

## 1.8H I Know, What Do You Know? A Practice Understanding Task



Use the information provided to graph and write out the polynomial function in factored form. Note: you may have to determine other roots based upon what is given.

1. Degree of the polynomial: 3

Given roots:  $-2, 1, 1$

Leading coefficient:  $-2$

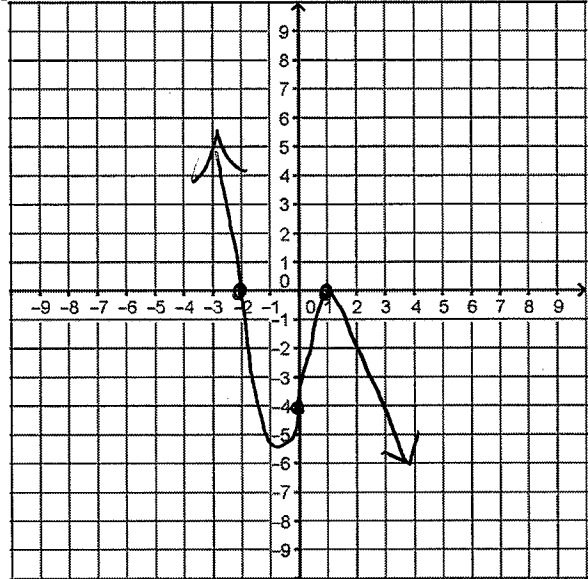
Additional roots:  $\emptyset$

Equation factored form:  $-2(x+2)(x-1)^2$

Equation in standard form:

$$\begin{aligned} &(-2x-4)(x^2-2x+1) \\ &-2x^3 + 4x^2 - 2x - 4x + 8x - 4 \\ &-2x^3 + 6x - 4 \end{aligned}$$

Graph:



2. Degree of the polynomial: 4

Given roots:  $2+i, 4, 0$

Leading coefficient: 1

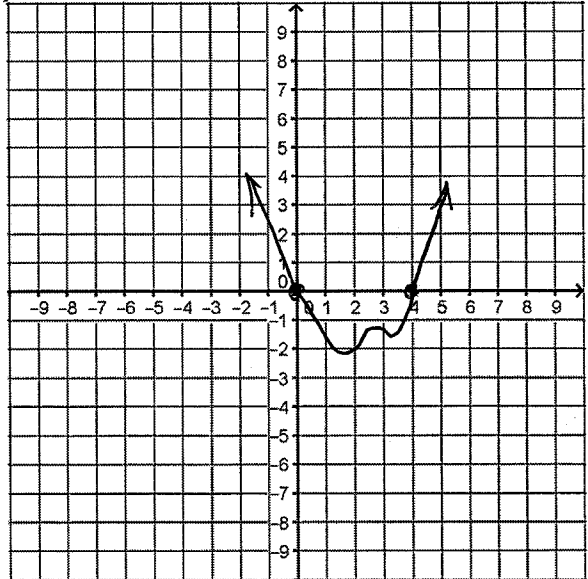
Additional roots:  $2-i$

Equation factored form:  $(x-4)(x)(x^2-4x+5)$

Equation in standard form:

$$\begin{aligned} &(x^2-4x)(x^2-4x+5) \\ &x^4 - 4x^3 + 5x^2 - 4x^3 + 16x^2 - 20x \\ &x^4 - 8x^3 + 21x^2 - 20x \end{aligned}$$

Graph:



