

### Part 1 – Finding fractions of a fraction

1. Discuss with students how to shade a given fraction of a rectangle. Check that students understand that to be able to shade, say  $\frac{2}{5}$  of a shape, the shape must first be divided into 5 EQUAL parts in some way, then 2 parts are selected (shaded).
2. *Suppose you found some of your favourite chocolate bar in a pocket. You see that there is  $\frac{1}{3}$  of the bar left and you decide to have half of it today and the rest tomorrow. What fraction of the original chocolate bar would you eat each day?*

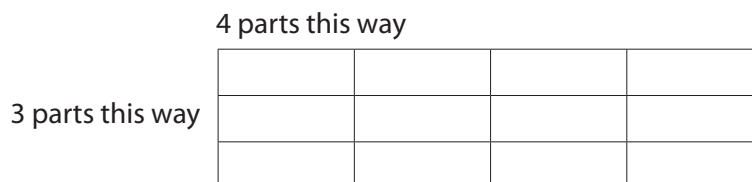
Explain that this means finding one half of one third, and so mathematically we would write:  $\frac{1}{2} \times \frac{1}{3}$  the key word here is **of** which we associate with multiplication.

See PowerPoint for a diagrammatic way of doing this.

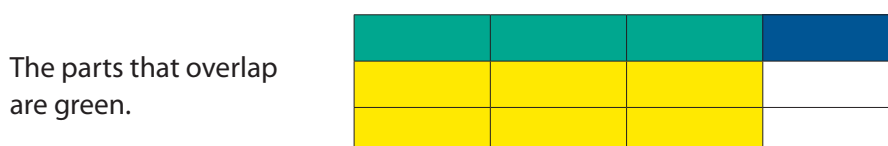
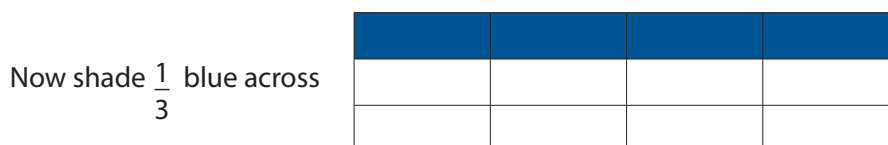
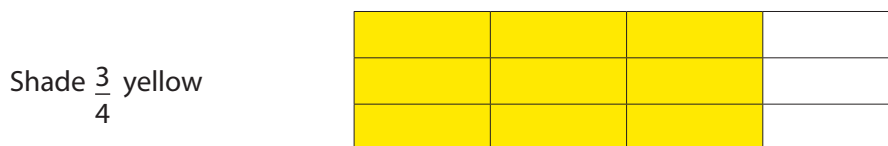
3. Suppose we want to calculate  $\frac{1}{3} \times \frac{3}{4}$  (ie finding  $\frac{1}{3}$  of  $\frac{3}{4}$  )

Follow these steps with the students or use the PowerPoint.

First divide a rectangle in 3 parts horizontally and 4 parts vertically.  
(Because the two denominators are 3 and 4).



This divides the rectangle into 12 equal parts as shown.



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# Teachers Explanatory Notes

## TI-15 Explorer™: Fractions

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Now 3 parts of the 12 are shaded green. This suggests that  $\frac{1}{3} \times \frac{3}{4} = \frac{3}{12}$

Elicit from the students that the part shaded green is also 1/4.

4. Use this method to find i.  $\frac{1}{4} \times \frac{2}{3}$  ii.  $\frac{2}{3} \times \frac{1}{5}$  iii.  $\frac{1}{5} \times \frac{2}{3}$

Ensure students draw the rectangles and divided then up themselves.

Answers are on PowerPoint.

Hand out Worksheet 1 to students.

W1

### Part 2 – Using The TI-15 Explorer™

5. Using the TI-15 Explorer™ calculator check your answers to the calculations in point 4 above. Instructions for setting up the TI-15 Explorer™ are also on the PowerPoint. To multiply two fractions, first follow these instructions:

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- Press  $\boxed{\text{Frac}}$  button to enter the Fraction Menu. The selection **U n/d** **n/d** is displayed. This lets you choose to display fractions results as mixed numbers (**U n/d**) or improper fractions (**n/d**).
- Press the left  $\leftarrow$  and right  $\rightarrow$  arrow keys to move the underline to choose the display you want.
- In this case, move the underline to **n/d**.
- Press the down arrow  $\downarrow$ , and move the underline to **MAN**. This lets you choose to simplify fractions manually (using the  $\boxed{\text{Simp}}$  key).
- Select  $\boxed{\text{Enter}}$ .



6. This example is also on the PowerPoint.

e.g.  $\frac{1}{3} \times \frac{3}{4}$  Press  $\boxed{1} \boxed{.}$   $\boxed{3} \boxed{\overline{\square}}$   $\boxed{\times}$   $\boxed{3} \boxed{.}$   $\boxed{4} \boxed{\overline{\square}}$   $\boxed{\text{Enter}}$

(Remember the top line is the **numerator** and the bottom line is the **denominator**.)

The answer is  $\frac{3}{12}$  [which can be simplified to get  $\frac{1}{4}$  (press  $\boxed{\text{Simp}}$ )]

NB. If  $\frac{n}{d} \div \frac{N}{D} \rightarrow \frac{n}{d}$  is visible at the top of the screen then the fraction can be simplified further.

Press  $\boxed{\text{Simp}}$   $\boxed{\text{Enter}}$  The simplified fraction is displayed.

Press  $\boxed{\text{Frac}}$  and if for example a 2 is shown, the fraction has been simplified by dividing numerator and denominator by 2.

If  $\frac{n}{d} \div \frac{N}{D} \rightarrow \frac{n}{d}$  is still visible, then further simplification can occur.

Press  $\boxed{\text{Frac}}$  again to get back to the fraction.

Now check your answers to the other questions in 4 above.

W2

7. Hand out Worksheet 2 to students.

### Part 3 – Introducing a Fraction ‘FFOO’

8. This concept is the basis of being able to find and use equivalent fractions.

Ask students: *What is the easiest number to multiply by? 1. Why??*

*Do you know your “one times tables” ...?!!*

- The number 1 can be written in fraction form as  $\frac{1}{1}$   
(as can any whole number e.g. 8 can be written in fraction form as  $\frac{8}{1}$ )  
so  $\frac{2}{3} \times 1 = \frac{2}{3} \times \frac{1}{1} = \frac{2}{3}$
- We can write the number 1 in many ways as a fraction eg  $\frac{2}{2}$  or  $\frac{5}{5}$  or  $\frac{6}{6}$  etc.
- Write down 3 more ways to write 1 as a fraction.
- These fractions can be called **FFOO’s** or “Funny Forms Of One”
- So  $\frac{2}{3} \times 1 = \frac{2}{3} \times \frac{1}{1} = \frac{2}{3} = \frac{2}{3} \times \frac{3}{3} = \frac{6}{9}$  so  $\frac{2}{3}$  and  $\frac{6}{9}$  represent the same number!
- **We call them equivalent fractions.**

9. Using the TI-15 Explorer™ to find equivalent fractions: See PowerPoint.

[First set up your calculator as in Part 2 No 5.]

To find a number of fraction equivalents for e.g.  $\frac{1}{3}$  follow the steps below:

- Press  $\boxed{1} \boxed{\div} \boxed{3} \boxed{=}$  to see  $\frac{1}{3}$  changed to  $\frac{2}{6}$ .
- Check that this is still the same as  $\frac{1}{3}$  by pressing the  $\boxed{\text{Simp}}$  key and then  $\boxed{=}$ .
- If you now press  $\boxed{\text{Fac}}$  you will see a 2 to indicate that the calculator has simplified the fraction by dividing the numerator and denominator by a factor of 2.

10. Ask students to use several other FFOO’s to find 3 more fractions that are equivalent to  $\frac{1}{3}$ .

11. Ask students

- To compare their fractions with a partner’s.
- How many do you think are possible? *There are an infinite number of ways of writing the fraction 1 so there is no limit to how many equivalent fractions can be written.*
- Can you write down some more without using the calculator?

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12. Choose another simple fraction and ask students to find at least 3 other fractions that are equivalent to it.

They should be able to do them mentally but should use the calculator if they need to. Note that the calculator needs to be in the MANual Mode.

13. Have a class see who can write down the most fractions equivalent to e.g.  $\frac{2}{5}$  in 20 seconds. This could be done individually or in pairs etc.

### Part 4 – Extension to division of simple fractions (Please Note: not on PowerPoint)

WS3

For the teacher, if required for students – an explanation of why, when dividing one fraction by another, the second fraction is **INVERTED**. (turned upside down!) ie the first fraction is **MULTIPLIED** by the **RECIPROCAL** of the second fraction.

For students:

To explain this process a **VERY FUNNY FORM OF ONE** is used. - ( a “VFFOO”)

Check the steps shown below:

- To find  $\frac{3}{4} \div \frac{2}{5}$ . First write down what you think the answer will be.
- Write the question like an ordinary division where  $\frac{a}{b} = a \div b$  and vice versa.

$$\frac{3}{4} \div \frac{2}{5} = \frac{\frac{3}{4}}{\frac{2}{5}}$$

- The **VFFOO** to choose this time is  $\frac{5}{2}$ . Can you see why?

Check on the table in Question 2 of WS 3.

If we multiply the two fractions in the denominator we get 1 (from Question 1 above) so we would then have a fraction being divided by 1 which of course is the same as multiplying by 1.

ie. The question now becomes:

$$\begin{aligned} & \frac{\frac{3}{4}}{\frac{2}{5}} \times \frac{\frac{5}{2}}{\frac{5}{2}} \\ &= \frac{\left(\frac{3}{4} \times \frac{5}{2}\right)}{\left(\frac{2}{5} \times \frac{5}{2}\right)} \\ &= \frac{\left(\frac{3}{4} \times \frac{5}{2}\right)}{\left(\frac{10}{10}\right)} \\ &= \frac{\left(\frac{3}{4} \times \frac{5}{2}\right)}{(1)} \\ &= \left(\frac{3}{4} \times \frac{5}{2}\right) \\ &= \frac{15}{8} \end{aligned}$$

Did you guess correctly? Check the answer on your calculator.

- Write down all the steps like the question above to calculate  $\frac{2}{3} \div \frac{4}{5}$ .  
Check your answer on the calculator.  
Students might want to do a couple more of these.
- Can you see a quicker way to do the question (without using the calculator!)?
  - Hint: Think of two fractions that you could MULTIPLY to get this answer.
  - Try your method on  $\frac{3}{5} \div \frac{2}{3}$  and check on the calculator to see if you were correct.  
Explain your method to a friend.