Honors Math II
Factoring

Name Key
Period _____ Date _____

Factor the following polynomials using synthetic/long division.

1. $x^3 - 2x^2 - 11x + 12$ if (x – 1) is one of the factors.

1	1	-2	-11	12
		1	-1	-12
	1	-1	-12	0

$x^2 - x - 12$

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

$(x-1)(x+3)(x-4)$

2. $x^3 + x^2 - 4x - 4$ if (x + 2) is one of the factors.

-2	1	1	-4	-4
		-2	2	4
	1	-1	-2	0

$x^2 - x - 2$

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

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

3. $15x^3 + 14x^2 - 3x - 2$ if (x + 1) is one of the factors.

-1	15	14	-3	-2
		-15	1	2
	15	-1	-2	0

$15x^2 - x - 2$

$(3x+1)(5x-2)$

$(3x+1)(5x-2)(x+1)$

4. $3x^3 + 13x^2 - 52x + 28$ if (x + 7) is one of the factors.

-7	3	13	-52	28
		-21	56	-28
	3	-8	4	0

$3x^2 - 8x + 4$

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

$(3x-2)(x-2)(x+7)$

5. $8x^3 - 2x^2 - 41x - 10$ if (x + 2) is one of the factors.

-2	8	-2	-41	-10
		-16	36	10
	8	-18	-5	0

$8x^2 - 18x - 5$

$(4x+1)(2x-5)$

$(x+2)(4x+1)(2x-5)$

6. $x^3 - x^2 - 8x + 12$ if (x + 3) is one of the factors.

-3	1	-1	-8	12
		-3	12	-12
	1	-4	4	0

$x^2 - 4x + 4$

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

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

7. $x^3 - 2x^2 - 7x - 4$ if (x + 1) is one of the factors.

-1	1	-2	-7	-4
		-1	3	4
	1	-3	-4	0

$x^2 - 3x - 4$

$(x-4)(x+1)$

$(x-4)(x+1)(x+1)$

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

8. $x^4 + 4x^3 - x^2 - 16x - 12$ if $(x^2 - 4)$ is one of the factors.

$$
\begin{array}{r}
x^2 + 4x + 3 \\
x^2 + 0x - 4 \overline{\big) x^4 + 4x^3 - x^2 - 16x - 12} \\
-x^4 + 0 \pm 4x^2 \\
\hline
4x^3 + 3x^2 - 16x \\
-4x^3 + 0 \pm 16x \\
\hline
3x^2 + 0 - 12 \\
3x^2 + 0 - 12
\end{array}
$$

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

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

Factor each completely.

9. $5x^3 + 2x^2 + 10x + 4$

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

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

10. $27x^3 + 1$ $(3x+1)(9x^2-3x+1)$

11. $2x^2 - 2x - 60$

$2(x^2-x-30)$

$2(x-6)(x+5)$

12. $x^3 + 11x^2 + 28x$

$x(x^2+11x+28)$

$x(x+4)(x+7)$

13. $4x^2 + 28x$

$4x(x+7)$

14. $x^4 + 2x^2 + 1$

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

15. $4x^2 - 25$

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

16. $16x^2 - 24x + 9$

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

17. $12x^3 + 15x^2 + 4x + 5$

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

$(4x+5)(3x^2+1)$

18. $54 + 250x^3$

$2(27+125x^3)$

$2(3+5x)(9-15x+25x^2)$

19. $7x^2 + 15x + 8$

$(7x+8)(x+1)$

20. $5x^2 - 24x - 5$

$(5x+1)(x-5)$

21. $9x^2 + 23x - 12$

$(9x-4)(1x+3)$

22. $10x^2 - 7n + 1$

$(5x-1)(2x-1)$

23. $10x^2 + 63x + 18$

$(1x+6)(10x+3)$

24. $8x^2 - 21x - 9$

$(1x-3)(8x+3)$

25. $3x^2 - 22x - 45$

$(3x+5)(x-9)$

26. $7x^2 - 31x + 30$

$(7x-10)(x-3)$

27. $3x^3 + 3$

$3(x^3+1)$

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

28. $6x^2 + 7x - 24$

$(2x-3)(3x+8)$

29. $9x^2 + 21x - 14$

DNF

30. $4x^2 - 29x - 24$

$(4x+3)(x-8)$