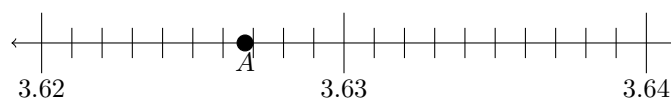


# Decimals

*Problems about decimal numbers.*

**Problem 1** On the number line below, a point is marked  $A$ . Select all options which could be candidates for the value of  $A$ .



**Select All Correct Answers:**

- (a) 3.6278 ✓
- (b) 3.627783 ✓
- (c) 3.68
- (d) 3.62788983 ✓
- (e) 3.629

**Problem 2** Select all fractions below which have terminating decimal representation.

**Select All Correct Answers:**

- (a)  $\frac{1}{10}$  ✓
- (b)  $\frac{1}{30}$
- (c)  $\frac{1}{80}$  ✓
- (d)  $\frac{1}{64}$  ✓
- (e)  $\frac{1}{125}$  ✓

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(f)  $\frac{1}{250}$  ✓

(g)  $\frac{1}{385}$

(h)  $\frac{1}{2048}$  ✓

(i)  $\frac{1}{4228}$

(j)  $\frac{1}{2^{19} \times 5^{47}}$  ✓

**Problem 3** A harder version of the previous problem: select all fractions below which have terminating decimal representation.

**Select All Correct Answers:**

(a)  $\frac{14}{10}$  ✓

(b)  $\frac{6}{30}$  ✓

(c)  $\frac{4}{60}$

(d)  $\frac{7}{98}$

(e)  $\frac{11}{125}$  ✓

(f)  $\frac{3}{150}$  ✓

(g)  $\frac{11}{385}$

(h)  $\frac{2}{2049}$

(i)  $\frac{1057}{4228}$  ✓

(j)  $\frac{3^4 \times 7^{11} \times 19}{3^2 \times 5^{22} \times 19}$  ✓

**Hint:** Don't forget to reduce the fractions to lowest terms!

**Problem 4** Give an example of an irrational number. For a challenge, don't pick  $\pi$ ,  $e$ , or  $\sqrt{p}$  where  $p$  is prime.

**Free Response:** **Hint:** One of my favorites is  $0.01001000100001000001\dots$ . This number's decimal representation is neither terminating nor repeating, though it does have a pattern!

**Problem 5** Without doing the long division, after how many places would you expect  $\frac{1}{47}$  to repeat?

We expect the repetition to occur after at most  $\frac{46}{\text{given}}$  places.

**Problem 6** Without doing the long division, after how many places would you expect  $\frac{3}{104}$  to repeat?

We expect the repetition to occur after at most  $\frac{103}{\text{given}}$  places.

**Problem 7** Write each of the following decimals as a fraction. Enter your answer as a single fraction reduced to lowest terms.

$$(a) 0.\overline{215} = \frac{215}{999}$$

$$(b) 0.0\overline{317} = \frac{317}{9990}$$

$$(c) 0.\overline{0317} = \frac{317}{9999}$$

$$(d) 0.16\overline{23} = \frac{1607}{9900}$$

**Problem 8** We have seen that  $0.\overline{9} = 1$ . Using these same ideas we saw in that argument, what are the following numbers equal to?

*Decimals*

(a)  $1.\bar{9} = \boxed{2}$

(b)  $0.5\bar{9} = \boxed{0.6}$

(c)  $2.34\bar{9} = \boxed{2.35}$

(d)  $0.87893\bar{9} = \boxed{0.87894}$

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