

Percentages in Circles

Overview

This activity is a way of bringing together the shortcut percentage methods based on division by 10 and halving. It can be used to:

- Revise the methods introduced in previous activities
- Graduate the level of difficulty of calculations for individual students
- Develop individualised homework and revision exercises
- Introduce and practise estimation of percentages

Ideally it follows the activities *Shortcut Calculation: 50%, 25% & 75%* and *Shortcut Calculations: 10%*.

Skills and Knowledge

- 'In the head' calculation of percentages
- 10%, 20%, 30%
- 5%, 15% ... 50%, 25%

Preparation and Materials

Photocopy Practice Sheet 1: *Shortcut Percentages in Circles* (3 or more blank copies for each student)

Alternatively, make several blank photocopies of *Shortcut Percentages in Circles*, insert chosen amounts of money in the central space (see below), and photocopy each of these (1 per student)

Suggested Procedure

If you are doing this activity after the Activities: *Shortcut 10%, Shortcut 20%, 30% ...* and *Shortcut 50%, 25%, 75%* then introducing this Activity should require only a demonstration of how to use the sheet.

As described below, work through one example with the group so they are reminded of the various shortcut methods they have used previously. You can then use the blank space in the centre to graduate the level of difficulty for individual students.

Introducing the format

Distribute one blank sheet to each student and ask them all to write \$320 in the centre square.

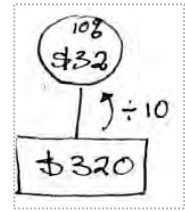
The following possible script explains the suggested use of the sheet.

Explain:

- *Starting with \$320, your task is to fill in these circles with the percentages marked on them*
- *This is about using shortcuts only - no formulas allowed*
- **On the top half** you start with the 10% circle
- *What will we write in it?* [\$32]

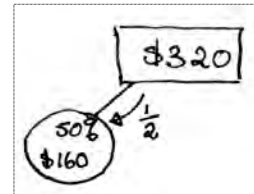


- Show the path you have taken from the centre to the 10% circle with an arrow
- Beside the arrow you write what you did to work out 10%
- So what will we write here? $[\div 10]$



- Now we move out from the 10% - so you choose another circle
- How much money will that be?
- What will we write on the arrow?
- In a minute you can finish the circles on the top yourselves [work in pairs if it helps you]

- **On the bottom half:** You should start with the 50% circle and then go from there to the others. How much will 50% be? $[\$160]$
- Again draw the arrow and write what you did.
- What will we write on the arrow? $[\div 2 \text{ or half}]$



Allow students to complete this example Practice Sheet at their own pace.

As they complete it give them another to try – inserting increasingly more challenging amounts in the central space (see below for suggestions).

Checking Answers

In order for students to check their answers you could:

- Ask them to compare their answers with one another
- Have pre-prepared answer sheets for students to look at as they complete each sheet
- Ask students to use the percentage function on their calculators and see if they get the same result.

Increasing the challenge

These practice sheets are ideal for providing practice to students of varying speeds and ability levels at the same time. All you have to do is put different numbers in the centre for different students.

Note: The numbers are more difficult if they are not easily halved then halved again, or if they involve cents as well as whole dollars at the 10% stage.

Some suggestions for increasingly difficult are given below but many learners may need more time than others on the simpler numbers. Don't rush them. The aim is to build confidence, not challenge them beyond their capacity.

*Don't regard this as a one-off activity.
You can return to these many times to
keep students' skills honed.*



Suggested amounts for increasing difficulty

First level: (Numbers which divide simply by 10 and 2 then 2 again)
\$200; \$280; \$360; \$480; \$1200

Second level: (Numbers which divide simply by 10 and 2)

\$260; \$300; \$380; \$540

Third level: (Numbers which involve decimal amounts but divide by 2)

\$64; \$128; \$426; \$738

If you prepare plenty of these blank sheets they can be used as extension or revision at any time with increasing levels of difficulty for students who need further challenges.

Larger numbers: For some students handling larger amounts of money with differing numbers of zeros may also be a useful skill. For example \$8,000; \$9,000; \$400,000; \$85,000; \$2 million.

These are the sort of rounded off amounts which arise when estimating percentages for large amounts of money.

Estimating percentage calculations

The circle percentage sheets can also be used to give students the idea of estimating for percentage calculations in real situations.

Explain:

- *Quite often it is not really necessary to calculate exact percentages*
- *For instance, if we are interested in how much interest we may have to pay on a loan or credit card*
- *We are usually only trying to get a **sense** of how much it will be, not the exact amount*

An example

Place an amount such as \$789.65 in the circle.

Explain:

- *Working out percentages of this number will not be quick*
- *We don't need to know exact amounts*
- *So we choose a more friendly approximate*
- *This will be a number that is easy to work with*

Ask:

- *Can you suggest a number?*
- *It has to be close to this but easy to calculate*

When students can appreciate why \$800 is a suitable friendly approximate write it in the space and ask them to complete the sheet in pairs or individually.

Compare solutions using the language like 'approximately', 'about'.



Further Practice

For further practice collect local ads for cars or home appliances from the papers and use the circles sheet to calculate the yearly interest which would accrue for a range of possible interest rates. The interest rate can also be approximated to a friendly number for the purpose of rough estimates, for example $17\frac{1}{2}\%$ could be approximated as 15% or 20%.

Encourage students to check the interest rate on any personal loans or credit cards that they have and do an approximate calculation of the interest they would accrue in the first year.

Students may want to discuss the interest payments shown on their credit card statements. Although the advertised interest rate is annual or 'per annum' (for 1 year), it is important that they realise the amount on the statement is only a monthly instalment.



Percentages in Circles

15 %

5 %

40 %

30 %

10 %

20 %

60 %

\$

50 %

80 %

25 %

75 %

