568536 – Mathematics 5 SN

Name : _____

Group : _____

Date : ______

Mathematics 5 SN

SQUARE ROOT FUNCTIONS

Which one of the following graphs represents a square root function?



Solve the following inequality in \mathfrak{R} :

$$\sqrt{4(x-5)} \ge \frac{2}{5} \left(x+1\right)$$

A)
$$[9, +\infty[$$

B) $[9, 14]$
C) $]-\infty, 9]Y[14, +\infty[$
D) $[7, 18]$

The graph shown below, with the axes graduated in meters, represents a slide that spans 31 metres in length.

Three posts placed 8 meters apart support the first part of the slide. This part of the slide is represented by a square root function with vertex (0, 15).

The second part of the slide is linear and forms an angle of 25° with the horizontal.



As shown in the graph above, the second post is 8 meters away from the first, which is located on the y-axis.

What is the height of the second post?

Round your answer to the nearest hundredth of a metre.

Show all your work.



Given function *f* with equation: $f(x) = \frac{9}{2}\sqrt{-\frac{1}{2}x + \frac{3}{4}} - 5$.

What is the solution set of f(x) < -2?

Show all your work.

Jonas is playing with his remote control plane. From 0 to 4 seconds, its path is that of a square root function, f(x), whose vertex is located at (0,3). From 4 to 9 seconds, the plane follows the path of an absolute value function, g(x). The following diagram shows the path of the plane over 9 seconds with respect to height, in meters.



What is the value of $(f \circ g)(6)$, rounded to the nearest tenth?



Anthony received a remote-controlled airplane for his birthday. The plane's altitude, as a function of time, is represented by a square root function followed by an absolute value function. The plane's altitude follows a square root function until it first reaches 2 metres, at which point the altitude can be described by an absolute value function.

Anthony begins by putting his plane into take-off position from an altitude of 6 metres. One second after take-off, the plane is 4 metres above the ground. The plane reaches its maximum altitude of 6 metres 8 seconds after take-off.



How much time did the plane spend in the air?



Answer: The plane spent ______ seconds in the air.

2- Correction key



Coordinates of point (16,?)

3

 $y = 15 \tan 25^\circ \approx 6.99 \text{ or } 7 \text{ m} \Longrightarrow (16,7)$

Equation of the square root function

$$f(x) = a\sqrt{(x-h)} + k \text{ with } b = 1$$
$$f(x) = a\sqrt{(x-0)} + 15 \text{ with } b = 1$$

Value of *a* with the help of point (16,7)

$$7 = a\sqrt{16} + 15$$
$$\Rightarrow a = -2$$
$$f(x) = -2\sqrt{x} + 15$$

Height of the 2^{nd} post where x = 8

$$f(x) = -2\sqrt{8} + 15$$
$$f(x) \approx 9.34$$

Answer: The height of the second post is 9.34 meters.

Example of an appropriate solution

Determine the domain of the function

$$-\frac{1}{2}x + \frac{3}{4} \ge 0$$
$$-2x + 3 \ge 0$$
$$x \le \frac{3}{2}$$

$$\frac{9}{2}\sqrt{-0.5x + \frac{3}{4}} - 5 < -2$$
$$\sqrt{-0.5x + \frac{3}{4}} < \frac{2}{3}$$
$$-0.5x + \frac{3}{4} < \left(\frac{2}{3}\right)^2$$
$$x > \frac{11}{18}$$

Answer: The solution set of function *f* is $x \in \left[\frac{11}{18}, \frac{3}{2}\right]$.

Rule of square root function

Rule of absolute value function

$$f(x) = a\sqrt{b(x-h)} + k$$

$$f(x) = a\sqrt{x} + 3$$

$$0 = a\sqrt{4} + 3$$

$$-3 = 2a$$

$$-1.5 = a$$

$$f(x) = -1.5\sqrt{x} + 3$$

$$g(x) = a | x - h | + k$$

$$g(x) = a | x - 6.5 | + 3$$

$$0 = a | 9 - 6.5 | + 3$$

$$\frac{-3}{2.5} = a \frac{2.5}{2.5}$$

$$-1.2 = a$$

$$g(x) = -1.2 | x - 6.5 | + 3$$

 $(f \circ g)(6) = f(2.4)$ = 0.7

Answer: The value of $(f \circ g)(6)$, to the nearest tenth, is **0.7**.

Note: Students who have determined the rule of f(x) or the rule of g(x) have shown they have a partial understanding of the problem.

Example of an appropriate solution

Solution

$$y = a\sqrt{x-h} + k$$
$$4 = a\sqrt{1-0} + 6$$
$$a = -2$$

Solving for x when y = 2

$$2 = -2\sqrt{x} + 6$$
$$-4 = -2\sqrt{x}$$
$$2 = \sqrt{x}$$
$$4 = x$$

giving (4, 2)

Using the absolute value function

$$2 = a|4 - 8| + 6$$

-4 = 4a
-1 = a
y = 0
0 = -|x - 8| + 6
-6 = -|x - 8|
6 = |x - 8|
x = 2 or x = 14

Answer: The plane spent **14 seconds** in the air.

Note: Students who found the point (4, 2) have shown they have a partial understanding of the problem.