Use the scenario and table below to answer questions 1 – 5.

SCIENCE

 The Texas Department of Public Safety can use the length of a skid marks to help determine the speed of a vehicle before the brakes were applied. The quadratic function that best models the data is $f(x) = \frac{x^2}{24}$ where x represents the speed of the vehicle, and $f(x)$ is the length of the skid mark. The speeds of a vehicle and the length of the corresponding skid mark are shown in the table below.

| SPEED OF A VEHICLE IN MILES PER HOURS, x	DISTANCE OF THE SKID IN FEET, $f(x)$
30	37.5
36	54
42	73.5
48	96
54	121.5

1. Write an equation and use the table of data to determine the length of a skid mark of a vehicle that was traveling at a speed of 60 miles when it applied the brakes.

2. Write an equation and use the table of data to determine the length of a skid mark of a vehicle that was traveling at a speed of 20 miles when it applied the brakes.

3. Write an equation and use the table of data to determine how fast a vehicle was traveling if the length of the skid mark was 26 feet.

4. Write an equation and use the table of data to determine how fast a vehicle was traveling if the length of the skid mark was 216 feet.

5. Phyllis was driving on a road with a posted speed limit of 65 miles an hour. She had to apply the brakes suddenly and left a skid mark on the road. When the highway patrol arrived, she said she was driving less than the posted speed limit. The officers measured the skid mark and found the mark to be 170 feet. Was Phyllis speeding? Justify your answer?

GEOMETRY

Watershed Tanks builds storage tanks in the shape of a square prism with a height of x meters and a base edge length of $(x - 10)$ meters. The volume of the tank is found using the formula $V = Bh$, where B represents the area of the base and h represents the height of the prism. The graph of $f(x)$, which can be used to calculate the volume of the prism with a height of x meters, is shown.
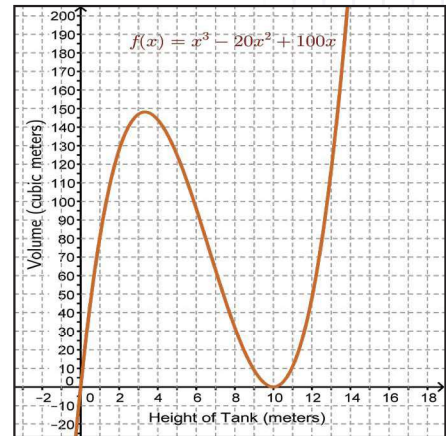
6. If the height of a tank is 14 meters, what is the volume of the tank? Write an equation related to $f(x)$ and use the graph and equation to determine the volume.

7. A customer wants to have a tank with a height of 12 meters. Write an equation related to $f(x)$ and use the graph and equation to determine the volume.

8. A customer needs a tank with a volume of 100 cubic meters. Write an equation related to $f(x)$ and use the graph to approximate solutions to the equation.

9. Of the possible heights generated by your equation, which height(s) could actually be used to construct a tank? Justify your reasoning.

TRAVEL

This summer, Amber is going to drive to her vacation destination which is 500 miles from her home. The driving time it takes Amber to travel the 500 miles, $f(x)$, is represented by the function $f(x) = \frac{500}{x}$, for any driving speed, x. The average speeds Amber can drive and the length of time it will take her to drive to her vacation destination are shown in the table below.

AVERAGE SPEED (MILES PER HOUR)	DRIVING TIME (HOURS)
50	10
55	$9\frac{1}{11}$
60	$8\frac{1}{3}$
65	$7\frac{9}{13}$
70	$7\frac{1}{7}$

10. Write an equation, and use the table of data to determine how long it will take Amber to drive to her vacation destination if she drives an average of 62.5 miles per hour.

11. Write an equation and use the table of data to determine the average speed Amber would need to drive if she wants to arrive at her vacation destination in 12.5 hours.

12. Amber knows that there is road construction along her path and determines that she should add an additional hour to the driving time to allow for delays. The driving time it takes Amber to travel the 500 miles allowing for construction delays, $f(x)$, is represented by the function $f(x) = \dfrac{500}{x} + 1$, for any driving speed, x. Write an equation and use the table of data to determine what average speed Amber will need to drive if she wants to make it to her vacation destination in approximately 9.5 hours?

Use the scenario below to answer questions 13 – 15.

SPORTS

Robert enjoys running for exercise. He has started a training plan that will gradually increase his weekly mileage as he prepares for a marathon. The miles he will run per week, $f(x)$, is represented by the function $f(x) = 16(1.1)^x$, for the number of weeks he plans to run, x. The number of weeks he plans to run and the miles he will run in each week are shown in the table below.

# OF WEEKS, x	MILES PER WEEK, $f(x)$
0	16
1	18
2	19
3	21
4	23
5	26

13. Write an equation and use the table of data to determine about how many miles Robert will run in week 7 of his training program.

14. Write an equation and use the table of data to determine during which week Robert will run about 38 miles.
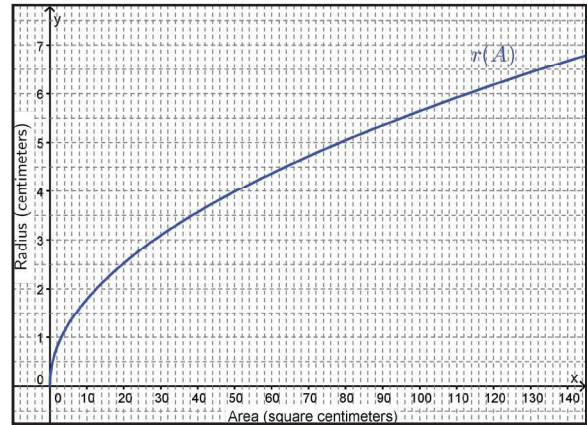
15. The race Robert is training for is in 12 weeks and he set a goal to be running approximately 60 miles a week by that time. Will Robert meet his training goal? Justify your answer.

GEOMETRY

The radius of a circle, $r(A)$, is represented by the function $r(A) = \sqrt{\dfrac{A}{\pi}}$ with A representing the area of the circle. The graph of this function is shown.

16. Write an equation and use the graph to determine radius of a circle with an area that is about 78.5 cm.

17. Write an equation, and use the graph to determine the area of a circle with a radius of 6 cm.

GEOMETRY

The volume of a rectangular prism, $f(x)$, is represented by the function $f(x) = 2.4x^3$, for a prism with a length of the base that is x inches. The length of the base and the volume of the prism are shown in the table below.

LENGTH OF BASE, x (INCHES)	VOLUME, $f(x)$ (CUBIC INCHES)
0	0
1	2.4
2	19.2
3	64.8
4	153.6

18. Write an equation and use the table of data to determine the volume of a rectangular prism with a length of the base 6 inches.

19. Write an equation and use the table of data to determine the length of the base of the rectangular prism that has a volume of 1228.8 cubic inches.

20. A shipping company wants to use one of the rectangular prisms as a shipping box. They want a box that will hold 3100 cubic inches of product. What is the length of the base of the rectangular prism that will be closest to the size they need?