3. Degree of the polynomial: 2

Given roots:  $\sqrt{2}$   $-\sqrt{2}$

Leading coefficient:  $-1$

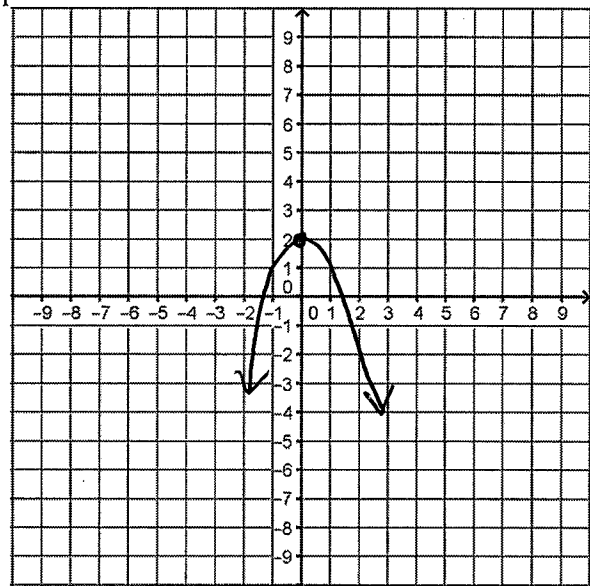
Additional roots:  $-\sqrt{2}$

Equation factored form:  $(x^2 - 2)$

Equation in standard form:

$$-x^2 + 2$$

Graph:



If I know...What do you know? For each problem, what I know about a function is given. Your job is to complete the table of information with what you know.

4. **Function:**

$$f(x) = 2(x - 1)(x + 3)^2$$

**End Behavior:**

As  $x \rightarrow -\infty$ ,  $f(x) \rightarrow -\infty$

As  $x \rightarrow \infty$ ,  $f(x) \rightarrow \infty$

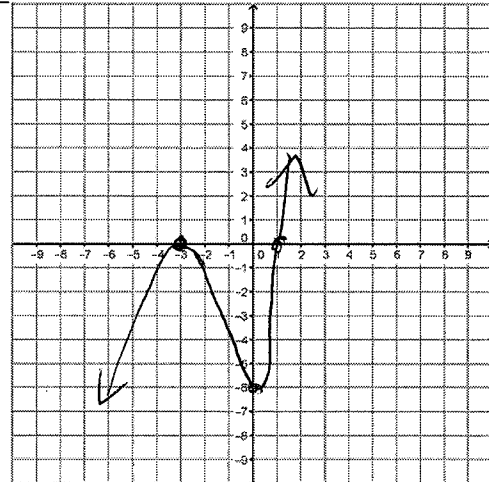
**Roots (with multiplicity):**  $-3$  multiplicity  $\times 2$

**Value of Leading Coefficient:**  $2$

**Degree:**  $3$

**Domain:**  $(-\infty, \infty)$

**Range:** All real numbers



5. **Function:**  $-x^5 + x^4 + 5x^3 + 3x^2$

**End Behavior:**

As  $x \rightarrow -\infty, f(x) \rightarrow \infty$

As  $x \rightarrow \infty, f(x) \rightarrow -\infty$

**Roots (with multiplicity):**

$(3, 0), m = 1$

$(-1, 0), m = 2$

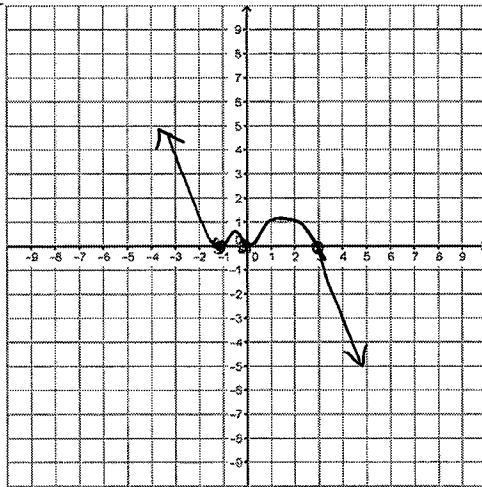
$(0, 0), m = 2$

**Value of Leading Coefficient:**  $-1$

**Degree:** 5

**Domain:**  $-\infty, \infty$

**Range:**  $-\infty, \infty$



$(x-3)(x+1)^2 x^2$   
 $(x-3)(x^2+2x+1)x^2$   
 $(x^3+2x^2+x-3x^2-6x-3)x^2$

6. **Function:**

$f(x) = \frac{1}{2}x^4 - 8x^2 + 16$

**End Behavior:**

As  $x \rightarrow -\infty, f(x) \rightarrow \infty$

As  $x \rightarrow \infty, f(x) \rightarrow \infty$

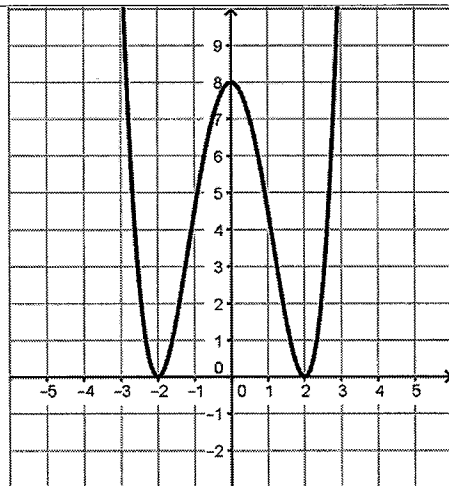
**Roots (with multiplicity):**  $(-2, 0) m=2$   
 $(2, 0) m=2$

**Value of Leading Coefficient:**  $a = \frac{1}{2}$

**Degree:** 4

**Domain:**  $-\infty, \infty$

**Range:**  $0, \infty$



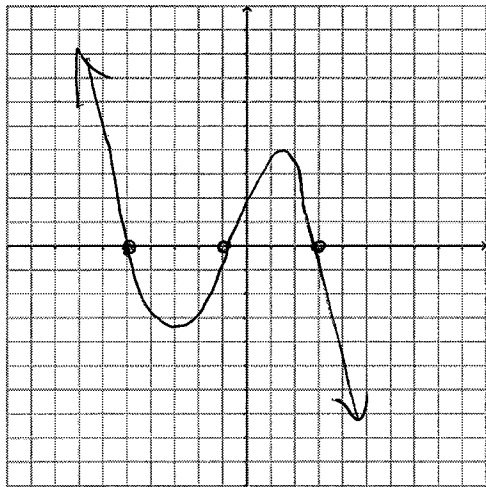
$(x-2)^2(x+2)^2$

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

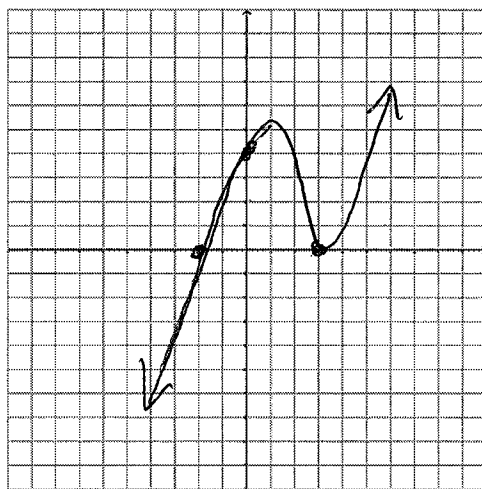
$x^4 + 4x^3 + 4x^2 - 4x^3 - 16x^2 - 16x + 4x^2 + 16x + 16$   
 $8x^2 - 16x^2$

Without using technology, sketch the graph of the polynomial function described. The term “imaginary roots” means complex zeros.

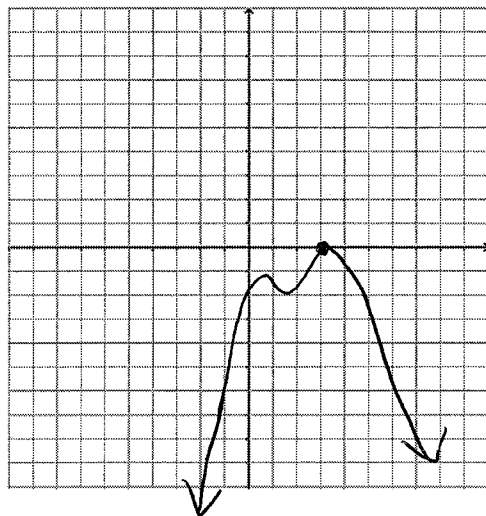
7. A cubic function with a leading coefficient of  $-2$ , with two negative zeros and one positive.



