INTERMEDIATE ALGEBRA

GPS # 37 **8.1 QUADRATIC FUNCTIONS AND THEIR GRAPHS** **NAME:** Parul Patel

Useful Guidelines: as long as highest power 2

* Quadratic Function: $f(x) = ax^2 + bx + c, (a \neq 0)$, where a, b and c are real numbers.

* The vertex of the graph of $f(x) = ax^2 + bx + c, (a \neq 0)$ has coordinates $(x, y) = \left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$.

step-1 find a, b & c

* To graph a quadratic function: ∩ ∪
  Step 2: Determine whether the parabola opens up or down.
  [If $a > 0$, the parabola is open up; If $a < 0$, the parabola is open down.]
  Step 3: Find the vertex. (Location of (x, y))
  Step 4: Find the x-intercepts (if any) and y-intercept.
  Step 5: Plot the graph. [Find additional points as needed.]

Very Good Job.

Graph each parabola, Give the vertex, axis, domain, and range.

1. $f(x) = x^2 - 4x + 3$

step-1
$a = 1 > 0$, ∪ facing ↑ up.
$b = -4$
$c = 3$

step → 3 Find Vertex $x = -\frac{b}{2a} = \frac{-(-4)}{2(1)} = 2$

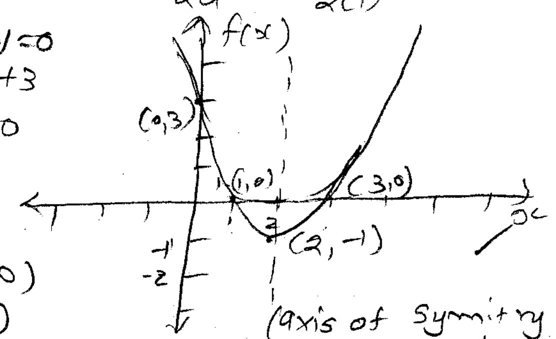
(y) $F(2) = (2)^2 - 4(2) + 3$
$= 4 - 8 + 3$
$= -1$
So, (x, y) is $(2, -1)$

(1) $a > 0$ ∪
$a < 0$ ∩
(2) vertex $(2, -1)$

(3) y int - Let $x = 0$
$f(0) = 3$
$(0, 3)$

(4) x int - Let $y = 0$
$0 = x^2 - 4x + 3$
$(x-1)(x-3) = 0$
$\boxed{x = 1}, \boxed{x = 3}$

$D = (-\infty, \infty)$
$R = [-1, \infty)$

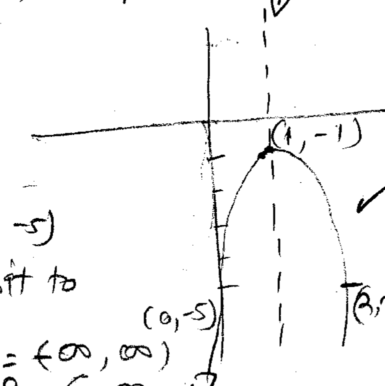


2. $f(x) = -4x^2 + 8x - 5$

step-1 $a = -4$ $b = 8$ $c = -5$
step-2 $a < 0$ parabola ∩ facing down.
step-3 vertex (x) $= -\frac{b}{2a} = -\frac{8}{2(-4)} = \frac{-8}{-8} = 1$

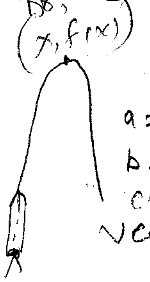
$y = F(x) = -4x^2 + 8x - 5$
$F(1) = -4(1)^2 + 8(1) - 5$
$= -4 + 8 - 5$
$\boxed{y = -1}$
So vertex $(x, y) = (1, -1)$

step 4 Find x & y intercept
→ y intercept
Let $x = 0$
$y = -4(0)^2 + 8(0) - 5$
$= 0 + 0 - 5$
$\boxed{y = -5}$ y intercept $(0, -5)$
→ find second point oposit to
$(0, -5) \rightarrow (2, -5)$



$D = (-\infty, \infty)$
$R = (-\infty, -1]$

3. A rocket is fired upward. After x hour, the height of the rocket is given by $f(x) = -16x^2 + 32x$. Find the time required in hours for the rocket to reach maximum height, and find the maximum height in kilometers.



$a = -16$ so ∩
$b = 32$
$c = 0$
vertex $= x = \frac{-b}{2a}$
$= \frac{-32}{2(-16)} = \frac{-32}{-32}$
$\boxed{= 1}$ hour.

$f(x) = -16(1)^2 + 32(1)$
y $\boxed{= 16 \text{ k.m. hight}}$
So, vertex (x, y)
$= (1, 16)$