

Grade 8 - Rational and Irrational Numbers - Answer Key

Common Core 8.NS.A.1, 8.NS.A.2 · maths-pdf.fr/en/

This answer key gives a full worked solution for each of the 20 problems on the rational and irrational numbers worksheet (Common Core 8.NS.A.1 and 8.NS.A.2). Compare each step with your own work, not only the final answer, and note any step where your method differed.

Grade 8 · Common Core State Standards: **8.NS.A.1, 8.NS.A.2**

Exercise 1 - Fraction to decimal

Divide 7 by 16: $7 \div 16 = 0.4375$. The division ends, so the decimal terminates.

0.4375

Exercise 2 - Repeating decimal

Divide 5 by 11: 0.4545... The block 45 repeats.

$0.\overline{45}$

Exercise 3 - Terminating or repeating

The denominator 20 equals 4×5 , so the fraction can be written with denominator 100: $\frac{7}{20} = \frac{35}{100}$.

terminating, 0.35

Exercise 4 - Classify numbers

- a. $\sqrt{49} = 7$, an integer: **R**
- b. 12 is not a perfect square: **I**
- c. A fraction of integers: **R**
- d. $\pi = 3.14159...$ never repeats: **I**

Exercise 5 - Repeating decimal to fraction

Let $x = 0.\overline{81}$. Then $100x = 81.\overline{81}$, so $99x = 81$.

$$x = \frac{81}{99} = \frac{9}{11}.$$

$$\frac{9}{11}$$

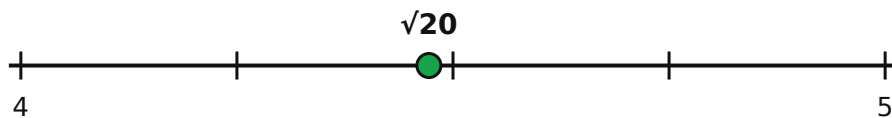
Exercise 6 - Two-digit repeat

Let $x = 0.\overline{27}$. Then $100x = 27.\overline{27}$. Subtract: $99x = 27$, so $x = \frac{27}{99} = \frac{3}{11}$.

$$\frac{3}{11}$$

Exercise 7 - Number line estimate

$4^2 = 16$ and $5^2 = 25$, and $16 < 20 < 25$.



The square root of 20 is about 4.47.

$$4 < \sqrt{20} < 5$$

Exercise 8 - Round a square root

$4.2^2 = 17.64$ and $4.3^2 = 18.49$. Since 18 is closer to 17.64 (difference 0.36) than to 18.49 (0.49), the root is nearer 4.2.

$$\sqrt{18} \approx 4.2$$

Exercise 9 - Compare

$5.5^2 = 30.25$, which is greater than 30. So $\sqrt{30} < 5.5$.

$$\sqrt{30} < 5.5$$

Exercise 10 - Order from least to greatest

$\sqrt{5} \approx 2.236$ and $\frac{9}{4} = 2.25$. Order the decimals: 2.2, 2.236, 2.25, 2.3.



Orange is the square root of 5 and green is $\frac{9}{4}$.

2.2, $\sqrt{5}$, $\frac{9}{4}$, 2.3

Exercise 11 - Repeating with a head

Let $x = 0.2\bar{3}$. Then $10x = 2.\bar{3}$ and $100x = 23.\bar{3}$.

Subtract: $90x = 21$, so $x = \frac{21}{90} = \frac{7}{30}$.

$$\frac{7}{30}$$

Exercise 12 - Sums of rationals

$0.\bar{3} = \frac{1}{3}$ and $0.\bar{6} = \frac{2}{3}$.

$$\frac{1}{3} + \frac{2}{3} = 1.$$

Yes, the sum is 1, which is rational.

Exercise 13 - Pi and its approximations

$\frac{22}{7} = 3.142857\dots$, and $3.142857 > 3.14159$.

$$\frac{22}{7} > \pi$$

Exercise 14 - Spot the irrational

$0.\overline{12}$ repeats and 0.125 terminates, so both are rational. The third pattern has growing blocks of 0s, so it never repeats.

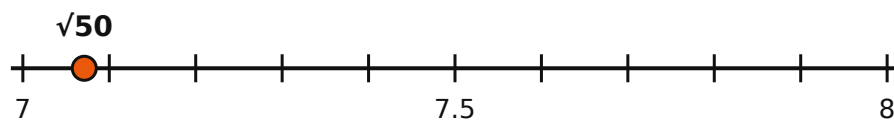
0.1010010001...

Exercise 15 - Squares and roots

$6^2 = 36$ and $7^2 = 49$, so $6 < \sqrt{40} < 7$. $6.3^2 = 39.69$ and $6.4^2 = 40.96$, so $\sqrt{40} \approx 6.3$.

$-7 < -\sqrt{40} < -6$, $-\sqrt{40} \approx -6.3$

Exercise 16 - Patio side



The side length sits just above 7.

Side $= \sqrt{50}$. $7^2 = 49$ and $8^2 = 64$, so the side is between 7 and 8. $7.1^2 = 50.41$ and $7.0^2 = 49$.

50 is closer to 50.41 than to 49.

Between 7 ft and 8 ft; about 7.1 ft

Exercise 17 - Fence for a garden

Side $= \sqrt{75} \approx 8.66$ yd. Perimeter $= 4 \times 8.66 = 34.64$.

about 34.6 yd

Exercise 18 - Board length

Let $x = 0.\bar{8}$. Then $10x - x = 8$, so $x = \frac{8}{9}$ yd.

1 yd = 3 ft, so $\frac{8}{9} \times 3 = \frac{8}{3} = 2\frac{2}{3}$ ft.

8/9 yd, or 2 2/3 ft

Exercise 19 - Explain a claim

No. $0.\bar{3}$ goes on forever, but it repeats, and it equals $\frac{1}{3}$, a rational number.

Jamal is wrong; only decimals that never repeat are irrational.

Exercise 20 - Weekly average

$3 \div 7 = 0.428571428571\dots$ The block 428571 repeats, so it does not terminate.

about 0.43 mi; the decimal repeats ($0.\overline{428571}$)