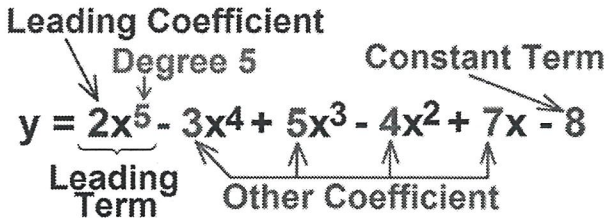
Math 20-2

KEY

LO1 – 6.0 Factoring Review

Part 1 – Polynomial Terminology



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

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

$x^2 + 8x - 2y$

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Part 3 – Multiplying Polynomials without Tiles

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

$6x^2+2x$

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

$6x^2-3x$

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

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

x^2+3x+2

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

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

$2x^2-5x-3$

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

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

$6x^2+x-1$

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

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

$6x^2-5x-6$

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Part 4 – Harder Questions

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

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

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

x^3+x+10

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

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

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

$x^2+10x+25$

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

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

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

$a^2-6a+9 + 2a^2+5a-12$

$3a^2-a-3$

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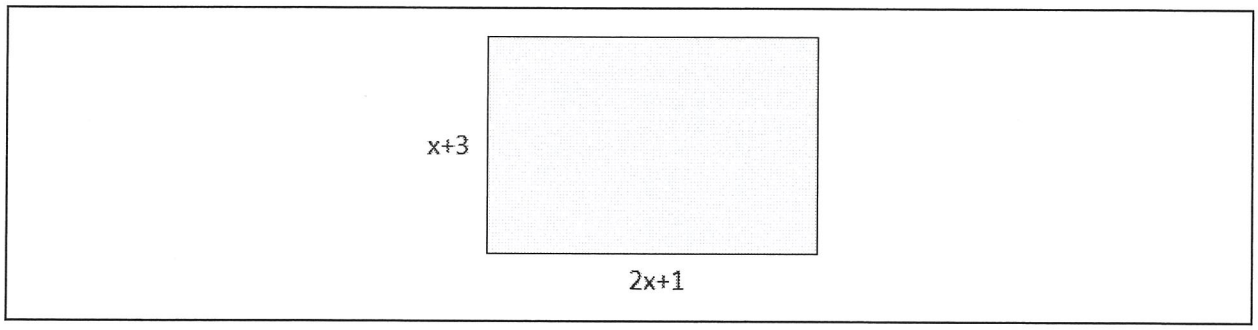
Part 5: Perimeters and Areas

Use the following information to answer Q15-Q17:



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

$P = L + w + L + w$
$= (x+3) + (2x+1) + (x+3) + (2x+1)$
$= 6x + 8$

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	

$A = (L)(w)$
$= (x+3)(2x+1)$
$= 2x^2 + 1x + 6x + 3$
$= 2x^2 + 7x + 3$
$ax^2 + bx + c$

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)*

$P = 6x + 8$
$32 = 6x + 8$
$-8 \quad -8$
$24 = 6x$
$\div 6 \quad \div 6$
$4 = x$

$A = 2x^2 + 7x + 3$
$= 2(4)^2 + 7(4) + 3$
$= 32 + 28 + 3$
$= 63$

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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	$3(x^2 - 2x + 4)$
$98x^3 - 18xy^2$	$2x$	$2x(49x^2 - 9y^2)$

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Part 7: Factoring using the "Box Method"

Q19: *Factor the following questions:*

$x^2 + 5x + 6$

+2 +3
□+□ = 5 (1,6; 2,3)
□×□ = 6

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

$x^2 + 7x + 12$

+3 +4
□+□ = 7 (1,12; 2,6; 3,4)
□×□ = 12

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

$x^2 - x - 6$

+2 -3
□+□ = -1 (1,6; 2,3)
□×□ = -6

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

$x^2 - 9x + 20$

-4 -5
□+□ = -9 (1,20; 2,10; 4,5)
□×□ = 20

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

$x^2 + 0x - 25$

+5 -5
□+□ = 0
□×□ = -25

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

$x^2 - 16$

$x^2+0x-16$

□+□ = 0 (1,16; 2,8; 4,4)
□×□ = -16

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

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

Q20: *Factor the following questions:*

$3x^2 + 6x + 3$

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

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

+1 +1
□ + □ = 2
□ × □ = 1

$x^2 + 0x - 25$

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

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

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

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

-2 -4
□ + □ = -6
□ × □ = 8

1,8
2,4

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

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

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

+3 -5
□ + □ = -2
□ × □ = -15

1,15
3,5

$2x^3 - 18x$

$2x(x^2 - 9)$

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

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

+3 -3
□ + □ = 0
□ × □ = -9

1,9
3,3

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

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

□ + □ = 2
□ × □ = 4

1,4
2,2

Not able to factor further

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Part 9: Step #2: Factoring using Decomposition

