EXAM PAPERS PRACTICE

GCSE Edexcel Math
1MA1
Recurring Decimals

Answers

"We will help you to achieve A Star "

Answer 1

Prove algebraically that the recurring decimal $0.2\dot{5}$ has the value $\frac{23}{90}$

$f = 0.255555\ldots$

$\times 10$ $10f = 2.555555\ldots$

$\times 10$ $100f = 25.555555\ldots$

DECIMAL PARTS SAME

SUBTRACT THIS WAY

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$$\frac{90f}{90} = \frac{23}{90}$$

$$f = \frac{23}{90}$$

Answer 2

Use algebra to show that the recurring decimal $0.3\dot{8} = \frac{7}{18}$

$0.3888888\ldots$

$f = 0.3\dot{8}$

$\times 10 \quad 10f = 3.\dot{8}$

$\times 10 \quad 100f = 38.\dot{8}$

$100f - 10f = 38.\dot{8} - 3.\dot{8}$

$\frac{90f}{90} = \frac{35}{90}$

$f = \frac{35}{90}$

$f = \frac{5 \times 7}{5 \times 18}$

$f = \frac{7}{18}$

Answer 3

Write the recurring decimal $0.2\dot{5}$ as a fraction.
[$0.2\dot{5}$ means 0.2555...]

Multiply the number by 10 to "shift it" by one repeating cycle.

$$10 \times 0.2\dot{5} = 2.5\dot{5}$$

Subtract the number with recurring decimal from both sides.

$$9 \times 0.2\dot{5} = 2.5\dot{5} - 0.2\dot{5}$$

$$9 \times 0.2\dot{5} = 2.3$$

Divide both sides of the equation by 9.

$$0.2\dot{5} = \frac{2.3}{9}$$

Multiply the denominator and the numerator of the fraction by 10

$$0.2\dot{5} = \mathbf{\frac{23}{90}}$$

Answer 4

Write the recurring decimal $0.3\dot{6}$ as a fraction.
Give your answer in its simplest form.
[$0.3\dot{6}$ means $0.3666\ldots$]

We have that

$$100 \times 0.3\dot{6} = 36.\dot{6}$$

$$10 \times 0.3\dot{6} = 3.\dot{6}$$

Subtracting these we get

$$\rightarrow 100(0.3\dot{6}) - 10(0.3\dot{6}) = 33$$

$$\rightarrow 90 \times 0.3\dot{6} = 33$$

$$\rightarrow 0.3\dot{6} = \frac{33}{90}$$

$$= \mathbf{\frac{11}{30}}$$

Answer 5

Write the recurring decimal $0.\dot{4}$ as a fraction.
[$0.\dot{4}$ means $0.444\ldots$]

Set $x = 0.444\ldots$

$$10x = 4.444\ldots$$

$$10x - x = 4.444\ldots - 0.444\ldots$$

$$9x = 4$$

$$\boldsymbol{x = \frac{4}{9}}$$

Answer 6

Show that the recurring decimal $0.1\dot{7} = \frac{8}{45}$

$0.1\dot{7} = 0.1777777\ldots$

$f = 0.1\dot{7}$

$\times 10 \quad 10f = 1.\dot{7}$

$\times 10 \quad 100f = 17.\dot{7}$

$100f - 10f = 17.\dot{7} - 1.\dot{7}$

$\frac{90f}{90} = \frac{16}{90}$

$f = \frac{16}{90}$

$f = \frac{2 \times 8}{2 \times 45}$

$f = \frac{8}{45}$

Answer 7

$0.26666666\ldots$

Use algebra to show that the recurring decimal $0.2\dot{6} = \frac{4}{15}$

$f = 0.2\dot{6}$

$\times 10$ $\quad 10f = 2.\dot{6}$

$\times 10$ $\quad 100f = 26.\dot{6}$ $\quad -$

$100f - 10f = 26.\dot{6} - 2.\dot{6}$

$\frac{90f}{90} = \frac{24}{90}$

$f = \frac{24}{90}$

$f = \frac{6 \times 4}{6 \times 15}$

$f = \frac{4}{15}$

Answer 8

Write the recurring decimal $0.\dot{2}$ as a fraction.
[$0.\dot{2}$ means $0.222\ldots$]

Give it a name: $f = 0.222222\ldots$

Multiply by 10 until the decimal parts are the same: $10f = 2.222222\ldots$

Subtract to get rid of the decimal part: $10f - f = 2.222222\ldots - 0.222222\ldots$

$9f = 2$

And simplify: $\boldsymbol{f = \frac{2}{9}}$

Answer 9

Write the recurring decimal $0.32\dot{}$ as a fraction.
[$0.32\dot{}$ means $0.3222\ldots$]

