BUILD-A-polynomial WORKSHOP

Find a polynomial in standard form with the following attribute(s). All coefficients need to be integers. After you build the polynomial, check your build on Desmos and make note of the attributes it has.

zeros: $x=-3$; mult:2, $x=4$

mult2

$x=-3$ $x=-3$ $x=4$

$(x+3)=0$ $(x+3)=0$ $(x-4)=0$

standard form

$(x+3)(x+3)(x-4)$

$(x^2+3x+3x+9)(x-4)$

$(x^2+6x+9)(x-4)$

$x^3+6x^2+9x-4x^2-24x-36$

$\boxed{x^3+2x^2-15x-36}$

The ***fully factored form*** of f(x) is:

$(x+3)^2(x-4)$

The ***x-intercepts*** are:

$(-3,0)$ $(4,0)$

The ***y-intercept*** of the polynomial is: (plug in 0)

$(0+3)^2(0-4) = (9)(-4) = -36$ $(0,-36)$

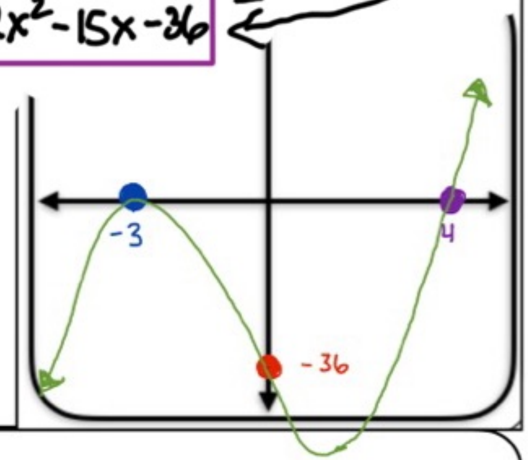
The ***end behavior*** of the polynomial is…

if $x \to \infty$ then $y \to$ ∞

if $x \to -\infty$ then $y \to$ $-\infty$

multiply the x's and their exponents together

$(x)^2 \cdot (x) = x^3$



zeros: $x = -\sqrt{3}$, $x = 0$; mult:2

The ***fully factored form*** of f(x) is:

$(x+\sqrt{3})(x-\sqrt{3})(x)^2$

The ***x-intercepts*** are:

$(-\sqrt{3},0)$ $(\sqrt{3},0)$ $(0,0)$

The ***y-intercept*** of the polynomial is: plug in 0

$(0+\sqrt{3})(0-\sqrt{3})(0)^2 = (0,0)$

The ***end behavior*** of the polynomial is…

if $x \to \infty$ then $y \to \underline{\infty}$

if $x \to -\infty$ then $y \to \underline{\infty}$

multiply the x's and their exponents together

$(x)(x)(x)^2 = x^4$

given

$x=-\sqrt{3}$

$(x+\sqrt{3})=0$

$x=0$

$x=0$

implied

$x=\sqrt{3}$

$(x-\sqrt{3})=0$

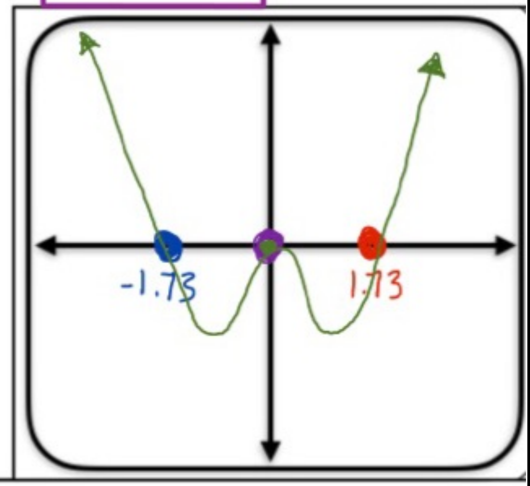
Standard Form

$(x+\sqrt{3})(x-\sqrt{3})(x)^2$

$(x^2-\cancel{x\sqrt{3}}+\cancel{x\sqrt{3}}-3)(x)^2$

$(x^2-3)(x^2)$

$\boxed{x^4-3x^2}$



zeros: $x = 2-\sqrt{5},\ x = 1$

The ***fully factored form*** of f(x) is:

