# **Algebra 2 Unit Test Guide**

## Exponents & Radicals Unit Test

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| **Item** | **Lesson Coverage** | **Objective** | **Mathematical Practice Standard** | **Lesson Page** | **Assessment Item** |
| 1 | Lesson 2: Revisiting Exponents & Their Functions | In this section, you will use the laws of exponents to solve algebraic equations containing integer exponents. | Make sense of problems and persevere in solving them. | p. 2-7 | Solve for x in the equation $2^{2x+2}=2^{3x}$**Answer: 2** |
| 2 | Lesson 2: Revisiting Exponents & Their Functions | In this section, you will use the laws of exponents to solve algebraic equations containing integer exponents. | Make sense of problems and persevere in solving them. | p. 2-7 | Tariq wants to solve for x in the equation $8^{x+1}=16^{2x-4}$. Which of the following answers should he select?**Answer:** $x=\frac{19}{5}$ |
| 3 | Lesson 2: Revisiting Exponents & Their Functions | In this section, you will use the laws of exponents to solve algebraic equations containing rational exponents and roots. | Make sense of problems and persevere in solving them. | p. 9-12 | Which of the following correctly solves for x in the equation $x^{\frac{10}{3}}=27⋅x^{\frac{1}{3}}$?**Answer: 3** |
| 4 | Lesson 2: Revisiting Exponents & Their Functions | In this section, you will use the laws of exponents to solve algebraic equations containing rational exponents and roots. | Make sense of problems and persevere in solving them. | p. 9-12 | Which of the following correctly solves for x in the equation $2x^{\frac{1}{3}}+6=18$?**Answer: 216** |
| 5 | Lesson 2: Revisiting Exponents & Their Functions | In this section, you will model situations involving exponential growth and decay. | Make sense of problems and persevere in solving them. | p. 14-19 | The current fox population in a protected region is 367 and is decreasing by 8% per year. Find the exponential function 𝑓(𝑥) that represents the fox population, where x is the number of years from now. Estimate the fox population of the region 9 years from now.**Answer:** $f\left(x\right)=367∙0.92^{x}$**. The estimated fox population 9 years from now will be 173.**[Exponents & Radical Unit Test item #5 - GeoGebra](https://www.geogebra.org/calculator/u9uja7bf) |
| 6 | Lesson 3: Radical Equations | In this section, you will solve radical equations with variables on one side. | Make sense of problems and persevere in solving them. | p. 2-7 | Solve the radical equation $\sqrt[3]{2x^{2}+19x+17}=2$to find the two solutions. Round the answer to one decimal place if needed.**Answer: -0.5; -9** |
| 7 | Lesson 3: Radical Equations | In this section, you will solve radical equations with variables on one side. | Make sense of problems and persevere in solving them. | p. 2-7 | What is the solution of $2\sqrt{3x+4}-9=13$?*x* = \_\_\_\_**Answer: 39** |
| 8 | Lesson 3: Radical Equations | In this section, you will solve radical equations with variables on both sides. | Make sense of problems and persevere in solving them. | p. 9-13 | Solve the radical equation $7-\sqrt{4x+5}=x+3$.*x* = \_\_\_\_\_**Answer: 1** |
| 9 | Lesson 3: Radical Equations | In this section, you will solve radical equations with variables on both sides. | Make sense of problems and persevere in solving them. | p. 9-13 | Cornell solved the radical equation $\sqrt{x^{2}+3x+2}= \sqrt{x^{2}-3}-1$ and found $x=-2$. What is the other solution of this radical equation? Enter your answer as a fraction, or enter 0 if $x=-2 $is the only solution.*x* = \_\_\_\_\_**Answer:** $-\frac{14}{5}$ |
| 10 | Lesson 4: Irrational Exponents | In this section, you will estimate quantities involving positive rational exponents. | Model with mathematics. | p. 2-7 | Without using a calculator, estimate the value of $32^{1.4}$.**Answer: 128** |
| 11 | Lesson 4: Irrational Exponents | In this section, you will estimate quantities involving positive rational exponents. | Model with mathematics. | p. 2-7 | Use the image to answer the question.The graph shows the total amount of an investment account that has a principal of $5,000 and increases by 70% every 10 years. Estimate the balance of the investment after 15 years to the nearest thousand.**Answer: 11,000** |
| 12 | Lesson 4: Irrational Exponents | In this lesson, you will use sequences to closely approximate quantities with irrational exponents. | Model with mathematics. | p. 9-14 | Approximate $11^{\sqrt{31}}$, correct to one decimal place, by using a sequence of values that gets closer and closer to $\sqrt{31}$.**Answer: 628,389.7** |
