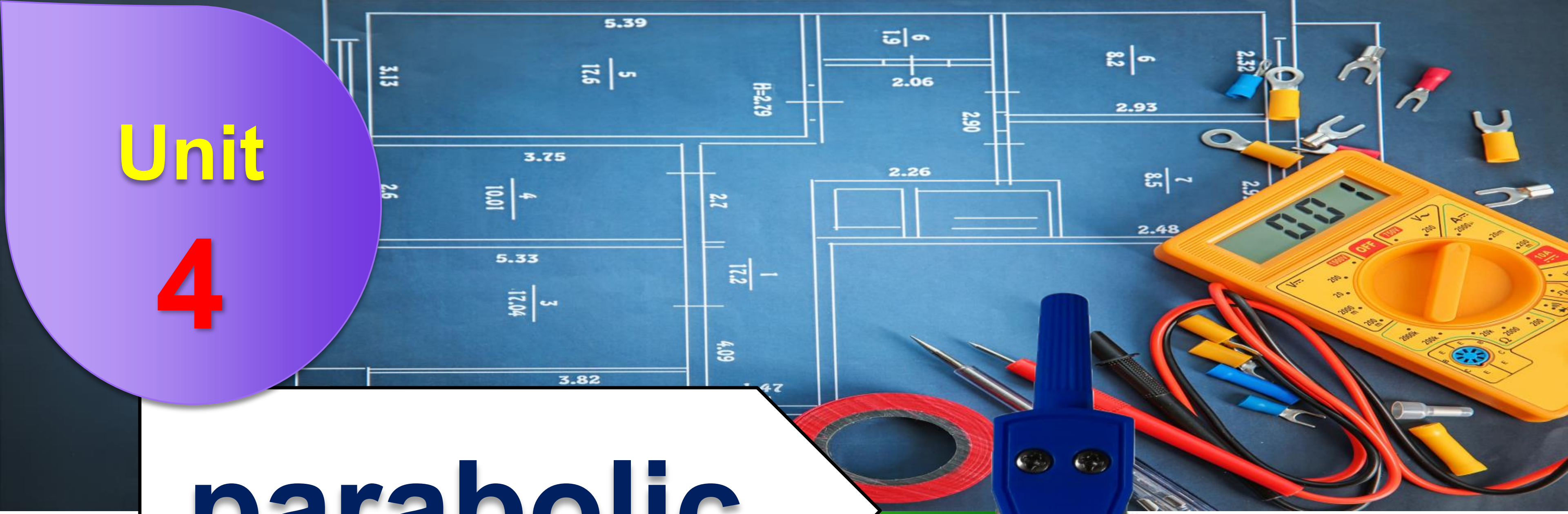
Unit
4

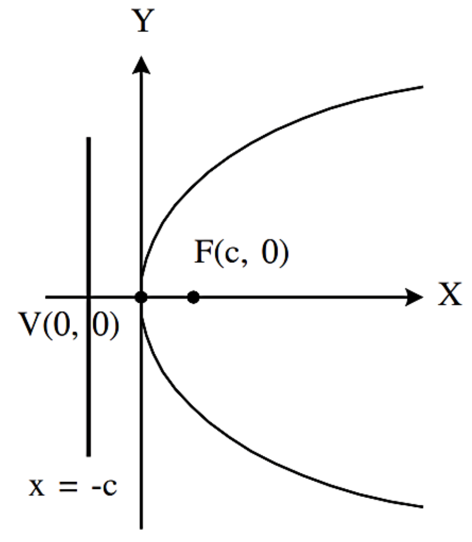


parabolic

A parabola with the vertex at the origin. The focal point is on the X or Y axis.

4

Type 1: Parabola opens to the right, as shown in Figure 7.2.

