

1.01 - 6.0 Factoring Review**Part 1 - Polynomial Terminology****Leading Coefficient**

$y = 2x^5 - 3x^4 + 5x^3 - 4x^2 + 7x - 8$

Q1: Complete the following table:

Polynomial	Leading Coefficient	Degree	Constant	Number of Terms	Type of Polynomial
$2x^2 - 5x + 6$	2	2	+6	3	Trinomial
$x^2 - 49$	1	2	-49	2	Binomial
$-2x^3 + 6x^2 - 8$	-2	3	-8	3	Trinomial

**Part 2 - Adding and Subtracting Polynomials without Tiles**

Q2: Simplify  $(x^2 + 5x + 2) + (2x^2 - 3x - 5)$

$$3x^2 - 2x - 3$$

Q3: Simplify  $(2x^2 - 2x + 6) - (x^2 + 3x - 2)$

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

$$x^2 - 5x + 8$$

Q4: Simplify  $(2x - 5) - (x^2 - 3) + (x^2 + 6)$

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

$$0x^2 + 2x + 4$$

$$2x + 4$$

Q5: Simplify  $(2x^2) + (5x - 2y) - (x^2 - 3x)$

$$2x^2 + 5x - 2y - x^2 + 3x$$

$$x^2 + 8x - 2y$$

## Part 3 – Multiplying Polynomials without Tiles

Q6: Simplify  $2x(3x + 1)$ 

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

$$6x^2 + 2x$$

	$3x$	$+1$
$2x$	$6x^2$	$+2x$

Q7: Simplify  $(3x)(2x - 1)$ 

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

$$6x^2 - 3x$$

	$2x$	$-1$
$3x$	$6x^2$	$-3x$

Q8: Simplify  $(x + 1)(x + 2)$ 

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

$$x^2 + 2x + 1x + 2$$

$$x^2 + 3x + 2$$

	$x$	$+2$
$x$	$x^2$	$+2x$
$+1$	$+1x$	$+2$

Q9: Simplify  $(2x + 1)(x - 3)$ 

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

$$2x^2 - 6x + 1x - 3$$

$$2x^2 - 5x - 3$$

	$x$	$-3$
$2x$	$2x^2$	$-6x$
$+1$	$+1x$	$-3$

Q10: Simplify  $(2x + 1)(3x - 1)$ 

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

$$6x^2 - 2x + 3x - 1$$

$$6x^2 + x - 1$$

	$3x$	$-1$
$2x$	$6x^2$	$-2x$
$+1$	$+3x$	$-1$

Q11: Simplify  $(3x + 2)(2x - 3)$ 

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

$$6x^2 - 9x + 4x - 6$$

$$6x^2 - 5x - 6$$

	$2x$	$-3$
$3x$	$6x^2$	$-9x$
$+2$	$+4x$	$-6$

## Part 4 – Harder Questions

Q12: Simplify  $(x + 2)(x^2 - 2x + 5)$ 

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

$$\underline{x^3} - \underline{2x^2} + \underline{5x} + \underline{2x^2} - \underline{4x} + \underline{10}$$

$$x^3 + 0x^2 + 1x + 10$$

$$x^3 + x + 10$$

Q13: Simplify  $(x + 5)^2$ 

$$(x+5)(x+5)$$

$$x^2 + 5x + 5x + 25$$

$$x^2 + 10x + 25$$

Q14: Simplify  $(a - 3)^2 + (a + 4)(2a - 3)$ 

$$(a-3)(a-3) + (a+4)(2a-3)$$

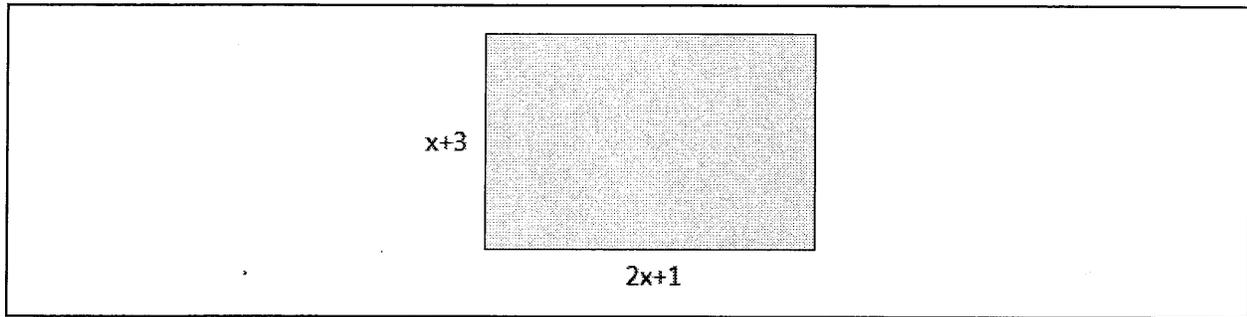
$$(a^2 - 3a - 3a + 9) + (2a^2 - 3a + 8a - 12)$$

$$\underline{a^2} - \underline{6a} + \underline{9} + \underline{2a^2} + \underline{5a} - \underline{12}$$

$$3a^2 - a - 3$$

## Part 5: Perimeters and Areas

Use the following information to answer Q15-Q17:



**Q15:** (Long Answer) Write an expression for the perimeter of the object.

$$\begin{aligned}
 P &= (L) + (w) + (L) + (w) \\
 &= (x+3) + (2x+1) + (x+3) + (2x+1) \\
 &= 6x + 8
 \end{aligned}$$

**Q16:** The area of the object can be written as  $ax^2 + bx + c$ , where  $a$ ,  $b$ , and  $c$  are \_\_, \_\_, and \_\_.

(Record your **three digit** answer in the Numerical Response boxes below)

2	7	3	
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$$\begin{aligned}
 A &= (L)(w) \\
 &= (x+3)(2x+1) \\
 &= 2x^2 + 1x + 6x + 3 \\
 &= 2x^2 + 7x + 3
 \end{aligned}$$

$a = 2$   
 $b = 7$   
 $c = 3$

**Q17:** If the object has a perimeter of 32 meters, what is the area of the object, in  $m^2$ ?

(Record your **two digit** answer in the Numerical Response boxes below)

6	3		
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$$\begin{aligned}
 P &= 6x + 8 \\
 32 &= 6x + 8 \\
 -8 &\quad -8 \\
 24 &= 6x \\
 \div 6 &\quad \div 6 \\
 4 &= x
 \end{aligned}$$

→

$$\begin{aligned}
 A &= 2x^2 + 7x + 3 \\
 &= 2(4)^2 + 7(4) + 3 \\
 &= 32 + 28 + 3 \\
 &= 63
 \end{aligned}$$

**Part 6: Finding a Common Factor versus Common Factoring an Expression**

**Q18:** What is the difference between a question that asks "What is the Common Factor" and a question that asks you to "Common Factor the Expression"?

Expression	What is the Greatest Common Factor (GCF)?	Common Factor the Expression
$2x^6 - 8x^4$	$2x^4$	$2x^4(x^2 - 4)$
$x^3 - 5x^2 + 3x$	$x$	$x(x^2 - 5x + 3)$
$4x^3 - 6x^2 + 8x$	$2x$	$2x(2x^2 - 3x + 4)$
$3x^2y^5 - 15x^7y^3$	$3x^2y^3$	$3x^2y^3(y^2 - 5x^5)$
$3x^2 - 6x + 12$	$3$	$3(x^2 - 2x + 4)$
$98x^3 - 18xy^2$	$2x$	$2x(49x^2 - 9y^2)$

## Part 7: Factoring using the "Box Method"

Q19: Factor the following questions:

