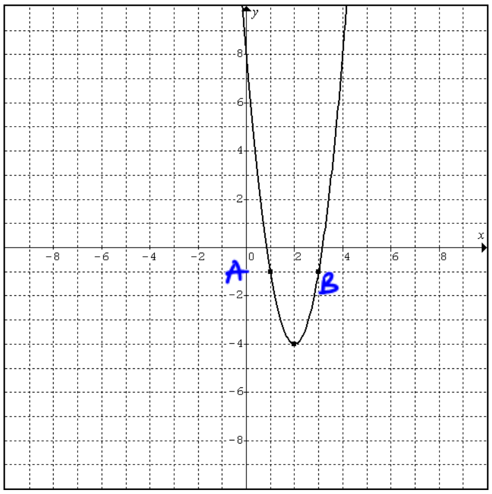
WHAT IS THE EQUATION?

Determine the equation in vertex form: $y = a(x-h)^2 + k$

h k



The vertex is $(2,-4)$

Another point is $A(1,-1)$ find "a"

x y

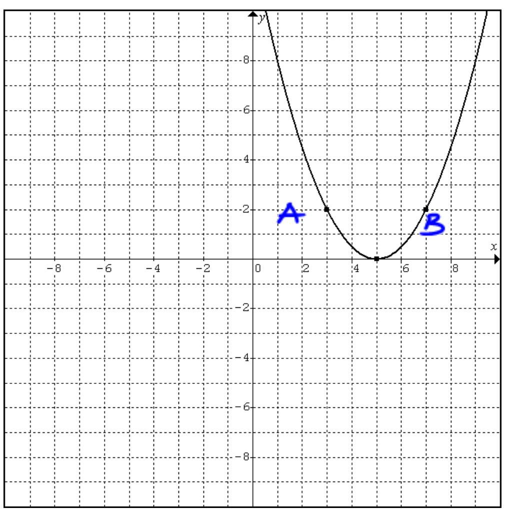
① $y = a(x-h)^2 + k$

$-1 = a(1-2)^2 - 4$

$-1+4 = a(-1)^2$

$\boxed{3 = a}$

$\therefore y = 3(x-2)^2 - 4$



The Vertex is $(5,0)$

Another point is $A(3,2)$

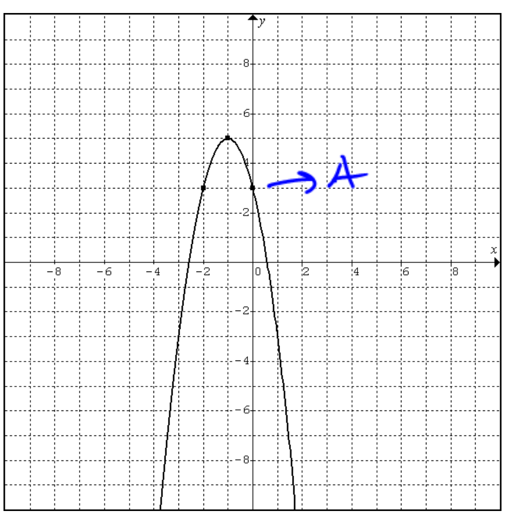
$y = a(x-h)^2 + k$

$2 = a(3-5)^2 + 0$

$2 = 4a$

$a = 1/2$

$\therefore y = \frac{1}{2}(x-5)^2$



The vertex is $(-1,5)$

Another point is $A(0,3)$

$y = a(x-h)^2 + k$

$3 = a(0-(-1))^2 + 5$

$\boxed{-2 = a}$

$\therefore y = -2(x+1)^2 + 5$

h k x y

The vertex is (4, -2). Another point is (7, 1).

Step1 $y = a(x-h)^2 + k$

$1 = a(7-4)^2 - 2$

$1 + 2 = a(3)^2$

$\frac{3}{9} = \frac{9a}{9}$

$\boxed{a = 1/3}$

$\therefore y = \frac{1}{3}(x-4)^2 - 2$

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h k x y

The vertex is (2, 0). Another point is (0, -2).

Step1 $y = a(x-h)^2 + k$

$-2 = a(0-2)^2 + 0$

$\frac{-2}{4} = \frac{4a}{4}$

$\boxed{a = -1/2}$

$\therefore y = \frac{-1}{2}(x-2)^2$

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h k x y

The vertex is (0, -3). Another point is (1, -4).

$y = a(x-h)^2 + k$

$-4 = a(1-0)^2 - 3$

$-4 + 3 = a$

$\boxed{a = -1}$

$\therefore y = -(x)^2 - 3$

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h k x y

The vertex is (-3, -4). Another point is (-2, 1).

$y = a(x-h)^2 + k$

$1 = a(-2-(-3))^2 - 4$

$5 = a(-2+3)^2$

$\boxed{a = 5}$

$\therefore y = 5(x+3)^2 - 4$

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h k x y

The vertex is (-4, 8). Another point is (0, 0).

$y = a(x-h)^2 + k$

$0 = a(0-(-4))^2 + 8$

$\frac{-8}{16} = \frac{16a}{16}$

$\boxed{a = -1/2}$

$\therefore y = \frac{-1}{2}(x+4)^2 + 8$

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h k x y

The vertex is (5, 1). Another point is (1, 5).

$y = a(x-h)^2 + k$

$5 = a(1-5)^2 + 1$

$\frac{4}{16} = \frac{16a}{16}$

$\boxed{a = 1/4}$

$\therefore y = \frac{1}{4}(x-5)^2 + 1$

1. Find the equation of the parabola with vertex (0,-6), opening down and a vertical compression factor of 1/3 .

h, k, a=-1

$y = a(x-h)^2+k \Rightarrow h=0$, $k=-6$, $a=-\frac{1}{3}$

$y = \frac{-1}{3}(x)^2-6$

2. Find the equation of the parabola with vertex (0,4), opening down and vertical stretch by a factor of 2.

$h=0$
$k=4$
$a=-2$

$y=-2(x-0)^2+4 \Rightarrow y=-2x^2+4$

3. Find the equation of the parabola compressed vertically by a factor of one-quarter, and then translated 4 units to the right and one unit up.

$a = 1/4$
$h = 4$
$k = 1$

$y = \frac{1}{4}(x-4)^2+1$

4. What happens to the point (3,9) on the graph of y=x² when the parabola is reflected about the x-axis then stretched vertically by a factor of two?

$(3,9) \longrightarrow (3,-18)$

5. Find the value of kso that the parabola $y = -\frac{1}{3}x^2 + k$ passes through (6,8).

x, y

$8 = \frac{-1}{3}(6)^2+k$

$8 = -\frac{36}{3}+k$

$8 = -12+k$

$\boxed{k=20}$

6. Find the value of a and k so that the parabola passes through the points (1,-1) and (2,5)
The parabola is in the form y = ax² +k