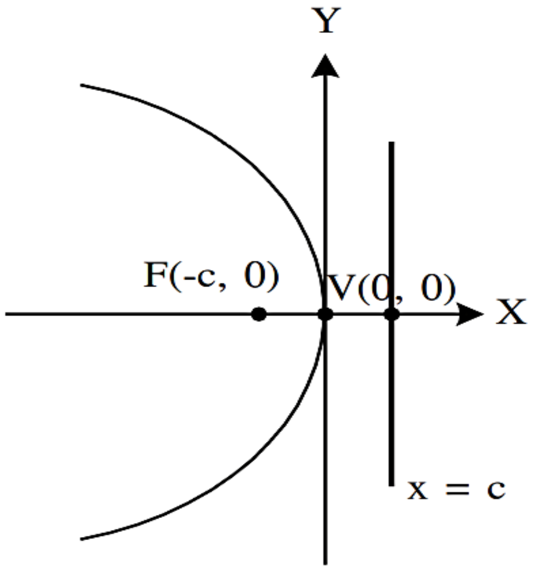


รูปที่ 7.2

The vertex is V(0, 0).The focus point is F(c, 0).The directrix is x = -c.The axis of the parabola is the x-axis and the focal length is |c| = c.

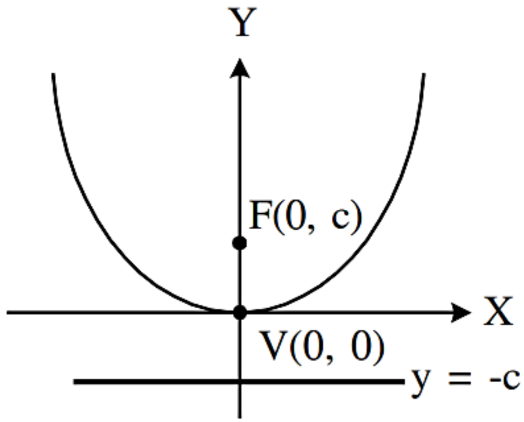
Type 2: Parabola opens to the left, as shown in Figure 7.3.

The vertex is V(0, 0).The focus point is F(-c, 0).The directrix is x = c. The axis of the parabola is the X axis.The focal length is |-c| = c.



รูปที่ 7.3

Type 3: Parabola opens at the top, as shown in Figure 7.4.



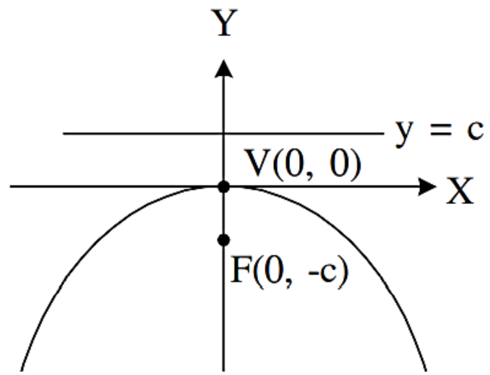
รูปที่ 7.4

The vertex is V(0, 0).The focal point is F(0, c).The directrix is y = -c.The axis of the parabola is the Y axis.The focal length is |c| = c.

4

Type 4: Parabola opens at the bottom, as shown in Figure 7.5.

The vertex is V(0, 0).The focal point is F(0, -c).The directrix is y = c.The axis of the parabola is the Y axis and the focal length is |-c| = c.



รูปที่ 7.5

Parabola with vertex at point (h, k)