$[x-(2-\sqrt{5})][x-(2+\sqrt{5})](x-1)$

The ***x-intercepts*** are:

$[(2-\sqrt{5}), 0]$ $[(2+\sqrt{5}), 0]$ $(1,0)$

The ***y-intercept*** of the polynomial is:

$[0-(2-\sqrt{5})][0-(2+\sqrt{5})](0-1) \to (0,1)$

The ***end behavior*** of the polynomial is...

if $x \to \infty$ then $y \to \infty$

if $x \to -\infty$ then $y \to -\infty$

$(x)(x)(x) = x^3$ ↗ ↙

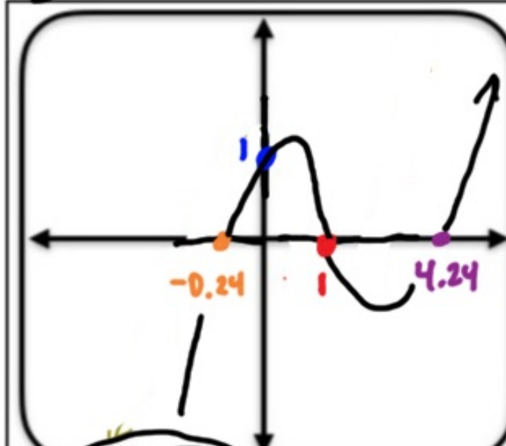
given | implied

$x=(2-\sqrt{5})$ $x=(2+\sqrt{5})$

$[x-(2-\sqrt{5})]=0$ $[x-(2+\sqrt{5})]=0$

$x=1$

$(x-1)=0$



Standard form

$[x-(2-\sqrt{5})][x-(2+\sqrt{5})](x-1)$

$[x^2 - x(2+\sqrt{5}) - x(2-\sqrt{5}) + (2-\sqrt{5})(2+\sqrt{5})](x-1)$

$[x^2-2x-\cancel{x\sqrt{5}}-2x+\cancel{x\sqrt{5}}+4+\cancel{2\sqrt{5}}-\cancel{2\sqrt{5}}-5](x-1)$

$(x^2-4x-1)(x-1)$

$x^3-4x^2-x-x^2+4x+1$

$\boxed{x^3-5x^2+3x+1}$

$i^2 = -1$

zeros: $x = -2i$, $x = \sqrt{2}$

The ***fully factored form*** of f(x) is:

$(x + 2i)(x - 2i)(x - \sqrt{2})(x + \sqrt{2})$

standard form

$(x + 2i)(x - 2i)(x - \sqrt{2})(x + \sqrt{2})$

$(x^2 - 2xi + 2xi - 4i^2)(x^2 + x\sqrt{2} - x\sqrt{2} - (\sqrt{2}\cdot\sqrt{2}))$

$(x^2 + 4)(x^2 - 2)$

$x^4 - 2x^2 + 4x^2 - 8$

$\boxed{x^4 + 2x^2 - 8}$

The ***x-intercepts*** are:

$(-2i, 0)(2i, 0)(\sqrt{2}, 0)(-\sqrt{2}, 0)$

The ***y-intercept*** of the polynomial is:

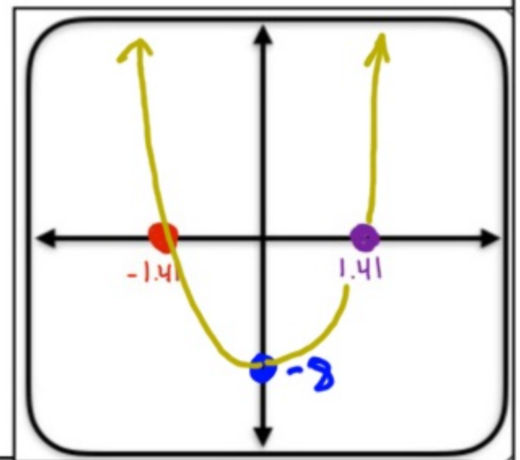
$(0 + 2i)(0 - 2i)(0 - \sqrt{2})(0 + \sqrt{2})$ (0,-8)

