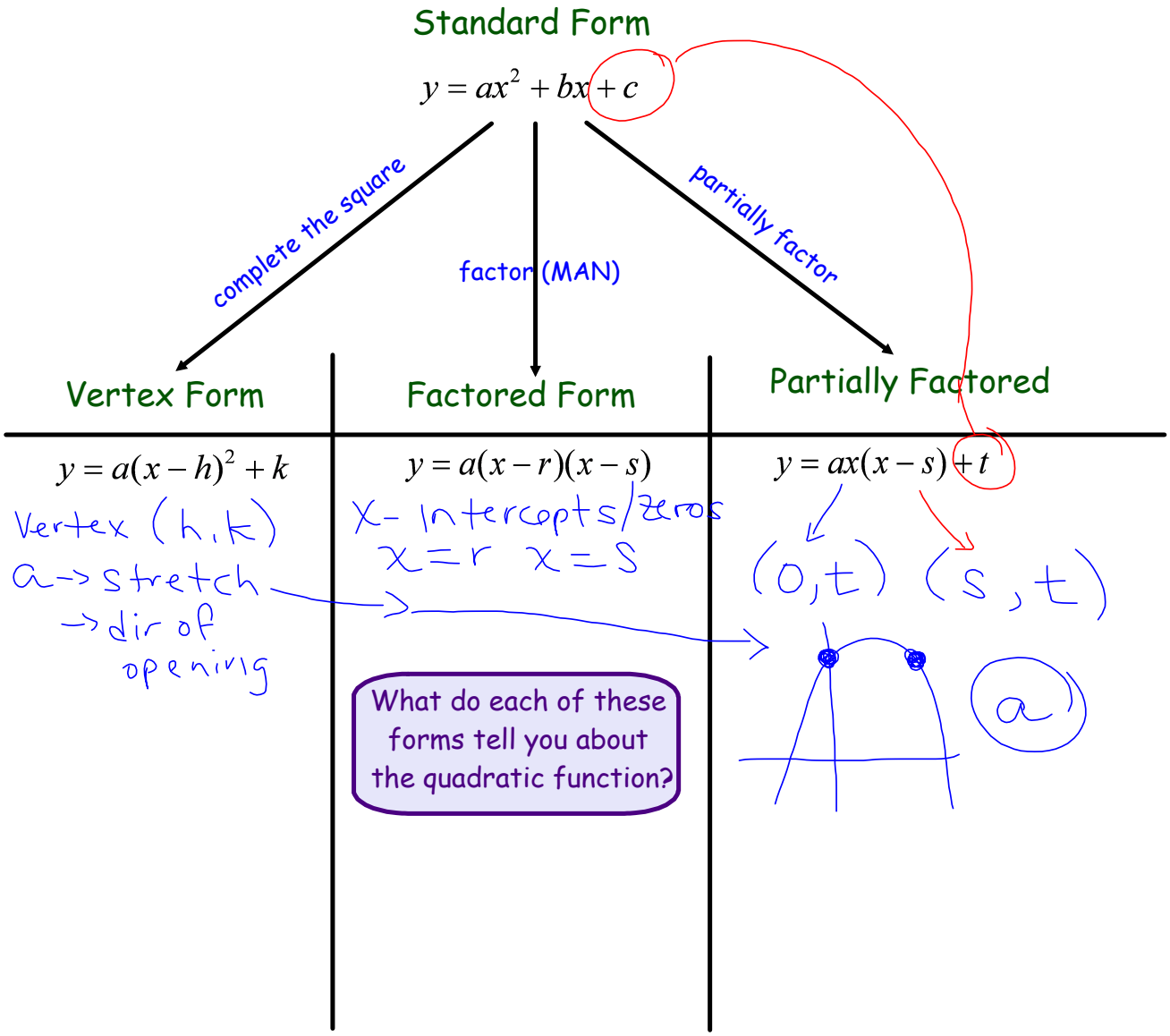
1.6 Determining a Quadratic Equation Given its Roots

Quadratics can be represented in a number of different forms:



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Ex 1: A parabola has zeros at x = 4 and x = 3. What could the equation be that models the quadratic, in factored form.

family

$y = 3(x-4)(x-3)$

$y = 287(x-4)(x-3)$

$y = 3(x-4)(2x-6) \rightarrow y = 6(x-4)(x-3)$

Ex 2: Determine the equation of the quadratic function with only one x-intercept, at x = 2, containing the point (3, 10).

(x, y)

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

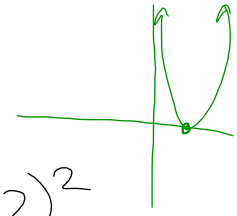
$y = a(x-2)^2$

$10 = a(3-2)^2$

$10 = a(1)^2$

$a = 10$

$\therefore y = 10(x-2)^2$



Ex 3: Find an equation of the parabola that has x-intercepts $3+\sqrt{7}$ and $3-\sqrt{7}$ that passes through the point (-5,3) (x, y)

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

$y = a[x-(3+\sqrt{7})][x-(3-\sqrt{7})]$

$y = a(x-3-\sqrt{7})(x-3+\sqrt{7})$

$3 = a(-5-3-\sqrt{7})(-5-3+\sqrt{7})$

$3 = a(-8-\sqrt{7})(-8+\sqrt{7})$

$3 = a(64 - 8\sqrt{7} + 8\sqrt{7} - 7)$

$3 = a(64-7)$

$\frac{3}{57} = \frac{a(57)}{57}$

$a = \frac{3}{57}$

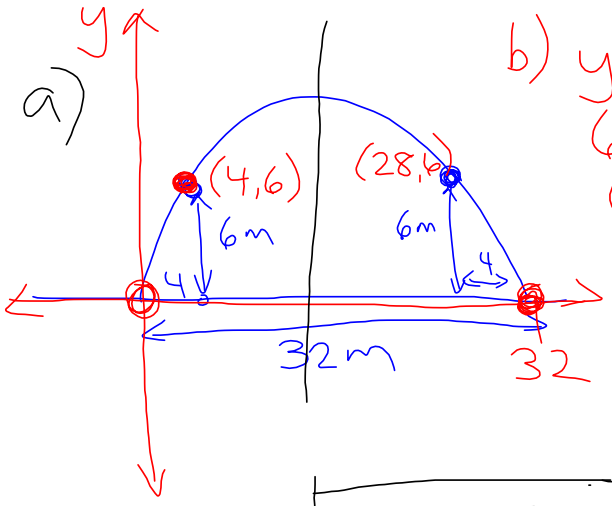
$a = \frac{1}{19}$

$y = \frac{1}{19}(x-3-\sqrt{7})(x-3+\sqrt{7})$

Ex 4: The parabolic opening to a tunnel is 32 m wide measured from side to side along the ground. At the point's are 4 m from each side, the tunnel entrance is 6 m high.

a) Sketch a diagram of the given information.
b) Determine the equation of the function that models the opening to the tunnel.
c) Find the maximum height of the tunnel, to the nearest tenth.

a)



b) $y = a(x-0)(x-32)$

$6 = a(4)(4-32)$

$6 = a(4)(-28)$

$\frac{6}{-112} = \frac{a(-112)}{-112}$

$-\frac{3}{56} = a$

$$y = -\frac{3}{56}x(x-32)$$

c) $x = \frac{0+32}{2}$

$x = 16$

$y = -\frac{3}{56}(16)(16-32)$

$y = -\frac{3}{56}(16)(-16)$

$y = \frac{96}{7}$

$y \doteq 13.7$

∴ max height of tunnel is 13.7m

HOMEWORK

p. 57 #C3, 3ac, 4ac, 5, 6ab, 7, 8a, 11c, 15, 18, 20 1.3B Handout #9, ~~10~~

Keep some for review too