

Math II

Big Question 2.2.3

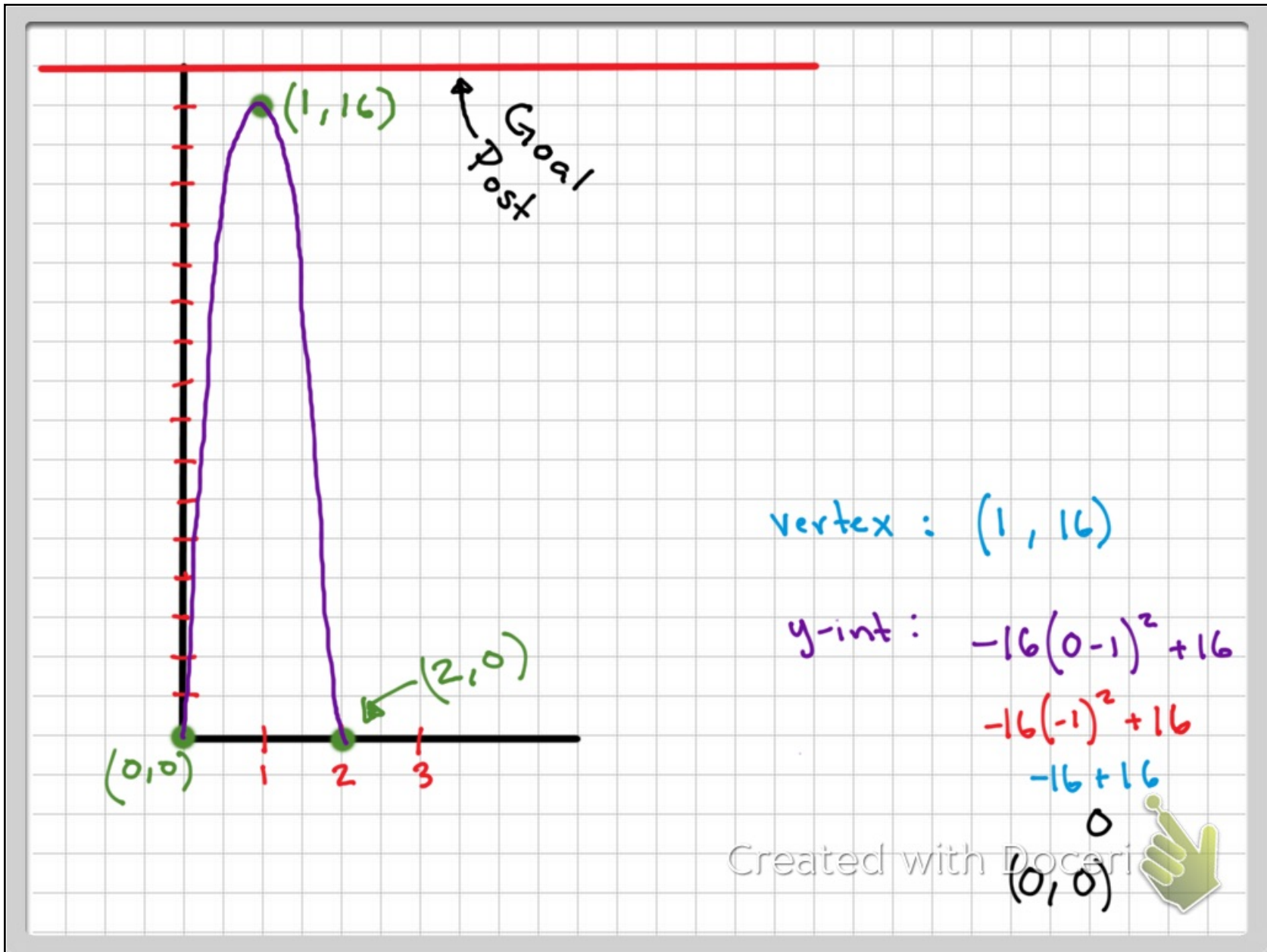
It is Super Bowl season and teams that have made the play-offs have specialists evaluating every aspect of their field game. One particular team received news that their recently injured kicker's field goal kick is modeled by the function  $h(t) = -16(x - 1)^2 + 16$ , where  $h(t)$  is the height of the ball in feet  $t$  seconds after it is kicked. If the football needs to clear a 17-foot goalpost, will the ball make it over if this particular team member kicks it? What is the average rate of change of the football's height from the moment it reaches its maximum height to the moment it hits the ground?

What are the unknown values?

What do you need to know in order to determine whether the football will clear the goalpost?

What do you need to know in order to find the average rate of change of the football's height from its maximum height to the ground?





What are the unknown values?

Where the ball is kicked from

What do you need to know in order to determine whether the football will clear the goalpost?

Vertex. Vertex gives us the max height of ball.

What do you need to know in order to find the average rate of change of the football's height from its maximum height to the ground?

Where the ball hits the ground.

The x-intercepts

If the football needs to clear a 17-foot goalpost, will the ball make it over if this particular team member kicks it?

No. The ball reaches a max height of 16 ft.  
The goal post is 17 ft high.

What is the average rate of change of the football's height from the moment it reaches its maximum height to the moment it hits the ground?

$(1, 16)$   
↑  
 $x_1, y_1$

$(2, 0)$   
↑  
 $x_2, y_2$

$$\frac{0 - 16}{2 - 1} = \frac{-16}{1} = -16$$