The ***end behavior*** of the polynomial is…

if $x \to \infty$ then $y \to$ ∞

if $x \to -\infty$ then $y \to$ ∞

$(x)(x)(x)(x) = x^4$ ↖ ↗



given	implied
$x = -2i$	$x = 2i$
$(x + 2i) = 0$	$(x - 2i) = 0$
$x = \sqrt{2}$	$x = -\sqrt{2}$
$(x - \sqrt{2}) = 0$	$(x + \sqrt{2}) = 0$

zeros: $x=i,\ x=3i$

$(x-i)(x+i)(x-3i)(x+3i)$ Standard form

$(x^2+xi-xi-i^2)(x^2+3xi-3xi-9i^2)$

$(x^2+1)(x^2+9)$

$x^4+9x^2+x^2+9$

$\boxed{x^4+10x^2+9}$

The ***fully factored form*** of f(x) is:

$(x-i)(x+i)(x-3i)(x+3i)$

The ***x-intercepts*** are:

$(i,0)\ (-i,0)\ (3i,0)\ (-3i,0)$

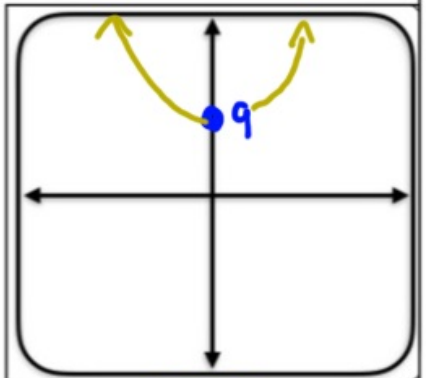
The ***y-intercept*** of the polynomial is:

$(0-i)(0+i)(0-3i)(0+3i)$ → $(0,9)$

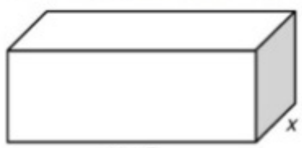
The ***end behavior*** of the polynomial is…

if $x\to\infty$ then $y\to$ ∞

if $x\to-\infty$ then $y\to$ ∞



Write a polynomial to represent the volume of the rectangular prism.



$x+3$

$x-4$

$x+5$

y-int

$(x+3)(x-4)(x+5)$

$(0+3)(0-4)(0+5)$

$(3)(-4)(5)$

$(-12)(5)$

-60

Standard form

$(x+3)(x-4)(x+5)$

$(x^2-4x+3x-12)(x+5)$

$(x^2-x-12)(x+5)$

$x^3-x^2-12x+5x^2-5x-60$

$\boxed{x^3+4x^2-17x-60}$

The ***fully factored form*** of f(x) is:

$(x+3)(x-4)(x+5)$

The ***x-intercepts*** are:

$(-3,0)\ (4,0)\ (-5,0)$

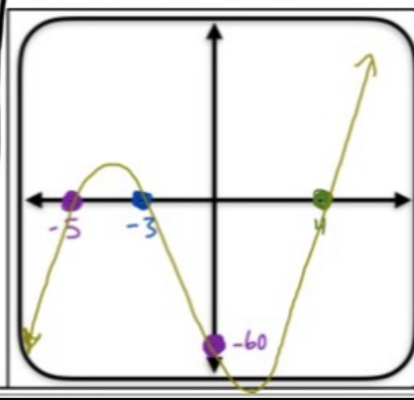
The ***y-intercept*** of the polynomial is:

$(0,-60)$

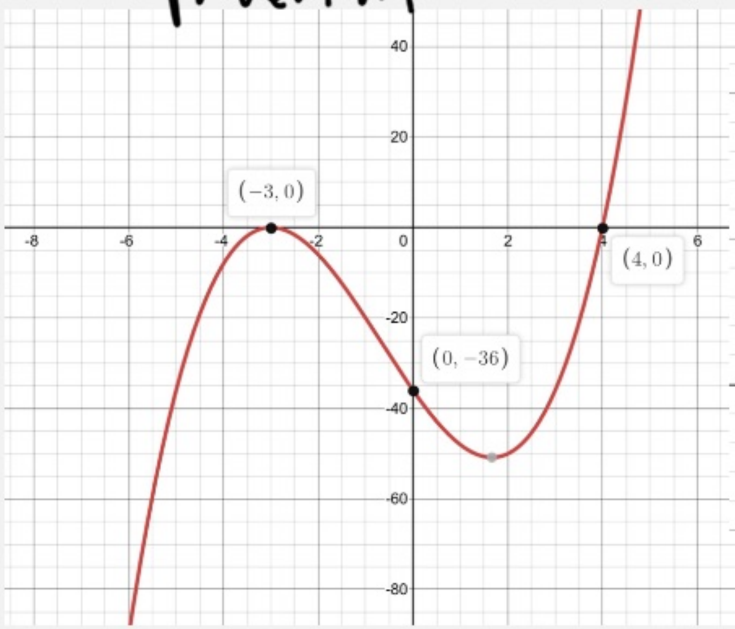
The ***end behavior*** of the polynomial is…

