H. Algebra 2 Module 6 Review

Name: Key Date: Hour:

Key

6.1 Adding and Subtracting Polynomials

Identify the degree of each monomial.

1. $6x^2$ 2nd 2. $3p^3m^4$ 7th 3. $2x^8y^3$ 11th

Rewrite each polynomial in standard form. Then identify the leading coefficient, degree, and number of terms.

4. $6 + 7x - 4x^3 + x^2$

$-4x^3 + x^2 + 7x + 6$ L. coef.: -4 degree: 3rd terms: 4

5. $x^2 - 3 + 2x^5 + 7x^4 - 12x$

$2x^5 + 7x^4 + x^2 - 12x - 3$ L.C.: 2 D: 5 Terms: 5

Add or subtract. Write your answer in standard form.

6. $(2x^2 - 2x + 6) + (11x^3 - x^2 - 2 + 5x)$

$11x^3 + x^2 + 3x + 4$

7. $(x^2 - 8) - (3x^3 - 6x - 4 + 9x^2)$

$-3x^3 - 8x^2 + 6x - 4$

8. $(5x^4 + x^3) + (7 + 9x^2 - 2x^4 + x^3)$

$3x^4 + x^3 + 10x^2 + 7$

9. $(12x^2 + x) - (6 - 9x^2 + x^7 - 8x)$

$-x^7 + 21x^2 + 9x - 6$

10. A community garden has a perimeter of $(2x^3 + 48x^2 - 14x + 4)$ feet and a width of x feet.

Find the length of the pool when the width is 25 feet. $L(x) = x^3 + 24x^2 - 8x + 2$

$2x^3 + 48x^2 - 14x + 4 = 2x + 2(L)$

$2x^3 + 48x^2 - 16x + 4 = L$ $L(25)$ 25 | 1 24 −8 2 / 25 1225 30425 / 1 49 1217 30427

30427

30427

6.2 Multiplying Polynomials

Find each product.

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

$12x^4 + 4x^2$

2. $-9x(x^2 + 2x + 4)$

$-9x^3 - 18x^2 - 36x$

3. $-6x^2(x^3 + 7x^2 - 4x + 3)$

$-6x^5 - 42x^4 + 24x^3 - 18x^2$

4. $x^3(-4x^3 + 10x^2 - 7x + 2)$

$-4x^6 + 10x^5 - 7x^4 + 2x^3$

5. $(p + q)(4p^2 - p - 8q^2 - q)$

$4p^3 - p^2 - 8pq^2 - pq + 4p^2q$

$-pq - 8q^3 - q^2$

$4p^3 - p^2 - 8pq^2 + 4p^2q - 2pq$

$-8q^3 - q^2$

6. $(x + 2)(y^2 + 2y - 12)$

$xy^2 + 2xy - 12x + 2y^2 + 4y - 24$

Expand each expression. 1 3 3 1

9. $(3x - 1)^3$ $a = 3x$ $b = -1$

$27x^3 - 27x^2 + 9x - 1$

10. $3(a - 4b)^2$

$3(a^2 - 8ab + 16b^2)$

$3a^2 - 24ab + 48b^2$

6.3 The Binomial Theorem

Use the Binomial Theorem to expand each binomial.

1. $(x + y)^3$

$x^3 + 3x^2y + 3xy^2 + y^3$

2. $(2x - y)^4$ $a = 2x$ $b = -y$ 1 4 6 4 1

$(2x)^4(-y)^0 + 4(2x)^3(-y)^1 + 6(2x)^2(-y)^2 + 4(2x)^1(-y)^3 + (2x)^0(-y)^4$

$16x^4 - 32x^3y + 24x^2y^2 - 8xy^3 + y^4$

3. $(m + 3n)^3$ $a = m$ $b = 3n$

$m^3 + 9m^2n + 27mn^2 + 27n^3$

4. $(p + q)^5$ 1 5 10 10 5 1 $a = p$ $b = q$

$p^5 + 5p^4q + 10p^3q^2 + 10p^2q^3 + 5pq^4 + q^5$

6.4 Factoring Polynomials

Fully factor the following polynomials.

1. $3n^2 - 48$

$3(n^2 - 16)$

$3(n - 4)(n + 4)$

2. $3x^3 - 75x$

$3x(x^2 - 25)$

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

3. $9m^4 - 16$

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

4. $16r^4 - 9$

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

5. $3n^6 - 12$

$3(n^6 - 4)$

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

6. $x^6 - 9$

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

7. $3b^7 + 12b^4 + 12b$

$3b(b^6 + 4b^3 + 4)$

$3b(b^3 + 2)^2$

8. $50v^6 + 60v^3 + 18$

$2(25v^6 + 30v^3 + 9)$

$2(5v^3 + 3)^2$

9. $x^3 - 64$ $a = x$ $b = 4$

$(x - 4)(x^2 + 4x + 16)$

10. $x^3 - 125$

$(x-5)(x^2+5x+25)$

11. $x^6 - 64$ $a=x^2$ $b=4$

$(x^2-4)(x^4+4x^2+16)$

$(x+2)(x-2)(x^4+4x^2+16)$

12. $x^6 - 1$

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

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

Factor each polynomial by grouping.

