Welcome!

	Assignment Effort Grade (Circle One)	Comments (What was interesting or challenging?)
Monday Date: 3/19 Topic: Nothing due - Quiz 6.1 was Friday	0 1 2	
Tuesday Date: _____ Topic:_____	0 1 2	
Wednesday Date: _____ Topic:_____	0 1 2	
Thursday Date: _____ Topic:_____	0 1 2	
Friday Date: _____ Topic:_____	0 1 2	

Warm-up: Solve the quadratic equations.

(Square roots) **METHODS** (Factoring)

$x^2 + 4 = 54$

$-4 \quad -4$

$\sqrt{x^2} = \sqrt{50}$

$x = \pm\sqrt{25 \cdot 2}$

$\boxed{x = \pm 5\sqrt{2}}$

$x^2 + 2x = 8$

$-8 \quad -8$

$x^2 + 2x - 8 = 0$

$(x+4)(x-2) = 0$

$x+4=0 \quad x-2=0$

$\boxed{x=-4, x=2}$

Class Plan:

1. Warm-up ✓
2. Football Application
3. Solving Quadratics Method
4. Practice

Football Application:

A football is thrown from a quarterback...
and it isn't caught!!!

x: distance from QB (yards)

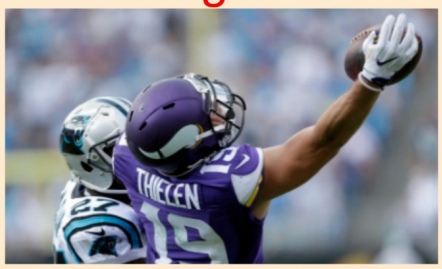
y: height of football (feet)

$$y = -.025x^2 + x + 5$$

Sketch a graph of the scenario.

At what height is the ball thrown?

At what point did the ball hit the ground?



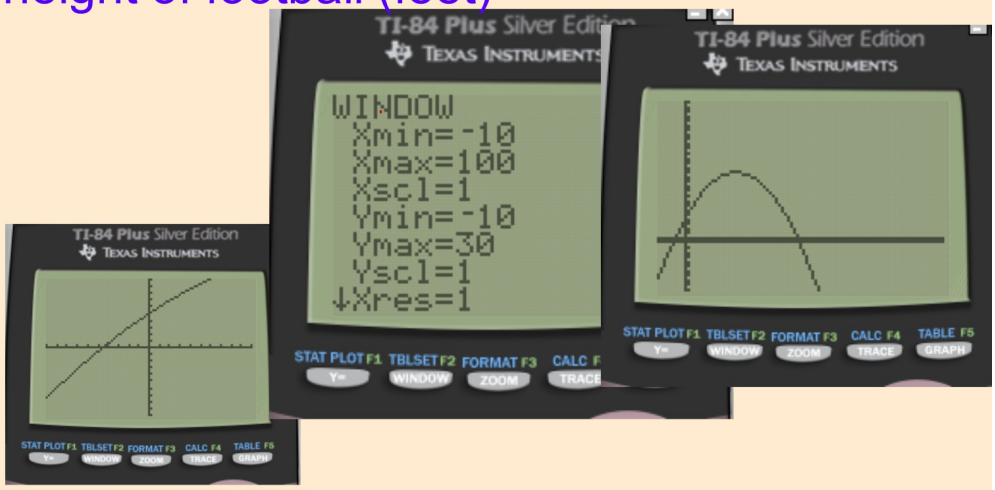
At what height is the ball thrown? 5 feet

$$y = -.025x^2 + x + 5$$

y-int

x: distance from QB (yards)

y: height of football (feet)

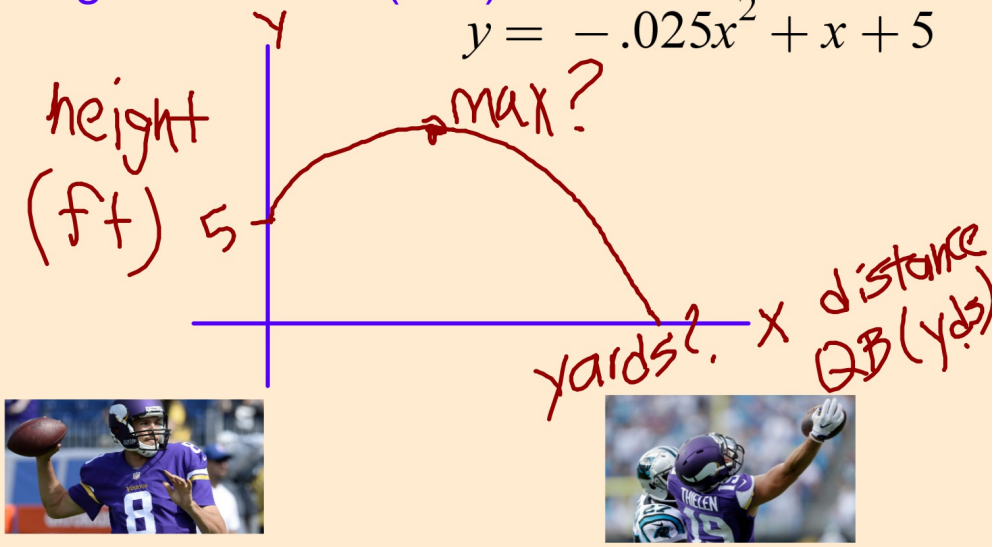


Sketch a ***rough*** graph of the scenario. (no scale necessary at this point....)

