Name: ______________________ Date: ______________________ Hour: _____Alg 1_____

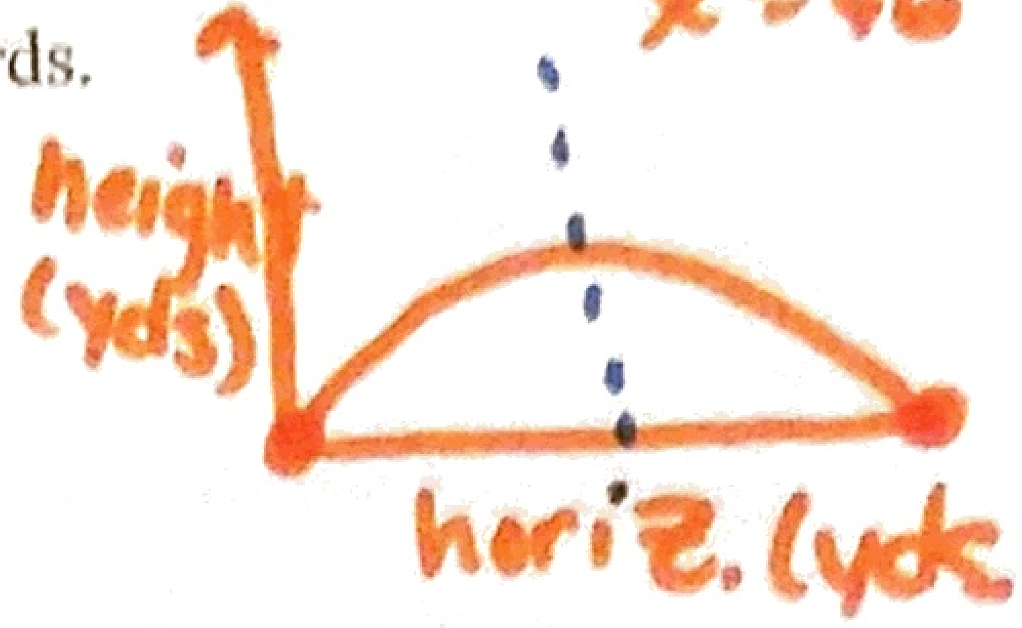
Unit 7C Day 28: Applications of quadratics in intercept form

Focus Question: How do I use a quadratic in intercept form?

$x=0$ or $x-46=0$
$+46\ +46$
$x=46$

A. The path of a kicked football can be modeled by the function $f(x)=-0.026x(x-46)$ where x is the horizontal distance in yards and $f(x)$ is the corresponding height in yards.

1) How far was the ball kicked?



dist. btwn x int.

$46-0=\boxed{46\text{ yds}}$

2) What is the maximum height of the ball in yards? In feet?

y part of vertex a.o.s. $x=\frac{p+q}{2}$ $\frac{46+0}{2}$ $x=23$

$f(23)=-0.026(23)(23-46)$ $\boxed{=13.754\text{ yds.}}$

3ft in 1 yd.
$13.754\cdot 3=\boxed{41.262\text{ ft}}$

3) If this was a 40 yard field goal attempt and the height of the cross bar is 10 feet, would the kicker have made or missed the field goal (assume his aim was good and between the goal posts)?

$f(40)=-0.026(40)(40-46)$
$=6.24$ yds

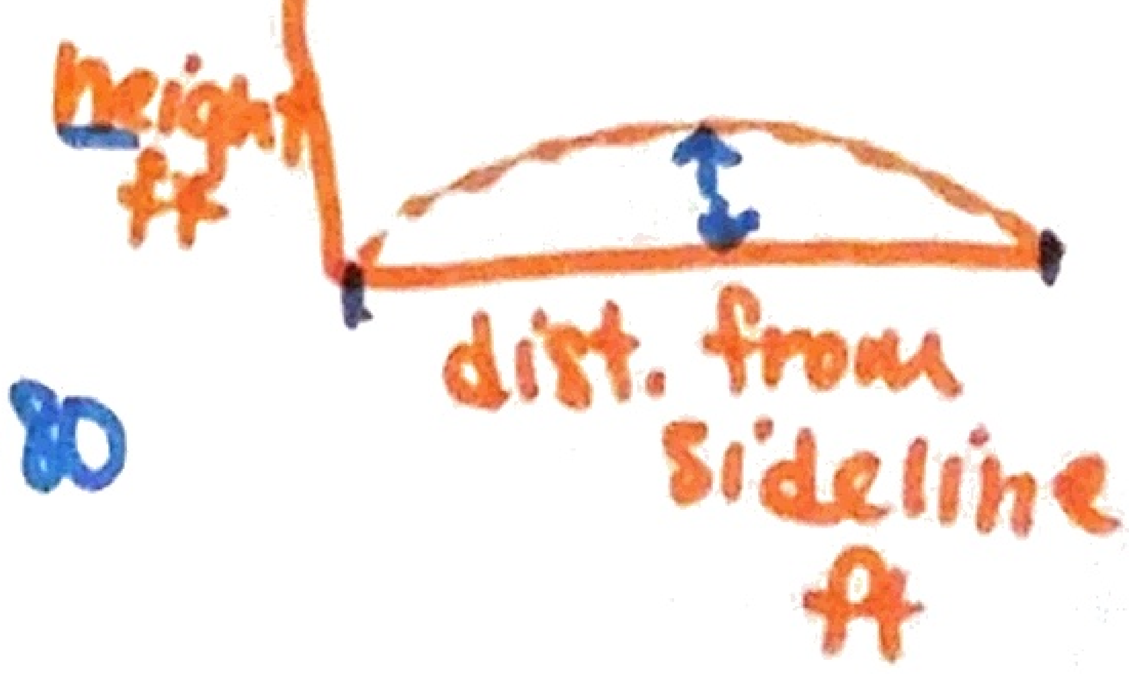
Is 6.24 yds > 10 ft.
18.7 ft > 10 ft.

Yes! He makes the field goal.

B. Although a football field appears to be flat, its surface is actually shaped like a parabola so that rain runs off to both side lines. The cross section of a field with synthetic turf can be modeled by the function $h(x)=-0.000234x(x-160)$ where x, which represents the distance from the sideline, and h, which represents height, are both measured in feet.

$x=0$ or $x-160=0$ $x=160$

1) How much higher is the center of a football field than the sidelines?



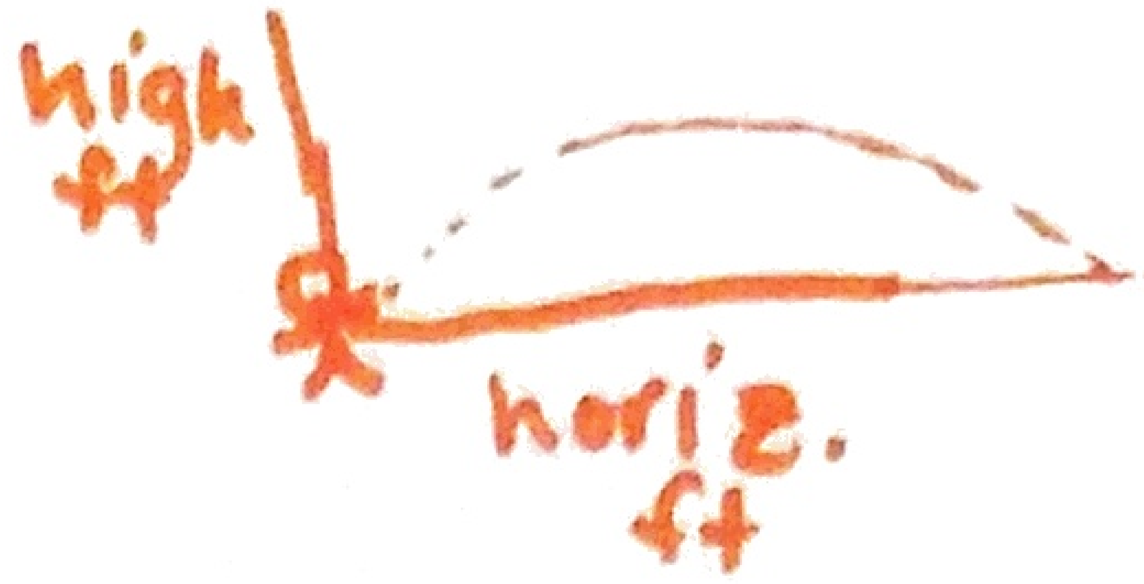
y part of vertex a.o.s. $x=\frac{160+0}{2}$ $x=80$

$h(80)=-0.000234(80)(80-160)$
≈ 1.4976 ft

2) How wide is a football field? dist. btwn x int. $160-0=\boxed{160\text{ ft}}$

C. Babe Ruth is a famous New York Yankee's slugger. One of his hits can be modeled by the function $h(d) = -0.00002(2d+73)(4d-1981)$ where h is the height of the ball and d is the horizontal distance it's been hit in feet.

1. How high was the ball off the ground when he hit it? y int



$h(0) = -0.00002(2(0)+73)(4(0)-1981)$
$= -0.00002(73)(-1981)$
$= 2.89226$ ft

2. In 1923 the outfield wall up the right field line was 295 feet from home plate and had a height of 10 feet. Would this hit have been a homerun?

$h(295) = -0.00002(2(295)+73)(4(295)-1981)$
$= 10.62126$ ft.

Is $10.62126 > 10$ Yes! It's a homerun.

3. The straight away center field fence was 520 feet from home plate. How far from the fence would the ball have hit the ground? $h(d)=0$ $0 = -0.00002(2d+73)(4d-1981)$

$2d+73=0$ or $4d-1981=0$
$-73\ -73$ $\quad +1981\ +1981$
$\cancel{2d=-73}$ neg dist. $\quad \frac{4d}{4} = \frac{1981}{4}$
$-\frac{73}{2}$ $d=-36.5$ $\quad d=495.25$

$520 - 495.25 = 24.75$ ft from fence

4. What was the highest the ball went in the air?

y part of vertex $x = \frac{p+q}{2}$ $\frac{-36.5+495.25}{2}$ $x=229.375$

$h(229.375) = -0.00002(2\cdot 229.375+73)(4\cdot 229.375-1981)$
≈ 11.31 ft.

D. A bottlenose dolphin jumps out of the water. The path the dolphin travels can be modeled by $h(d) = -0.2d(d-10)$, here h represents height of the dolphin in feet and d represents horizontal distance in feet.

$0 =$ $d=0$ or $d-10=0 \rightarrow d=10$

a) What is the maximum height the dolphin reaches?

y part of vertex a.o.s. $\frac{10+0}{2}$ $x=5$
$h(5) = -0.2(5)(5-10) = \boxed{5\text{ ft}}$

b) How far did the dolphin jump?

dist btwn x int.
$10-0 = \boxed{10\text{ ft}}$