Mathematics 10D

1 - Properties of Quadratics

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- Quadratics are the equations.
- Parabolas are the graphs.

There are three equations of quadratics.

1. Standard Form

$$y = ax^2 + bx + c$$

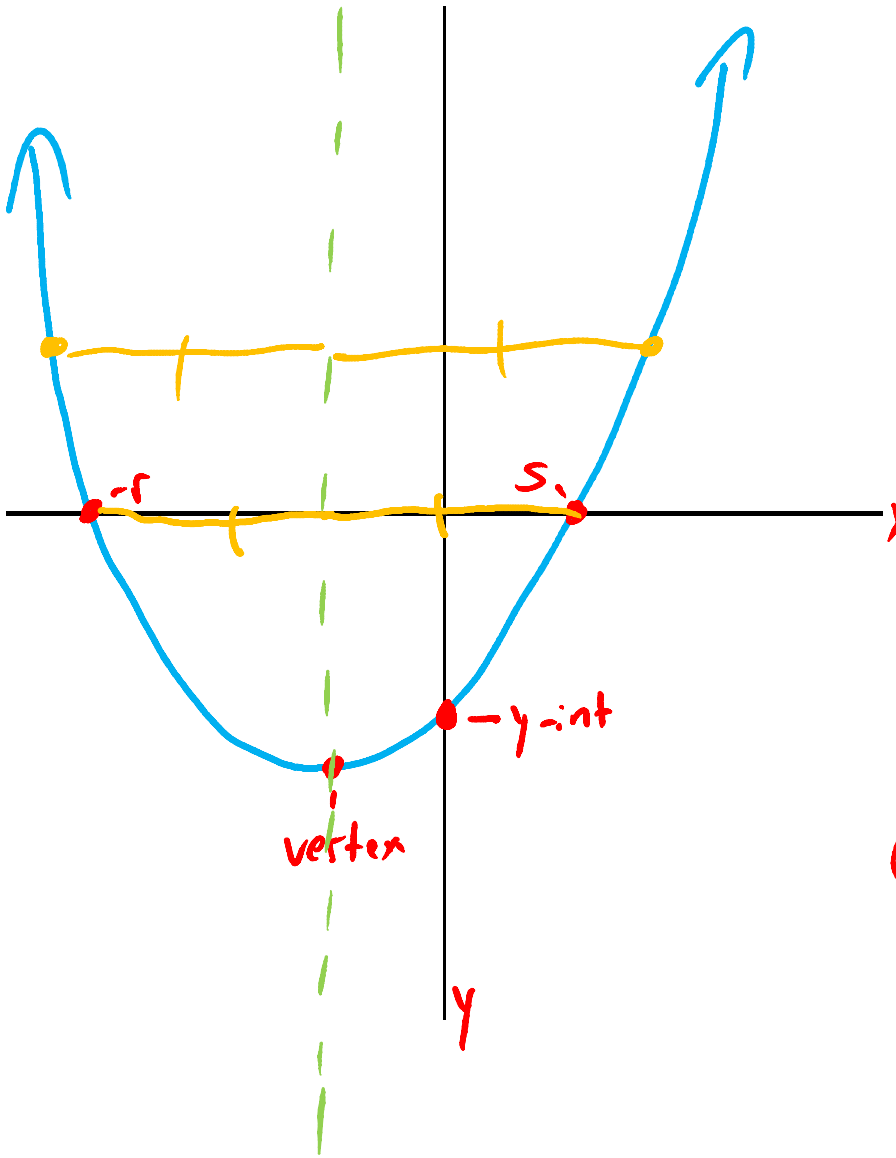
2. Zeros/Factored Form

$$y = a(x - r)(x - s)$$

3. Vertex Form

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

Properties of Parabolas



① y-int: $y = c$

② x-int: $x = r$ and $x = s$

Zeros: $(r, 0)$ and $(s, 0)$

③ Vertex: (h, k)

④ Equation of the axis of symmetry

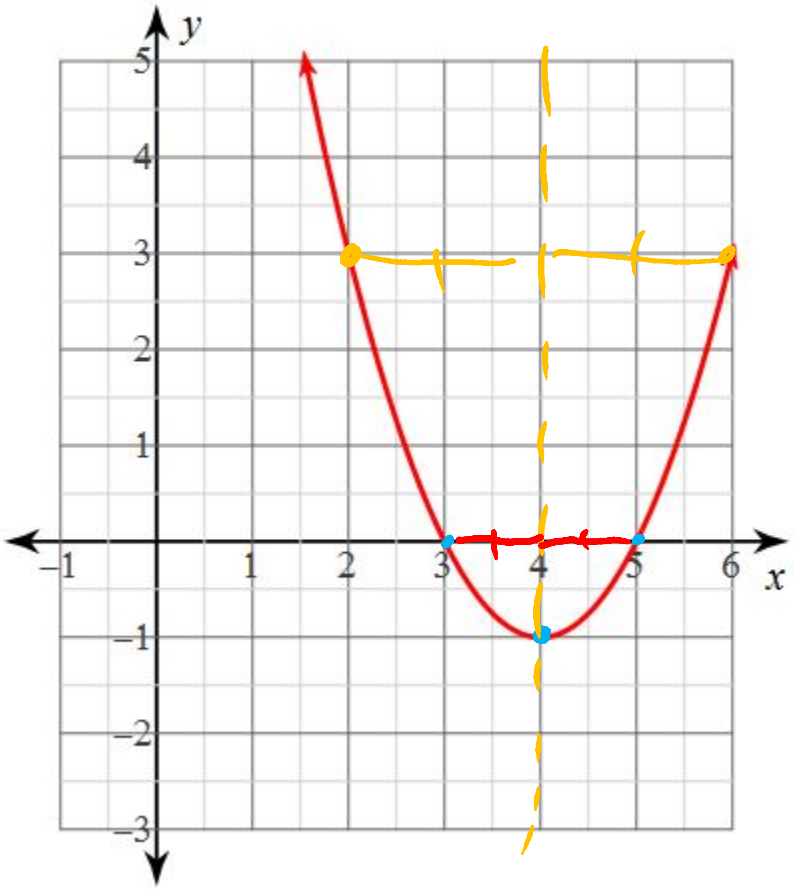
AoS: $x = h$

↳ $h = \frac{r+s}{2}$ (average)

⑤ If $a > 0$, then the parabola opens up ∴ Minimum

If $a < 0$, the parabola opens down ∴ Maximum

1) $y = x^2 - 8x + 15$



y-int: $y = 15$

x-int: (zeros): $x = 3$ and $x = 5$

vertex: $(4, -1)$ is a minimum

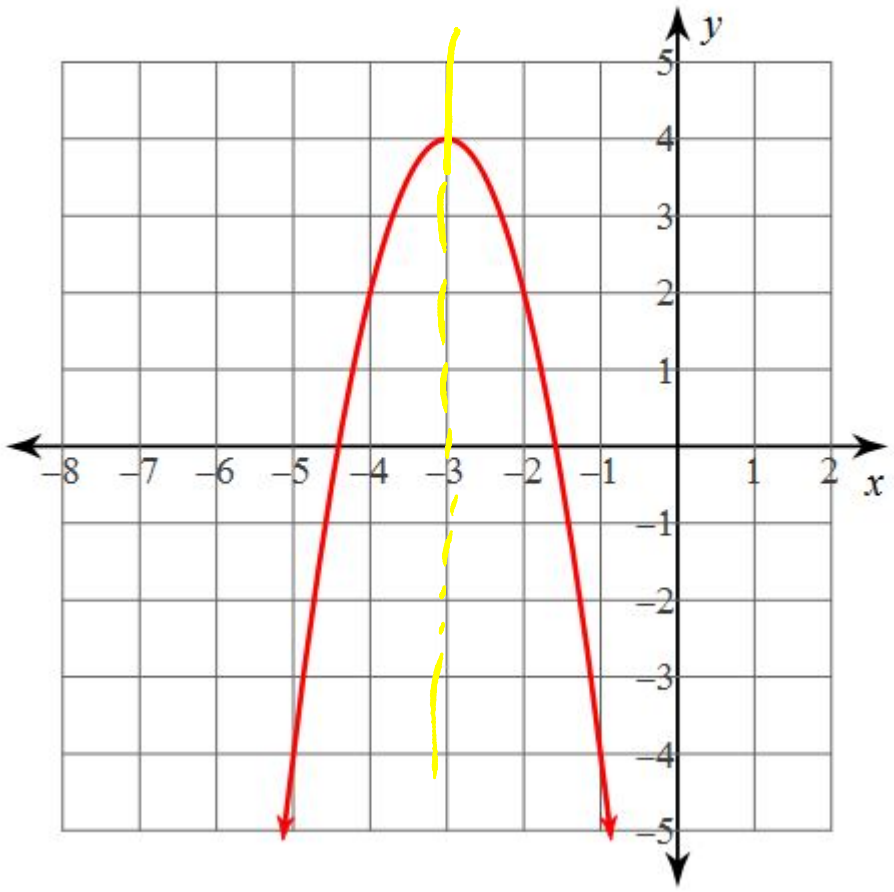
AoS: $x = 4$

$h = \frac{3+5}{2} = \frac{8}{2} = 4$

$h = \frac{2+6}{2} = \frac{8}{2} = 4$

Minimum Value: $y = -1$
(optimal)

2) $y = -2x^2 - 12x - 14$



y-int: $y = -14$

zeros: $x = -4.5$ and $x = -1.5$

vertex: $(-3, 4)$ is Maximum

AoS: $x = -3$

Max Value: $y = 4$