# **Algebra 1 Unit Test Guide**

## Rational & Irrational Numbers Unit Test

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Item** | **Lesson Coverage** | **Objective** | **Mathematical Practice Standard** | **Assessment Item** |
| 1 | Lesson 2: Sums & Products of Rational Numbers | In this section, you will prove that the sum of any two rational numbers is rational. | Construct viable arguments and critique the reasoning of others. | Evaluate the two sums and determine which statement is true. Enter the correct number associated with your response.

| **Column A** | **Column B** |
| --- | --- |
| $$0.5+\frac{3}{4}$$ | $$\sqrt{3}+\frac{2}{5}$$ |

Statement #1: Only Column A has a rational sum. Statement #2: Only Column B has a rational sum. Statement #3: Column A and Column B both have rational sums. The simplified values of both columns indicate that Statement #\_\_\_ is true.**Answer: 1** |
| 2 | Lesson 2: Sums & Products of Rational Numbers | In this section, you will prove that the product of any two rational numbers is rational. | Construct viable arguments and critique the reasoning of others. | The product of a multiplication problem is $\sqrt{225}$. What do you know about the factors?**Answer: It cannot be predicted based on the information given.** |
| 3 | Lesson 3: Sums & Products of Rational & Irrational Numbers | In this section, you will prove that the sum of any rational number and any irrational number is irrational. | Construct viable arguments and critique the reasoning of others. | Put the steps to the proof that the sum $t=r+s$ is irrational if r is a rational and s is rational in the correct sequence.Step 1. Subtract, writing s as a fraction.Step 2. For a contradiction, assume that t is rational, and write r and t as fractions.Step 3. Realize a contradiction.Step 4. Find a common denominator.Answer: Step 2, Step 4, Step 1, Step 3 |
| 4 | Lesson 3: Sums & Products of Rational & Irrational Numbers | In this section, you will prove that the product of any nonzero rational number and any irrational number is irrational. | Construct viable arguments and critique the reasoning of others. | What type of number will the product of $π$ and $\frac{3}{4}$ be?Answer: an irrational number |
| 5 | Lesson 4: Rational Exponents | In this section, you will relate the meaning of a rational exponent to the frequency with which a number is used as a factor. | Reason abstractly and quantitatively. | Charles, Zayeer, and Kali are trying to simplify $1000^{\frac{2}{3}}$. Charles says the correct simplification is 10 because $1,000=10⋅10⋅10$ and $1000^{\frac{2}{3}}=10$. Zayeer says the correct simplification is 1,000 because 1,000=10⋅10⋅10→$1000^{\frac{2}{3}}$=10⋅10⋅10=1,000.Kali says the correct simplification is 100 because 1,000=10⋅10⋅10→$1000^{\frac{2}{3}}$=10⋅10=100. Who has the correct value?Answer: Kali[Rational & Irrational Numbers Unit Test Item #5 - GeoGebra](https://www.geogebra.org/calculator/v9hp59dk) |
| 6 | Lesson 4: Rational Exponents | In this section, you will relate the meaning of a rational exponent to the frequency with which a number is used as a factor. | Reason abstractly and quantitatively. | What is the correct simplification of $243^{\frac{3}{5}}$?Answer: 27[Rational & Irrational Numbers Unit Test Item #6 - GeoGebra](https://www.geogebra.org/calculator/j6vmv5zt) |
| 7 | Lesson 4: Rational Exponents | In this section, you will connect the meaning of a rational exponent to the meaning of a root. | Reason abstractly and quantitatively. | How can you rewrite $25^{\frac{1}{4}}$ using a root?Answer: $\sqrt[4]{25}$ |
| 8 | Lesson 4: Rational Exponents | In this section, you will connect the meaning of a rational exponent to the meaning of a root. | Reason abstractly and quantitatively. | What is the simplest form of $25^{\frac{1}{2}}$?Answer: 5[Rational & Irrational Numbers Unit Test Item #8 - GeoGebra](https://www.geogebra.org/calculator/ea6mghs4) |
| 9 | Lesson 5: Properties of Rational Exponents | In this section, you will use the properties of exponents to generate equivalent expressions involving rational exponents. | Look for and make use of structure. | Rewrite the expressions: $27^{\frac{1}{2}}∙27^{\frac{1}{4}}$.Answer: $27^{\frac{3}{4}}$ |
| 10 | Lesson 5: Properties of Rational Exponents | In this section, you will use the properties of exponents to generate equivalent expressions involving rational exponents. | Look for and make use of structure. | What is an equivalent expression for $-(b^{\frac{1}{4}})^{12}$?Answer: $-b^{3}$ |
