

NAME _____

HW2.3: Rational Root Thm

For questions 1-3, state the possible rational roots:

1) $a(x) = x^4 + x^2 + 2x - 3$ 2) $b(x) = 2x^2 - 5x + 3$ 3) $c(x) = 4x^6 - x^5 + 3x^3 - 2x + 10$

Find all of the zeros of each function **using synthetic division and quadratic formula**:

4) $f(x) = x^3 - 3x - 2$ 5) $g(x) = x^3 + x^2 - 80x - 300$
if one root is 10. 6) $h(x) = x^3 + 4x^2 + 3x$

7) $j(x) = 2x^3 - 15x^2 + 31x - 12$ 8) $k(x) = 2x^3 - x^2 - 15x + 18$
if one root is 4. if one root is 2. 9) $l(x) = 6x^3 - 5x^2 - 2x + 1$

10) $m(x) = x^4 - 5x^2 - 36$ 11) $n(x) = x^3 - 4x^2 + 6x - 4$ 12) $p(x) = x^3 - 5x^2 + 7x + 13$
if one root is 3.

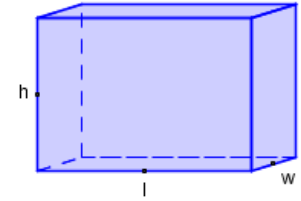
For questions 13-15, find a third degree polynomial with rational coefficients that has the given roots.

13) $x = \{-3, 2, 1\}$

14) $x = \{2i, 3\}$

15) $x = \{0, 5, -6\}$

A failing student is determined to not be most useful to society in their current form. With a zap of the transmogrification ray, the student is changed into a student-sized goldfish, suited more for entertainment purposes. The tank used to contain the student-fish has the following properties:



- The height must be 2 ft longer than the width
- The length must be 4 ft longer than the width
- The volume ($V = lwh$) of the tank must be 105 ft^3

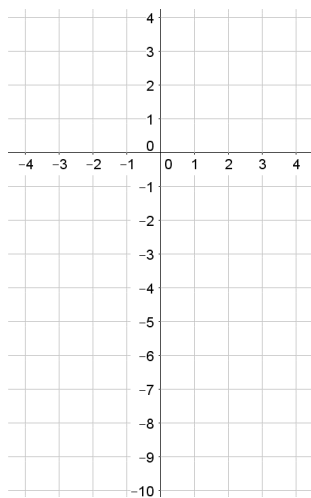
16) Build polynomial $v(w)$ by replacing l, h with expressions in terms of w .

17) Find all roots of $v(w)$.

18) Which root must be the width of the tank? Write a sentence or two that explains why the other roots are not suitable.

19) Determine the potential roots the function may have. Find all of the roots of the function. Then, graph the function. State the domain of the function. Estimate where the function is increasing or decreasing.

$$f(x) = x^3 + 2x^2 - 5x - 6$$



Potential Roots:

Actual Roots: $x = \{ \quad , \quad , \quad \}$

$D_f =$

Increasing Interval:

Decreasing Interval: