Shortcut Percentages: 10%

Overview

This activity is designed to introduce students to the method of calculating 10% by finding a tenth (or dividing by 10). It also provides opportunity to revise the fundamental meaning of percentage and simple fraction concepts.

Ideally this activity should be done after students have been introduced to shortcut methods for 50% and 25% by halving.

Skills and Knowledge

Calculating 10% by ÷ 10

Preparation and Materials

Photocopy several copies of Activity Sheet 1: *Large 100 Square Grid*

Photocopy Practice Sheets 1 & 2 (1 per student)

Coloured pencils or textas (ideally 1 per student)

Suggested Procedure

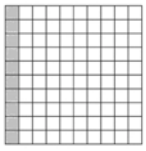
Introducing the activity

Remind students that they have so far used shortcuts to find 50% and 25% (and 75% in some cases). You are now going to look at an even more useful shortcut method.

Reinforcing the meaning of percentage

Hold up one of the 100 square grids and ask:

- *How many small squares are there in this grid?*
- *Why is it useful for thinking about percentages?*
- *So what percentage is each of the small squares?*



Introducing 10%

Quickly shade one column of 10 squares on the grid.

- *What percentage is this?*

[10% - if necessary students should count the squares together]

Write 10% on the column.

Shade another column, in a different colour and repeat the question:

- *What percentage is this?*

Write 10% on the second column and ask?

- *How many of these columns could I colour in?*

You want students to see that there are 10 columns like this all the same size – if necessary colour a few more or distribute grids so the students can try it for themselves, writing 10% on each of the columns as they go.

Note: This is not just 'busy work' physical activity like this may help some students to relate better to the underlying concepts.

If students have a foundation of fraction concepts then you want to relate 10% to $^1/_{10}$ so that they will understand that 10% of something is the same as $^1/_{10}$.

Ask:

- *If there are ten of these and they are all the same size what fraction is it?*

Write $^1/_{10}$ on each of the columns as well as 10%

If students do not have a firm understanding of fractions, then you may prefer to emphasize that the whole grid has been ***divided*** into 10 equal pieces.

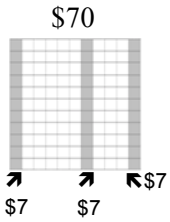
Explain:

- *You can use this to find 10% of any amount.*
- *For example let's look at $70.*

Example: 10% of $70

Use another 100 square grid with **$70** written at the top so it is clearly visible.

Draw the lines for the ten columns clearly on the paper.
[You could give students their own copy to do this with you if necessary.]

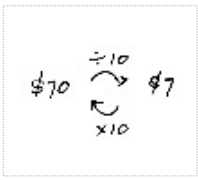


Hold up the grid.

- *How many columns are there?*
- *How much money would be in each of these ten columns?*
- *How did you work it out?*

You want students to see that they need to divide by 10 so that there will be $7 in each column. Emphasize that dividing by 10 is the same as finding one tenth.

Checking the calculation



- *So we worked out 10% of $70 = $7*
- *Does that seem right?*
- *You can check division by going backwards*

Model the checking process for students by multiplying to see that $7 times 10 will give you $70.

Why bother with 10%?

Ask:

- *Why is it so useful to be able to find 10% quickly in your head?*

Answers will vary but should include the current Australian GST rate.

Other possibilities: 10% is a common deposit when you buy something with a loan, and a common amount for tips in some restaurants or fast food deliveries.

It is also a first step to calculate lots of other percentage rates such as 20%, 30% etc.

Further Examples

Calculate 10% of: *$60; $100; $300;*
$4,000; 50 cents; 90 cents.

[Answers: $6; $10; $30; $400, 5 cents; 9 cents]

Circulate while students are doing these calculations to ensure they are using the **shortcut method for division by 10**, that is, crossing off the zeros.

If students need more practice at dividing by 10, or have not learned it before, refer to the 'in the head' Activity: *Multiplying & Dividing by tens*.

Practice Sheet 1 provides more practice at finding 10% of simple amounts as above.

Examples that don't end with '0'

Once students are confident with numbers ending in 0 ask them to:

- *Find 10% of $38*

For students who **can** divide decimals by 10 this should be straightforward, as long as they realise that they can write $38 as $38.00

$38 → $38.00 *38.00 ÷ 10 = 3.80 or 3.8*
So 10% of $38 = $3.80

If students cannot yet divide decimals by 10 these examples can be done by changing the amount into cents.

$38 →3800 cents *3800 cents ÷ 10 = 380 cents = $3.80*
So 10% of $38 = $3.80

Checking the calculations

Encourage students to check these calculations by estimation because it is easy to make mistakes with zeros and decimal calculations.

Model the process for students as follows:

$38 is almost $40
10% of $40 = $4

Our answer is $3.80, that's almost $4, so will be correct.

Ask students to try these calculations:

10% of: $92; $49; $71.20; $167 and $23.90.
Check each answer by estimation.

[Answers: $9.20; $4.90; $7.12; $16.70 and $2.39]

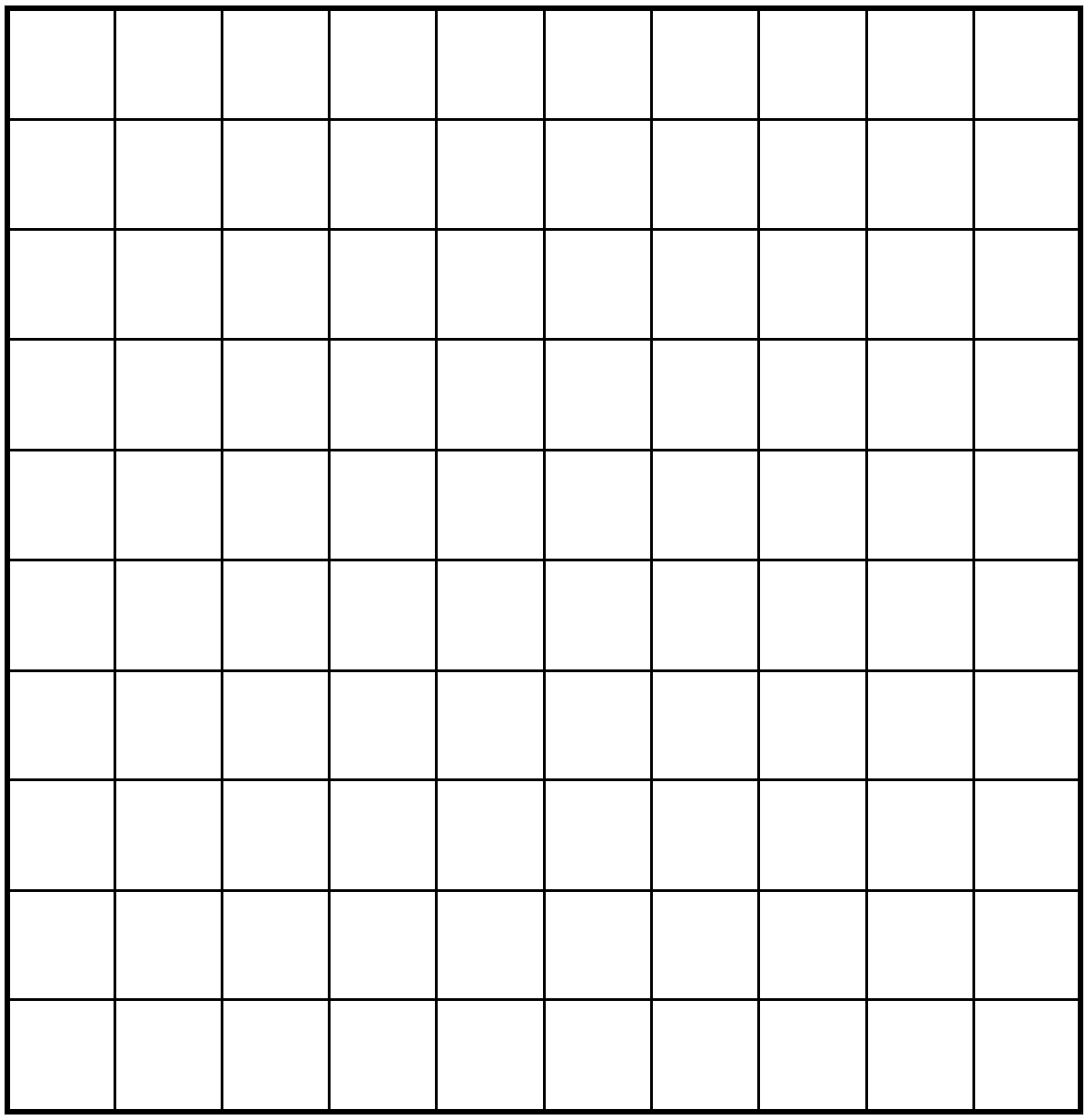
Further examples can be found in Practice Sheet 2.

Also recommended

Collect local shop or supermarket catalogues or advertising leaflets, ask students to calculate 10% discounts on a selection of items and work out what the final price would be.

Large 100 Square Grid

Activity Sheet 1



10% GST and Wastage

Practice Sheet 1

In 2012 Australia's GST (Goods and Service Tax) was 10%.
Calculate the GST that will be added to:

1. A $40 cleaning charge — GST 10% of $40 = $
2. $70 for lawn mowing — GST = $
3. $150 for washing machine repairs — GST = $
4. A $90 catering fee — GST = $
5. $380 labour fee for painting a room — GST = $.

Find the amount **after** GST is added to these charges.

6. $40 cleaning: GST = Charge with GST: + =
7. $70 lawn mowing: GST = Charge with GST: + =
8. $150 repairs:
9. $ 90 catering:
10. $380 painting:

When a builder buys things like bricks, tiles and paint he always orders 10% more to allow for 'wastage', eg damaged tiles, spilt paint.

Calculate the extra 10% for wastage when ordering:

11. 20 litres of paint for a house
12. 130 tiles for a bathroom
13. 420 bricks for an outdoor space
14. 5,000 bricks for a house
15. 6,500 bricks for a house

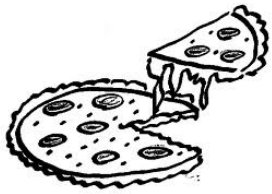
10% Tips and Service Charges

Practice Sheet 2

When Tony does home delivery for the local pizza shop he hopes for a 10% tip.

What would that be for these approximate charges?

1. $28 tip = 10% of $28 =
2. $39 tip =
3. $47 tip =
4. $52 tip =
5. $105 tip =



If people did pay these tips calculate how much they would pay:

6. $28: tip = They pay $28 + = $
7. $39: tip = They pay $ = $
8. $47:
9. $52:
10. $105:

Some restaurants add a 10% 'service' charge to every bill. They say they share this between all of the staff.

Find the service charge and the final bill for these amounts.

11. $36
12. $49
13, $78
14. $123
15. $109