The second question 13

Use x-int form

$y = a(x - x_1)(x - x_2)$

$(0, 0)$ $(140, 0)$

$y = a(x-0)(x-140)$

$y = a \cdot x(x-140)$

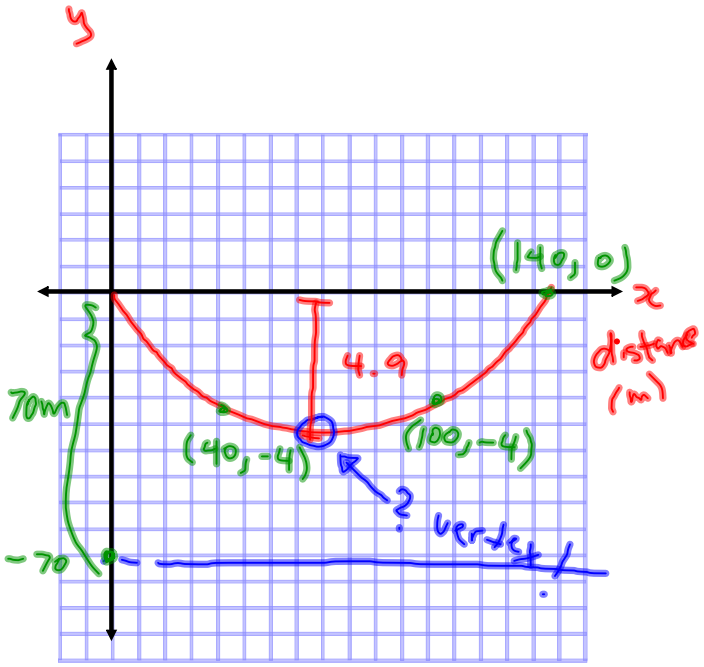
sub in $(40, -4)$ to find a.

$-4 = a \cdot 40(40-140)$

$-4 = a \cdot 40(-100)$

$\frac{-4}{-4000} = \frac{a - 4000}{-4000}$

$a = 0.001$



$y = 0.001 \cdot x \cdot (x-140)$

↳ put this equation in general form, so we can use the vertex formula!

$y = 0.001[x^2 - 140x]$

$y = 0.001x^2 - 0.14x$

$a = 0.001$

$b = -0.14$

$c = 0$

$V\left(\frac{-b}{2a}, \frac{-\Delta}{4a}\right)$

$V\left(\frac{-(-0.14)}{2(0.001)}, \frac{-0.0196}{4(0.001)}\right)$

$V(70, -4.9)$

$\Delta = b^2 - 4ac$

$\Delta = (-0.14)^2 - 4(0.001)(0)$

$\Delta = 0.0196$

∴ the bridge is 4.9 m below the rope!

Second question

14

$f(t) = -5t^2 + 45t + 1$ (a = −5, b = 45, c = 1)

$\Delta = b^2 - 4ac$

$\Delta = (45)^2 - 4(-5)(1)$

$\Delta = 2045$

$V\left(\frac{-b}{2a}, \frac{-\Delta}{4a}\right)$

$V\left(\frac{-45}{2(-5)}, \frac{-2045}{4(-5)}\right)$

$V(4.5, 102.25)$

$g(t) = -5t^2 + 48t + 1$ (a = −5, b = 48, c = 1)

$\Delta = b^2 - 4ac$

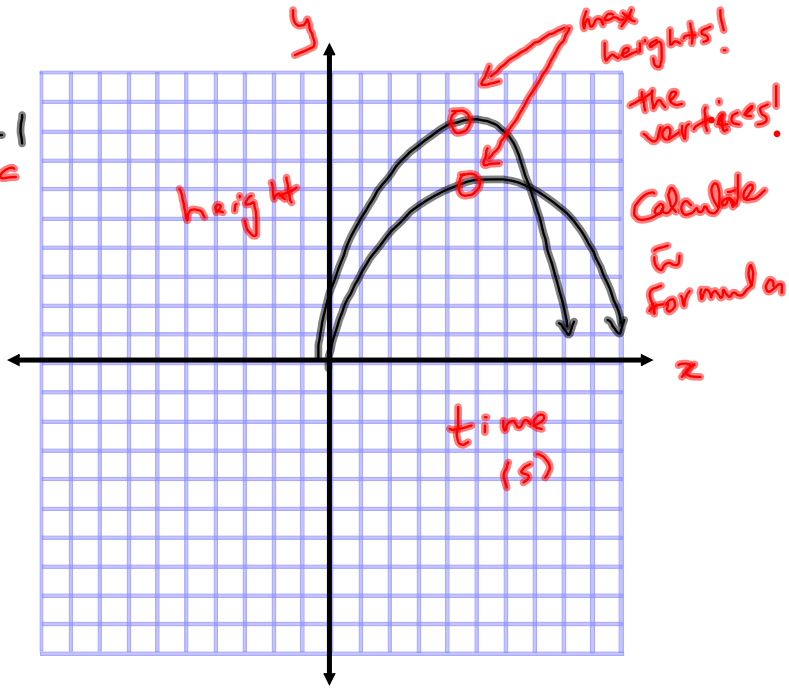
$\Delta = (48)^2 - 4(-5)(1)$

$\Delta = 2324$

$V\left(\frac{-b}{2a}, \frac{-\Delta}{4a}\right)$

$V\left(\frac{-48}{2(-5)}, \frac{-2324}{4(-5)}\right)$

$V(4.8, 116.2)$



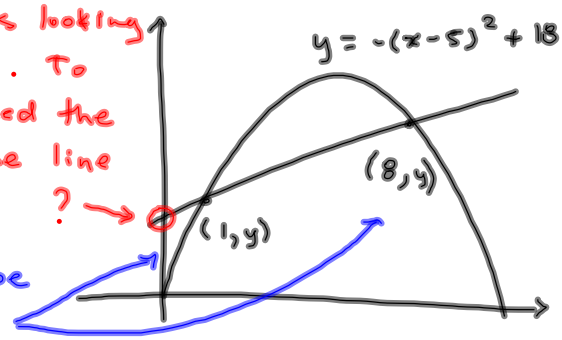
Player #4's ball reached at max height of 102.25 m.

Player #7's ball reached a max height of 116.2 m, making a difference of $116.2 - 102.25 = 13.95$ m

second question is

The question is looking for the y-int. To answer we'll need the equation of the line

$y = mx + b$?



To find the slope we need 2 points

However they are missing their y coordinates. Since these points are also on the parabola, we can use the formula of the parabola to find the missing y's

Sub $x = 1$ into

$k(1) = -(x-5)^2 + 18$

$k(1) = -(1-5)^2 + 18$

$k(1) = 2$

$(1, 2)$
$x_1\ y_1$

Sub $x = 8$ into formula

$k(x) = -(x-5)^2 + 18$

$k(8) = -(8-5)^2 + 18$

$k(8) = 9$

$(8, 9)$
$x_2\ y_2$

Find m using points

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{9-2}{8-1}$$

$$m = \frac{7}{7} = 1$$

So far

$y = mx + b$

$y = 1x + b$

Sub in $(1, 2)$
$x\ y$

$2 = 1(1) + b$

$2 = 1 + b$

$2 - 1 = b$

$b = 1$

We could use modified slope formula or we could remember the way to find the last parameter of a function is by subbing in a point

The equation is

$y = x + 1$

↳ y-int $(0, 1)$

∴ the elevation is 1 meter high!