$x^2 + 5x + 6$

$+2 \quad +3$

$\square + \square = 5$

$\square \times \square = 6$

$\begin{array}{l} 1, 6 \\ \hline 2, 3 \end{array}$

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

$x^2 + 7x + 12$

$+3 \quad +4$

$\square + \square = 7$

$\square \times \square = 12$

$\begin{array}{l} 1, 12 \\ 2, 6 \\ \hline 3, 4 \end{array}$

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

$x^2 - x - 6$

$+2 \quad -3$

$\square + \square = -1$

$\square \times \square = -6$

$\begin{array}{l} 1, 6 \\ \hline 2, 3 \end{array}$

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

$x^2 - 9x + 20$

$-4 \quad -5$

$\square + \square = -9$

$\square \times \square = +20$

$\begin{array}{l} 1, 20 \\ 2, 10 \\ \hline 4, 5 \end{array}$

$(x-4)(x-5)$

$x^2 + 0x - 25$

$+5 \quad -5$

$\square + \square = 0$

$\square \times \square = -25$

$\begin{array}{l} 1, 25 \\ \hline 5, 5 \end{array}$

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

$x^2 - 16$

$x^2 + 0x - 16$

$+4 \quad -4$

$\square + \square = 0$

$\square \times \square = -16$

$\begin{array}{l} 1, 16 \\ 2, 8 \\ \hline 4, 4 \end{array}$

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

## Part 8: Factoring using the "Box Method" and Common Factors

Q20: Factor the following questions:

$3x^2 + 6x + 3$

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

$$\begin{array}{l} +1 \quad +1 \\ \square + \square = 2 \\ \square \times \square = 1 \end{array}$$

$3(x+1)(x+1)$

$\boxed{1,1}$

$x^2 + 0x - 25$

$$\begin{array}{l} +5 \quad -5 \\ \square + \square = 0 \\ \square \times \square = -25 \end{array}$$

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

$\boxed{1,25}$   
 $\boxed{5,5}$

$2x^3 - 12x^2 + 16x$

$2x(x^2 - 6x + 8)$

$$\begin{array}{l} -2 \quad -4 \\ \square + \square = -6 \\ \square \times \square = 8 \end{array}$$

$2x(x-2)(x-4)$

$\boxed{1,8}$   
 $\boxed{2,4}$

$3x^3y^2 - 6x^2y^2 - 45xy^2$

$3xy^2(x^2 - 2x - 15)$

$$\begin{array}{l} +3 \quad -5 \\ \square + \square = -2 \\ \square \times \square = -15 \end{array}$$

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

$\boxed{1,15}$   
 $\boxed{3,5}$

$2x^3 - 18x$

$2x^3 + 0x^2 - 18x$

$2x(x^2 - 9)$

$2x(x^2 + 0x - 9)$

$$\begin{array}{l} +3 \quad -3 \\ \square + \square = 0 \\ \square \times \square = -9 \end{array}$$

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

$\boxed{1,9}$   
 $\boxed{3,3}$

$3x^3y + 6x^2y + 12xy$

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

$$\begin{array}{l} \square + \square = 2 \\ \square \times \square = 4 \end{array}$$

$$\begin{array}{l} 1,4 \\ 2,2 \\ \hline \text{Not Factorable} \end{array}$$

## Part 9: Step #2: Factoring using Decomposition

Q21: Factor the following questions:

$$\overbrace{2x^2 + 7x + 3}^{+6}$$



$$\begin{array}{l} +1 \quad +6 \\ \square + \square = 7 \\ \square \times \square = 6 \\ \boxed{1, 6} \\ 2, 3 \end{array}$$

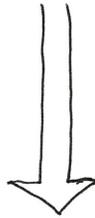
$$2x^2 + 1x + 6x + 3$$

$$(2x^2 + 1x) + (6x + 3)$$

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

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

$$\overbrace{2x^2 + 11x + 15}^{+30}$$



$$\begin{array}{l} \square + \square = 11 \\ \square \times \square = 30 \end{array}$$

$$\begin{array}{l} 1, 30 \\ 2, 15 \\ 3, 10 \\ \boxed{5, 6} \end{array}$$

$$2x^2 + 5x + 6x + 15$$

$$(2x^2 + 5x) + (6x + 15)$$

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

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

$$\overbrace{6x^2 - 11x - 10}^{-60}$$



$$\begin{array}{l} +4 \quad -15 \\ \square + \square = -11 \\ \square \times \square = -60 \end{array}$$

