**Piecewise Functions Practice Questions**

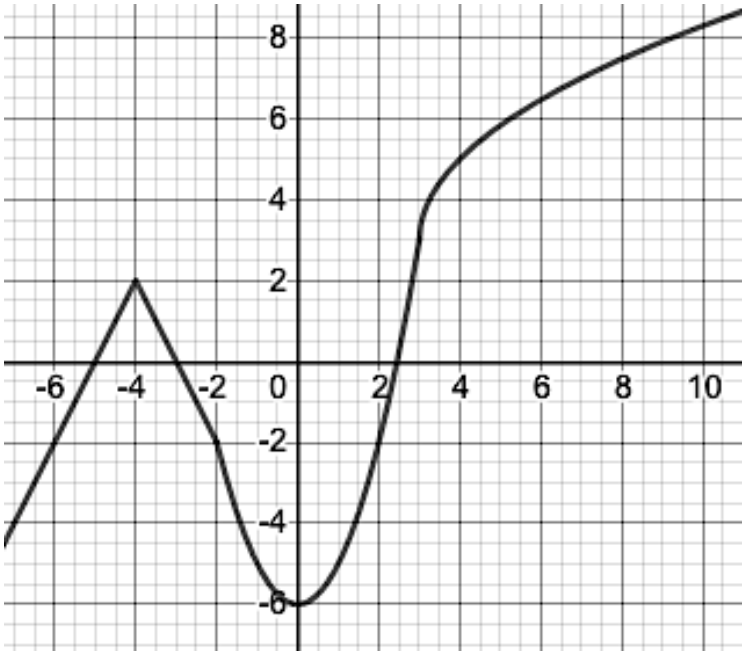
**Rational Functions: Basics and Sketching**

1) Sketch the following piecewise function.

$$f(x) = \begin{cases} 10\sqrt{15x} + 20 & 0 \le x \le 15 \\ \frac{1}{4}|x - 35| + 165 & 15 \le x \le 55 \\ \frac{750}{x - 50} + 20 & 55 \le x \le 75 \end{cases}$$


2) Sketch the following piecewise function.

$$g(x) = \begin{cases} -2|x + 4| + 2 & x \le -2 \\ x^2 - 6 & -2 \le x \le 3 \\ 2\sqrt{x - 3} + 3 & x \ge 3 \end{cases}$$



**Piecewise Functions: Solving Equalities**

3) Solve the following piecewise function

$$f(x) = \begin{cases} 10\sqrt{15x} + 20 & 0 \le x \le 15 \\ \frac{1}{4}|x - 35| + 165 & 15 \le x \le 55 \\ \frac{750}{x - 50} + 20 & 55 \le x \le 75 \end{cases}$$

a) w$hen\ x = 60$
$y = 95$

b) $when\ y = 140$
$x = 9.6\ and\ x = 56.25$

4) Solve the following piecewise function

$$g(x) = \begin{cases} -2|x + 4| + 2 & x \le -2 \\ x^2 - 6 & -2 \le x \le 3 \\ 2\sqrt{x - 3} + 3 & x \ge 3 \end{cases}$$

a) w$hen\ x = -4$
$y = 2$

b) $when\ y = 1$
$x = -4.5, x = -3.5, and\ x = 2.646$

**Rational Functions: Solving Inequalities**

5) Solve the following piecewise function when $y \leq 100$

$$f(x) = \begin{cases} 10\sqrt{15x} + 20 & 0 \leq x \leq 15 \\ \frac{1}{4}|x - 35| + 165 & 15 \leq x \leq 55 \\ \frac{750}{x - 50} + 20 & 55 \leq x \leq 75 \end{cases}$$

$$]-\infty, 4.267] \cup [59.375, 75]$$

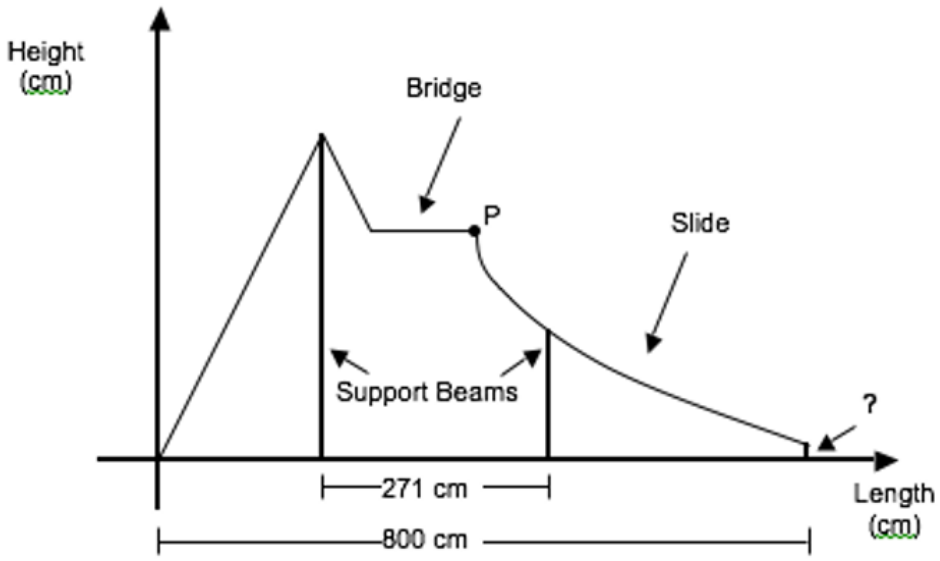
6) Solve the following piecewise function when $y < 0$

$$g(x) = \begin{cases} -2|x + 4| + 2 & x \leq -2 \\ x^2 - 6 & -2 \leq x \leq 3 \\ 2\sqrt{x - 3} + 3 & x \geq 3 \end{cases}$$

$$]-\infty, -5[ \cup ]-3, 2.449[$$

**Piecewise Functions: Putting it all together**

7) A designer of a children's outdoor playground set outlines the structures and support beams on a Cartesian plane.




The total length of the playground is 800 cm with a maximum height of 400 cm. The first section of the playground as seen on the graph, scaled in cm, can be represented by an absolute value function, with one of the support beams passing through the line of symmetry of the absolute value function. In addition, the zeros of the absolute value function are 0 and 400.

At a height of 280 cm, a horizontal bridge with a length of 130 cm connects the first section of the playground to a slide which is represented by a square root function with vertex P. A support beam with a height of 163 cm is placed under the slide, 271 cm from the first support beam.

A safety regulation requires that the end of the slide cannot exceed a height of 20cm from the ground.

**Did the designer meet the safety regulation?**

Yes. The height is 16.77cm