GCSE Maths – Number

Terminating and Recurring Decimals

Worksheet

NOTES

SOLUTIONS

This worksheet will show you how to work out different types of terminating and recurring decimals questions. Each section contains a worked example, a question with hints and then questions for you to work through on your own.

Section A

Worked Example

Work out $0.55 + \frac{1}{4}$

Step 1: Convert both terms to the same form.

For this question, we will convert them into terminating decimals.

To convert $\frac{1}{4}$ to a decimal, we divide 1 by 4. This gives us 0.25. This is a terminating decimal because we can see the end of the numbers.

Step 2: Perform the operation once both are in the same form.

You can use any preferred method of addition, for example, column addition, to perform the calculation.

$$0.55 + 0.25 = \mathbf{0.80}$$

Guided Example

Work out $0.9 - \frac{2}{5}$

Step 1: Convert both terms to the same form.

For this question, we will convert both terms into terminating decimals.

Step 2: Perform the operation once both are in the same form.

1. Work out the following, writing the final answer as a terminating decimal.

   a) $0.75 + \frac{1}{5}$

   b) $2.4 + \frac{3}{4}$

   c) $\frac{4}{5} - 0.1$

   d) $\frac{1}{10} + 0.999$

Section B

Worked Example

Calculate $0.5 + 0.3$. Write the answer as a fraction.

Step 1: If necessary, convert both terms to terminating decimals. Then perform the operation.

We do not need to convert these terms because they are already in terminating decimal form.

$$0.5 + 0.3 = 0.8$$

Step 2: To convert the decimal result to a fraction, identify the numbers in the unit, tenths and hundredths column (and more if appropriate).

For this number, we have 8 tenths only. This can be written as $\frac{8}{10}$.

Step 3: Simplify the fraction if possible.

$\frac{8}{10}$ can be simplified to $\frac{4}{5}$, by dividing the numerator and denominator by 2.

Hence, the final answer is $\frac{4}{5}$.

Guided Example

Calculate $0.8 - 0.3$. Write the answer as a fraction.

Step 1: If necessary, convert both terms to terminating decimals. Then perform the operation.

Step 2: To convert the decimal to a fraction, identify the numbers in the unit, tenths and hundredths column (and more if appropriate).

Step 3: Simplify the fraction if possible.

Now it's your turn!

If you get stuck, look back at the worked and guided examples.

2. Calculate the following, writing the answer as a fraction.

a) $0.25 + \frac{1}{4}$

b) $0.3 + 0.6$

c) $\frac{2}{5} - \frac{1}{10}$

d) $2\frac{1}{2} + 0.4$

Section C – Higher Only

Worked Example

Convert $\frac{2}{3}$ to a recurring decimal

Step 1: To obtain the decimal, we simply divide the numerator by the denominator.

Using the 'bus-stop' method or another method, we find $2 \div 3 = 0.6666\ldots$

Step 2: Write the decimal in its recurring form.

Identify the numbers that recur. For this number, it is just 6. We place a dot above 6 as it is the only number that is recurring.

$$0.66666\ldots = 0.\dot{6}$$

Guided Example

Write $\frac{5}{6}$ as a recurring decimal

Step 1: To obtain the decimal, we simply divide the numerator by the denominator. Use the bus stop method to help with the division.

Step 2: Write the decimal in its recurring form.

---

3. Write the following fractions as recurring decimals:

a) $\frac{7}{9}$

b) $\frac{4}{3}$

c) $\frac{13}{6}$

d) $\frac{1}{13}$

Section D – Higher Only

Worked Example

Convert $0.\dot{4}\dot{5}$ **to a fraction**

Step 1: Write out an equation to show that an unknown fraction, *x*, is equal to the recurring decimal. Write the recurring decimal out to show several numbers.

$$x = 0.45454545\ldots$$

Step 2: Multiply both sides of the equation by a number that gives the same recurring numbers after the decimal.

To obtain the same recurring numbers after the decimal place (if we think of the number as $0.4545454545\ldots$*) then we must multiply by* 100*.*

$$100x = 45.45454545\ldots$$

Step 3: Subtract the first equation from the second equation.

$$100x - x = 45.45454545\ldots - 0.45454545\ldots$$

$$99x = 45$$

Step 4: Rearrange the equation to solve for x.

$$99x = 45$$

$$x = \frac{45}{99}$$

Guided Example

Write $0.\dot{1}1\dot{9}$ **as a fraction**

Step 1: Write out an equation to show that an unknown fraction, x, is equal to the recurring decimal. Write the recurring decimal out to show several numbers.

Step 2: Multiply both sides of the equation by a number that gives the same recurring numbers after the decimal. This gives a second equation.

Step 3: Subtract the first equation from the second equation and rearrange to solve for x.

4. Write the following recurring decimals as fractions.

    a) $0.\dot{2}$

    b) $0.\dot{9}2\dot{3}$

    c) $0.\dot{4}629\dot{1}$

    d) $1.\dot{4}$

    e) $3.\dot{1}\dot{6}$

    f) $-29.\dot{5}\dot{6}$