if $x\to\infty$ then $y\to$ ∞

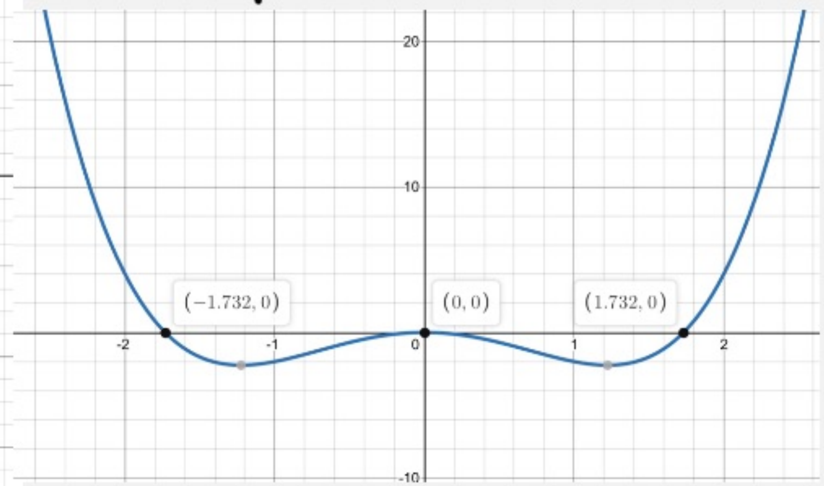
if $x\to-\infty$ then $y\to$ $-\infty$



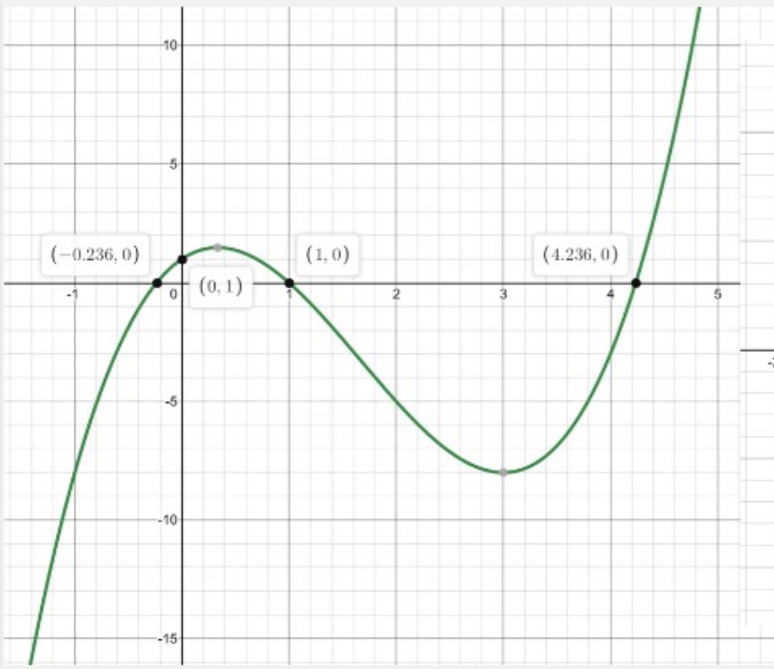
problem #1



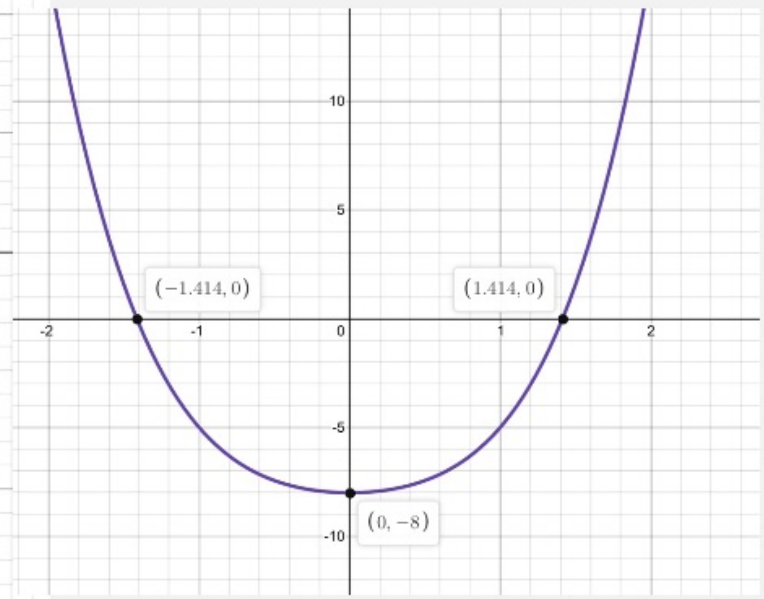
problem #2



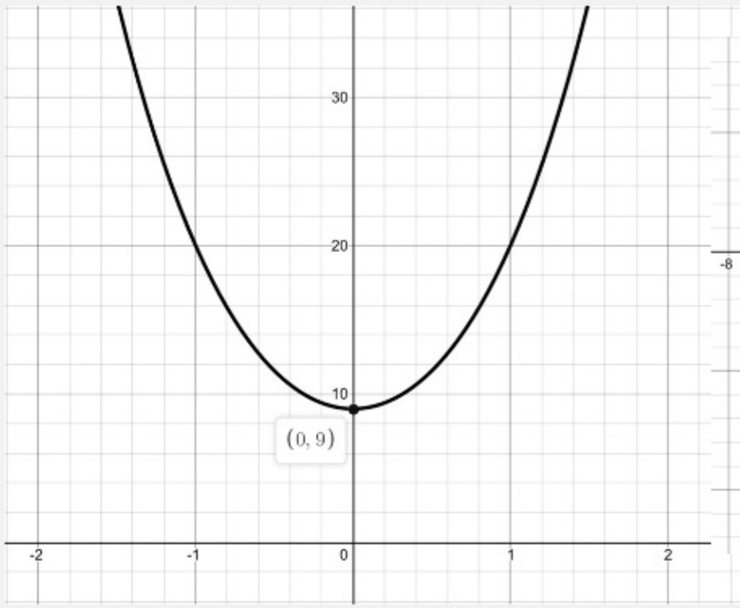
problem#3



problem#4



problem#5



problem#6