

**Aim: How do find the domain of a function?****I. Do Now:**1. Which of the following are functions of  $x$ ? Justify your answer.

(a)  $x = 4$

(b)  $y = 2$

(c)  $y = 2x - 3$

(d)  $x^2 - y^2 = 9$

(e)  $x = y^5$

2. Evaluate the following piecewise functions:

(a)  $f(x) = \begin{cases} -x, & x < 0 \\ x, & x \geq 0 \end{cases}$

(i)  $f(3)$

(ii)  $f(0)$

(iii)  $f(-4)$

(b)  $g(x) = \begin{cases} -x + 1, & x \leq 0 \\ x^2 + 2, & 0 < x \leq 3 \\ 5, & x > 3 \end{cases}$

(i)  $g(-2)$

(ii)  $g(0)$

(iii)  $g(2)$

(iv)  $g(100)$

**II. Development:**The domain of a function is the set of  $x$ -values. It must be restricted, if needed, to prevent the following:

- 1) division by zero
- 2) the square root (or fourth root, or sixth root, etc.) of a negative number
- 3) the logarithm of a non-positive number
- 4) a combination of the above

**III. Applications:** Find the domain of each function.

3.  $f(x) = \frac{2}{x^2 - 9}$

4.  $f(x) = \sqrt{x}$

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

6.  $f(x) = \frac{x+4}{\sqrt{x-6}}$

7.  $h(x) = 2x + 3$

8.  $g(x) = \frac{x}{\sqrt{4-x^2}}$

**IV. Further Applications:** Find the domain of each function.

9.  $f(x) = \{(-3,0), (-1,7), (0,2), (2,2)\}$

10.  $g(x) = \frac{1}{x+4}$

11.  $V(r) = \frac{4}{3}\pi r^3$

12.  $h(x) = \sqrt{5-x}$

13. What is the domain of the functions in #2?

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1. Is it a function of  $x$ ? Justify your answer.

(a)  $x + y = 7$       (b)  $y^2 = x + 4$       (c)  $x = 0$       (d)  $y = |x|$       (e)  $x = y^4 + 1$

2. Find the domain of each function.

(a)  $f(x) = \frac{3}{x+2}$       (b)  $g(x) = \frac{x}{8}$       (c)  $A(r) = \pi r^2$       (d)  $g(x) = \sqrt{x-6}$

(e)  $r(x) = \frac{1}{\sqrt{x^2-9}}$       (f)  $f(x) = \ln(x)$       (g)  $f(x) = \ln(x+4)$

3. Factor completely:      (a)  $(9x+2)(3x-4) - (3x-4)^2$       (b)  $7(3x+2)^2(1-x)^2 + (3x+2)(1-x)^3$

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