| 11 | Lesson 5: Properties of Rational Exponents | In this section, you will solve equations involving rational exponents. | Look for and make use of structure. | Select the correct answer to the following equation: $-x^{\frac{3}{2}}=-27$.Answer: 9 |
| 12 | Lesson 5: Properties of Rational Exponents | In this section, you will solve equations involving rational exponents. | Look for and make use of structure. | Select the correct answer to the following equation: $27x^{\frac{3}{4}}-1=26$.Answer: 1 |
| 13 | Lesson 6: Radicals & Rational Exponents | In this section, you will use the properties of exponents to generate equivalent expressions involving radicals and rational exponents. | Look for and make use of structure. | Using the exponent properties, which of the following expressions is equivalent to $(\sqrt{2})^{3}∙2^{-\frac{1}{2}}$?Answer: 2 |
| 14 | Lesson 6: Radicals & Rational Exponents | In this section, you will use the properties of exponents to generate equivalent expressions involving radicals and rational exponents. | Look for and make use of structure. | Which of the following expressions is equivalent to $\frac{\sqrt[3]{216}}{27^{\frac{1}{3}}}$ when applying the exponent properties?Answer: 2 |
| 15 | Lesson 6: Radicals & Rational Exponents | In this section, you will use the properties of exponents to determine whether equations involving radicals and rational exponents are true or false. | Look for and make use of structure. | Is the equation $(\sqrt[4]{8})^{-24}∙\left(\sqrt{8}\right)^{16}=8^{-48}$ true or false? Select the response that correctly answers the question and provides the appropriate justification.Answer: False, because the exponents should be added rather than multiplied. |
| 16 | Lesson 6: Radicals & Rational Exponents | In this section, you will use the properties of exponents to determine whether equations involving radicals and rational exponents are true or false. | Look for and make use of structure. | Is the equation $\frac{7^{-4}∙7^{3}}{\sqrt{49}}=7$ true or false? Select the response that correctly answers the question and provides the appropriate justification. Answer: False. When applying the Quotient Property, the final exponent is not 1. |
| 17 | Lesson 2: Sums & Products of Rational Numbers | In this section, you will prove that the sum of any two rational numbers is rational. | Construct viable arguments and critique the reasoning of others. | Consider the expression $\frac{47}{3}+\sqrt{121}$. Will the sum of the two rational numbers produce a rational number? Explain your reasoning in 1-2 sentences.Answer: The sum of these two numbers is $\frac{80}{3}$. This number is a rational number because it can be written as a fraction in $\frac{a}{b}$ form, where *a* and *b* are nonzero whole numbers. |
| 18 | Lesson 2: Sums & Products of Rational Numbers | In this section, you will prove that the product of any two rational numbers is rational. | Construct viable arguments and critique the reasoning of others. | Prove that the product of the two rational numbers $\sqrt{36}$ and $\frac{5}{3}$ is a rational number. Find the product and explain how you know it is a rational number. Explain your reasoning in 1–2 sentences.Answer: $$\sqrt{36}∙\frac{5}{3}=6∙\frac{5}{3}=\frac{6}{1}∙\frac{5}{3}=\frac{30÷3}{3÷3}=10$$10 is an integer, which is a rational number. |
| 19 | Lesson 3: Sums & Products of Rational & Irrational Numbers | In this section, you will prove that the sum of any rational number and any irrational number is irrational. | Construct viable arguments and critique the reasoning of others. | Prove that the sum of $\frac{3}{4}$ and $\sqrt{10}$ is irrational. Show your work, and in 1-2 sentences explain why the sum is an irrational number.Answer: $$\frac{3}{4}+\sqrt{10}=0.75+3.16227…=3.91227…$$This number is an irrational number. The decimal goes to infinity and never repeats. |
| 20 | Lesson 3: Sums & Products of Rational & Irrational Numbers | In this section, you will prove that the product of any nonzero rational number and any irrational number is irrational. | Construct viable arguments and critique the reasoning of others. | Prove that the product of $2π$ and $\frac{3}{4}$ is an irrational number. Find the product and explain why the value is irrational. Explain your reasoning in 1-2 sentences.Answer: $$2π∙\frac{3}{4}=2\left(3.1415…\right)∙\left(0.75\right)=6.2831…∙\left(0.75\right)=4.71238…$$This number is irrational. It is an infinite decimal with no consecutive repeating integers. |