

1-3 HW Answer Key

1. $x^4 + 3x^3 - 4x^2 - 9x + 3$

2. $4x^2 - 5x - 2$

3. $x^2 + 2x + 4$

4. $x^3 + 2x^2 - 5x - 6$

5. $-x$

6. $2x^3 - x^2 - 3x + 14$

7. $x^2 + 7x - 2$

8. $-x^2 - 2x$

~~9. $2x^4 - 7x^3 + 9x^2 - 8x + 4$~~

10. $x^2 + 2x + 1$

11. $x^4 - 2x^3 - 74x^2 + 115x - 12$

12. $3x^3 - 5x^2 - x - 14$

13. $x^5 - 4x^4 + 4x^3 - 8x^2 + 32x - 32$

14. $x^2 - 4x + 3$

15. $2x^2 - 4x + 3$

16. $7x^2 + 8x - 25$

17. $4x^2 - 6x + 12$

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

19. $12x^5 + 24x^4 - 34x^3 - 8x^2 + 10x$

20. $x^2 - 6x + 9$

21. $x^2 + 2x - 5 + \frac{6}{x - 6}$

Re-write each polynomial in standard form by applying the operations in the appropriate order. You have some completed from the in class activity.

$$\begin{aligned} 1) (x^2-3)(x^2+3x-1) \\ = x^4+3x^3-x^2-3x^2-9x+3 \\ = x^4+3x^3-4x^2-9x+3 \end{aligned}$$

$$\begin{aligned} 2) (5x^2-3x-7)-(x^2+2x-5) \\ = 5x^2-3x-7-x^2-2x+5 \\ = 4x^2-5x-2 \end{aligned}$$

$$\begin{array}{r} 3) (x^3-8) \div (x-2) \\ x^2+2x+4 \\ x-2 \overline{) x^3+0x^2+0x-8} \\ \underline{-x^3+2x^2} \\ 2x^2+0x \\ \underline{-2x^2+4x} \\ 4x-8 \\ \underline{-4x+8} \\ 0 \end{array}$$

$$\begin{aligned} 4) (x+1)(x-2)(x+3) \\ = (x^2-x-2)(x+3) = x(x^2-x-2)+3(x^2-x-2) \\ = x^3-x^2-2x+3x^2-3x-6 \\ = x^3+2x^2-5x-6 \end{aligned}$$

$$\begin{aligned} 5) (x+1)-(x-2)-(x+3) \\ = x+1-x+2-x-3 \\ = -x \end{aligned}$$

$$\begin{aligned} 6) (x+2)(2x^2-5x+7) \\ = x(2x^2-5x+7)+2(2x^2-5x+7) \\ = 2x^3-5x^2+7x+4x^2-10x+14 \\ = 2x^3-x^2-3x+14 \end{aligned}$$

$$\begin{array}{r} 7) \frac{x^3-2x^2-65x+18}{x-9} \\ x^2+7x-2 \\ x-9 \overline{) x^3-2x^2-65x+18} \\ \underline{-x^3+9x^2} \\ 7x^2-65x \\ \underline{-7x^2+63x} \\ -2x+18 \\ \underline{-2x+18} \\ 0 \end{array}$$

$$\begin{aligned} 8) (x^2-3x+2)-(2-x+2x^2) \\ = x^2-3x+2-2+x-2x^2 \\ = -x^2-2x \end{aligned}$$

$$\begin{aligned} 9) (x^2-3x+2)(2-x+2x^2) \\ = x^2(2-x+2x^2)-3x(2-x+2x^2)+2(2-x+2x^2) \\ = 2x^2-x^3+2x^4-6x+3x^2-6x^3+4-2x+4x^2 \\ = 2x^4-7x^3+9x^2-8x+4 \end{aligned}$$

$$\begin{array}{r} 10) \frac{x^3-x^2-5x-3}{x-3} \\ x^2+2x+1 \\ x-3 \overline{) x^3-x^2-5x-3} \\ \underline{-x^3+3x^2} \\ 2x^2-5x \\ \underline{-2x^2+6x} \\ x-3 \\ \underline{-x+3} \\ 0 \end{array}$$

$$\begin{aligned} 11) (x^2+7x-12)(x^2-9x+1) \\ = x^2(x^2-9x+1)+7x(x^2-9x+1)-12(x^2-9x+1) \\ = x^4-9x^3+x^2+7x^3-63x^2+7x-12x^2+108x-12 \\ = x^4-2x^3-74x^2+115x-12 \end{aligned}$$

$$12) (2x^3 - 6x^2 - 7x - 2) + (x^3 + x^2 + 6x - 12)$$

$$= 3x^3 - 5x^2 - x - 14$$

$$13) (x^3 - 8)(x^2 - 4x + 4)$$

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

$$= x^5 - 4x^4 + 4x^3 - 8x^2 + 32x - 32$$

$$14) (x^3 - 2x^2 - 5x + 6) \div (x + 2)$$

$$\begin{array}{r} x^2 - 4x + 3 \\ x+2 \overline{) x^3 - 2x^2 - 5x + 6} \\ \underline{-x^3 + 2x^2} \\ -4x^2 - 5x \\ \underline{+4x^2 + 8x} \\ 3x + 6 \\ \underline{-3x - 6} \\ 0 \end{array}$$

