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# 8.NS.A.1 Classify Numbers as Rational or Irrational

8.NS.A.1 Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.

1 Which number is rational?
1) $\pi$
2) $\frac{5}{4}$
3) $\sqrt{7}$
4) $\sqrt{\frac{3}{2}}$

2 Which is a rational number?
1) $\sqrt{8}$
2) $\pi$
3) $5\sqrt{9}$
4) $6\sqrt{2}$

3 Which expression is rational?
1) $\pi$
2) $\sqrt{\frac{1}{2}}$
3) $\sqrt{3}$
4) $\sqrt{\frac{1}{4}}$

4 Which is an irrational number?
1) $\sqrt{9}$
2) 3.14
3) $\sqrt{3}$
4) $\frac{3}{4}$

5 Which is an irrational number?
1) 0
2) $\pi$
3) $-\frac{1}{3}$
4) $\sqrt{9}$

6 The number 0.14114111411114 . . . is
1) integral
2) rational
3) irrational
4) whole

7 Which expression represents an irrational number?
1) $\sqrt{2}$
2) $\frac{1}{2}$
3) 0.17
4) 0

8 Which number is irrational?
1) $\sqrt{9}$
2) $\sqrt{8}$
3) 0.3333
4) $\frac{2}{3}$

9 Which is an irrational number?
1) $0.\overline{3}$
2) $\frac{3}{8}$
3) $\sqrt{49}$
4) $\pi$

10 Which number is irrational?
1) $\frac{5}{4}$
2) $0.\overline{3}$
3) $\sqrt{121}$
4) $\pi$

11 The value of $\sqrt{x^2-9}$ is a real and irrational number when $x$ is equal to
1) 5
2) 0
3) –3
4) 4

12 Which number below is irrational?

$$\sqrt{\frac{4}{9}},\ \sqrt{20},\ \sqrt{121}$$

Why is the number you chose an irrational number?

13 Given: $\frac{\sqrt{99}}{11}$, $\sqrt{164}$, $\sqrt{196}$

Identify the expression that is a rational number and explain why it is rational.

14 Write an irrational number and explain why it is irrational.

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Answer Key

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1 ANS: 2

$\frac{5}{4}$ is rational because it is the ratio of two integers.

2 ANS: 3

$5\sqrt{9}$ is rational because it is the ratio of two integers, $\frac{15}{1}$.

3 ANS: 4

$\sqrt{\frac{1}{4}} = \frac{1}{2}$, the ratio of two integers.

4 ANS: 3

$\sqrt{3}$ is irrational as it may not be expressed as the ratio of two integers. $\sqrt{9} = \frac{3}{1}$ $3.14 = \frac{314}{100}$

5 ANS: 2

$\pi$ may not be expressed as the ratio of two integers. $0 = \frac{0}{1}$ $\sqrt{9} = \frac{3}{1}$ $-\frac{1}{3} = \frac{-1}{3}$

6 ANS: 3

The number 0.14114111411114 . . . is irrational because it may not be expressed as the ratio of two integers. It is not a repeating decimal.

7 ANS: 1

$\sqrt{2}$ is irrational as it may not be expressed as the ratio of two integers. $0.17 = \frac{17}{100}$ $0 = \frac{0}{1}$

8 ANS: 2

$\sqrt{8}$ is irrational as it may not be expressed as the ratio of two integers. $\sqrt{9} = \frac{3}{1}$ $0.3333 = \frac{3333}{10000}$

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9 ANS: 4

$\pi$ is an irrational number as it may not be expressed as the ratio of two integers. $0.\bar{3} = \frac{1}{3}$ $\sqrt{49} = \frac{7}{1}$

10 ANS: 4

$\pi$ may not be expressed as the ratio of two integers. $0.\bar{3} = \frac{1}{3}$ $\sqrt{121} = \frac{11}{1}$

11 ANS: 4

$\sqrt{x^2 - 9} = \sqrt{4^2 - 9} = \sqrt{7}$

12 ANS:

$\sqrt{20}$ is irrational because it may not be expressed as the ratio of two integers.

$\sqrt{\frac{4}{9}} = \frac{2}{3}$

$\sqrt{121} = \frac{11}{1}$

13 ANS:

$\sqrt{196}$ because the number may be written as the ratio of integers. $\frac{\sqrt{99}}{11} \neq 3$, $\sqrt{\frac{99}{11}} = 3$

14 ANS:

$\pi$ because it may not be expressed as the ratio of two integers.