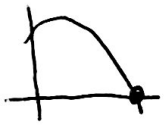
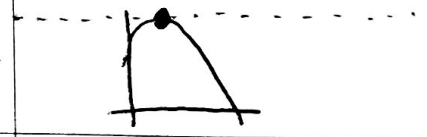
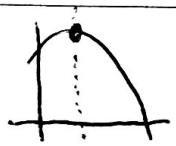
6.3 Writing Equations from Word Problems

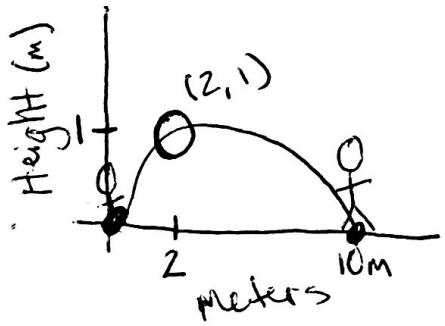
Today we will combine the skills we have learned in the first two days of the unit to write quadratic equa from word problems. Let's remind ourselves of the key words or phrases that indicate the different key features of a parabola:

Critical Part	Graph	Key words
~~Intercept~~ y-intercept		Starting height, Initial height
~~Intercepts~~ x-intercepts		Hit the ground
~~part of vertex~~ y-part of vertex		Max height, ∩ Min height ∪
~~part of vertex~~ x-part of vertex		Time to max/min height

Steps for writing equations from word problems

1) Draw a picture
2) Choose your form based on the points
3) Plug in points and solve for a to get equation

1) Sean is kicking a soccer ball to his dad who is 10 meters away. If after 2 meters, the ball is 1 meter in the air, write the equation the represents the path of the ball.



x-int: $(\underset{p}{0},0), (\underset{q}{10},0)$ Point: $(\underset{x}{2},\underset{y}{1})$

$y = a(x-p)(x-q)$

$y = a(x-0)(x-10)$

$1 = a(2)(2-10)$

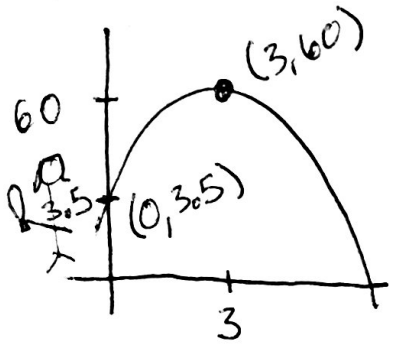
$1 = a(2)(-8)$

$\frac{1}{-16} = \frac{-16a}{-16}$

$-\frac{1}{16} = a$

$$y = -\frac{1}{16}x(x-10)$$

2) Mae hit a softball so that its maximum height was 60 ft at 3 seconds after she hit it. If she hit the ball 3.5 feet above the ground, what is the equation for path of the ball in terms of seconds?



Vertex: $(3, 60)$ (h, k) Point: $(0, 3.5)$ (x, y)

$y = a(x-h)^2 + k$

$y = a(x-3)^2 + 60$

$3.5 = a(0-3)^2 + 60$

$-60 \quad -60$

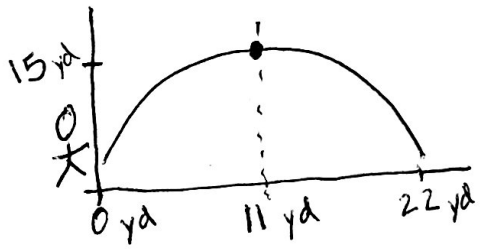
-60

$\frac{-56.5}{9} = \frac{9a}{9}$

$-6.28 = a$

$y = -6.28(x-3)^2 + 60$

3) Alex is kicking a field goal. If the ball landed 22 yards away, what is the equation for the path of the ball in terms of seconds if the maximum height the ball reaches is 15 yards?



x-int: $(0, 0)$, $(22, 0)$ (x, y) Vertex: $(11, 15)$ (h, k)

$y = a(x-h)^2 + k$

$y = a(x-11)^2 + 15$

$0 = a(0-11)^2 + 15$

$-15 \quad a(-11)^2 \quad -15$

$\frac{-15}{121} = \frac{121a}{121}$

$\frac{-15}{121} = a$

$y = \frac{-15}{121}(x-11)^2 + 15$

4) A seagull dives in the water to catch a fish. The bird dives from a rock that is 4 ft tall and submerges to a depth of 5ft at 2 seconds into its dive. Write an equation for the path of the bird in terms of seconds.