8th Grade Math

ELG 8.1: Know that there are numbers that are not rational, and approximate them by rational numbers.

Vertical Progression:

6th Grade	**ELG 6.4 Apply and extend previous understandings of numbers to the system of rational numbers.** o **6.NS.C.6** Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. o **6.NS.C.6c** Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
7th Grade	**ELG 7.2 Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.** o **7.NS.A.2** Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. o **7.NS.A.2d** Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats. o **7.NS.A.3** Solve real-world and mathematical problems involving the four operations with rational numbers.
8th Grade	**ELG 8.1 Know that there are numbers that are not rational, and approximate them by rational numbers.** o **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. o **8.NS.A.2** Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). *For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*
Algebra 1	**ELG.MA.HS.N.2 Use properties of rational and irrational numbers.** o **N-RN.B.3** Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.

Students will demonstrate command of the ELG by:

- Identifying numbers as rational or irrational and explaining how you know.
- Converting a fraction to its decimal equivalent and a repeating or terminating decimal to its fraction equivalent.
- Approximating the value of irrational numbers.
- Placing rational and irrational numbers on a number line.
- Comparing the size of rational and irrational numbers.
- Approximating the size of square roots that are not whole numbers.

Vocabulary:

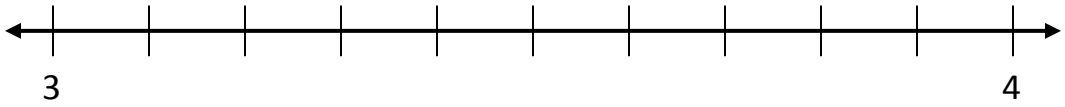
- irrational number
- rational number
- repeating decimal
- terminating decimal

Sample Instructional/Assessment Tasks:

1) **Standard(s): 8.NS.A.2**

Source: New Jersey Educator Resource Exchange http://njcore.org/resource/8nsa1-task-rational-vs-irrational

Item Prompt:
Identify at least 5 rational numbers that are between 3 and 4. Then, identify at least 3 irrational numbers that are between 3 and 4.



Correct Answer(s):

Answers will vary.

2) Standard(s): 8.NS.A.1

Source: **Illustrative Mathematics** https://www.illustrativemathematics.org/content-standards/tasks/334

Item Prompt:

Decide whether each of the following numbers is rational or irrational. If it is rational, explain how you know.

a. $0.33\overline{3}$

b. $\sqrt{4}$

c. $\sqrt{2} = 1.414213\ldots$

d. 1.414213

e. $\pi = 3.141592\ldots$

f. 11

g. $\frac{1}{7} = 0.\overline{142857}$

h. $12.3456565\overline{656}$

Correct Answer

a. rational. Equals 1/3 which is the quotient of two whole numbers

b. rational. A whole number is rational.

c. not rational. The square root of a prime is irrational.

d. rational. Can be written as 1414213/100000 which means it is rational.

e. irrational. The decimal for π never repeats.

f. rational. A whole number is rational since it can be written as 11/1.

g. rational. It is the quotient of two whole numbers and also a repeating decimal.

h. rational. This is a repeating decimal which means that it is rational.