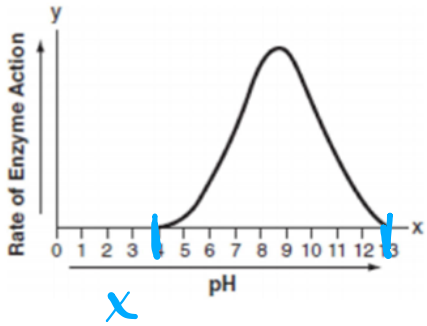
Independent Variable → x-values; inputs; Domain

Dependent Variable → y-values; outputs; Range

Restricted domain → When there is a limit on the x-values used to make the function. No Arrows!

Examples:

1 The effect of pH on the action of a certain enzyme is shown on the accompanying graph.

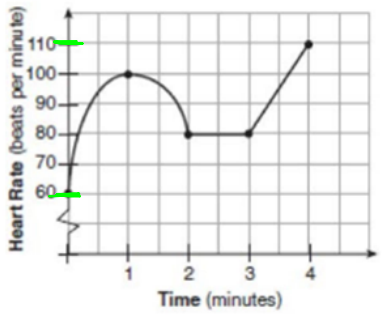


x

What is the domain of this function?

1) $4 \le x \le 13$
2) $4 \le y \le 13$
3) $x \ge 0$
4) $y \ge 0$

2 The accompanying graph shows the heart rate, in beats per minute, of a jogger during a 4-minute interval.



y

What is the range of the jogger's heart rate during this interval?

1) 0 – 4
2) 1 – 4
3) 0 – 110
4) 60 – 110

$2(-2)^2+3(-2)$

3 Let f be a function such that $f(x) = 2x - 4$ is defined on the domain $2 \le x \le 6$. The range of this function is

1) $0 \le y \le 8$
2) $0 \le y < \infty$
3) $2 \le y \le 6$
4) $-\infty < y < \infty$

x	f(x)
2	0
3	2
4	4
5	6
6	8

4 What is the range of the relation $y = 2x^2 + 3x$ if the domain is the set $\{-2,-1,0\}$?

x y

1) $\{2,1,0\}$
2) $\{2,-1,0\}$
3) $\{-1,-5,0\}$
4) $\{10,1,0\}$

x	y
-2	2
-1	-1
0	0

If a domain is not given, use the following rules:

1.) If the equation is a model where the variables have actual meaning, choose a domain that makes sense for the model.
2.) If the equation has no context (not a word problem), assume the domain is the largest set of real numbers for which y will be defined as real. This is called the *natural domain* of the function. The following must be satisfied:
   - The denominator must not equal 0. A zero denominator would make the function undefined.
   - The radicand must be greater than or equal to 0. A negative radicand would give imaginary outputs (we will cover this later ☺)
   - There is a third consideration if the function involves logarithms. We will also get into this later!

$\sqrt{2x-3}$ → radicand

"Such that"

Examples:

$f(x)=\sqrt{2x-3}$

radicand ≥ 0

$2x-3 \geq 0$

$2x \geq 3$

$\boxed{x \geq \frac{3}{2}}$

Domain:

$\{x \mid x \geq \frac{3}{2}\}$

$\{x \text{ real} \mid x \geq \frac{3}{2}\}$

$f(x)=\frac{1}{5x+2}$

denominator $\neq 0$

$5x+2 \neq 0$

$5x \neq -2$

$\boxed{x \neq \frac{-2}{5}}$

Domain:

$\{x \mid x \neq \frac{-2}{5}\}$

$\{x \text{ real} \mid x \neq \frac{-2}{5}\}$

$f(x)=\frac{x+3}{\sqrt{x-5}}$

radicand ≥ 0

denom. $\neq 0$

$x-5 > 0$

$\boxed{x > 5}$

Domain:

$\{x \mid x > 5\}$

$\{x \in \mathbb{R} \mid x > 5\}$

$\in$ is in $\mathbb{R}$ the set of all real #'s