Re: Can someone show me the working for this please

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- *From*: magidin@xxxxxxxxxxxxxxxxxx (Arturo Magidin)
- *Date*: Wed, 29 Aug 2007 14:40:55 +0000 (UTC)

In article <1188397911.728166.183390@xxxxxxxxxxxxxxxxxxxxxxxxxxx>,
Dougsd1r <dougsdir@xxxxxxxxx> wrote:

> A rectangular based area is fenced using 40m of fencing
>
> Taking x metres for its length, show that the area of the rectangle,
> A m^2, can be written
>
> A = 100 − (x − 10)^2 . What is the maximum floor area, and the
> corresponding length and breadth.
>
> I know the answer is A=100m^2 , length = 10m, breadth = 10m
>
> This question is in relation to questions on quadratic function f(x) =
> ax^2+bc+c i have been doing

First, you need to figure out how to set up the equation.

If you let x be the base of the area, and y the height, both measured
in meters, then the area will be A = xy.

To fence off an area with base x and height y, you will need x + y + x
+ y = 2x + 2y meters of fencing.

Since you have 40 meters of fencing available, that means that the
best you can do is when you use it all up, so you will need to have

A = xy
2x + 2y = 40.

> From the second equation, you can "solve for y in terms of x", and

then replace that value in the first equation. That will allow you to
express the area A as an equation involving only one variable x.

It turns out that this equation will be a quadratic equation in x. So

then, to figure out the maximum value of A, you want to find the
maximum of the quadratic.

There are a number of methods to do that; if you know calculus, you'll
want to take derivatives, find critical points, and so on.

If you do not, then you'll want to complete the square so you can
write the area A in the form

$$A = a(x-v)^2 + b$$

Finding the maximum or minimum is then a matter of considering the
sign of a. If $a>0$, then there is no maximum: larger and larger x will
yield larger and larger $(x-v)^2$, so A will get very large. If $a<0$,
then there is no minimum, and the maximum will be obtained when
$|a(x-v)^2|$ is as small as possible. Since $(x-v)^2$ is always bigger
than or equal to 0, when will that happen?

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"It's not denial. I'm just very selective about
what I accept as reality."
−−− Calvin ("Calvin and Hobbes" by Bill Watterson)
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