Accelerated Geometry CC
10.4 Dividing Polynomials

Name: _____ **KEY** _____
Date: _____ Period: _____

Divide using long or synthetic division:

1. $6x^2 - 5x + 9 \div 2x - 1$

$$
\begin{array}{r}
3x - 1 \\
2x-1 \overline{\smash{\big)}\, 6x^2 - 5x + 9} \\
\underline{6x^2 - 3x} \\
-2x + 9 \\
\underline{-2x + 1} \\
8
\end{array}
$$

$$\boxed{3x - 1 + \dfrac{8}{2x-1}}$$

2. $x^4 - 6x^3 - 40x + 33 \div x - 7$

$$
\begin{array}{c|ccccc}
7 & 1 & -6 & 0 & -40 & 33 \\
+ & \downarrow & 7 & 7 & 49 & 63 \\
\hline
& 1 & 1 & 7 & 9 & \boxed{96}
\end{array}
$$

$$\boxed{x^3 + x^2 + 7x + 9 + \dfrac{96}{x-7}}$$

3. $x^3 - 3x^2 + 8x - 5 \div x - 1$

$$
\begin{array}{c|cccc}
1 & 1 & -3 & 8 & -5 \\
+ & \downarrow & 1 & -2 & 6 \\
\hline
& 1 & -2 & 6 & \boxed{1}
\end{array}
$$

$$\boxed{x^2 - 2x + 6 + \dfrac{1}{x-1}}$$

4. $5x^4 + 2x^3 - 9x + 12 \div x^2 - 3x + 4$

$$
\begin{array}{r}
5x^2 + 17x + 31 \\
x^2 - 3x + 4 \overline{\smash{\big)}\, 5x^4 + 2x^3 + 0x^2 - 9x + 12} \\
\underline{5x^4 - 15x^3 + 20x^2} \\
17x^3 - 20x^2 - 9x + 12 \\
\underline{17x^3 - 51x^2 + 68x} \\
31x^2 - 77x + 12 \\
\underline{31x^2 - 93x + 124} \\
16x - 112
\end{array}
$$

$$\boxed{5x^2 + 17x + 31 + \dfrac{16x-112}{x^2-3x+4}}$$

5. $2x^4 - 11x^3 + 15x^2 + 6x - 18 \div x - 3$

$$
\begin{array}{c|ccccc}
3 & 2 & -11 & 15 & 6 & -18 \\
+ & \downarrow & 6 & -15 & 0 & 18 \\
\hline
& 2 & -5 & 0 & 6 & \boxed{0}
\end{array}
$$

$$\boxed{2x^3 - 5x^2 + 6}$$

6. $8x^3 + 5x^2 - 12x + 10 \div x^2 - 3$

$$
\begin{array}{r}
8x + 5 \\
x^2 - 3 \overline{\smash{\big)}\, 8x^3 + 5x^2 - 12x + 10} \\
\underline{8x^3 - 24x} \\
5x^2 + 12x + 10 \\
\underline{5x^2 - 15} \\
12x + 25
\end{array}
$$

$$\boxed{8x + 5 + \dfrac{12x+25}{x^2-3}}$$

7. $2x^4 - x^3 + 4 \div x + 1$

$$
\begin{array}{c|ccccc}
-1 & 2 & -1 & 0 & 0 & 4 \\
+ & \downarrow & -2 & 3 & -3 & 3 \\
\hline
& 2 & -3 & 3 & -3 & \boxed{7}
\end{array}
$$

$$\boxed{2x^3 - 3x^2 + 3x - 3 + \dfrac{7}{x+1}}$$

8. $x^3 + x + 30 \div x + 3$

$$
\begin{array}{c|cccc}
-3 & 1 & 0 & 1 & 30 \\
+ & \downarrow & -3 & 9 & -30 \\
\hline
& 1 & -3 & 10 & \boxed{0}
\end{array}
$$

$$\boxed{x^2 - 3x + 10}$$

A polynomial f and a factor of f are given. Factor f completely.

9. $f(x) = x^3 - 3x^2 - 16x - 12; x - 6$

$$
\begin{array}{r|rrrr}
6 & 1 & -3 & -16 & -12 \\
+ & \downarrow & 6 & 18 & 12 \\
\hline
& 1 & 3 & 2 & \boxed{0}\checkmark
\end{array}
$$

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

$\boxed{(x-6)(x+1)(x+2)}$

10. $f(x) = x^3 - 12x^2 + 12x + 80; x - 10$

$$
\begin{array}{r|rrrr}
10 & 1 & -12 & 12 & 80 \\
+ & \downarrow & 10 & -20 & -80 \\
\hline
& 1 & -2 & -8 & \boxed{0}\checkmark
\end{array}
$$

$(x-10)(x^2 - 2x - 8)$

$\boxed{(x-10)(x-4)(x+2)}$

11. $f(x) = x^3 - 18x^2 + 95x - 126; x - 9$

$$
\begin{array}{r|rrrr}
9 & 1 & -18 & 95 & -126 \\
+ & \downarrow & 9 & -81 & 126 \\
\hline
& 1 & -9 & 14 & \boxed{0}\checkmark
\end{array}
$$

$(x-9)(x^2 - 9x + 14)$

$\boxed{(x-9)(x-7)(x-2)}$

12. $f(x) = 4x^3 + 8x^2 - 25x - 50; x + 2$

$$
\begin{array}{r|rrrr}
-2 & 4 & 8 & -25 & -50 \\
+ & \downarrow & -8 & 0 & 50 \\
\hline
& 4 & 0 & -25 & \boxed{0}\checkmark
\end{array}
$$

$(x+2)(4x^2 - 25)$

$\boxed{(x+2)(2x+5)(2x-5)}$

13. $f(x) = 6x^5 - 38x^4 + 12x^3 - 15x^2 + 95x - 30; x - 6$

$$
\begin{array}{r|rrrrrr}
6 & 6 & -38 & 12 & -15 & 95 & -30 \\
+ & \downarrow & 36 & -12 & 0 & -90 & 30 \\
\hline
& 6 & -2 & 0 & -15 & 5 & \boxed{0}\checkmark
\end{array}
$$

$(x-6)(6x^4 - 2x^3 - 15x + 5)$
$(x-6)\,2x^3(3x-1) - 5(3x-1)$

$\boxed{(x-6)(3x-1)(2x^3-5)}$

14. $f(x) = x^3 + 9x^2 - 37x - 165; x - 5$

$$
\begin{array}{r|rrrr}
5 & 1 & 9 & -37 & -165 \\
+ & \downarrow & 5 & 70 & 165 \\
\hline
& 1 & 14 & 33 & \boxed{0}\checkmark
\end{array}
$$

$(x-5)(x^2 + 14 + 33)$

$\boxed{(x-5)(x+11)(x+3)}$

15. $f(x) = x^3 + x^2 + 2x + 24; x + 3$

$$
\begin{array}{r|rrrr}
-3 & 1 & 1 & 2 & 24 \\
+ & \downarrow & -3 & 6 & -24 \\
\hline
& 1 & -2 & 8 & \boxed{0}\checkmark
\end{array}
$$

$\boxed{(x+3)(x^2 - 2x + 8)}$