3 × 6

(B) 18 ÷ 3



(1)
Start by drawing the Grid.
Point out that it's a picture of the Maths Table.

(2)
For × put the 3 (Cardinal property) on the Left Hand Side (LHS).
For ÷ put the 18 (Cardinal) on the Maths table.

(3)
Then insert the appropriate symbol for the item.

(4)
For × put the Number of times you'll be getting the 3 in the top line (Ordinal property) on the LHS.
For ÷ put the 3, the sized pile (Cardinal) on the LHS.

(5)
Finally the answers can be inserted in the grey area, using the fact sheets if necessary.

** Note that the Cardinal and Ordinal properties of number are preserved in the lay out of the grid and the two Maths Stories can be acted out in Real Stories;

$3_{cups} \times 6 = 18_{cups}$

$18_{cups} \div 3_{cups} = 6$

The Cardinal Property, the Much-ness, is a response to "How much is there here?" and has a numerator and a denomination. i.e. for 3 × 6 the = symbol prompts the question and the answer is 18 (numerator) of those things called CUPS (denomination). The question could also be asked of the amount you're getting each time 3(numerator)CUPS(denomination).

The Ordinal Property, the Many-ness, is a response to "How many times did you do it?" and has only a numerator. i.e. for 3 × 6 you get the three cups (Much-ness & therefore cardinal property being used) .....SIX (numerator) times. (not six cups times!!!)

Try and get this distinction clear as it needs to be rigorously & consistently applied.

Arithmetic 2

Block 4 Term 3
Weeks 1 to 10
THURSDAYS

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Grade Busters

Study and Tutorial Centre

Parent's Toolkit

Primary Maths

Using a Calculator in worded problems; including
Multiplication and Division with a remainder.
Probability; Definitions and Vocabulary

Weeks 1 to 5
Using a Calculator and Worded Problems.

Week 1 Using a Calculator

Calculators: Some are '**mathematical**' and some are '**ordinary**'.

Calculators on sale in shops and from educational suppliers come in two types – they are programmed in different ways. The best way to distinguish between these two types is to tap in the calculation 4 + 2 × 3

There is only one correct answer to this. The answer is 10. This will be given by one type of calculator. This type of calculator is '**mathematical**'. It is usually called 'scientific' in the shops and catalogues. What it does is to scan the calculation and recognise that it is required to add 4 and 6 to give the correct answer 10.

Obviously, the **mathematical** calculator will also provide the correct answer 10 to the calculation of 2 × 3 + 4

The answer to 4 + 2 × 3 is definitely not 18 but this answer will be given, completely incorrectly, by the other type of calculator. This type of calculator is '**ordinary**'. Calculators on mobile phones also tend to be "**ordinary**". It is not normally called anything in particular in the shops and catalogues. The important thing about this type of calculator is that it is not programmed to deal with 4 + 2 × 3 correctly – it is programmed only to deal correctly with single calculations. It wrongly adds the 4 and 2 and then multiples 6 by 3 to give 18. It simply starts from the left and then works along the line without using **mathematical logic**.

Notice however that the **ordinary** calculator will give the correct answer 10 to the calculation of 2 × 3 + 4 but the correct answer is obtained by luck – and the **ordinary** calculator cannot be relied on to give the correct answer to any complex calculation.

This work was begun in the Reasoning Strand of Block 3 term 2, and is repeated now, to enable pupils to examine their calculator to know whether it is '**mathematical**' or '**ordinary**' – but we make sure that the technique described above (of using 4 + 2 × 3) is understood in relation to the manner in which the Real Story is acted.

Script for teaching;
How to decide if a calculator is '**mathematical**' or '**ordinary**'.

THIS SCRIPT IS USED IN BLOCK 3 TERM 2 REASONING STRAND AND REPEATED HERE

Either
(i) distribute 1 **ordinary** and 1 **mathematical** calculator to each pupil
or
(ii) distribute 1 **ordinary** and 1 **mathematical** calculator to each group of pupils
or
(iii) display 1 **ordinary** and 1 **mathematical** calculator on O.H.P. or interactive whiteboard.

T: Look at this Maths Story [Displays 4 + 2 × 3]. Act the Real Story.

NOTE. It is vitally important that this is done precisely, i.e. (i) 4 cups are moved to the Maths Table; (ii) there is then a distinct pause between the two tables; (iii) hands are raised over the Resources Table to 'Get ready to get some more';

(iv) 2 cups are moved to the Maths Table and then without any pauses this is done a total of 3 times.

It is in this manner that the Real Story accurately represents what is required by the Maths Story: the pause after doing 4 cups ensures that it is the 2 cups that is then done lots of times; it **IS NOT** six cups that are repeated. That is the purpose of the pause: it ensures that the 4 cups are not in any way implicated in the repeated actions.

T: Look what happens when we type this into this calculator (refers to and uses the '**mathematical**' calculator). The calculator gets it **RIGHT**.

T: Look what happens when we type this into this other calculator (refers to and uses the '**ordinary**' calculator). The calculator gets it **WRONG**.

[NOTE: the calculator on a mobile phone is an '**ordinary**' calculator – and it makes it very clear what it is doing because a 6 appears immediately on entering the multiplication sign. i.e. it immediately performs the addition - which the Real Story is designed to avoid].

T and **P**: [Discuss what each calculator is doing –what one is doing **RIGHT** {is programmed to scan the whole calculation} and one is doing **WRONG** {is not programmed and can't scan the whole calculation}].

T and **P**: Test both calculators with 2 × 3 + 4 =10 [both calculators get it **RIGHT**].

T and **P**: [Clarify that we can use 4 + 2 × 3 to test whether a calculator is '**mathematical**' or '**ordinary**'; and explain that the '**mathematical**' one is programmed to get it **RIGHT** and the '**ordinary**' one is not programmed for anything as complicated as that – so it gets it **WRONG**].

T and **P**: [Discuss other Maths Stories that will enable us to work out if a calculator is '**mathematical**' or '**ordinary**', emphasising that we must be able to work out the right answer ourselves (Think cups!) – and also discuss further Maths Stories which would not help us to decide what sort of calculator it is].

Script;

For using an '**ordinary**' calculator to get the right answer to 4 + 2 × 3

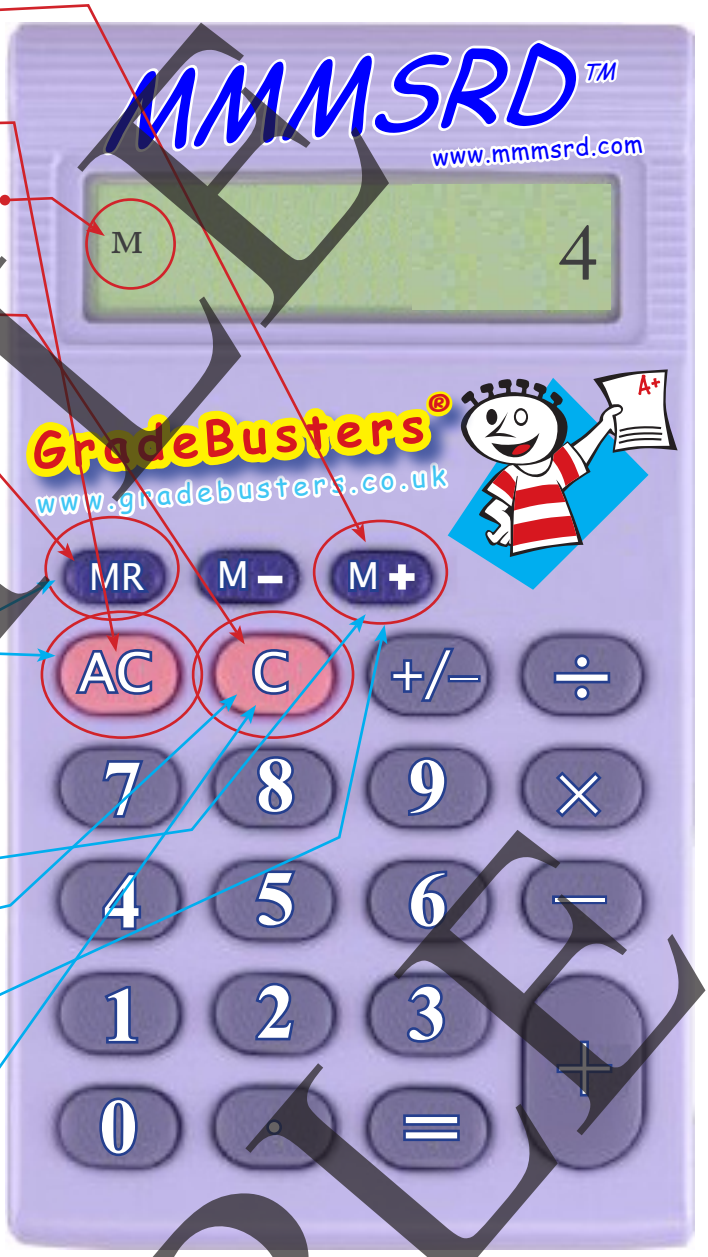
THIS SCRIPT IS USED IN BLOCK 3 TERM 2 REASONING STRAND AND REPEATED HERE

This Script introduces the calculator's memory and practises it to achieve the correct answer to 4 + 2 × 3 using an '**ordinary**' calculator - a process which requires **mathematical reasoning**. When we work with an '**ordinary**' calculator we have to be **mathematical** because the calculator is not programmed to be **mathematical**.

Note 1: If there are insufficient '**ordinary**' calculators available, the use of the calculator's memory can be practised using 'mathematical' calculators – the memory operates in the same way but for the calculations we are doing the '**mathematical**' calculator can do it without our help.
Note 2: Mobile phones do not in general provide a memory for their calculators: they are **very ordinary** calculators! – the 'memory process would need to be done by writing down each figure that needs memorising ...

[A] Introduce the M+ key.

(i) Press {AC} to clear all values.
(ii) Put 4 in the display.
(iii) Press {M+} (a little M may appear on the display to indicate a value is now in the memory).
(iv) Press Clear {C} (clears display).
(v) Press {MR} (recalls memory: 4 re-appears in the display).



[B] Introduce 'adding to memory' with the M+ key.

(i) Press All Clear key {AC}.

(ii) Press {MR} key. Display displays zero (because there is nothing in memory).

(iii) Put 4 in the display.

(iv) Press {M+}.

(v) Press Clear {C}.

(vi) Put 2 in the display.

(vii) Press {M+} key.

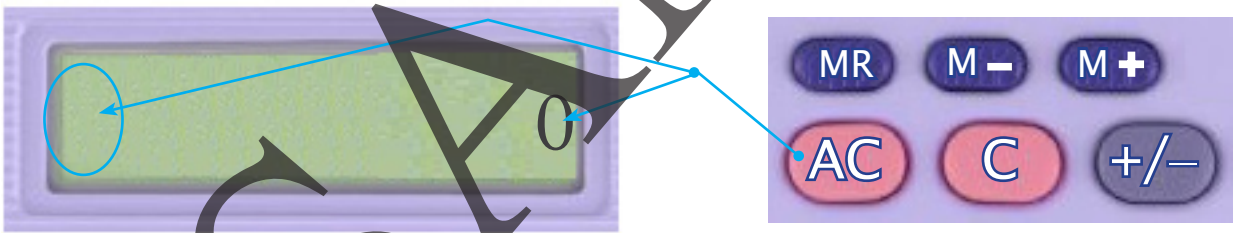
(viii) Press Clear key {C} (display shows zero).

(ix) Press {MR} key (6 appears in the display, being the total of 4 and 2).

(x) Discuss that the M+ key adds to whatever is already in memory.

[C] Adding several numbers using the M+ key

(i) Emphasise the need to clear the display and clear the memory before starting. Always press AC.



(ii) Use the M+ key to calculate 4 + 6 + 5 [there is nothing exciting about this because we could get the answer simply by using the calculator in a simple way – we are just making the point that the memory continues to hold the latest result and then add to that. Ensure that the display is cleared {C} after adding each number to the memory.

Geometry

Block 5 Term 1
Weeks 1 to 10
TUESDAYS

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Parent's Toolkit

Primary Maths

Drawing and Measuring specified angles and shapes using a Protractor.
Constructing Perpendicular Bisectors and Circumcircles
Supplementary and Vertically Opposite Angles

