



Intro to



PARABOLAS

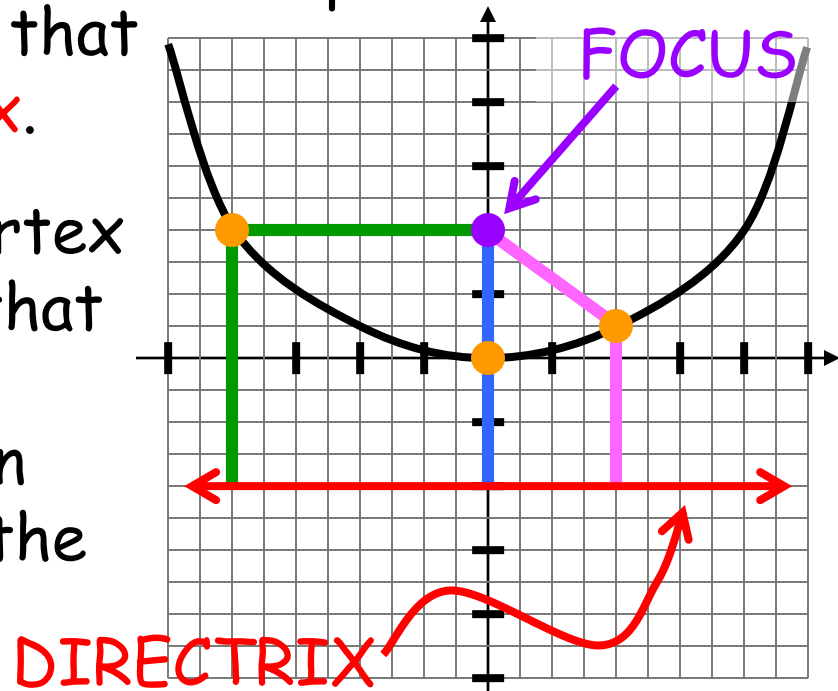


On a cartesian plane, the set of points that describe a parabola is defined using a point called the **FOCUS** and a line called the **DIRECTRIX**.

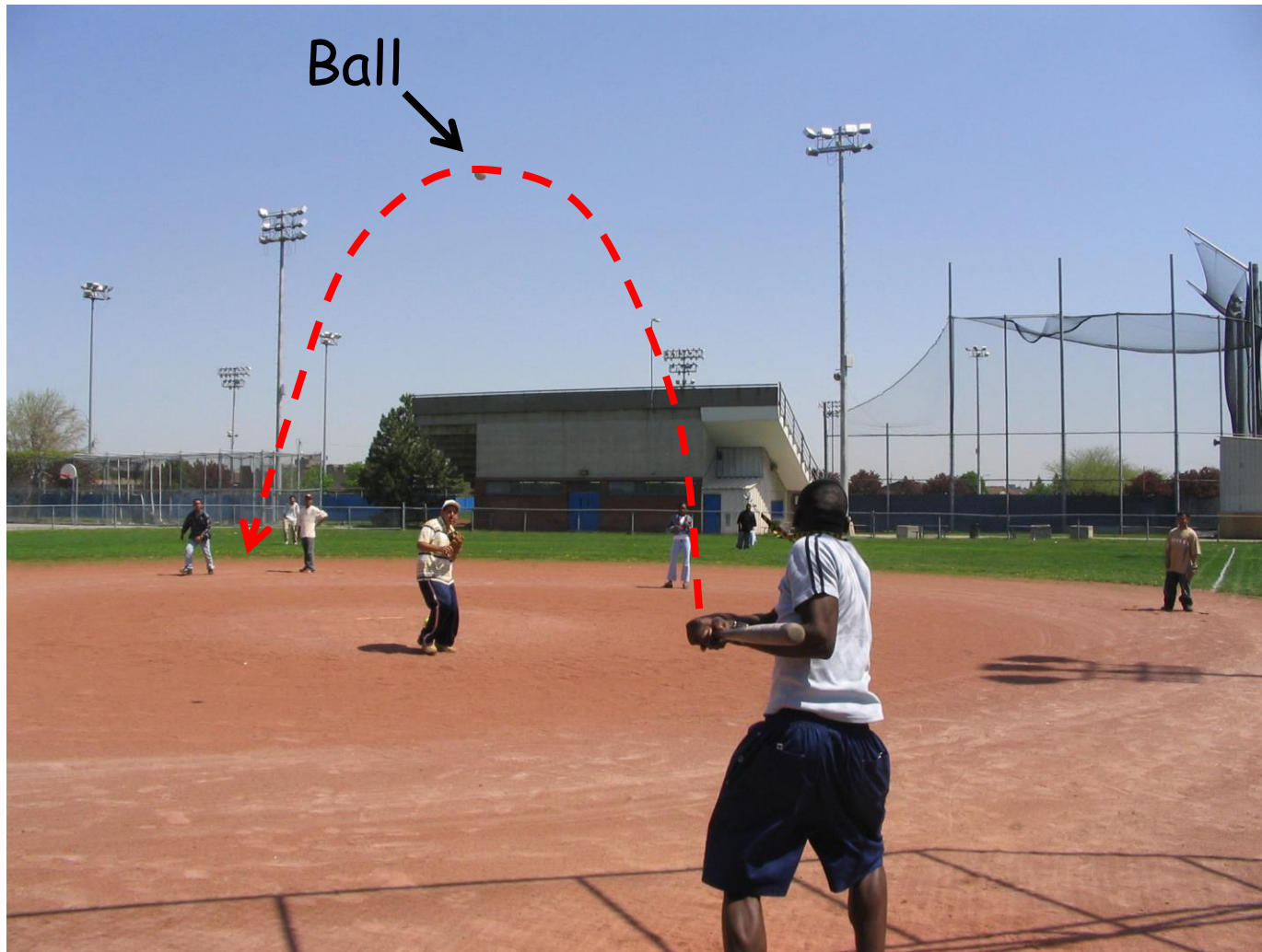
The distance of a given **point** on the parabola from the **focus** is equal to the distance of that same **point** to the **directrix**.

