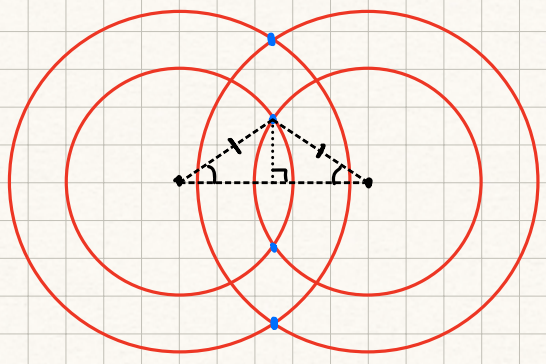
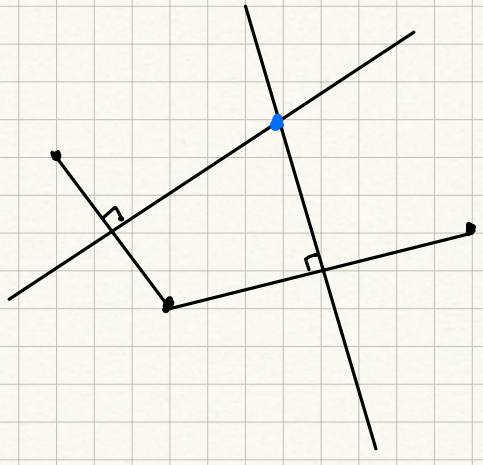
Ex: Locus of points equidistant from 2 points.

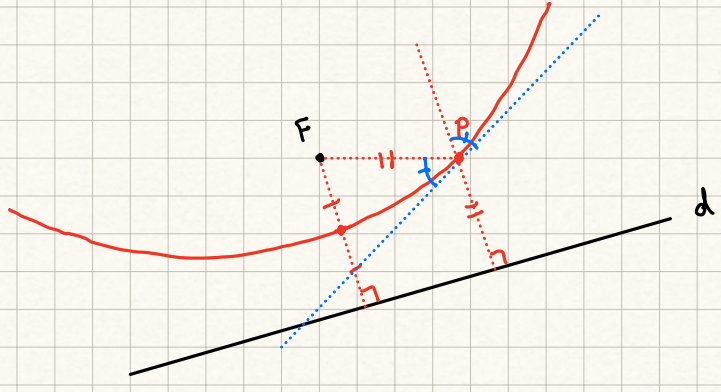


Perpendicular Bisector

Ex: Locus of points equidistant from 3 given points



3. **Parabola** – locus of points equidistant from a given point (focus) and a given line (directrix).



① **Who Cares?:** A parabola has the property that a line from F to any point P on the parabola makes the same angle w/ the parabola as line from P to d (⊥).

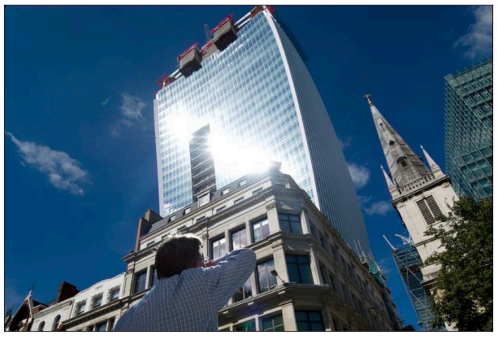
- satellite dish
- flashlight, headlight, spotlight

- distance microphones
- solar fields
- solar cooker
- radio telescopes

National Geographic Daily News

How Sunlight Reflected Off a Building Can Melt Objects

A new skyscraper in London exemplifies the phenomenon.



A man reacts to a shaft of intense sunlight reflected from the glass windows of the "Walkie Talkie" tower in central London.

The Arecibo Observatory in Puerto Rico as seen before its collapse. NAIC Arecibo Observatory/NSF

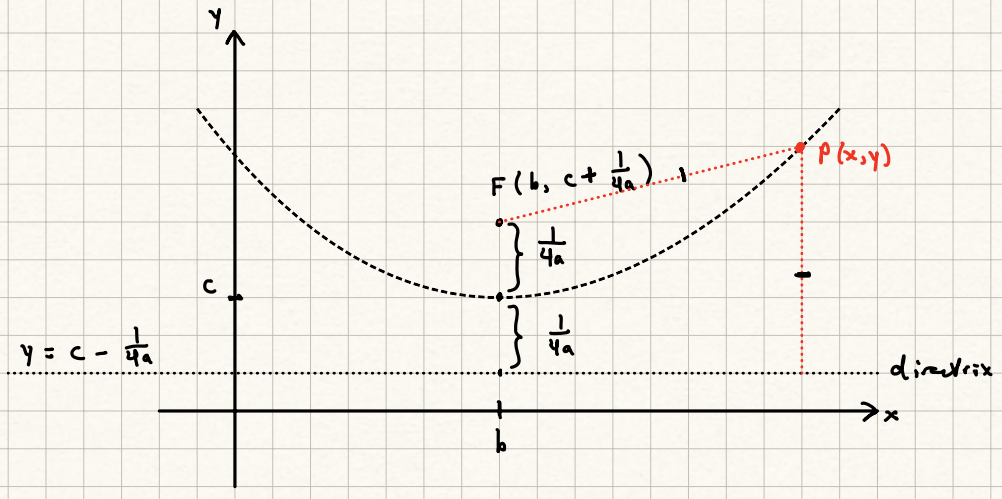
- Newton: parabolic motion for an object in free fall near surface of earth.

$$h'' = -32$$

$$h' = -32t + V_0$$

$$h = -16t^2 + V_0 t + h_0$$

② **Analytic Geometry:**



By definition, if P is going to be on parabola,

$$d(P, F) = d(P, \text{directrix})$$

$$\sqrt{(x-b)^2 + \left(y-c-\tfrac{1}{4a}\right)^2} = y-\left(c-\tfrac{1}{4a}\right)$$

$$(x-b)^2 + \left(y-c-\tfrac{1}{4a}\right)^2 = \left(y-\left(c-\tfrac{1}{4a}\right)\right)^2$$

$$(x-b)^2 = \left(y-\left(c-\tfrac{1}{4a}\right)\right)^2 - \left(y-c-\tfrac{1}{4a}\right)^2$$

$$\vdots$$

$$(x-b)^2 = \frac{y-c}{a}$$

$$y = a(x-b)^2 + c$$