WS
Chapter 2

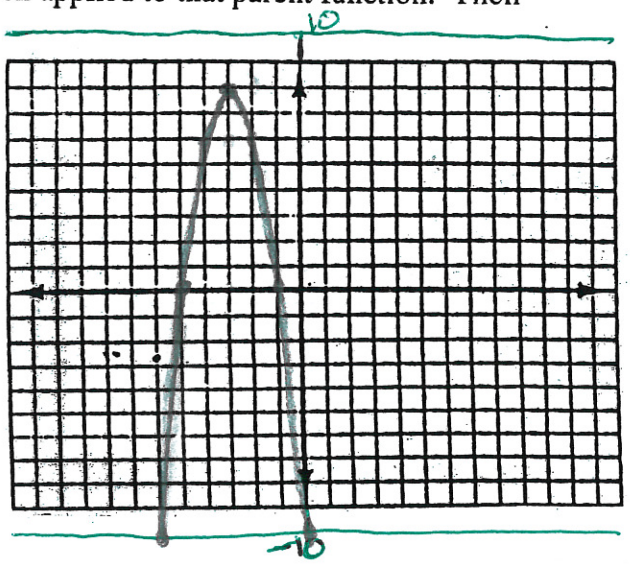
1. For the function $f(x) = -2(x+3)^2 + 8$, give the parent function and then describe in words the shifts, reflections and stretches that have been applied to that parent function. Then graph the function and find the domain and range.

$f(x) = x^2$ → parent function

- reflect across x-axis
- vertical stretch by a factor of 2
- horizontal shift left 3
- vertical shift up 2

Domain: $\mathbb{R}$ or $(-\infty, \infty)$

Range: $(-\infty, 8]$



X	Y
-6	-10
-5	0
-3	8
-2	
-1	0
0	-10

2. For the function $f(x)\begin{cases} x^2 & -3 \le x < 2 \\ 2x-1 & x \ge 2 \end{cases}$,

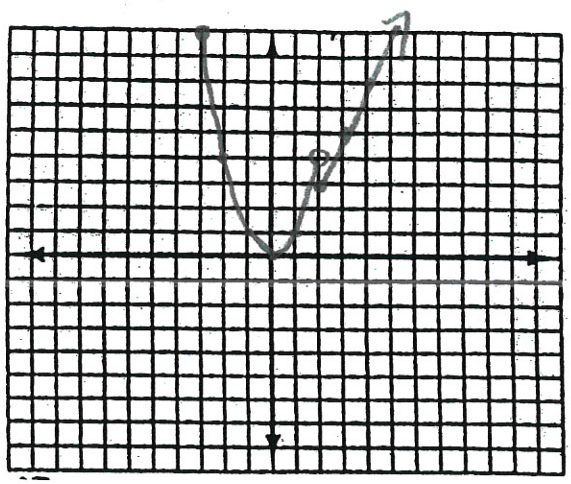
A. Find the domain and range

$[-3, \infty)$

B. Locate any intercepts

$(0,0)$

C. Graph the function



3. A function is defined by $g(x) = \frac{A}{x} + \frac{8}{x^2}$, if g(-1) = 0, find A.

$g(x) = 0$

$0 = \frac{A}{(-1)} + \frac{8}{(-1)^2} \longrightarrow 0 = -A + 8$

$A = 8$

10. Let $P = (x, y)$ be a point on the graph of $y = x^2 - 8$.

(a) Express the distance d from P to the point $(0, -1)$ as a function of x.

(b) What is d if $x = 0$? → 7

(c) What is d if $x = -1$? → $\sqrt{37}$

(d) Use a graphing utility to graph $d = d(x)$.

(e) For what values of x is d smallest? → ± 2.55

$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

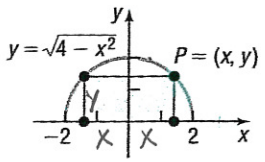
$D = \sqrt{(x-0)^2 + (x^2 - 8 - (-1))^2}$

$D = \sqrt{x^2 + (x^2 - 7)^2}$

$D = \sqrt{x^2 + x^4 - 14x^2 + 49}$

$D = \sqrt{x^4 - 13x^2 + 49}$

16. A rectangle is inscribed in a semicircle of radius 2 (see the figure). Let $P = (x, y)$ be the point in quadrant I that is a vertex of the rectangle and is on the circle.



