



eClassroom

GCSE MATHEMATICS • NUMBER

FDP Equivalence

Worksheet

Pearson Edexcel GCSE (1MA1) & International GCSE (4MA1) • No calculator

Free FDP Equivalence worksheet for GCSE and iGCSE Maths, with full worked solutions



Tap a section to jump straight to it

By the end of this worksheet you can: convert between fractions, decimals and percentages • order and compare them • use them together in problems • *Higher:* convert between fractions and recurring decimals, and prove results algebraically.

Which questions are for me?

FOUNDATION Everyone starts here. These skills appear on both tiers.

HIGHER Recurring decimals and harder problems, finishing with grade 8 to 9 challenges.

Every section has both, clearly labelled. Questions get harder as you go, and every skill in Sections A to D is needed in Section E.

Track your progress

Section	B	C	D	E
Foundation marks	27	12	17	12
Higher marks	15	18	22	15
My score				

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A

Worked examples & Your turn

Read each example carefully. Cover it up, then answer the question beside it using the same method.

FOUNDATION

Everyone starts here

Worked example A1

Write 0.35 as a fraction in its simplest form.

The last digit is in the hundredths column.

$$0.35 = \frac{35}{100}$$

Divide top and bottom by 5.

$$\frac{35}{100} = \frac{7}{20}$$

$$\frac{7}{20}$$

Your turn A1

Write 0.85 as a fraction in its simplest form.

Worked example A2

Write $\frac{9}{25}$ as a percentage.

Make the denominator 100.

$$\frac{9}{25} = \frac{9 \times 4}{25 \times 4} = \frac{36}{100}$$

"Per cent" means "out of 100".

36%

Your turn A2

Write $\frac{13}{20}$ as a percentage.

Worked example A3

Write these in order of size. Start with the smallest.

$$\frac{3}{5}$$

0.58

62%

Change them all to decimals.

$$\frac{3}{5} = 0.6 = 0.60 \quad 62\% = 0.62$$

Compare: $0.58 < 0.60 < 0.62$. Answer with the original values.

0.58, $\frac{3}{5}$, 62%

Your turn A3

Write these in order of size. Start with the smallest.

45%

$$\frac{2}{5}$$

0.42



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HIGHER

Higher tier only

Worked example A4

Prove algebraically that $0.\dot{4}\dot{5} = \frac{5}{11}$

Two digits recur, so multiply by 100.

Let $x = 0.454545\dots$

$100x = 45.454545\dots$

Subtract to remove the recurring part.

$99x = 45$

$$x = \frac{45}{99} = \frac{5}{11}$$

Your turn A4

Prove algebraically that $0.\dot{7}\dot{2} = \frac{8}{11}$

Worked example A5

Prove algebraically that $0.2\dot{3} = \frac{7}{30}$

*Only the 3 recurs. Make two multiples with the **same** decimal part.*

Let $x = 0.2333\dots$

$10x = 2.333\dots$

$100x = 23.333\dots$

Subtract: $100x - 10x$.

$90x = 21$

$$x = \frac{21}{90} = \frac{7}{30}$$

Your turn A5

Prove algebraically that $0.4\dot{3} = \frac{13}{30}$

Worked example A6

Write these in order of size. Start with the smallest.

$$\frac{4}{9} \quad 0.\dot{4}\dot{5} \quad 0.45 \quad 44.5\%$$

Write each as a decimal to 4 places.

$$\frac{4}{9} = 0.4444\dots \quad 0.\dot{4}\dot{5} = 0.4545\dots$$

$$0.45 = 0.4500 \quad 44.5\% = 0.4450$$

$$\frac{4}{9}, \quad 44.5\%, \quad 0.45, \quad 0.\dot{4}\dot{5}$$

Your turn A6

Write these in order of size. Start with the smallest.

$$0.\dot{6}\dot{3} \quad \frac{5}{8} \quad 0.63 \quad 63.5\%$$



B**Fluency**

Each question is a designed sequence. From one part to the next, ask yourself: what changed, and what did it do to the answer?

FOUNDATION*Everyone starts here*

B1 Write each decimal as a fraction in its simplest form.

(a) 0.7

(b) 0.25

(c) 0.06

(d) 0.125

[4 marks]

B2 Write each percentage as a decimal.

