

GCSE MATHS

Fractions, decimals and recurring decimals

Worked Solutions

Q1

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$$\frac{8}{12} + \frac{5}{12}$$

$$\frac{13}{12}$$

Use denominator 12: multiply the first numerator and denominator by 4.

Simplify the result.

Q2

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$$\frac{21}{24} - \frac{8}{24}$$

$$\frac{13}{24}$$

Use denominator 24: multiply the first fraction by $\frac{3}{3}$ and the second by $\frac{8}{8}$.

Simplify the result.

Q3

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$$\frac{3 \times 1}{2 \times 5}$$
$$\frac{3}{10}$$

Cancel 7 against 14 and 3 against 9 and 15.

Simplify the result.

Q4

**

$$\frac{5}{6} \times \frac{9}{10}$$
$$\frac{3}{4}$$

Multiply by the reciprocal of the divisor.

Simplify the result.

Q5

**

$$\frac{7}{3} \times \frac{3}{2}$$

$$\frac{7}{2}$$

Convert both mixed numbers to improper fractions.

Simplify the result.

Q6

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$$\frac{3}{4} - \frac{1}{6}$$
$$\frac{7}{12}$$

Divide two thirds by 4 before subtracting.

Simplify the result.

Q7

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$$0.375 = \frac{375}{1000}$$

$$= \frac{3}{8}$$

Use place value.

Divide top and bottom by 125.

Q8

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(a) $\frac{7}{20} = \frac{35}{100} = 0.35$

Make the denominator 100.

(b) $0.35 \times 100 = 35\%$

Convert to a percentage.

Q9

**

$$12.5\% = \frac{12.5}{100} = \frac{125}{1000}$$

$$= \frac{1}{8}$$

Divide the percentage by 100.

Cancel common factors.

Q10

**

$$\frac{5}{8} = 0.625$$

Compare in one form.

$$63\% = 0.63$$

$$0.62 < 0.625 < 0.63$$

Order the values.

Q11

**

(a) $\frac{3}{5}(240) = 144$

Find the quantity.

(b) $144/180 \times 100 = 80\%$

Use 180 as the new whole.

Q12

$$40 = 2^3 \times 5$$

Both fractions are already in simplest form.

$$30 = 2 \times 3 \times 5$$

$$\frac{7}{40} = \frac{175}{1000}$$

A denominator made only of 2s and 5s divides a power of ten.

3 does not divide any power of 10

The second denominator cannot be converted to a power of ten.

Q13

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$$x = 0.\overline{3}$$

Define the recurring decimal.

$$10x = 3.333 \dots$$

Multiply so the repeating decimal tails agree.

$$x = 0.333 \dots$$

$$10x - x = 3$$

Subtract to cancel the repeating decimal parts.

$$9x = 3 \Rightarrow x = \frac{1}{3}$$

Divide and simplify.

Q14

**

$$x = 0.\overline{27}$$

Define the recurring decimal.

$$100x = 27.2727 \dots$$

Multiply so the repeating decimal tails agree.

$$x = 0.2727 \dots$$

$$100x - x = 27$$

Subtract to cancel the repeating decimal parts.

$$99x = 27 \Rightarrow x = \frac{3}{11}$$

Divide and simplify.

Q15

**

$$x = 0.\overline{18}$$

Define the recurring decimal.

$$100x = 18.1818 \dots$$

Multiply so the repeating decimal tails agree.

$$x = 0.1818 \dots$$

$$100x - x = 18$$

Subtract to cancel the repeating decimal parts.

$$99x = 18 \Rightarrow x = \frac{2}{11}$$

Divide and simplify.

Q16

$$x = 0.1\overline{6}$$

Define the recurring decimal.

$$100x = 16.666 \dots$$

Multiply so the repeating decimal tails agree.

$$10x = 1.666 \dots$$

$$100x - 10x = 15$$

Subtract to cancel the repeating decimal parts.

$$90x = 15 \Rightarrow x = \frac{1}{6}$$

Divide and simplify.

Q17

$$x = 0.2\overline{45}$$

$$1000x = 245.4545 \dots$$

$$10x = 2.4545 \dots$$

$$1000x - 10x = 243$$

$$990x = 243 \Rightarrow x = \frac{27}{110}$$

Define the recurring decimal.

Multiply so the repeating decimal tails agree.

Subtract to cancel the repeating decimal parts.

Divide and simplify.

Q18

**

$$x = 1.\overline{23}$$

$$100x = 123.2323 \dots$$

$$x = 1.2323 \dots$$

$$100x - x = 122$$

$$99x = 122 \Rightarrow x = \frac{122}{99}$$

Define the recurring decimal.

Multiply so the repeating decimal tails agree.

Subtract to cancel the repeating decimal parts.

Divide and simplify.

Q19

$$\frac{3}{5} - \frac{3}{8} = \frac{9}{40}$$

$$C = 18 \div \frac{9}{40} = 80$$

Find the fraction of capacity removed.

Divide the removed volume by this fraction.

Q20

$$1 - \frac{1}{3} = \frac{2}{3}$$

$$\frac{2}{3} \left(1 - \frac{2}{5}\right) = \frac{2}{3} \times \frac{3}{5} = \frac{2}{5}$$

Find the first remainder.

Retain three fifths of that remainder.

Q21

$$1 - \frac{1}{3} - \frac{1}{4} = \frac{5}{12}$$

$$N = 15 \div \frac{5}{12} = 36$$

Find the bus fraction.

Recover the whole.

Q22

$$\frac{27}{99} + \frac{36}{99} = \frac{63}{99}$$

$$= \frac{7}{11}$$

Convert both recurring decimals.

Simplify.

Q23

$$\frac{n}{n+15} = \frac{n+2}{n+18}$$

$$n(n+18) = (n+2)(n+15)$$

$$18n = 17n + 30 \Rightarrow n = 30$$

$$\frac{30}{45}$$

Use the denominator condition.

Cross-multiply.

Expand and solve.

Use the original denominator.

Q24

$$84 = 2^2 \times 3 \times 7$$

$$\frac{n}{84} \times \frac{3}{7} = \frac{n}{196}$$

$$196 = 2^2 \times 7^2$$

The decimal does not terminate.

The numerator is coprime to 84.

Cancel only the factor of 3.

The denominator retains 7 because n is not divisible by 7.

A terminating denominator has only factors 2 and 5.