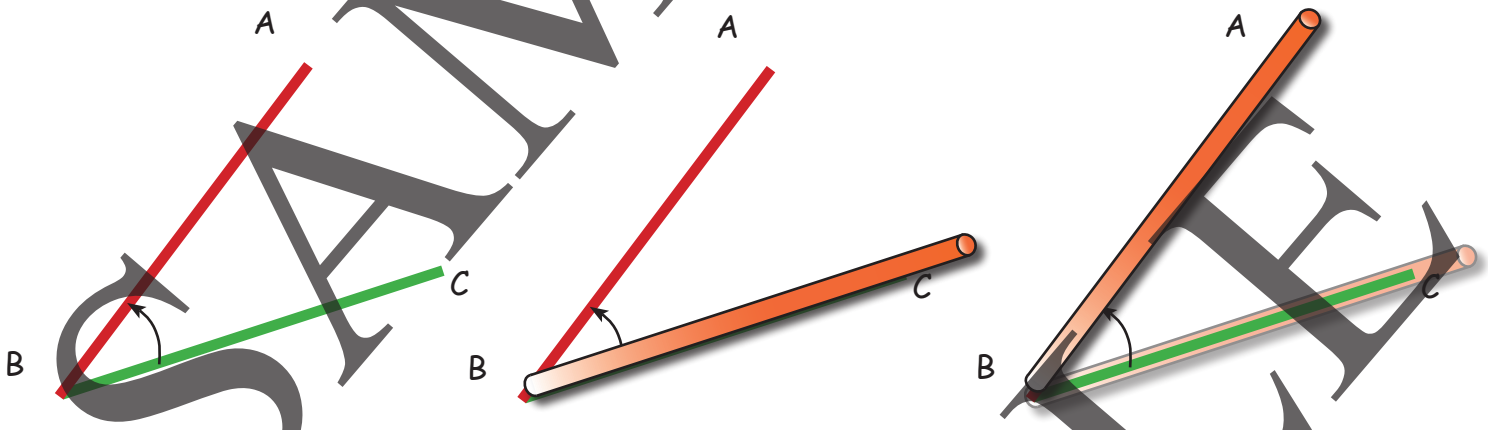
Week 1

Drawing and Measuring
Specified angles using Templates or a Protractor.

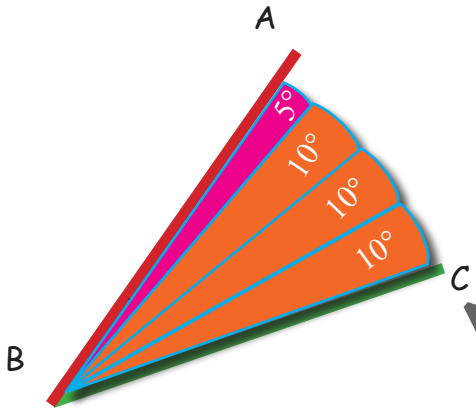
Using Templates to Measure & Estimate Angles

The use of the templates is essential in providing pupils with the necessary experience of working with angle. Use Item Sheet Week 1A and the 90°, 10° and 5° templates from the Geometry Kit, to measure carefully the supplied angles. The line segments are labelled so that the angle can be described accurately. Expect the pupils to record the angle correctly.

Start at the green line segment, CB, lay a small stick (a pencil would do) on top of CB, make B the centre of rotation and turn the stick in the direction of the arrow and stop when you are over line segment BA. Explain that this amount of turn is the Angle you are going to measure. This dynamic interpretation is key to developing a thorough feel for what an angle is.



Fit templates inside to show that the amount of turn can be measured. And describe the amount of turn carefully.



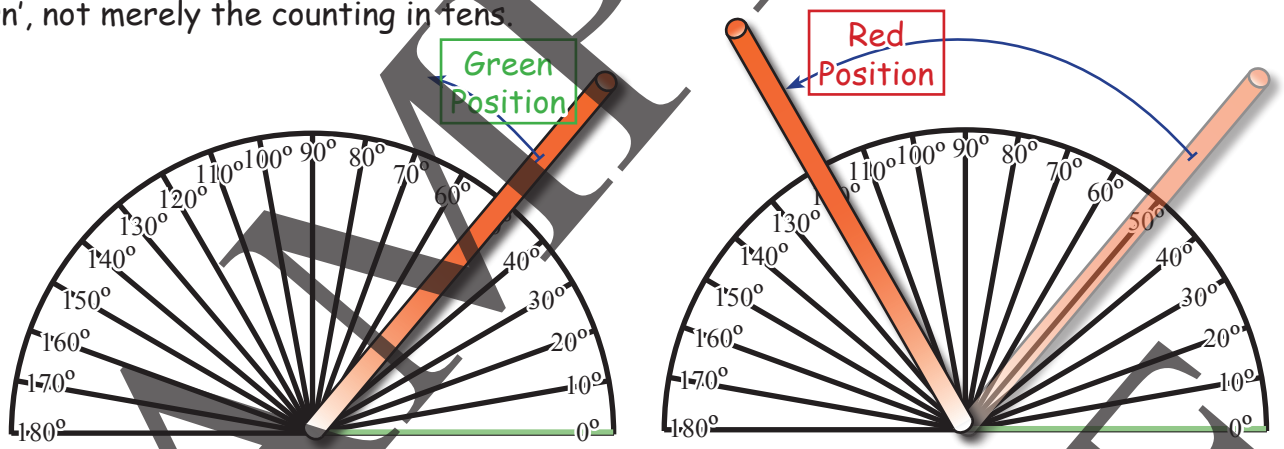
$C\hat{B}A = 35^{\circ}$ [The order matters here as it implies the direction of turn.]