(a) Express the area A of the rectangle as a function of x.

(b) Express the perimeter p of the rectangle as a function of x.

(c) Graph $A = A(x)$. For what value of x is A largest? → 1.414

(d) Graph $p = p(x)$. For what value of x is p largest? → 1.79

$A(x) = 2xy = 2x(\sqrt{4 - x^2})$

$P(x) = 2x + 2x + y + y = 4x + 2y = 4x + 2(\sqrt{4 - x^2})$

18. A circle of radius r is inscribed in a square (see the figure).

$A = (2r)^2$

$A = 4r^2$

$P = 4(2r)$

$P = 8r$

(a) Express the area A of the square as a function of the radius r of the circle.

(b) Express the perimeter p of the square as a function of r.

20. A wire 10 meters long is to be cut into two pieces. One piece will be shaped as an equilateral triangle, and the other piece will be shaped as a circle.

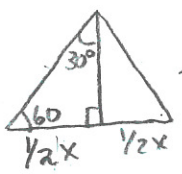
(a) Express the total area A enclosed by the pieces of wire as a function of the length x of a side of the equilateral triangle.

(b) What is the domain of A? $0 < x < 10/3$

(c) Graph $A = A(x)$. For what value of x is A smallest? 2.08 m

Area of triangle

$A = \frac{1}{2}bh$



→ In 30-60-90, the side opposite 30° is a, & the side opposite 60° is $a\sqrt{3}$, thus the side opp 60° is $\frac{1}{2}x \cdot \sqrt{3} = \frac{\sqrt{3}x}{2}$ = height

$A = \frac{1}{2}(x)\left(\frac{\sqrt{3}}{2}x\right) = \frac{\sqrt{3}x^2}{4}$ → Area of Δ

Area of $\bigcirc = \pi r^2 = \pi\left(\frac{10 - 3x}{2\pi}\right)^2 = \frac{(10-3x)^2}{4\pi}$

Total Area $= \frac{\sqrt{3}}{4}x^2 + \frac{(10-3x)^2}{4\pi}$

26. Using the graph of the function g shown:

(a) Find the domain and the range of g. D: $[-5, 4]$ R: $[-3, 1]$

(b) Find $g(-1)$. 1

(c) List the intercepts. $(0,0)$ & $(4,0)$

(d) For what value of x does $g(x) = -3$? 3

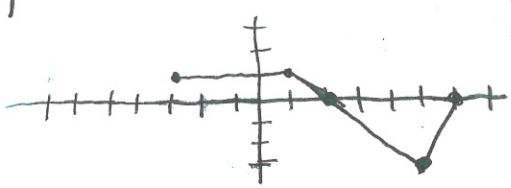
(e) Solve $g(x) > 0$. $[-5, 0)$

(f) Graph $y = g(x - 2)$.

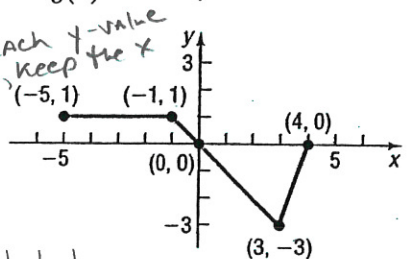
(g) Graph $y = g(x) + 1$.

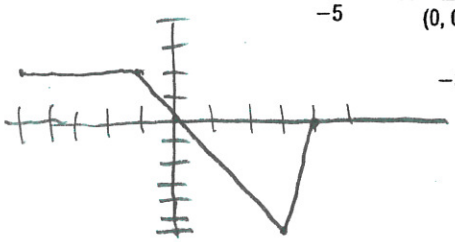
(h) Graph $y = 2g(x)$.

$g(x-2)$ → shift every point (R) 2



$2g(x)$ → mult each y-value by 2, keep the x





$g(x) + 1$ → shift every point up 1