13. $8n^3 - 7n^2 + 56n - 49$

$n^2(8n-7)+7(8n-7)$

$(n^2+7)(8n-7)$

14. $5x^3 - 6x^2 - 15x + 18$

$x^2(5x-6)-3(5x-6)$

$(x^2-3)(5x-6)$

15. $9r^3 + 3r^2 - 21r - 7$

$3r^2(3r+1)-7(3r+1)$

$(3r^2-7)(3r+1)$

16. $25v^3 + 25v^2 - 15v - 15$

$25v^2(v+1)-15(v+1)$

$5(5v^2-3)(v+1)$

17. $120b^3 + 105b^2 + 200b + 175$

$5(24b^3+21b^2+40b+35)$

$5[3b^2(8b+7)+5(8b+7)]$

$5(8b+7)(3b^2+5)$

18. $120x^3 - 80x^2 - 168x + 112$

$8((15x^3-10x^2-21x+14)$

$8[5x^2(3x-2)-7(3x-2)]$

$8(3x-2)(5x^2-7)$

6.5 Dividing Polynomials

Divide by using long division. Write result as *(dividend) =(divisor)(quotient)+remainder*

1. $(x^2 - x - 6) \div (x-3)$

$x+2$

$x-3 \;|\; x^2 - x - 6$

$-(x^2-3x)$

$2x-6$

$-(2x-6)$

0

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

2. $(2x^3 - 10x^2 + x - 5) \div (x-5)$

$2x^2+1$

$x-5 \;|\; 2x^3-10x^2+x-5$

$-(2x^3-10x^2)$

$0+x-5$

$-(x-5)$

0

$2x^3-10x^2+x-5=(x-5)(2x^2+1)$

3. $(-3x^2 + 20x - 12) \div (x-6)$

$-3x+2$

$x-6 \;|\; -3x^2+20x-12$

$-(-3x^2+18x)$

$2x-12$

$-(2x-12)$

0

$-3x^2+2x+12=(x-6)(-3x+2)$

4. $(3x^3 + 9x^2 - 14) \div (x+3)$

$3x^2$

$x+3 \;|\; 3x^3+9x^2+0x-14$

$-(3x^3+9x^2)$

$0+0x-14$

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

Divide by using synthetic division. Write result as *(dividend) = (divisor)(quotient)+remainder*

5. $(3x^2 - 8x + 4) \div (x-2)$

$+2 \;|\; 3 \;\; -8 \;\; 4$

$\quad\quad 6 \;\; -4$

$\quad 3 \;\; -2 \;\; 0$

$3x^2-8x+4=(x-2)(3x-2)$

6. $(5x^2 - 4x + 12) \div (x+3)$

$-3 \;|\; 5 \;\; -4 \;\; 12$

$\quad\quad -15 \;\; 57$

$\quad 5 \;\; -19 \;\; 69$

$(5x^2-4x+12)=(x+3)(5x-19)+69$

7. $(9x^2 - 7x + 3) \div (x-1)$

$1 \;|\; 9 \;\; -7 \;\; 3$

$\quad\quad 9 \;\; 2$

$\quad 9 \;\; 2 \;\; 5$

$9x^2-7x+3=(x-1)(9x+2)+5$

8. $(-6x^2 + 5x - 10) \div (x+7)$

$-7 \;|\; -6 \;\; 5 \;\; -10$

$\quad\quad 42 \;\; -329$

$\quad -6 \;\; 47 \;\; -339$

$-6x^2+5x-10=(x+7)(-6x+47)-339$

Use synthetic substitution to evaluate $P(x)$ for the given value.

9. $P(x) = 4x^2 - 9x + 2$ for $x = 3$

$3 \;|\; 4 \;\; -9 \;\; 2$

$\quad\quad 12 \;\; 9$

$\quad 4 \;\; 3 \;|\; 11$

$P(3) = 11$

10. $P(x) = -3x^2 + 10x - 4$ for $x = -2$

$-2 \;|\; -3 \;\; 10 \;\; -4$

$\quad\quad 6 \;\; -32$

$\quad -3 \;\; 16 \;|\; -36$

$P(-2) = -36$

Determine whether the given binomial is a factor of $P(x)$.

11. $(x-4)$; $P(x) = x^2 + 8x - 48$

$+4 \;|\; 1 \;\; 8 \;\; -48$

$\quad\quad 4 \;\; 48$

$\quad 1 \;\; 12 \;|\; 0$

YES

$(x-4)(x+12)$

12. $(x+5)$; $P(x) = 2x^2 - 6x - 1$

$-5 \;|\; 2 \;\; -6 \;\; -1$

$\quad\quad -10 \;\; 80$

$\quad 2 \;\; -16 \;|\; 79$

NO!