We need to get rid of the recurring decimal by doing the following

$$100 \times 0.3\dot{2} = 32.\dot{2}$$

$$10 \times 0.3\dot{2} = 3.\dot{2}$$

$$100 \times 0.3\dot{2} - 10 \times 0.3\dot{2} = 90 \times 0.3\dot{2}$$

$$= 32.\dot{2} - 3.\dot{2}$$

$$\rightarrow 90 \times 0.3\dot{2} = 29$$

Now divide by 90

$$\mathbf{0.3\dot{2} = \frac{29}{90}}$$

Answer 10

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

$0.2\dot{4}\dot{6}$ $0.24\dot{6}$ $0.\dot{2}4\dot{6}$ 0.246

$0.2\dot{4}\dot{6} = 0.246464646\ldots$

$0.24\dot{6} = 0.246666\ldots$

$0.\dot{2}46\dot{2} = 0.246246246\ldots$

$0.246 = 0.246$

IN ORDER OF SIZE

$0.246, 0.\dot{2}46\dot{2}, 0.2\dot{4}\dot{6}, 0.24\dot{6}$

Answer 11

Show that the recurring decimal $0.\dot{3}9\dot{6} = \frac{44}{111}$

$0.396396396396\ldots$

$f = 0.\dot{3}9\dot{6}$

$\times 10$ $10f = 3.\dot{9}6\dot{3}$

$\times 10$ $100f = 39.\dot{6}3\dot{9}$

$\times 10$ $1000f = 396.\dot{3}9\dot{6}$

$1000f - f = 396.\dot{3}9\dot{6} - 0.\dot{3}9\dot{6}$

$\frac{999f}{999} = \frac{396}{999}$

$f = \frac{396}{999}$

$f = \frac{9 \times 44}{9 \times 111}$

$f = \frac{44}{111}$

Answer 12

Write the recurring decimal $0.\dot{6}\dot{3}$ as a fraction in its lowest terms.
You must show all your working.

$$100 \times 0.\dot{6}\dot{3} - 0.\dot{6}\dot{3} = 63$$

$$= (100 - 1)0.\dot{6}\dot{3} = 99 \times 0.\dot{6}\dot{3}$$

$$\rightarrow 99 \times 0.\dot{6}\dot{3} = 63$$

Now divide through by 99

$$\rightarrow 0.\dot{6}\dot{3} = \frac{63}{99}$$

Cancel out 9 top and bottom

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

Answer 13

Write the recurring decimal $0.4\dot{8}$ as a fraction.
Show all your working.

$$48.\dot{4}\dot{8} - 0.\dot{4}\dot{8}$$

$$= 48$$

We can also factorise out the recurring decimal, making it

equal to

$$0.\dot{4}\dot{8}(100 - 1)$$

$$= 99 \times 0.\dot{4}\dot{8}$$

Hence

$$99 \times 0.\dot{4}\dot{8} = 48$$

$$\rightarrow 0.\dot{4}\dot{8} = \frac{48}{99}$$

$$= \mathbf{\frac{16}{33}}$$

Answer 14

Express the recurring decimal $0.28\dot{1}$ as a fraction in its simplest form.

$f = 0.28\dot{1}$ $(= 0.2818181\ldots)$

$10f = 2.8\dot{1}$

$100f = 28.1818181\ldots$

$1000f = 281.8\dot{1}$

$990f = 279$

$\frac{990f}{990} = \frac{279}{990}$

$f = \frac{279}{990} \rightarrow 18 \rightarrow 18$

CANCELLING 9s ↓

$f = \frac{31}{110}$

DIVISIBLE BY 3 IF THE DIGITS ADD UP TO A MULTIPLE OF 3

ALSO WORKS FOR 9

Answer 15

Using algebra, prove that $0.1\dot{3}\dot{6} \times 0.\dot{2}$ is equal in value to $\frac{1}{33}$

$f = 0.1\dot{3}\dot{6} = 0.136363636\ldots$

$\times 10$ $10f = 1.\dot{3}\dot{6}$

$\times 10$ $100f = 13.\dot{6}\dot{3}$

$\times 10$ $1000f = 136.\dot{3}\dot{6}$

$1000f - 10f = 136.\dot{3}\dot{6} - 1.\dot{3}\dot{6}$

$990f = 135$

$\frac{990f}{990} = \frac{135}{990}$

$f = \frac{135}{990}$

$g = 0.\dot{2}$

$\times 10$ $10g = 2.\dot{2}$

$10g - g$

$9g = 2$

$\frac{9g}{9} = \frac{2}{9}$

$g = \frac{2}{9}$

So $0.1\dot{3}\dot{6} \times 0.\dot{2} = f \times g$

$= \frac{135}{990} \times \frac{2}{9}$

$= \frac{1}{33}$