## 568536 - Mathematics 5 SN

Name : $\qquad$

Group : $\qquad$

Date : $\qquad$

## Mathematics 5 SN

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

C)

B)

D)


Solve the following inequality in $\mathfrak{R}$ :

$$
\sqrt{4(x-5)} \geq \frac{2}{5}(x+1)
$$

A) $[9,+\infty[$
C) $\quad-\infty, 9] \mathrm{Y}[14,+\infty[$
B) $[9,14]$
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 $25^{\circ}$ 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.

Show your work.


Answer The height of the second post is $\qquad$ meters.

4 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?

Show all your work.


Time (s)

Answer: $\quad$ The value of $(f \circ g)(6)$, to the nearest tenth, is $\qquad$

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?

Show all your work.

$\qquad$ seconds in the air.

## 2- Correction key

## 1 B

$\square$

Example of an acceptable solution

Coordinates of point (16,?)

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

Equation of the square root function

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

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

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

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

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

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

Example of an appropriate solution

Determine the domain of the function

$$
\begin{aligned}
-\frac{1}{2} x+\frac{3}{4} & \geq 0 \\
-2 x+3 & \geq 0 \\
x & \leq \frac{3}{2}
\end{aligned}
$$

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

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

Rule of square root function

$$
\begin{aligned}
f(x) & =a \sqrt{b(x-h)}+k \\
f(x) & =a \sqrt{x}+3 \\
0 & =a \sqrt{4}+3 \\
-3 & =2 a \\
-1.5 & =a \\
f(x) & =-1.5 \sqrt{x}+3
\end{aligned}
$$

Rule of absolute value function

$$
\begin{aligned}
g(x) & =a|x-h|+k \\
g(x) & =a|x-6.5|+3 \\
0 & =a|9-6.5|+3 \\
\frac{-3}{2.5} & =a \frac{2.5}{2.5} \\
-1.2 & =a \\
g(x) & =-1.2|x-6.5|+3
\end{aligned}
$$

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

$$
=0.7
$$

Answer: The value of $(f \circ g)(6)$, to the nearest tenth, is $\mathbf{0 . 7}$.

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.

Solution

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

Solving for $x$ when $y=2$

$$
\begin{aligned}
2 & =-2 \sqrt{x}+6 \\
-4 & =-2 \sqrt{x} \\
2 & =\sqrt{x} \\
4 & =x
\end{aligned}
$$

giving (4, 2)

Using the absolute value function

$$
\begin{aligned}
2 & =a|4-8|+6 \\
-4 & =4 a \\
-1 & =a \\
y & =0 \\
0 & =-|x-8|+6 \\
-6 & =-|x-8| \\
6 & =|x-8| \\
x=2 & \text { or } x=14
\end{aligned}
$$

Answer: The plane spent 14 seconds in the air.

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