x y x y

$-1 = a(1)^2+k$

1 $\boxed{-1 = a+k}$

$k = -a-1$

$5 = a(2)^2+k$

2 $\boxed{5 = 4a+k}$

Sub 1 → 2

$5 = 4a - a - 1$

$\frac{6}{3} = \frac{3a}{3}$

$\boxed{a=2}$

$k = -2-1$

$\boxed{k=-3}$

$\therefore a=2$
$k=-3$

7. Write an equation for the parabola with a vertex (–5,–3) passing through (–3,–11).

$y = a(x-h)^2+k$

$-11 = a(-3-(-5))^2-3$

$-8 = 4a$

$\boxed{a=-2}$

$\therefore y = -2(x+5)^2-3$

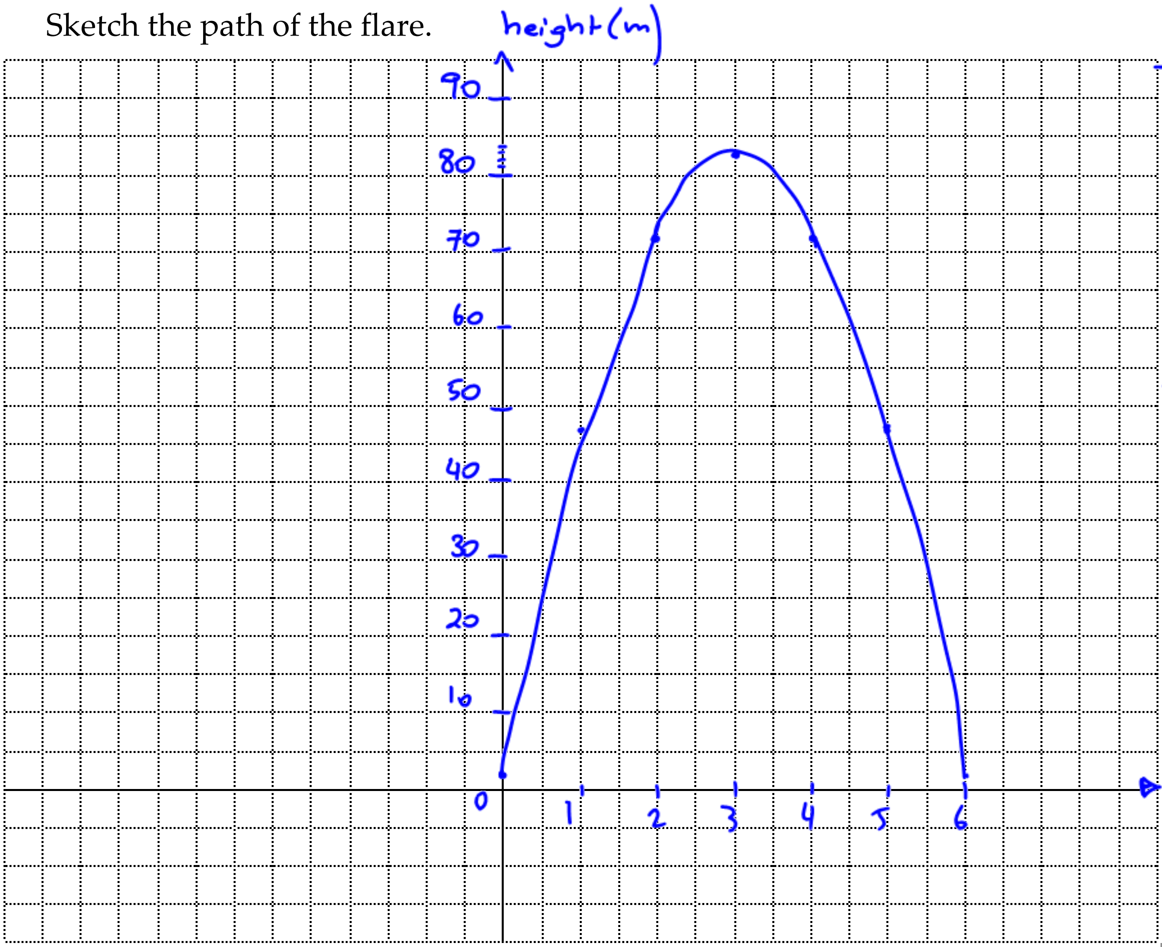
Applications of the Quadratic Relation:

t=0
-81-

8. A red flare is used by some boaters in an emergency. The flight of the flare is modelled by the function $h = -9(t-3)^2 + 83$ where h is the height (m) of the flare and t is the time (s) that the flare is in flight.

$V(3,83)$

a) Sketch the path of the flare.



t	h
0	$-9(0-3)^2+83=2$
1	$-9(1-3)^2+83=47$
2	$-9(2-3)^2+81=72$
3	83
4	72
5	47
6	2

b) What is the maximum height reached by the flare?

83 m.

c) After how many seconds does the flare reach its maximum height?

3 seconds

d) What is the height of the flare after 2 seconds?

72 m

e) Find another time that the flare is at the height in part d

4 sec.