Max / Min Statements

Date:

Create a "max / min" statement for each of the following relations. It may be necessary to put the relation into proper form before a max / min statement can be made. Relation needs to be in vertex form.

a) $y = 3(x-5)^2 + 12$

The **minimum** value of ***y*** is **12** when ***x*** is **5**.

b) $y = -7(x+4)^2 - 16$, $a = -7 < 0$, ∩ (dependent variable; x_{vertex})

The maximum value of y is -16 when x is -4.
(y_{vertex}; independent variable)

c) $e = 10(b+20)^2 - 30$, $a = 10 > 0$, ∪

The minimum value of e is -30 when b is -20.

d) $f = -1000(g-5400)^2 + 2000000$, $a = -1000 < 0$, ∩

The maximum value of f is 2000000 when g is 5400.

e) $r = 450(s+6)^2 - 15000$

The minimum value of r is -15000 when s is -6.

f) $p = \frac{1}{2}\left(y - \frac{3}{7}\right)^2 + \frac{1}{5}$

The minimum value of p is $\frac{1}{5}$ when y is $\frac{3}{7}$.

g) $d = -100k^2 + 6000k$ Need to complete the square.

$d = -100(k^2 - 60k) = -100(k^2 - 60k + 900 - 900)$

$d = -100(k^2 - 60k + 900) + 90000$, $d = -100(k-30)^2 + 90000$, $a = -100 < 0$, ∩

The maximum value of d is 90000 when k is 30.

h) $m = 250n^2 - 1750n + 800$

$m = 250(n^2 - 7n) + 800 = 250\left(n^2 - 7n + \frac{49}{4} - \frac{49}{4}\right) + 800$

$m = 250\left(n^2 - 7n + \frac{49}{4}\right) - \frac{6125}{2} + 800$, $m = 250\left(n - \frac{7}{2}\right)^2 - \frac{4225}{2}$

The minimum value of m is $\frac{-4225}{2}$ when n is $\frac{7}{2}$.

i) $w = -5000v^2 - 1000000v - 2000000$, $w = -5000(v^2 + 200v) - 2000000$

$w = -5000(v^2 + 200v + 10000 - 10000) - 2000000$

$w = -5000(v+100)^2 + 50000000 - 2000000$, $w = -5000(v+100)^2 + 48000000$

The maximum value of w is 48 million when v is -100.