

Recurring Decimals Questions

In each question, the variables x and y represent a single digit from 1 to 9. Give all your answers in their lowest terms.

1. Convert $0.\dot{x}$ to a fraction.
2. Convert $0.3\dot{x}$ to a fraction.
3. Convert $0.x\dot{5}$ to a fraction.
4. Convert $0.\dot{7}x$ to a fraction.
5. Convert $0.\dot{x}\dot{y}$ to a fraction.
6. Work out $0.\dot{x}\dot{y} - 0.\dot{y}\dot{x}$, giving your answer as a fraction.
7. $0.\dot{x}\dot{y} - 0.\dot{y}\dot{x} = 0.\dot{5}4$. How many possible pairs of values of x and y are there?
8. The fraction $\frac{1}{n}$, where n is a positive integer, is converted to a decimal. What values of n will give a terminating decimal? [Hint – use your calculator to try various values of n]
9. How many fractions of the form $\frac{1}{n}$, where n is an integer such that $1 \leq n \leq 30$, give a terminating decimal?
10. Giving your answer as a fraction, work out the value of

$$\frac{1}{10} + \frac{1}{100} + \frac{1}{1000} + \frac{1}{10000} + \dots$$

Fill in each box in the table with either “always recurring”, “always terminating”, or “sometimes recurring, sometimes terminating”. Provide an example for each case.

a	b	$a \times b$	$a + b$	$a \div b$
Recurring	Recurring			
Recurring	Terminating			
Terminating	Terminating			

1. $\frac{x}{9}$
2. $\frac{27+x}{90}$
3. $\frac{9x+5}{90}$
4. $\frac{70+x}{99}$
5. $\frac{10x+y}{99}$
6. $\frac{x-y}{11}$
7. $0.\dot{5}\dot{4} = \frac{6}{11}$, so $x - y = 6$. There are 3 such pairs for $1 \leq x, y \leq 9$
8. We only get a terminating decimal when the only prime factors of n are 2 and/or 5
9. 9 values (1, 2, 4, 5, 8, 10, 16, 20, 25)
10. $\frac{1}{9}$

a	b	$a \times b$	$a + b$	$a \div b$
Recurring	Recurring	Sometimes recurring, sometimes terminating	Sometimes recurring, sometimes terminating	Sometimes recurring, sometimes terminating
Recurring	Terminating	Sometimes recurring, sometimes terminating	Always recurring	Sometimes recurring, sometimes terminating
Terminating	Terminating	Always terminating	Always terminating	Sometimes recurring, sometimes terminating