

Name:

Period:

Date:

Practice Worksheet: Polynomial Long Division

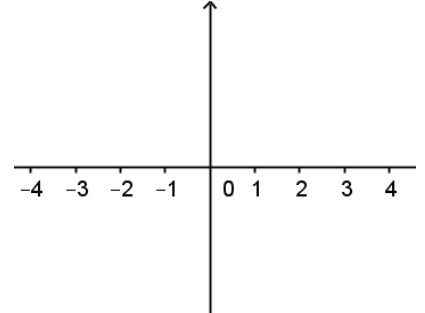
1] Write the standard form of the original polynomial.

$$\begin{array}{r} x^2 - 1 \\ x+3 \overline{) x^3 + 3x^2 - x - 3} \end{array}$$

2] Write the factored form of the original polynomial.

3] Identify all zeros of the original polynomial.

4] Sketch the graph of the original polynomial.



Find the missing information in each problem using the work shown.

5] $\frac{\quad}{x-4} \overline{) x^3 + 2x^2 - 6x + 12}$

$$\begin{array}{r} \\ -(x^3 - 4x^2) \\ \hline 6x^2 - 6x + 12 \\ -(6x^2 - 24x) \\ \hline 18x + 12 \\ -(18x - 72) \\ \hline 84 \end{array}$$

6] $\frac{x^2 - x - 3}{\quad} \overline{) x^3 + 2x^2 - 6x + 12}$

$$\begin{array}{r} \\ -(x^3 + 3x^2) \\ \hline -x^2 - 6x + 12 \\ -(-x^2 - 3x) \\ \hline -3x + 12 \\ -(-3x - 9) \\ \hline 21 \end{array}$$

Circle any errors in each polynomial long division and explain what the student did wrong.

7] $\frac{x^2 - 11x + 54}{x-3} + \frac{-180}{x-3}$

$$\begin{array}{r} \\ x-3 \overline{) x^3 - 8x^2 + 21x - 18} \\ \underline{x^3 - 3x^2} \\ -11x^2 + 21x - 18 \\ \underline{-11x^2 + 33x} \\ 54x - 18 \\ \underline{54x - 162} \\ -180 \end{array}$$

8] $\frac{x^3 + 4x^2 + 7x + 17}{x-2}$

$$\begin{array}{r} \\ x-2 \overline{) x^4 + 2x^3 - x^2 + 3} \\ \underline{-(x^4 - 2x^3)} \\ 4x^3 - x^2 + 3 \\ \underline{-(4x^3 - 8x^2)} \\ 7x^2 + 3 \\ \underline{-(7x^2 - 14)} \\ 17 \end{array}$$

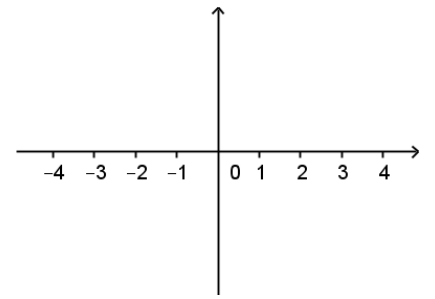
Use long division to find the quotient. Show all work.

9] $(10x^2 + 19x - 25) \div (x + 3)$

10] $(x^3 - 19x - 30) \div (x - 5)$

Use long division to rewrite $f(x)$ in factored form and find all zeros. Then sketch the graph. Show all work.

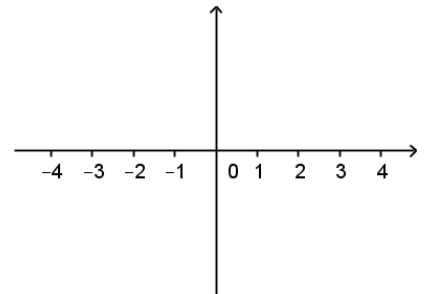
11] $f(x) = x^4 - 4x^3 - 6x^2 + 36x - 27$ has a factor of $(x - 3)$ with multiplicity two.



Factored Form:

Zeros:

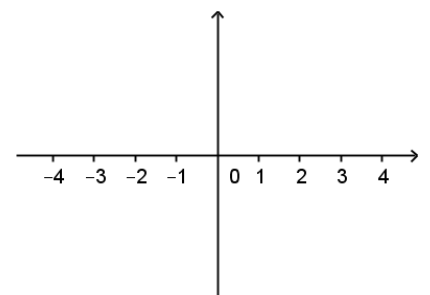
13] $f(x) = 2x^3 - 3x^2 - 14x + 15$ has factors of $(x - 1)$ and $(x - 3)$.



Factored Form:

Zeros:

BONUS: $f(x) = -x^5 + 7x^4 - 9x^3 - 27x^2 + 54x$ has a factor of $(x - 3)$ with multiplicity 3.



Factored Form:

Zeros: