h(x) FUNction Summary TEMPLATE

Square Root FUNction

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Your Personal Mathematics Trainer
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FUNCTION: $\mathbf{h(x)} = 3 - \sqrt{3\mathbf{x} - 6}$

$\mathbf{f(x)} = \sqrt{\mathbf{x}}$

A $= -1$: Reflection in x-axis

B $= 3$: Horizontal Contraction

C $= -6$: Horizontal Translation ; 2 units to the right

D $= 3$: Vertical Translation ; 3 units upward

Note: Since **h(x)** is "nice", we can find the graph of **h(x)** *before* finding **all** of the FUNction Summary Properties. However, we will still put its graph in Step #10 below. Appropriate calculations are shown at the bottom of the template.

1) DOMAIN:

Dom h $= [2, +\infty)_x$; allowable x values

2) INTERCEPT POINT(S):

y-intercept point: None ; graph does NOT intersect the y-axis

x – intercept points: $(5, 0)$; graph intersects the x-axis

3) CONTINUITY AND RELATED TOPICS:

CONT h $= [2, +\infty)_x$; NO breaks in the graph on this interval

DISCONT h = Where it is undefined

Hole h : N/A ; NO holes in the graph

Fin _ Jp h : N/A ; NO stair step behavior

V _ Asy h : N/A ; NO vertical asymptotes

Advanced : N/A

POS h $= [2,5)_x$; h(x) > 0

NEG h $= (5,+\infty)_x$; h(x) < 0

4) BEHAVIOUR AT (TOWARD) INFINITY:

$\lim_{x \to -\infty} h(x) = \nexists$; does not exist ; no graph

$\lim_{x \to +\infty} h(x) = -\infty$; as the x-values increase without bound, the cooresponding y-values decrease without bound

H _ Asy h : N/A ; NO horizontal asymptotes

5) SYMMETRY (y -axis *or* $(0,0)$):

Even h : No ; graph NOT symmetric with respect to y-axis

Odd h : No ; graph NOT symmetric with respect to (0,0)

6) INCREASING AND DECREASING:

INC h $= \varnothing$; Empty Set ; NEVER going up
DEC h $= [2,+\infty)_x$; going down on this interval

7) RELATIVE MAXIMUM AND/OR MINIMUM POINT(S):

R _ MAX _ Pt h : $(2,3)$

R _ MIN _ Pt h : N/A

… OMIT FOR NOW …

except range if known

8) CONCAVITY:

CU h $= (-\infty,+\infty)_x$; graph ALWAYS smiling

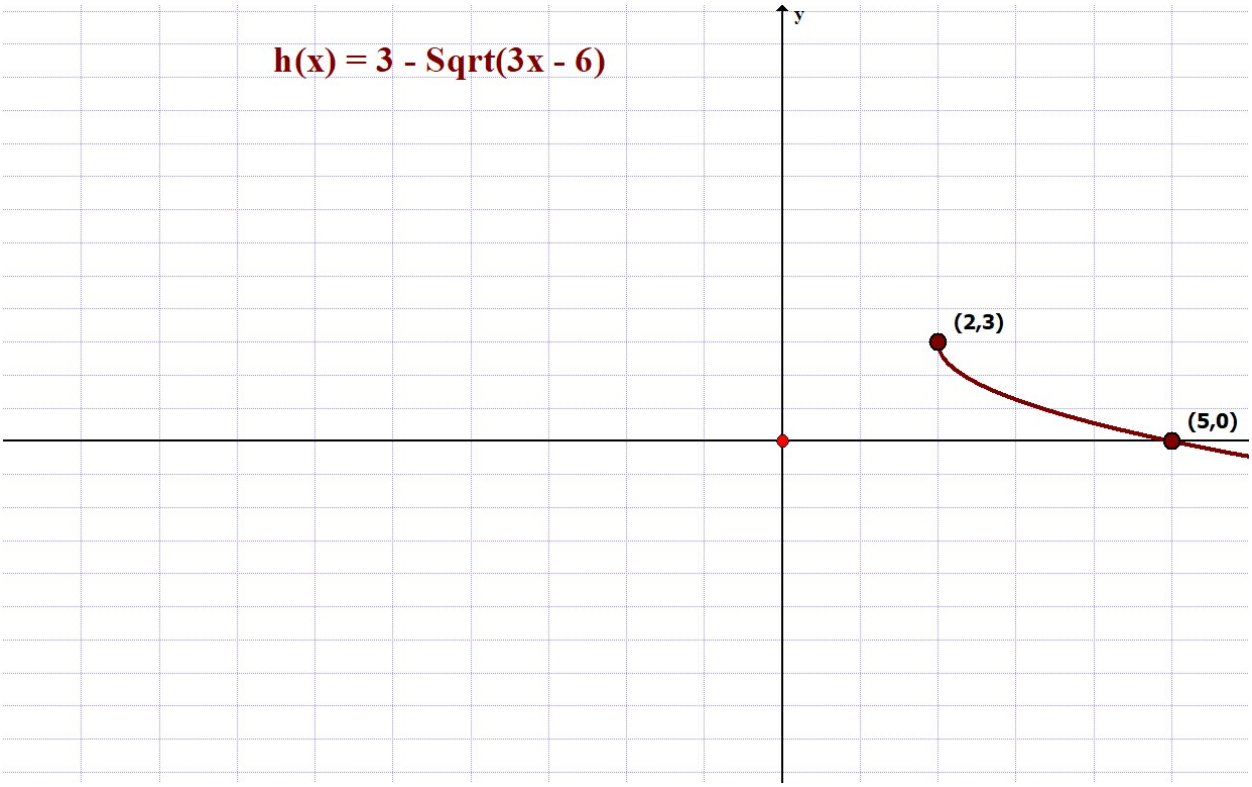
CD h $= \varnothing$; Empty Set ; graph NEVER frowning

9) INFLECTION POINT(S):

INF _ Pt h : N/A ; graph does NOT change from smiling to frowning or vice versa

10) GRAPH:

GRAPH h :



11) ABSOLUTE MAXIMUM AND/OR MINIMUM POINT(S):

A _ MAX _ Pt h : $(2,3)$; highest point on the graph

A _ MIN _ Pt h : N/A ; NO lowest point on the graph

12) RANGE:

RANGE h $= (-\infty, 3]_y$

Calculations:

1. Domain: $3\mathbf{x} - 6 \geq 0 \Rightarrow \mathbf{x} \geq 2 \Rightarrow \mathbf{Dom\ f} = [2, +\infty)_x$
2. Intercepts:
   a. y-intercept: $0 \notin \mathbf{Dom\ f} \Rightarrow$ None
   b. x-intercepts:

$$\mathbf{h(x)} \overset{\text{SET}}{=} 0 \Rightarrow 3 - \sqrt{3\mathbf{x} - 6} \Rightarrow \sqrt{3\mathbf{x} - 6} = 3$$

$$\Rightarrow 3\mathbf{x} - 6 = 9 \Rightarrow \mathbf{x} = 5 \Rightarrow (5,0)$$

3. Continuity: