

Rational numbers and recurring decimals

About 45 minutes No calculator 46 marks



Hints online, answers free with an account:
mathswariz.uk/worksheets/gcse-rational-numbers-and-recurring-decimals/

Date _____

A Do Now

The first question is what today's lesson needs. The others bring back earlier topics.

A1 Needed today [2 marks] **A2** From chapter 7 [2 marks]

Work out $2\frac{5}{6} - 1\frac{1}{2}$. Give your answer as a mixed number.

Answer

Triangles ABC and DEF have a right angle at B and at E .
 $AC = DF = 25$ cm and
 $AB = DE = 7$ cm. Which condition shows they are congruent? Find the length of EF .

Answer

A3 From chapter 14 [2 marks] **A4** Last lesson [2 marks]

Work out
 $(4.2 \times 10^{-4}) \div (6 \times 10^9)$. Give your answer in standard form.

Answer

The equation $x^3 + 7x = 19$ has one solution. Show that it lies between two consecutive whole numbers, and find them.

Answer

B Example, then your turn

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

Write $0.\dot{3}\dot{6}$ as a fraction in its simplest form.

Hint Two digits repeat, so multiply by 100 and subtract.

B1 Write $0.\dot{1}\dot{5}$ as a fraction in its simplest form. [2 marks]

Answer

EXAMPLE 2

Write $0.1\dot{6}$ as a fraction in its simplest form.

Hint Only the 6 repeats. Line up the repeats with $100x$ and $10x$.

B2 Write $0.2\dot{7}$ as a fraction in its simplest form. [3 marks]

Answer

c Practice

C1 Which of $\frac{9}{32}$, $\frac{7}{30}$ and $\frac{21}{35}$ give a terminating decimal? Give a reason. [2 marks]

Answer

C2 Write 0.124 as a fraction in its simplest form. [2 marks]

Answer

C3 Write $0.40\dot{5}$ as a fraction in its simplest form. [3 marks]

Answer

C4 Write down the reciprocal of $3\frac{1}{3}$. [1 mark]

Answer

C5 Write $\frac{7}{27}$ as a recurring decimal. Use dot notation. [2 marks]

Answer

C6 Write $3.2\dot{4}$ as a mixed number in its simplest form. [3 marks]

Answer

C7 Which of these numbers are irrational? $\sqrt{25}$, $\sqrt{18}$, $0.\dot{3}$, π , $\frac{22}{7}$ [2 marks]

Answer

C8 Write these in order of size, smallest first. $0.\dot{6}7$, 0.67, $0.\dot{6}$, 0.66 [2 marks]

Answer

D Exam-style questions

D1 Prove algebraically that the recurring decimal $0.2\dot{3}\dot{6}$ can be written as $\frac{13}{55}$. [3 marks]

D2 Mia says, " $\frac{7}{56}$ gives a recurring decimal, because 56 has a prime factor of 7." [2 marks]
Explain why Mia is wrong.

D3 $x = 0.\dot{7}\dot{2}$ and $y = 0.\dot{2}\dot{7}$

(a) Write x as a fraction in its simplest form.

[2 marks]

Answer

(b) Write y as a fraction, and hence show that $x + y = 1$.

[3 marks]

Total for D3: 5 marks

D4 Work out the reciprocal of $0.\dot{1}\dot{2}$. Give your answer as a mixed number.

[3 marks]

Answer

E Extension

No route is given. The hints are at the end of the sheet. Use one at a time.

E1 n is a whole number from 1 to 72. For how many values of n does $\frac{n}{72}$ give a terminating decimal? [3 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** Write 72 as a product of its prime factors.
Hint 2 $72 = 2^3 \times 3^2$, so the 3^2 must cancel with n .
Hint 3 n must be a multiple of 9: 9, 18, 27, ..., 72. That is $72 \div 9 = 8$ values.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

I can decide whether a fraction gives a terminating or a recurring decimal. ☐ ☐ ☒

I can prove algebraically what fraction a recurring decimal is. ☐ ☐ ☒

I can find a reciprocal and tell a rational number from an irrational one. ☐ ☐ ☒