Item Sheet Week 1B is to be used to estimate the drawn angles as they will not be multiples of 5°. Pupils have to use their templates and then use their judgement as there will be a gap, so that they provide an estimate. Teach them to talk themselves through the item: eg "This is a bit more than 65°. It is certainly not half way between, but it is nearly; it looks like 67°".

Now Demonstrate the following so that pupils can;
• Recognise turns indicated on a protractor as the movement of a 'stick' from its starting position indicated by a stationary 'stick'.
• Use a protractor and while doing so referring to the movement of a 'stick' from its starting position indicated by a stationary 'stick'.

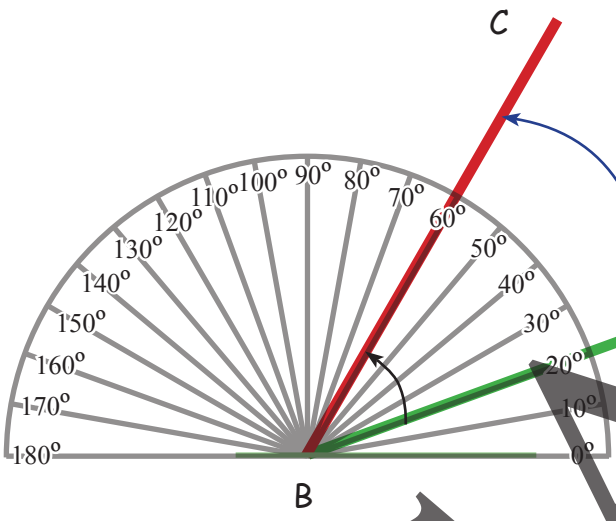
a) Study the protractor.

Use a protractor on the OHP screen. Use a stick to show a turn starting from any marked line (multiple of 10°) to any other – in other words, necessitating counting the degrees in 'tens'. Although the stick has no colour, talk about it starting in the green position and ending in the red position; and the size of the angle that it has turned, always emphasising that it is the 'turn', not merely the counting in tens.

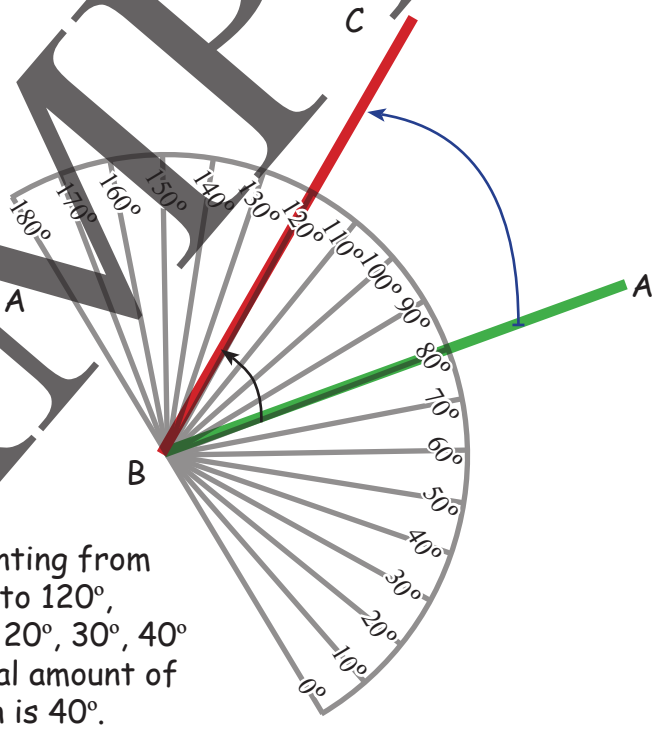


Turning from 50° to 120° is a turn of 10°, 20°, 30°, 40°, 50°, 60°, 70°
The total amount of turn is 70°.

Draw an angle of 40° on the OHP with a green line and a red line; and insert the arc. Name it $A\hat{B}C$ (with B as the centre of rotation). Place the protractor so that B is at the centre of rotation and AB is on one marked line. Count round to show that the turn, the angle, is 40°; and do this several times with the protractor placed differently each time.



Counting from 20° to 60°,
10°, 20°, 30°, 40°
Total amount of turn is 40°.



Counting from 80° to 120°,
10°, 20°, 30°, 40°
Total amount of turn is 40°.