(a) 37%

(b) 8%

(c) 12.5%

(d) 140%

[4 marks]

B3 Write each decimal as a percentage.

(a) 0.61

(b) 0.9

(c) 0.035

(d) 1.08

[4 marks]

B4 Write each fraction as a percentage.

(a) $\frac{3}{10}$

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

(c) $\frac{11}{20}$

(d) $\frac{17}{25}$

[4 marks]

B5 Write each percentage as a fraction in its simplest form.

(a) 9%

(b) 40%

(c) 85%

(d) 2.5%

[4 marks]

B6 Write each fraction as a decimal.

(a) $\frac{9}{20}$

(b) $\frac{3}{8}$

(c) $\frac{7}{8}$

[3 marks]



B7 Complete the table. Write each fraction in its simplest form.

Fraction	Decimal	Percentage
$\frac{1}{5}$		
	0.75	
		35%
	0.02	

[4 marks]

HIGHER

Higher tier only

B8 Use division to write each fraction as a recurring decimal. Use dot notation.

(a) $\frac{2}{9}$

(b) $\frac{5}{6}$

(c) $\frac{1}{11}$

(d) $\frac{7}{12}$

[4 marks]

B9 Write each recurring decimal as a fraction in its simplest form.

(a) $0.\dot{7}$

(b) $0.\dot{6}$

(c) $0.5\dot{4}$

(d) $0.\dot{1}2\dot{3}$

[6 marks]

B10 Prove algebraically that $0.1\dot{5} = \frac{7}{45}$

[2 marks]

B11 Write $1.2\dot{7}$ as a mixed number in its simplest form.

[3 marks]



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C**Reasoning**

Show your working and explain your thinking. A correct answer without a reason does not score full marks.

FOUNDATION

Everyone starts here

C1 Here are six cards.

$\frac{1}{4}$ 0.4 25% $\frac{2}{5}$ 40% 0.25

Sort the cards into two groups so that all the cards in each group have the same value.

[2 marks]

C2 Amira says, "0.4 is the same as 4%."

Amira is wrong. Explain why, and write down the correct percentage.

[2 marks]

C3 Which is greater, $\frac{5}{8}$ or 60%?

You **must** show your working.

[2 marks]

C4 A fraction has a denominator of 20.

The fraction is greater than 0.62 and less than 68%.

Find the fraction. Show how you know there is only one possible answer.

[3 marks]

C5 Kai is comparing $\frac{7}{25}$, $\frac{3}{10}$ and $\frac{1}{4}$

Kai says, " $\frac{7}{25}$ is the smallest because it has the biggest denominator."

Is Kai correct? You **must** show your working.

[3 marks]



HIGHER*Higher tier only***C6** Here are five fractions.

$$\frac{7}{20} \quad \frac{5}{12} \quad \frac{9}{16} \quad \frac{4}{15} \quad \frac{21}{28}$$

Without doing any division, decide which of these fractions can be written as terminating decimals.

Give a reason for your answer.

[3 marks]

C7 $p = 0.\dot{2}\dot{8}$ $q = \frac{2}{7}$

Without using a calculator, show clearly that $p < q$.**[3 marks]****C8** Use algebra to show that $0.\dot{9} = 1$ **[2 marks]****C9** Dan is asked to write $0.3\dot{5}$ as a fraction. Here is his working.

$$\begin{aligned} x &= 0.3\dot{5} \\ 100x &= 35.\dot{5} \\ 99x &= 35 \\ x &= \frac{35}{99} \end{aligned}$$

(a) Explain the mistake Dan has made.**(b)** Write $0.3\dot{5}$ as a fraction in its simplest form.**[3 marks]****C10** k is a whole number from 1 to 23.For how many values of k can $\frac{k}{24}$ be written as a terminating decimal?

You must explain your reasoning.

[3 marks]**C11** a is a single digit from 1 to 9.Prove algebraically that $0.\dot{a} - 0.0\dot{a}$ is always a terminating decimal.**[4 marks]**

D**Problem solving**

You decide the method. Read the whole question first, and show every step.

FOUNDATION

Everyone starts here

D1 Jay and Kim are doing the same 24 km charity walk.

Jay has completed 42% of the walk. Kim has completed $\frac{3}{10}$ of the walk.

How much further has Jay walked than Kim?

[3 marks]

D2 Maya takes two test papers. On Paper 1 she scores 34 out of 40. On Paper 2 she scores 41 out of 50.