$$15) (x^3 + 2x^2 - 3x - 1) + (4 - x - x^3)$$

$$= 2x^2 - 4x + 3$$

$$16) (7x^2 + 5x - 10) + (3x - 15)$$

$$= 7x^2 + 8x - 25$$

$$17) (6x^2 - 2x + 7) - (2x^2 + 4x - 5)$$

$$= 6x^2 - 2x + 7 - 2x^2 - 4x + 5$$

$$= 4x^2 - 6x + 12$$

$$18) (x^2 - 4)(x + 3) - (x^2 + 2x - 5)$$

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

$$= x^3 + 3x^2 - 4x - 12 - x^2 - 2x + 5$$

$$= x^3 + 2x^2 - 6x - 7$$

$$19) (6x^3 - 2x)(2x^2 + 4x - 5)$$

$$= 6x^3(2x^2 + 4x - 5) - 2x(2x^2 + 4x - 5)$$

$$= 12x^5 + 24x^4 - 30x^3 - 4x^3 - 8x^2 + 10x$$

$$= 12x^5 + 24x^4 - 34x^3 - 8x^2 + 10x$$

$$20) \frac{(x-3)^3}{x-3}$$

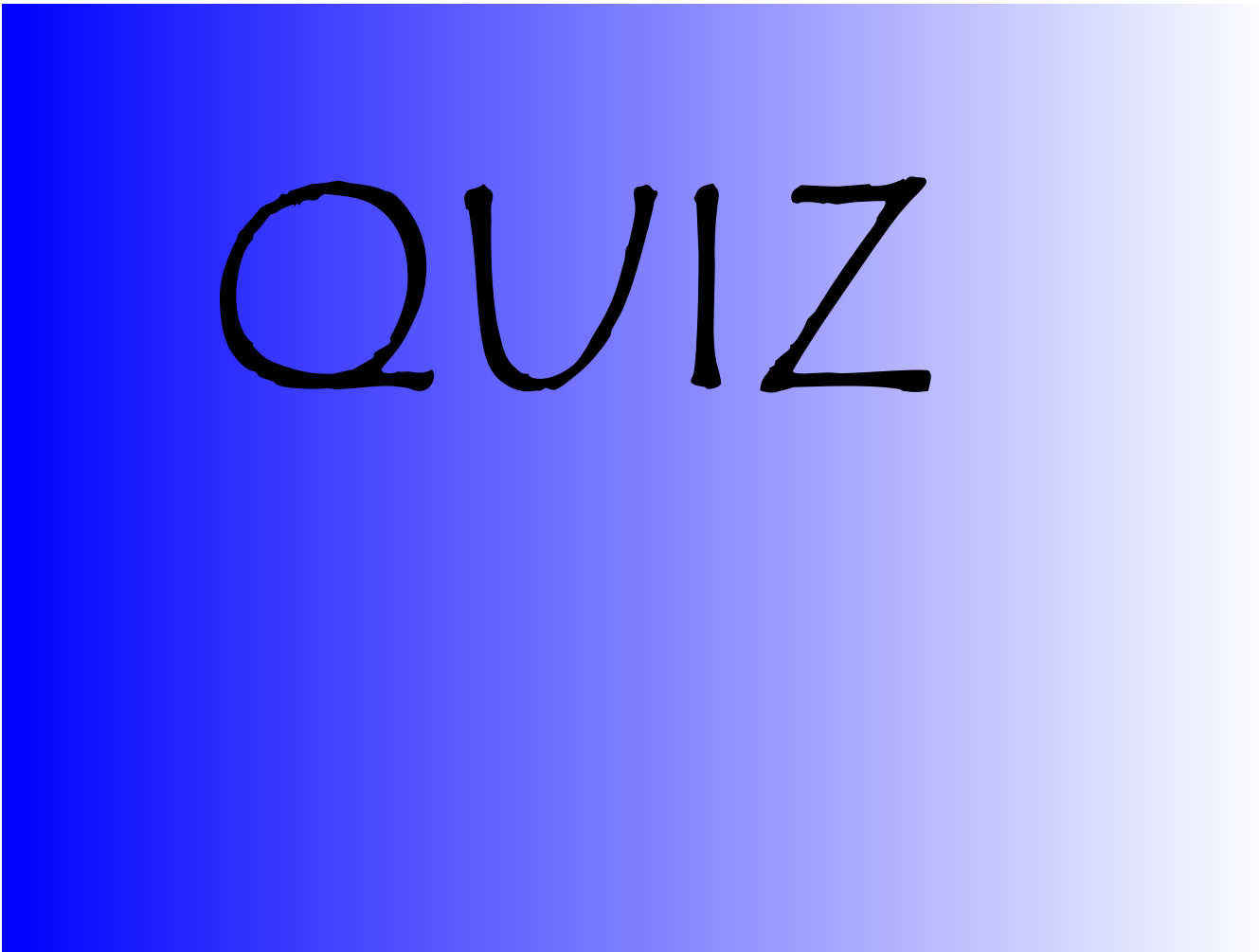
$$= \frac{(x-3)(x-3)(x-3)}{(x-3)}$$

$$= x^2 - 6x + 9$$

$$21) (x^3 - 4x^2 - 17x + 36) \div (x - 6)$$

$$\begin{array}{r} x^2 + 2x - 5 \\ x-6 \overline{) x^3 - 4x^2 - 17x + 36} \\ \underline{-x^3 + 6x^2} \\ 2x^2 - 17x \\ \underline{-2x^2 + 12x} \\ -5x + 36 \\ \underline{+5x - 30} \\ 6 = \text{Remainder} \end{array}$$