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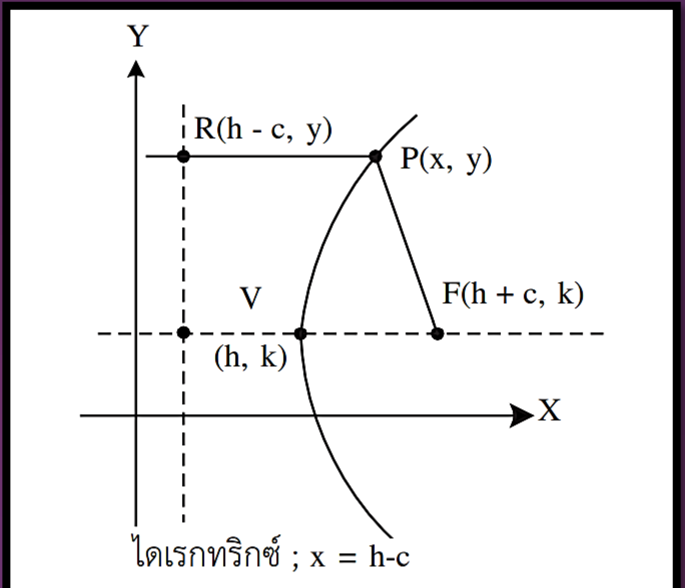
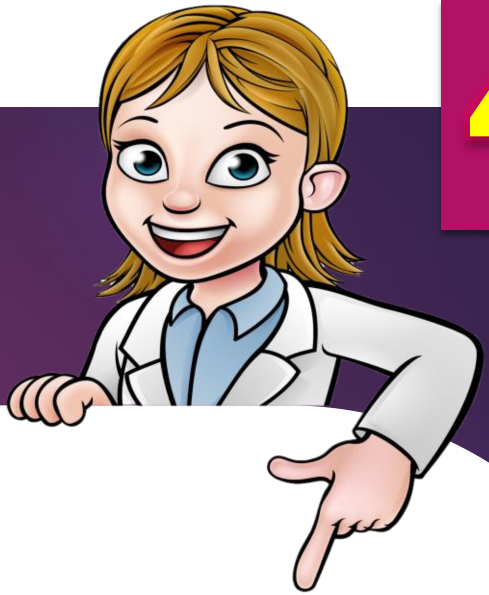


รูปที่ 7.10

From Figure 7.10, the vertex is V(h, k), the focus is F(h+c, k), the directrix is x = h- c, let P(x, y) be any point on the parabola and R is the point (h- c, y)

จะได้ $|PR| = |PF|$

$$
\begin{aligned}
x - (h - c) &= \sqrt{(x - (h + c))^2 + (y - k)^2} \\
(x - (h - c))^2 &= (x - (h + c))^2 + (y - k)^2 \\
(y - k)^2 &= (x - (h - c))^2 - (x - (h + c))^2 \\
&= x^2 - 2(h - c)x + (h - c)^2 - (x^2 - 2(h + c)x + (h + c)^2) \\
&= x^2 - 2hx + 2cx + (h - c)^2 - x^2 + 2(h + c)x - (h + c)^2 \\
&= -2hx + 2cx + h^2 - 2ch + c^2 + 2hx + 2cx - h^2 - 2ch - c^2 \\
&= 4cx - 4ch \\
&= 4c(x - h)
\end{aligned}
$$

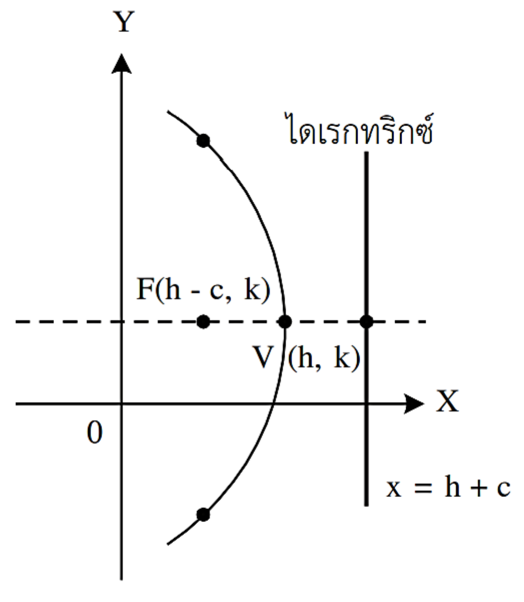


That is, the standard form equation of a right-open parabola. whose vertex is at point (h, k) is $(y-k)2 = 4c(x-h)$ when $c > 0$

or $\boxed{(y-k)2 = 4|c|(x-h)}$

- standard form equations of the left open parabola that has The vertex is at the point (h, k) which is

$$(y - k)^2 = -4 | c | (x - h)$$

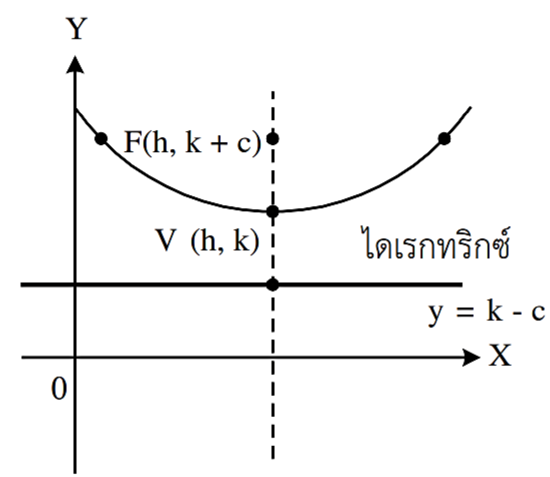


รูปที่ 7.11

- standard form equations of an open top parabola that has

The vertex is at the point (h, k) which is

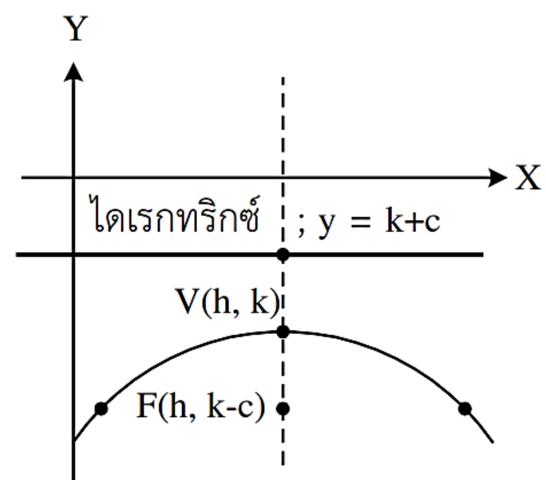
$$(x - h) \quad = \quad 4|\, c \,|(y - k)$$



รูปที่ 7.12

- standard form equations of an open parabola at the bottom that has The vertex is at the point (h, k) which is

$$(x - h)^2 \qquad = -4|c|(y - k)$$



รูปที่ 7.13

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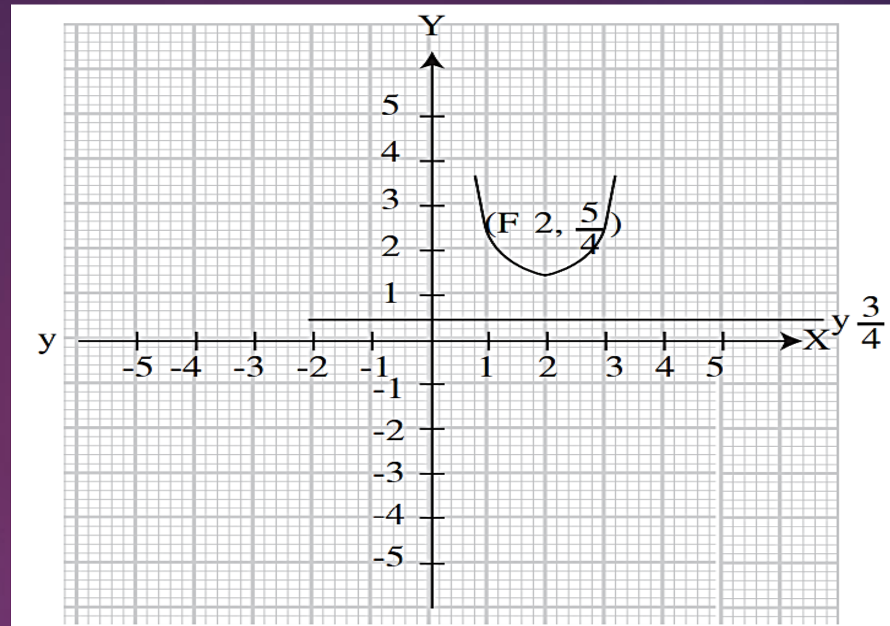
Graph of a parabola



รูปที่ 7.16

(1) When the parabolic axis is parallel to the Y axis, the equation is $x^2 + Ax + By + C = 0$ where A, B, C are constants and $B \neq 0$.

(2) When the parabolic axis is parallel to the X axis, the equation is $y^2 + Ax + By + C = 0$ where A, B, C are constants and $A \neq 0$.