On which paper did Maya do better? You must show your working.

[3 marks]

D3 There are 240 students in Year 11.

$\frac{3}{8}$ of the students walk to school.

35% of the students travel by bus.

All the other students travel by car.

Work out how many students travel by car.

[4 marks]

D4 The same coat normally costs £60 in Shop A and in Shop B.

Shop A has a sale with $\frac{1}{3}$ off. Shop B has a sale with 30% off.

In which shop is the coat cheaper in the sale, and by how much?

[3 marks]

D5 A family of 2 adults and 3 children buy tickets for a theme park.

An adult ticket normally costs £24 and a child ticket normally costs £15.

They can use **one** of these offers.

Family offer	Group offer
$\frac{1}{3}$ off adult tickets 40% off child tickets	35% off the total cost

Which offer is cheaper for the family, and by how much?

[4 marks]



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HIGHER*Higher tier only***D6** Work out $0.\dot{7} - 0.\dot{2}\dot{7}$

Give your answer as a fraction.

[3 marks]**D7** Show that $\sqrt{0.\dot{4}} = 0.\dot{6}$ **[3 marks]****D8** a and b are single digits.

$$0.\dot{a}\dot{b} = \frac{2}{11}$$

Find the value of a and the value of b . You must show algebraic working.**[3 marks]****D9** A machine fills small, medium and large bottles. $\frac{5}{12}$ of the bottles are small and 0.35 of the bottles are medium.

The rest of the bottles are large.

The machine fills 66 more small bottles than large bottles.

Work out the total number of bottles the machine fills.

[4 marks]**D10** x is a single digit and k is a whole number.

$$0.\dot{x}\dot{6} = \frac{k}{11}$$

Find the value of x and the value of k . You must show algebraic working.**[4 marks]****D11** A water tank is $0.\dot{4}$ full.39 litres of water are added to the tank. The tank is now $\frac{5}{8}$ full.**(a)** Work out the capacity of the tank.

A further 9 litres of water are added.

(b) Show that the tank is now $0.\dot{6}$ full.**[5 marks]**

E**Exam practice**

Exam-style questions. Write your answers in the spaces. Aim for about one minute per mark.

FOUNDATION*Foundation and Higher crossover*

E1 (a) Write 0.03 as a percentage.

..... %

(1)

(b) Write 45% as a fraction in its simplest form.

.....
(2)

(c) Write $\frac{4}{5}$ as a decimal.

.....
(1)

(Total for Question E1 is 4 marks)

E2 Write these numbers in order of size. Start with the smallest number.

0.35 $\frac{1}{3}$ 30% $\frac{3}{8}$

.....

(Total for Question E2 is 2 marks)



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E3 Priya has 250 stickers.

She gives $\frac{2}{5}$ of the stickers to her brother.

She gives 36% of the stickers to her sister.

Work out how many stickers Priya has left.

.....
(Total for Question E3 is 3 marks)

E4 Sam spends $\frac{1}{4}$ of his wages on rent.

He spends 35% of his wages on food.

Sam has £320 of his wages left.

Work out Sam's wages.

£

(Total for Question E4 is 3 marks)



HIGHER*Higher tier only*

- E5** Prove algebraically that the recurring decimal $0.4\dot{7}$ can be written as $\frac{43}{90}$

(Total for Question E5 is 2 marks)

- E6** Use algebra to show that the recurring decimal $0.\dot{2}3\dot{4} = \frac{26}{111}$

(Total for Question E6 is 2 marks)

- E7** Work out $0.\dot{2} \times 0.\dot{8}\dot{1}$
Give your answer as a fraction in its simplest form.

.....
(Total for Question E7 is 3 marks)



E8 The members of a club are either juniors or seniors.

number of juniors : number of seniors = 2 : 3

$\frac{3}{4}$ of the juniors play in a team.

35% of the seniors play in a team.

Work out what fraction of the members of the club play in a team.

Give your fraction in its simplest form.

.....
(Total for Question E8 is 4 marks)

E9 Show that $\sqrt[3]{0.\dot{2}9\dot{6}} = 0.\dot{6}$

(Total for Question E9 is 4 marks)

Finished? Mark your work with the **full worked solutions**, fill in your scores on the front page, then keep the skill sharp with unlimited questions on the **Number revision engine**.



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