

Big Quiz on Radicals and Number Sense

1. Is it possible for a number to belong to the rational numbers but not the integers? If yes, provide an example. If no, explain why not.

Yes, it is possible. Any number that is a simplified fraction without "1" in the denominator will not be an integer, but it will be a rational number.

2. Is it possible for a number to belong to the whole numbers but not the integers? If yes, provide an example. If no, explain why not.

No, it is not possible. The whole numbers are a subset of the integers consisting of those integers that are positive (or zero). Therefore, all whole numbers are also integers.

3. Circle the numbers below that are irrational:

π

2.51113

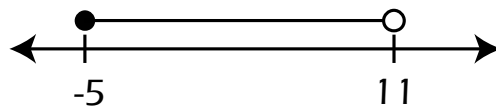
3.1414141414...

$\frac{7}{\sqrt{5}}$

4. Explain why $|-52|$ is greater than $|3|$ even though 3 is greater than -52 .

The absolute value of a number is its distance from zero (or its "size"). Since -52 is farther from zero than 3, its absolute value is greater than the absolute value of 3.

5. Draw the inequality $-5 \leq x < 11$ on a number line.



6. Explain, using an example, why it is not true that $\sqrt{j} + \sqrt{k} = \sqrt{j+k}$.

For example, $\sqrt{4} + \sqrt{25} = 7 = \sqrt{49} \neq \sqrt{29}$

7. Simplify the following radical expressions so that they cannot be further simplified. Show all work on this page.

a) $\sqrt{40}$

$$2\sqrt{10}$$

b) $3\sqrt{20}$

$$6\sqrt{5}$$

c) $\sqrt{8} + \sqrt{32}$

$$2\sqrt{2} + 4\sqrt{2} = 6\sqrt{2}$$

d) $3\sqrt{5} - 2\sqrt{20}$

$$3\sqrt{5} - 4\sqrt{5} = -\sqrt{5}$$

e) $\sqrt{3}(\sqrt{5} - 2\sqrt{6})$

$$= \sqrt{15} - 2\sqrt{18}$$

$$= \sqrt{15} - 6\sqrt{2}$$

f) $(\sqrt{3} - 1)(\sqrt{3} + 3)$

$$= 3 - \sqrt{3} + 3\sqrt{3} - 3$$

$$= 2\sqrt{3}$$

g) $(3\sqrt{3} - 2\sqrt{5})(7\sqrt{5} + 2\sqrt{3})$

$$= 21\sqrt{15} - 14 \cdot 5 + 6 \cdot 3 - 4\sqrt{15}$$

$$= 17\sqrt{15} - 52$$

h) $\frac{3}{\sqrt{5}}$

$$\frac{3}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{3\sqrt{5}}{5}$$

i) $\frac{3}{1 + \sqrt{2}}$

$$\frac{3}{1 + \sqrt{2}} \times \frac{1 - \sqrt{2}}{1 - \sqrt{2}} = \frac{3 - 3\sqrt{2}}{-1}$$

$$= 3\sqrt{2} - 3$$

j) $\frac{\sqrt{6} + \sqrt{2}}{2\sqrt{2} - 4\sqrt{6}}$

$$= \frac{\sqrt{6} + \sqrt{2}}{2\sqrt{2} - 4\sqrt{6}} \times \frac{2\sqrt{2} + 4\sqrt{6}}{2\sqrt{2} + 4\sqrt{6}}$$

$$= \frac{2\sqrt{12} + 4 \cdot 6 + 2 \cdot 2 + 4\sqrt{12}}{4 \cdot 2 - 16 \cdot 6}$$

$$= \frac{6\sqrt{12} + 28}{-88}$$

$$= \frac{12\sqrt{3} + 28}{-88}$$

$$= -\frac{3\sqrt{3} + 7}{22}$$