

## 1.1.06 | Test yourself | Number sets and decimals | Answers

**Task 1.** Decide if the following statements are true or false?

(a)	Every integer is a natural number.	False
(b)	Every natural number is an integer.	True
(c)	Every rational number is a result of division of two integers.	True
(d)	Every rational number can be written as a terminating decimal.	False
(e)	Recurring decimals are rational numbers.	True
(f)	All non-terminating decimals are irrational numbers.	False

**Task 2.** Convert the fraction  $\frac{3}{80}$  to a terminating decimal.

**Solution**

$$\frac{3}{80} = \frac{3}{2 \times 2 \times 2 \times 2 \times 5} = \frac{3 \times 5 \times 5 \times 5}{2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 5} = \frac{375}{10\,000} = 0.0375$$

You can also obtain this result by long division.

Created by [long division calculator](#).

$$\begin{array}{r} 0.0375 \\ 80 \overline{)3.00} \\ \underline{240} \phantom{0} \\ 600 \\ \underline{560} \phantom{0} \\ 400 \\ \underline{400} \\ 0 \end{array}$$

**Task 3.** Convert the fraction  $\frac{5}{33}$  to a recurring decimal.

**Solution:**

$$\frac{5}{33} = \frac{15}{99} = 0.(15)$$

You can also obtain this result by long division.

Created by [Long division calculator](#)

$$\begin{array}{r} 0.(15) \\ 33 \overline{)5.0} \\ \underline{33} \phantom{0} \\ 170 \\ \underline{165} \\ 5 \end{array}$$

**Task 4.** Put the following decimals in order from lowest to highest: 0.25(6), 0.2(56), 0.(256).

**Solution:** We are looking for the **first occurring of different digits from the right**.

$$0.25(6) = 0.25\mathbf{6}66666 \dots$$

$$0.2(56) = 0.25\mathbf{6}5656 \dots$$

$$0.(256) = 0.25\mathbf{6}256256 \dots$$

**Answer:**  $0.(256) < 0.2(56) < 0.25(6)$ .

**Task 5.** Convert the recurring decimal  $0.14(10)$  to a fraction.

**Solution**

Let  $x = 0.14(10)$ , which means that  $x = 0.14101010 \dots$

We are going to create two multiples of  $x$  that have repeating digits (in the same order) just after the decimal point.

$$10000x = 1410.1010 \dots$$

$$100x = 14.1010 \dots$$

If we now subtract these two numbers, both “tails” of repeating digits will cancel and we will get that

$$9900x = 1396$$

and so

$$x = \frac{1396}{9900}$$

**Answer:**  $0.14(10) = \frac{1396}{9900}$ .

**Note:** You can check your solution on [Wolfram Alpha](#) by putting  $0.14101010\dots$ . However, you will obtain exact value as irreducible fraction  $\frac{349}{2475}$ .

**Task 6.** Find a 151<sup>th</sup> digit after the decimal point in the recurring decimal  $0.12(3456789)$ .

**Solution:**

$$151 - 2 = 149$$

$$0.12 \underbrace{3456789}_{7 \text{ digits}} \underbrace{3456789}_{7 \text{ digits}} \dots \underbrace{3456789}_{7 \text{ digits}} \dots$$

149 digits

$$149 = 7 \times 21 + 2$$

The remainder of division 149 by 7 is 2, so the 151<sup>th</sup> digit after the decimal will be the 2<sup>nd</sup> digit in repeating sequence and this is 4.

$$0.12 \underbrace{3456789}_{7 \text{ digits}} \underbrace{3456789}_{7 \text{ digits}} \dots \underbrace{3456789}_{7 \text{ digits}} \underbrace{34}_{2 \text{ digits}}$$

151 digits

**Answer: 4.**