**Activity 2.6.1 Radical Functions**

*Radical functions* – functions involving square roots, cube roots, higher roots, and rational exponents – describe many interesting real-world phenomena. In this activity we will explore the utility of radical functions in several real-world situations.

**Estimating the Speed of a Car Using Skid Marks**

The function $f\left(x\right)=5.5\sqrt{x}$ describes the relationship between the speed of a car (in miles per hour) immediately before it brakes to a sudden stop and the length *x* (in feet) of skid marks (marks made on the road by the car’s tires) the car makes when it comes to a stop.

1. Graph this function on the axes below?



1. Describe the graph of the function?
2. What is the domain and range of the function?
3. If a car creates skid marks of 110 feet, approximately how fast was the car traveling when the driver suddenly stopped?
4. A driver traveling at a speed of 90 miles per hour suddenly slams on his brakes. Estimate the length of the resulting skid marks? Explain how you arrived at your answer.

**Growth Curves**

The National Center for Health Statistics collects and analyzes health statistics on children in the United States. The following data describe the median height of boys (in inches) from birth (0 months) to 2-years (24 months).

|  |  |
| --- | --- |
| **Month** | **Median Length (inches)** |
| 0 | 19.6 |
| 3 | 24.0 |
| 6 | 26.4 |
| 9 | 28.2 |
| 12 | 29.7 |
| 15 | 31.1 |
| 18 | 32.3 |
| 21 | 33.4 |
| 24 | 34.4 |

1. When is this function increasing at the fastest rate? Explain what this means in this context.
2. Create a square root function of the form $f\left(x\right)=a+\sqrt{bx}$ that models these data. Explain how you arrived at your answer.
3. Use the function you created in Question 7 to predict the median height of boys who are 22 months old.
4. Use the function you created in Question 7 to predict the age when boys’ median height is 30.5 inches.

The following data describe the median weight of boys (in kilograms) from birth (0 months) to 2-years (24 months).

|  |  |
| --- | --- |
| **Month** | **Median Weight (kg)** |
| 0 | 3.5 |
| 3 | 6.4 |
| 6 | 7.9 |
| 9 | 8.9 |
| 12 | 9.6 |
| 15 | 10.3 |
| 18 | 10.9 |
| 21 | 11.55 |
| 24 | 12.1 |

1. Create a square root function of the form $f\left(x\right)=a+\sqrt{bx}$ that models these data. Explain how you arrived at your answer.
2. Use the function you created in Question 10 to predict the median weight of boys who are 14 months old.
3. Use the function you created in Question 10 to predict the age when boys’ median weight is 10 kilograms.