$$x^2 + 2x - 5 + \frac{6}{x-6}$$



QUIZ

1-4: Factoring Review

Let's first review three types of factoring:

1. Greatest Common Factor (GCF)
2. Diff. of Two ^{Perfect} Squares
3. Factoring By Grouping
4. Product/Sum or Trinomial

To factor a polynomial by Greatest Common Factor (GCF):

Step 1: Identify the GCF. Consider the coefficients and the variables.

Step 2: Divide the GCF out of each term of the polynomial.

Step 3: Re-write the expressions in factored form.

Examples: Factor each expression using GCF

$$1. \frac{3x^2}{3x} - \frac{6x}{3x}$$

$$3x(x-2)$$

$$2. x^2 - x$$

$$x(x-1)$$

$$3. 2x^3 - 6x^2 + 10x$$

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

$$4. 6r^2s - 9rs^2 + 12r^2s^2$$

$$3rs(2r - 3s + 4rs)$$

$$5. \frac{y^6}{y^1} + \frac{y^4}{y^1}$$

$$y^1(y^2 + 1)$$

$$6. \frac{y^{a+2}}{y^a} + \frac{y^a}{y^a}$$

$$y^a(y^2 + 1)$$

To factor a polynomial by Difference Of Two Squares (DOTS):

Step 1: Take the square root of each term.

Step 2: The 1st square root is the 1st term of both parentheses.

Step 3: The 2nd square root is the 2nd term of both parentheses.

Step 4: Re-write the expressions in factored form.

* Note: any even exponent is a perfect square.

$$\sqrt{\frac{1}{4}} = \frac{\sqrt{1}}{\sqrt{4}} = \frac{1}{2}$$

$$\sqrt{.25} = .5$$

Factor each binomial using DOTS. $\sqrt{x^6} = x^3$

1. $a^2 - b^2$

$$(a+b)(a-b)$$

2. $x^2 - 4$

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

3. $y^2 - 64$

$$(y+8)(y-8)$$

4. $9a^2 - 16$

$$(3a+4)(3a-4)$$

5. $x^2y^2 - 9$

$$(xy-3)(xy+3)$$

6. $25 - 64x^2$

$$(5+8x)(5-8x)$$

Factor by Grouping:Example 1: Factor $x^3 + 3x^2 - 4x - 12$

Step 1: Write the polynomial in standard form.

Step 2: Group terms.

$$\begin{array}{l} x^2y - 4y \\ y(x^2 - 4) \end{array}$$

Step 3: Use GCF to factor common monomials from each group.

Step 4: Factor out the common binomial.

Step 5: Factor using DOTS if possible.

$$\begin{array}{l} \underline{x^3 + 3x^2} \quad \underline{-4x - 12} \\ \downarrow \quad \downarrow \\ x^2(x+3) - 4(x+3) \\ (x+3)(x^2 - 4) \\ (x+3)(x+2)(x-2) \end{array}$$

2. Factor $x^3 - 2x^2 - 9x + 18$

$$\begin{array}{l} \underline{x^3 - 2x^2} \quad \underline{-9x + 18} \\ \downarrow \quad \downarrow \\ x^2(x-2) - 9(x-2) \\ (x-2)(x^2 - 9) \\ (x-2)(x+3)(x-3) \end{array}$$

3. Factor $2x^3 + x^2 + 8x + 4$

Factor Completely:

1. $36x^2 - 4y^2$

$$4(9x^2 - y^2)$$

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

2. $12x^2 - 27$

$$3(4x^2 - 9)$$

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

$$\begin{array}{r} 12 \\ 1 \overline{) 12} \\ 2 \overline{) 6} \\ \textcircled{3} \overline{) 4} \end{array}$$

$$\begin{array}{r} 27 \\ 1 \overline{) 27} \\ 3 \overline{) 9} \\ \textcircled{3} \overline{) 9} \end{array}$$

3. $2y^4 + 2y^3 + 4y^2 + 4y$

$$2y(y^3 + y^2 + 2y + 2)$$

$$2y[y^2(y+1) + 2(y+1)]$$

$$2y(y+1)(y^2+2)$$

4. $81 - m^4$

$$(9 + m^2)(9 - m^2)$$

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

YouTube video on RSA encryption (about 10 minutes)

(<http://www.youtube.com/watch?v=M7kEpw1tn50>)

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