When that point is the vertex (the tip of the parabola) that distance has a special significance. It defines an important parameter for the parabola known as ' p '.

The distance from the focus to the vertex or from the directrix to the vertex is ' p '. This value plays a role in defining the equation of the parabola.



Parabolas are the shapes that define projectile motion (the path that a ball takes when it is hit or thrown into the air).



Parabolas show up in the architecture of bridges.



The parabolic shape is used when constructing mirrors for huge telescopes, satellite dishes and highly sensitive listening devices.

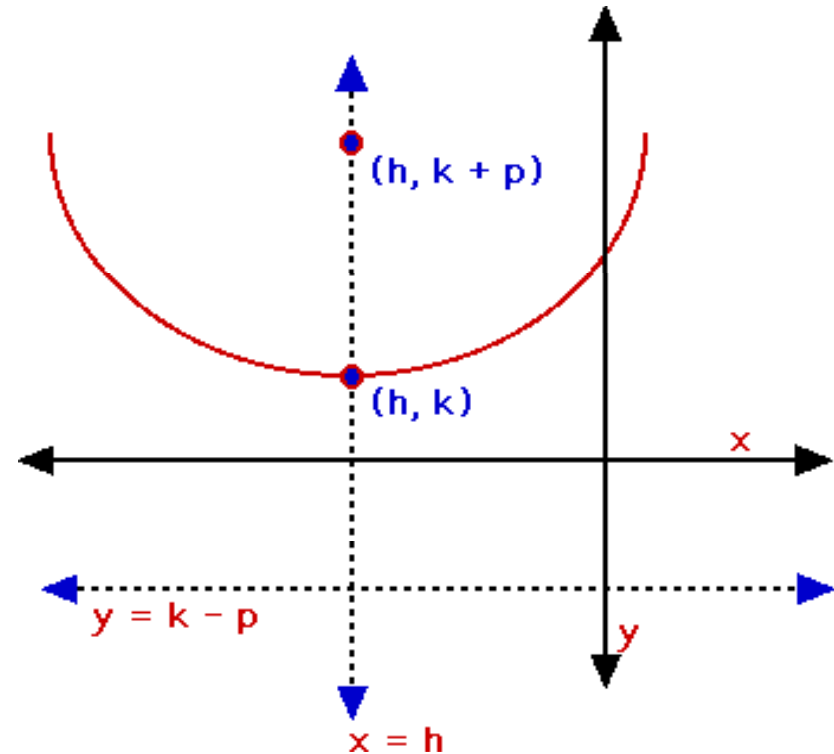


The Standard Form of the Equation with Vertex (h, k)

For a parabola with **vertex at (h, k)** , the standard form is ...

$$y = \frac{1}{4p} (x - h)^2 + k$$

- The equation of the **axis of symmetry** is $x = h$.
- The coordinates of the **focus** are $(h, k \pm p)$.
- The equation of the **directrix** is $y = k \pm p$.
- When p is **positive**, the parabola opens **upward**.
- When p is **negative**, the parabola opens **downward**.



Write the equation of the parabola with vertex $(-2, 3)$ and focus at $(-2, 6)$.

Find the equation of the parabola that has vertex $(3, -7)$
and directrix $y = -5$

Find the equation of the parabola with focus $(0, 2)$ and directrix $y = -2$

State the vertex, focus, directrix and axis of symmetry.
Draw a sketch.

$$-8(y + 3) = (x - 2)^2$$

An archway in front of a school is in the shape of a parabola. The top of the arch is the vertex $(0,0)$. The school seal is at the focus, 2.5 feet below the vertex, and the arch is 18 feet wide at the ground. Write an equation that represents the arch?

What is the height from the top of the arch to the ground?

THE END