| 13 | Lesson 5: Euler’s Number, e | In this section, you will discover Euler's number, $e$, and examine the application of e in a variety of mathematical situations. | Make sense of problems and persevere in solving them. | p. 2-9 | Gabriela invests $1,200 into a continuously compounding account with an annual interest rate of 16 percent. Use the formula $P(t)=1,200e^{0.16t}$ to determine the amount of money in the account after one year. Include cents, if needed.**Answer: 1,408.21**[Exponents & Radicals Unit Test Item #13 - GeoGebra](https://www.geogebra.org/calculator/nfpre5x9) |
| 14 | Lesson 5: Euler’s Number, e | In this section, you will discover Euler's number, $e$, and examine the application of e in a variety of mathematical situations. | Make sense of problems and persevere in solving them. | p. 2-9 | Radium-226, in grams, decays in such a way that after t years, the amount left over can be modeled by the equation $A(t)=450e^{-0.0004t}$. How many grams of Radium-226 will remain after seven years? Round your answer to the nearest tenth.\_\_\_\_\_ grams**Answer: 448.7**[Exponents & Radicals Unit Test Item #14 - GeoGebra](https://www.geogebra.org/calculator/tjz9nq2t) |
| 15 | Lesson 5: Euler’s Number, e | In this section, you will apply Euler's number (*e*) in a variety of situations. | Construct viable arguments and critique the reasoning of others. | p. 11-15 | Manny invests $100 in an account that is compounded continuously at an annual interest rate of 2%, according to the formula $A=Pe^{rt}$, where 𝐴 is the amount accrued, 𝑃 is the principal, r is the rate of interest, and t is the time, in years. In 20 years, how much will Manny’s investment be worth to the nearest dollar?**Answer: $149**[Exponents & Radicals Unit Test Item #15 - GeoGebra](https://www.geogebra.org/calculator/bcepyqmw) |
| 16 | Lesson 2: Revisiting Exponents & Their Functions | In this section, you will model situations involving exponential growth and decay. | Make sense of problems and persevere in solving them. | p. 14-19 | Mr. Bert deposited $5,000 into an investment account 20 years ago with an annual interest rate of 3.75%.a) Find the exponential function in the form $f(x)=a⋅b^{x}$ to represent the total value of Mr. Bert’s investment account over time.b) Mr. Bert will retire in 15 years. What will be the total value of his investment when he retires? What is the percent increase of this final amount compared to the initial amount of the investment? Round the answers to two decimal places. **Answer:** **a)   The initial value of the investment is**$a=5,000$**. Since the interest rate is 3.75%,**$r=0.0375$**. The growth factor of the function is**$b=1+r=1.0375$**. The exponential function that models this situation is**$f(x)=5,000⋅1.0375^{x}$**.****b)   Mr. Bert retires in 15 years, when it will be 35 years since he started the investment.****The final amount of the investment when Mr. Bert retires will be**$f(35)=5,000⋅1.0375^{35}=18,136.81$**dollars. The percent increase of the investment is**$$\frac{18,136.81-5,000}{5,000 }⋅100\%=262.73\%.$$ |
| 17 | Lesson 4: Irrational Exponents | In this lesson, you will use sequences to closely approximate quantities with irrational exponents. | Model with mathematics. | p. 9-14 | Use the function $f(x)=3^{x}$ to find the approximation $3^{\sqrt{3}}$, correct to three decimal places, by creating a table with x-values closer and closer to $\sqrt{3}$ and the corresponding 𝑓(𝑥) values.**Answer: Student answers should create a table like the one that follows:****Note that**$\sqrt{3}≈1.732050808$**. The approximation of**$3^{\sqrt{3}}$**, correct to three decimal places, is 6.705.** |
| 18 | Lesson 5: Euler’s Number, e | In this section, you will apply Euler's number (*e*) in a variety of situations. | Construct viable arguments and critique the reasoning of others. | p. 11-15 | Apply the formula $A=Pe^{rt}$, where 𝐴 is the amount accrued, 𝑃 is the principal, r is the rate of interest, and t is the time, in years. Dora invests $5,000 in an account that is compounded continuously at an annual interest rate of 2.5%. In 10 years, how much will Dora’s investment be worth to the nearest dollar? Show the steps that Dora must take to solve this problem.**Answer:** $$A=Pe^{rt}$$$$A=5,000e^{0.025∙10}$$$$A=5,000e^{0.25}$$$$A=6,420.13$$$$A=6,420$$ |