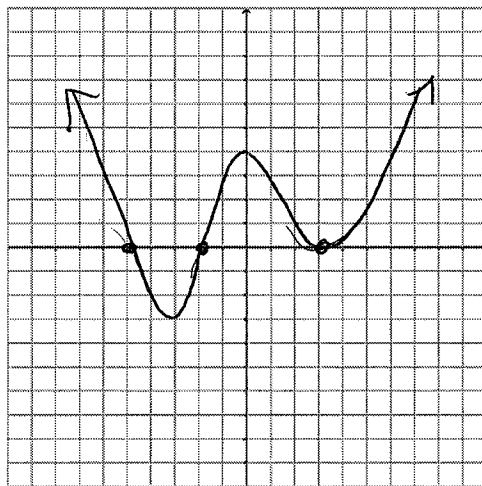
8. A cubic function passing through the point  $(0, 4)$ , with one negative zero and one positive double zero.



9. A quartic function with a leading coefficient of  $-3$ , with two imaginary roots and one positive double root.



10. A quartic function with a leading coefficient of  $2$ , with two negative zeros and one positive double root.

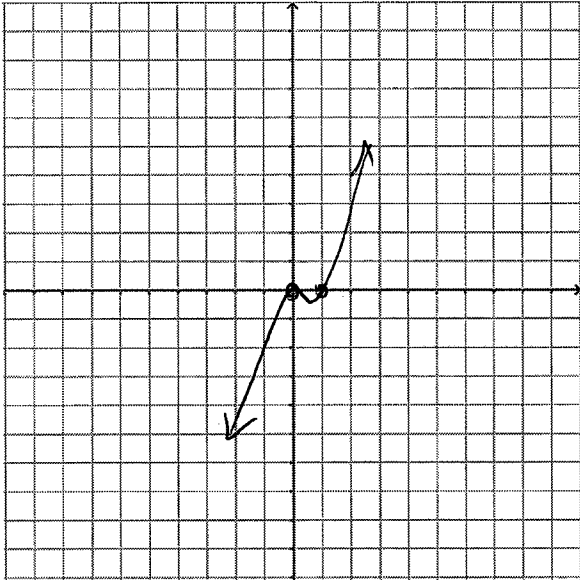


Find all factors and sketch the graph of the polynomial functions.

11.  $f(x) = x^3 - x^2$

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

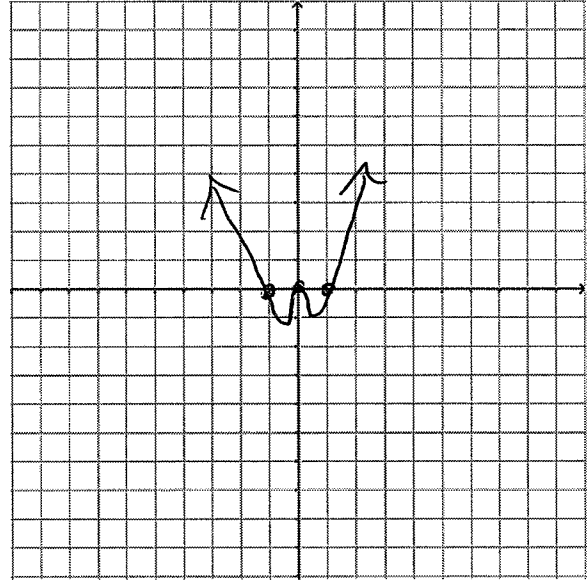
Factors:



12.  $f(x) = x^4 - x^2$

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

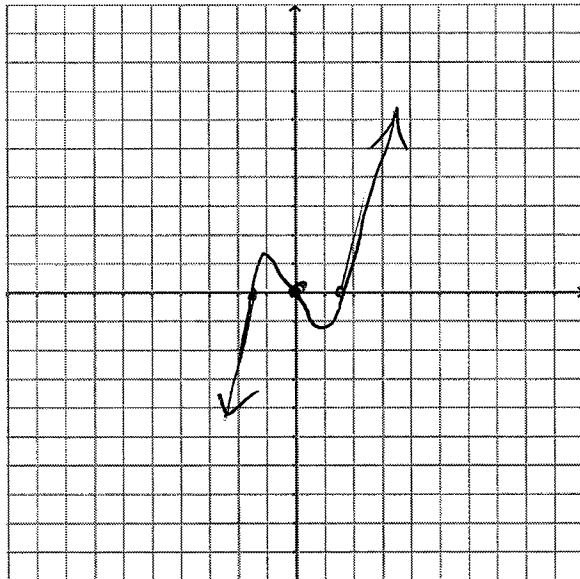
Factors:  $x^2(x+1)(x-1)$



13.  $f(x) = x^3 - 2x$

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

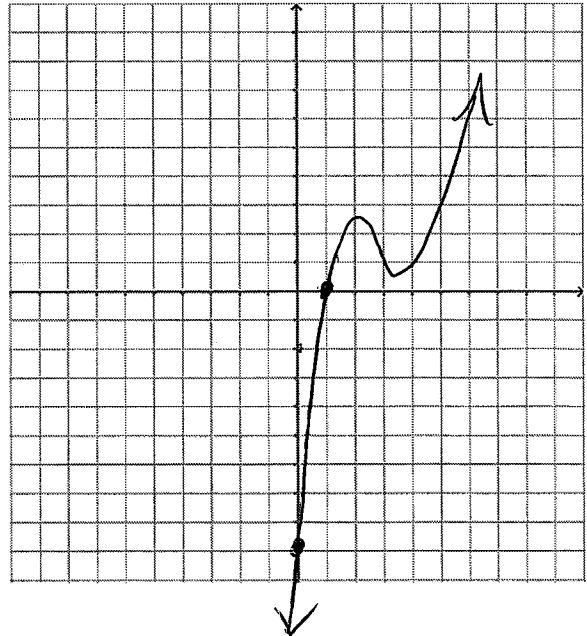
Factors: ~~x~~  $0, \pm\sqrt{2}$



14.  $f(x) = x^3 - x^2 + 9x - 9$

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

Factors:  $(x^2+9)(x-1)$   
 $x = \pm 3i, x = 1$



Name \_\_\_\_\_

Polynomial Functions

1.8H

**Ready, Set, Go!****Ready**

Topic: Solving polynomial, logarithmic, and rational equations.

**Solve for x.**

1.  $2(x - 2)(x + 1)^2 = 0$

$x = -1, 2$

2.  $6x^2 + x = 12$

$x = \frac{3}{2}, -\frac{4}{3}$

3.  $x^3 - 1 = 0$

$x = 1, \frac{-1+i\sqrt{3}}{2}$

4.  $x^2 + 4x - 9 = 0$

$x = -2 \pm \sqrt{13} \approx 1.61 \text{ \& } 5.61$

5.  $\log_2 9 = x$

$x = \frac{\log 9}{\log 2} \approx 3.17$

6.  $\frac{3}{x+1} = 6$

$x = -\frac{1}{2}$

Topic: Using the Remainder Theorem

**Find  $f(3)$  for each polynomial and state whether or not  $(x - 3)$  is a factor.**

7.  $f(x) = x^3 - 9x + 3$

$f(3) = 3$   
not a factor

8.  $f(x) = x^3 - 9x^2 + 27x - 28$

$f(3) = -1$   
not a factor

9.  $f(x) = 2x^3 - 5x^2 - 12x + 27$

$f(3) = 0$   
yes it is a factor