$$6x^2 + 4x - 15x - 10$$

$$(6x^2 + 4x) + (-15x - 10)$$

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

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

$$\begin{array}{l} 1, 60 \\ 2, 30 \\ 3, 20 \\ \boxed{4, 15} \\ 5, 12 \\ 6, 10 \end{array}$$

$$\overbrace{3x^2 + 7x - 20}^{-60} \text{ (Option \#1)}$$



$$\begin{array}{l} -5 \quad +12 \\ \square + \square = 7 \\ \square \times \square = -60 \end{array}$$

$$3x^2 - 5x + 12x - 20$$

$$(3x^2 - 5x) + (12x - 20)$$

$$x(3x - 5) + 4(3x - 5)$$

$$(3x - 5)(x + 4)$$

$$\begin{array}{l} 1, 60 \\ 2, 30 \\ 3, 20 \\ 4, 15 \\ \boxed{5, 12} \\ 6, 10 \end{array}$$

$$\overbrace{3x^2 + 7x - 20}^{-60} \text{ (Option \#2)}$$



$$\begin{array}{l} +12 \quad -5 \\ \square + \square = 7 \\ \square \times \square = -60 \end{array}$$

$$3x^2 + 12x - 5x - 20$$

$$(3x^2 + 12x) + (-5x - 20)$$

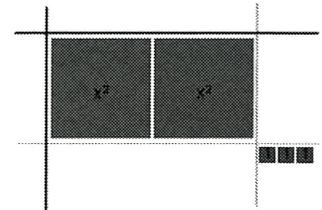
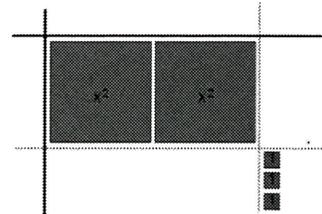
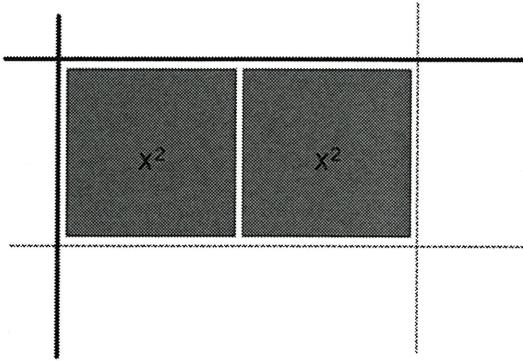
$$3x(x + 4) - 5(x + 4)$$

$$(x + 4)(3x - 5)$$

## Part 10: Alternate Method: Factoring using Algebra Tiles

Q22: Factor the following question:

$$2x^2 + 7x + 3$$



## Part 11: (Harder) Factoring with both Common Factors and Decomposition

Q23: Factor the following question:

$$4x^3 + 14x^2 + 6x$$

$$2x \left( \overbrace{2x^2 + 7x + 3}^{+6} \right)$$

$$\begin{array}{l} +1 \quad +6 \\ \square + \square = 7 \\ \square \times \square = 6 \end{array}$$

$$\begin{array}{|c|} \hline 1, 6 \\ \hline 2, 3 \\ \hline \end{array}$$



$$2x \left[ 2x^2 + 1x + 6x + 3 \right]$$

$$2x \left[ (2x^2 + 1x) + (6x + 3) \right]$$

$$2x \left[ x(2x + 1) + 3(2x + 1) \right]$$

$$2x \left[ (2x + 1)(x + 3) \right]$$

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

## Part 12: Factoring Special Polynomials – No Middle Term

Q24: Factor the following:

$$x^2 - 25$$

$$x^2 + 0x - 25$$

$$+5 \quad -5$$

$$\square + \square = 0$$

$$\square \times \square = -25$$

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

$$4x^2 - 49$$

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

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

## Part 13: Factoring Special Polynomials – Perfect Squares

Q25: Factor the following:

$$x^2 + 10x + 25$$

$$(x+5)(x+5)$$

$$(x+5)^2$$

$$x^2 - 10x + 25$$

$$(x-5)(x-5)$$

$$(x-5)^2$$

## Part 14: Factoring Special Polynomials with "y" terms

Q26: Factor the following:

$$4x^2 - 9$$

$$4x^2 + 0x - 9$$

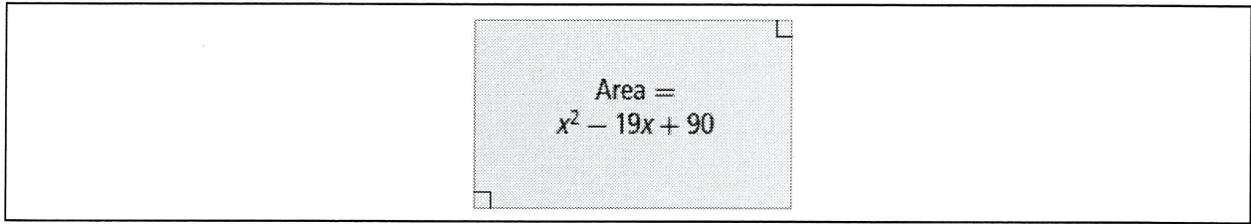
$$(2x+3)(2x-3)$$

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

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

Part 15: Areas of Shapes

Use the following information to answer Q27-Q28:



**Q27:** The length of the rectangle can be expressed as  $(x - a)$  and the width as  $(x - bc)$ , where  $a$ ,  $b$ , and  $c$  are \_\_\_\_, \_\_\_\_, and \_\_\_\_.

(Record your **three digit** answer in the Numerical Response boxes below)

9	1	0	
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$$x^2 - 19x + 90$$

$$(x - 9)(x - 10)$$

$$a = 9 \quad b = 1 \quad c = 0$$

$$\begin{array}{l} -9 \quad -10 \\ \square + \square = -19 \\ \square \times \square = +90 \end{array}$$

- 1, 90
- 2, 45
- 3, 30
- 5, 18
- 6, 15
- 9, 10

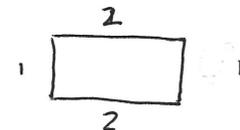
**Q28:** If  $x=11$  cm, what is the perimeter of the rectangle, in  $\text{cm}^2$ ?

(Record your **three digit** answer in the Numerical Response boxes below)

6	.	0	0
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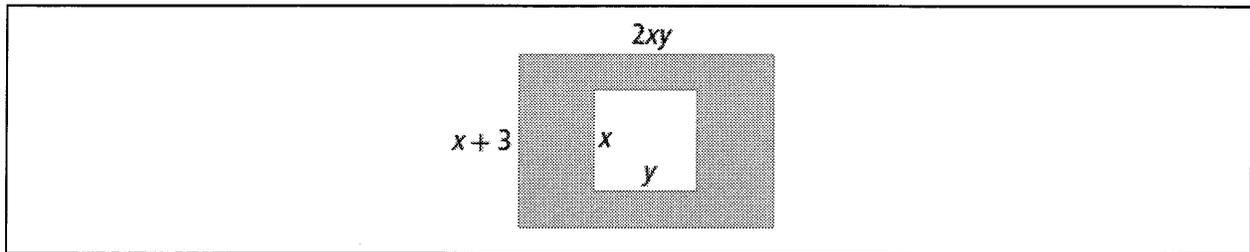
$$L = x - 9 = (11) - 9 = 2$$

$$w = x - 10 = (11) - 10 = 1$$

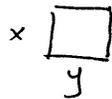
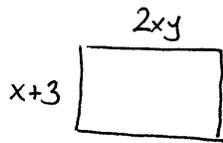


$$P = (2) + (1) + (2) + (1) = 6$$

Use the following information to answer Q29:



**Q29:** (Long Answer) Write an expression in fully factored form for the shaded area. (4 marks)



$$A = (2xy)(x+3)$$

$$= 2x^2y + 6xy$$

$$A = (x)(y)$$

$$= xy$$

$$\text{TOTAL AREA} = \text{Area of big rectangle} - \text{Area of small rectangle}$$

$$= (2x^2y + 6xy) - (xy)$$

$$= 2x^2y + 5xy$$

$$= xy(2x + 5)$$