x: distance from QB (yards)

y: height of football (feet)

$$y = -.025x^2 + x + 5$$

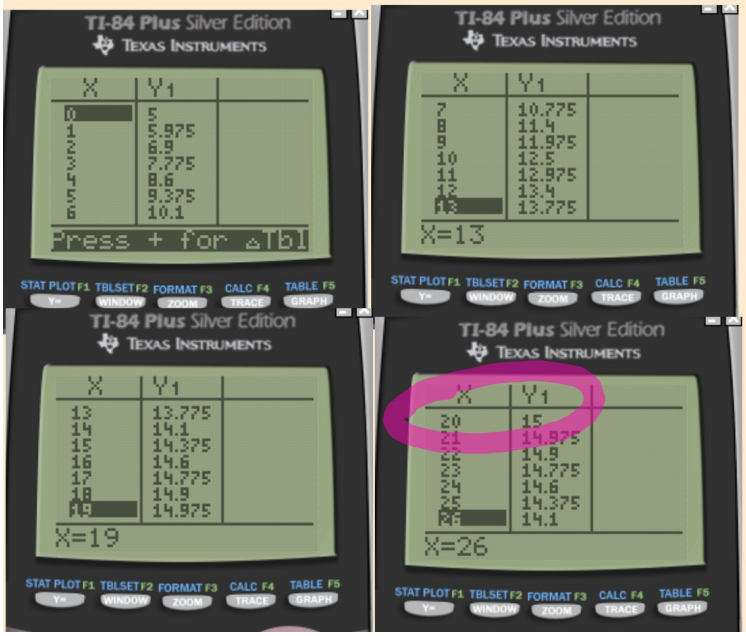


Where was the ball at its highest point?

x: distance from QB (yards)

y: height of football (feet)

$$y = -.025x^2 + x + 5$$



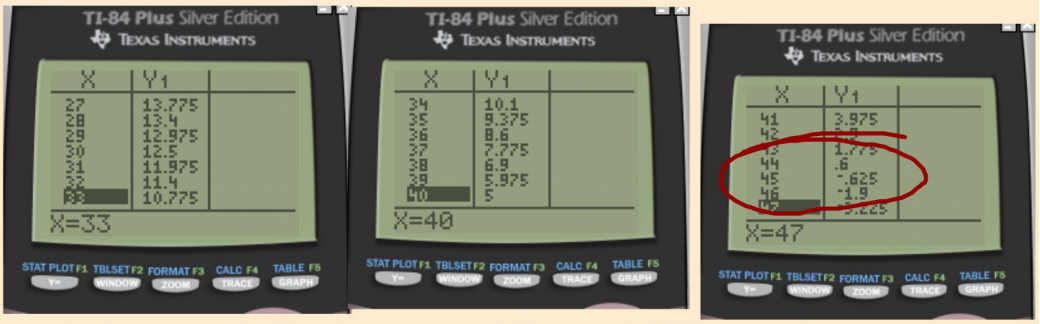
Max: (Vertex)

(20 yds, 15 feet)

After how many yards did the ball hit the ground? (What is this point on a graph?

x: distance from QB (yards)

y: height of football (feet) $y = -.025x^2 + x + 5$



x-intercept: between 44 and 45 yards

Is there another x-intercept?

How can we find both more precisely?

To solve algebraically for when the ball hit the ground... we need the quadratic formula!

$y = -.025x^2 + x + 5$ a= -.025, b= 1, c= 5

$$x = \frac{-1 \pm \sqrt{(1)^2 - 4(-.025)(5)}}{2(-.025)}$$

$$X = \frac{-1 \pm 1.5}{-.05}$$

$$X = \frac{-1 \pm 1.225}{-.05}$$

$$x = \frac{-1 + 1.225}{-.05}$$

$x \approx -4.5$

$$x = \frac{-1 - 1.225}{-.05}$$

$x \approx 44.5$ yards

Quadratic Formula:

for solving $ax^2 + bx + c = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Given any quadratic equation, the quadratic formula can solve for all values of *x*
(real and not real)

To solve algebraically for when the ball the ground... we need the quadratic formula!

$$y = -.025x^2 + x + 5$$

$a = -.025 \quad b = 1 \quad c = 5$

$$x = \frac{-(1) \pm \sqrt{(1)^2 - 4(-.025)(5)}}{2(-.025)}$$

$$x = \frac{-1 \pm \sqrt{1 + .5}}{-.05}$$

$$x = \frac{-1 + \sqrt{1.5}}{-.05} \qquad x = \frac{-1 - \sqrt{1.5}}{-.05}$$

$x \approx -4.5$ yds

$x \approx 44.5$ yds

*Real life, FIND decimal values.

Criterion D: Real Life Application

Is the solution realistic?

Is the solution accurate?

What method did we use and why?

Is this a realistic method to use in this situation?

Criterion D: Real Life Application

Is the solution realistic?

yes → A football player (pro) could throw half the field

Is the solution accurate? (RECORD: 80 yds)

depends on how the equation was produced

ball rolls

What method did we use and why?

quadratic formula → We can't factor → cannot take sq. roots

Is this a realistic method to use in this situation?

NO → watch film & the field is marked

Quadratic Formula Rap:

"Opposite of b plus or minus square root. B-squared minus 4ac is the TRUTH! Put it all over 2a - that's what I'm saying! Now you know the quadratic equation....."

Quadratic Formula:
"Pop Goes the Weasel":

"X equals negative b,
plus or minus the square root,
b-squared minus 4ac,
all over 2a"

Example: Solve the Quadratic.

$2k^2 - 7k + 5 = 0$ $\qquad ax^2 + bx + c = 0$

1. Identify coefficients a,b,c
2. Plug values into the Quadratic Formula

3. Evaluate. Be mindful of negatives!

Example: Solve the Quadratic.

$2k^2 - 7k + 5 = 0$ $\qquad ax^2 + bx + c = 0$

1. Identify coefficients a,b,c $a=2 \quad b=-7 \quad c=5$
2. Plug values into the Quadratic Formula

$$x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(2)(5)}}{2(2)}$$

3. Evaluate. Be mindful of negatives!

$$x = \frac{7 \pm \sqrt{49 - 40}}{4} \qquad x = \frac{7 \pm \sqrt{9}}{4}$$

$$x = \frac{7+3}{4} \qquad x = \frac{7-3}{4}$$

$$x = \frac{5}{2}, \quad x = 1$$

Do we need the Quad formula to solve this...?
Use two methods to show (*verify*) it works.

Solve each quadratic equation.

$$n^2 - 2n - 24 = 0$$

Solve each quadratic equation.

$a=1 \quad b=-2 \quad c=-24$

$$n^2 - 2n - 24 = 0$$

$4 \cdot -6 = -24$, $4 + (-6) = -2$

$(X+4)(X-6)=0$

$X+4=0 \quad X-6=0$

$X=-4, X=6$

$$X = \frac{-(-2) \pm \sqrt{(-2)^2-4(1)(-24)}}{2(1)}$$

$$X = \frac{2 \pm \sqrt{4+96}}{2}$$

$$X = \frac{2+10}{2} \quad X = \frac{2-10}{2}$$

$X=6 \quad X=-4$

Same solutions are found. Factoring is more efficient here.

Exercises... Solving Quadratics - The Quadratic Formula

1) When do we use the Quadratic Formula?

Avoid the quadratic formula unless you can **FACTOR** or **TAKE SQUARE ROOTS**

Exercises...

Solving Quadratics - The Quadratic Formula

Solutions

1)

2) $\{-2, -7\}$

3) $\{1, -3\}$

4) $\{-4, -7\}$

5) $\{3, -3\}$

6) $\left\{2, -\frac{1}{2}\right\}$

7) $\{-4 + 2\sqrt{3}, -4 - 2\sqrt{3}\}$

8) $\{1 + 2i, 1 - 2i\}$

9) $\left\{\frac{i\sqrt{7}}{3}, -\frac{i\sqrt{7}}{3}\right\}$

10) $\{-1 + 2i\sqrt{2}, -1 - 2i\sqrt{2}\}$

11) $\left\{\frac{6 + 4i\sqrt{6}}{11}, \frac{6 - 4i\sqrt{6}}{11}\right\}$

12) $\left\{\frac{7}{2}, -6\right\}$

13) $\left\{\frac{-2 + 2\sqrt{7}}{3}, \frac{-2 - 2\sqrt{7}}{3}\right\}$

14) $\left\{5, -\frac{21}{5}\right\}$

15) $\{1, -1\}$

Solve each quadratic equation.

2) $v^2 + 9v + 14 = 0$

3) $x^2 + 2x - 3 = 0$

$(x+3)(x-1)=0$

$x=-3, 1$

$+9, 7$

4) $x^2 + 11x + 28 = 0$

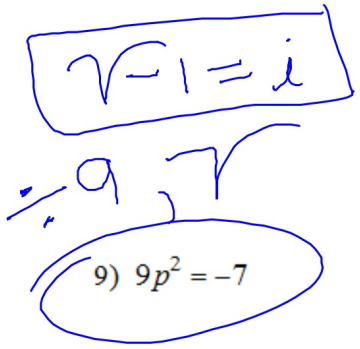
5) $x^2 - 9 = 0$

$x^2 = 9$

$x = 3$ and -3

6) $6k^2 = 6 + 9k$

7) $x^2 + 8x = -4$



8) $x^2 + 5 = 2x$

9) $9p^2 = -7$

10) $v^2 + 2v = -9$

11) $11p^2 - 12p = -12$

12) $2b^2 + 5b - 42 = 0$

13) $9n^2 + 12n - 24 = 0$

14) $5b^2 - 4b - 105 = 0$

15) $4x^2 - 4 = 0$