Decimals, rounding and accuracy

Junior Cycle · Higher Level

Understand the idea

How to start

In 3.47, the 4 means four tenths and the 7 means seven hundredths.

1. Read whether the question asks for decimal places or significant figures.
2. Mark the last digit you will keep, then look at the digit immediately after it.
3. Round only at the end of a calculation.

Key terms & definitions

Estimate
An approximate value used to judge whether an answer is sensible.

Significant figures
Digits starting at the first non-zero digit that show the stated precision.

Recurring decimal
A decimal with a repeating digit or block.

Key ideas

• To convert a fraction to a decimal, divide the numerator by the denominator.

• A terminating decimal ends. A recurring decimal repeats a digit or block; both are rational.

• Decimal places count positions after the decimal point. Significant figures begin at the first non-zero digit.

• For rounding, look at the next digit : 5 or more rounds up; 4 or less leaves the retained digit unchanged.

• Keep extra digits during a calculation. Round the final answer to the accuracy requested.

Quick reminder

• Decimal places start after the decimal point.

• Significant figures start at the first non-zero digit.

• Keep extra digits and round the final result.

Worked examples

Example 01 · Fractions and decimals

Write $\frac{3}{4}$ as a decimal.

Why this method?

Identify the place value or conversion being asked for before moving or rounding any digits.

$\frac{3}{4} = 3 \div 4$	**Step 1** The fraction bar means divide
$3.00 \div 4 = 0.75$	**Step 2** Think of 3 as 3.00 and divide by 4
$\frac{3}{4} = 0.75$	**Step 3** So the two forms name the same number

Think about it: Why is $0.75a$ sensible answer for $\frac{3}{4}$?

Example 02 · Decimal and percentage

Write $\frac{7}{20}$ as a decimal and percentage.

Why this method?

Identify the place value or conversion being asked for before moving or rounding any digits.

$7 \div 20 = 0.35$	**Step 1** The fraction bar means division. Divide the numerator by the denominator to find the decimal value.
$0.35 \times 100\% = 35\%$	**Step 2** Convert to hundredths

Example 03 · Rounding to a stated accuracy

Round 9.995 to 2 decimal places. For halfway values, round away from zero; show the stated precision.

Why this method?

Identify the place value or conversion being asked for before moving or rounding any digits.

Rounding unit : 0.01.	**Step 1** Identify the rounding unit
10.00	**Step 2** Round the magnitude, then restore the sign and show the precision

Think about it: Why does 0.00450 have three significant figures?

Example 04 · Rounding to a stated accuracy — another example

Round 0.46829 to 3 significant figures. For halfway values, round away from zero; show the stated precision.

Why this method?

Identify the place value or conversion being asked for before moving or rounding any digits.

Rounding unit : 0.001.	**Step 1** Identify the rounding unit
0.468	**Step 2** Round the magnitude, then restore the sign and show the precision

Example 05 · A recurring decimal as a fraction

Write $0.\overline{27}$ as a fraction.

Why this method?

Identify the place value or conversion being asked for before moving or rounding any digits.

$x = 0.272727\ldots$	**Step 1** Let x stand for the recurring decimal. The repeating block has two digits.
$100x = 27.272727\ldots$	**Step 2** Multiply by 100 to move one complete repeating block before the decimal point.

$100x - x = 27.272727\ldots - 0.272727\ldots$	**Step 3** Subtract the original from the new equation. The repeating parts cancel.
$99x = 27$	**Step 4** The decimal tails are identical, so their difference is zero.
$x = \frac{27}{99}$	**Step 5** Divide both sides by 99.
$x = \frac{3}{11}$	**Step 6** Simplify by dividing numerator and denominator by 9.

Common mistake

Counting the zeros before the first non-zero digit as significant figures. In 0.00470, the significant digits are 4, 7 and the final 0 : three significant figures. That final zero records precision.

Exam technique

Write the requested accuracy beside your answer.

Try it yourself

Work on paper before checking the answers at the end. These questions are for self-checking, not submitted homework.

Question 1

Round 0.62721 to 3 significant figures. For halfway values, round away from zero; show the stated precision.

A. 0.630

B. 0.627

C. 0.6272

D. 0.628

Question 2

Write $\frac{7}{10}$ as a decimal.

Watch an explanation

Cognito — Converting Fractions to Decimals

Cognito — Rounding Decimals

Open the website chapter to load the embedded players. Use the rates and rules in your question for financial examples.

Self-check answers

Question 1

0.627

Question 2

0.7

Open the full chapter online