Alg2.3 Family Support Material

Main ideas in this unit

In this unit, your student will extend what they know about numbers and exponents. They will use familiar exponent rules to see how to evaluate expressions with exponents that are fractions, like $5^{2/3}$. They will also use what they know about quadratic functions and square roots to learn about a new kind of number: imaginary numbers. Imaginary numbers are multiples of the square root of -1 (also known as i). So far, your student has used only real numbers, and no real number can square to make -1.

Square and cube roots will be studied in depth in this unit. Starting from the geometric meaning of square and cube roots, your student will learn to solve equations with variables inside square and cube roots. In geometry, roots are connected to area and volume. For example, if a square has an area of 16 ft^2, then each of its sides is 4 feet long, because 4 is the square root of 16. If a cube has a volume of 8 in^3, then each of its edges is 2 inches long, because 2 is the cube root of 8.

Here is a task to try with your student:

1. a. If a square has sides that are 5 feet long, what is the area of the square?
   b. If another square has an area of 20 ft^2, about how long is each of its sides? Try to find an estimate without using a calculator, then check to see how close your estimate was. What would be a better estimate?
2. a. If a cube has edges that are 3 meters long, what is its volume?
   b. If another cube has a volume of 30 m^3, about how long is each of its edges? Estimate without a calculator, then check to see how close your estimate was. What would be a better estimate?
3. a. If $m^2 = 4$, what could m be? Explain how you know.
   b. If $k^2 = -4$, what could k be? Explain how you know.

Solution

- 1. 25 ft^2.
  2. A little less than 5 ft, so maybe 4.8 ft. If I square 4.8, I get 23.04, so 4.8 is too big. A better estimate would be 4.5, which squares to make 20.25.
- 1. 27 m^3.
  2. A little larger than 3 m, so maybe 3.25 m. If I cube 3.25, I get about 34.33, so 3.25 is too big. A better estimate would be 3.1, which cubes to make 29.791.
- 1. m could be 2, because $2 \cdot 2 = 4$. But could also be -2, because $-2 \cdot -2$ is also 4.
  2. I don't think there's anything could be. If it's positive, then squaring it will give us a positive number, but if it's negative, then its square will also be positive.