Q21: *Factor the following questions:*

+6

$2x^2 + 7x + 3$

+1 +6
□+□ = 7
□×□ = 6
1,6
2,3

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

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

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

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

+30

$2x^2 + 11x + 15$

+5 +6
□+□ = 11
□×□ = 30

1, 30
2, 15
3, 10
5, 6

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

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

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

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

-60

$6x^2 - 11x - 10$

+4 -15
□+□ = -11
□×□ = -60

1, 60
2, 30
3, 20
4, 15
5, 12
6, 10

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

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

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

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

-60

$3x^2 + 7x - 20$ *(Option #1)*

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

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

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

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

-5 +12
□+□ = 7
□×□ = -60

1, 60
2, 30
3, 20
4, 15
5, 12
6, 10

$3x^2 + 7x - 20$ *(Option #2)*

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

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

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

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

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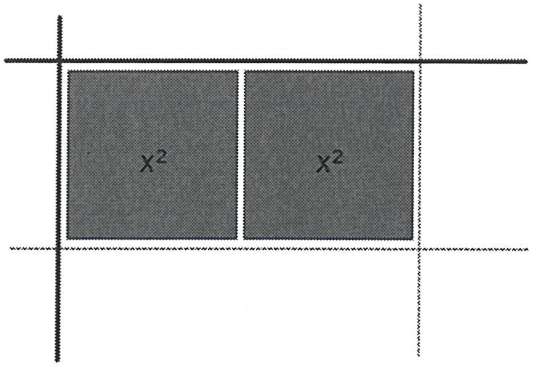
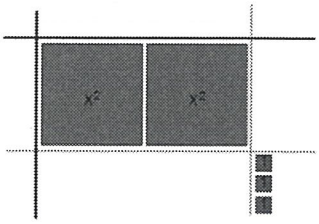
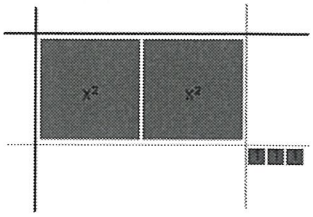
Part 10: Alternate Method: Factoring using Algebra Tiles

Q22: *Factor the following question:*

$2x^2 + 7x + 3$







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

Q23: *Factor the following question:*

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

$2x[2x^2 + 7x + 3]$ $\quad +1 \quad +6$ $\square + \square = 7$ $\quad 1,6$ $\square \times \square = 6$ $\quad 2,3$

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

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

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

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

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Part 12: Factoring Special Polynomials – No Middle Term

Q24: *Factor the following:*

$x^2 - 25$

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

$4x^2 - 49$

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

Part 13: Factoring Special Polynomials – Perfect Squares

Q25: *Factor the following:*

$x^2 + 10x + 25$

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

$x^2 - 10x + 25$

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

Part 14: Factoring Special Polynomials with "y" terms

Q26: *Factor the following:*

$4x^2 - 9$

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

$4x^2 - 9y^2$

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

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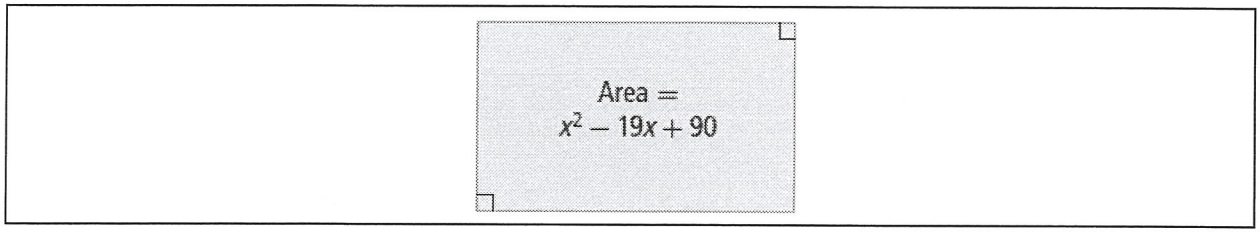
Part 15: Areas of Shapes

Use the following information to answer Q27-Q28:



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

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

9	1	0	

-9 -10
□ + □ = -19
□ × □ = 90

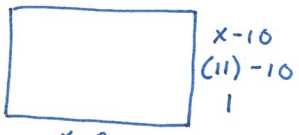
1, 90
2, 45
3, 30
5, 18
6, 15
9, 10

(x -9)(x -10)

Q28: If x=11 cm, what is the perimeter of the rectangle, in cm^2?

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

6			



P = L + w + L + w
= (1) + (2) + (1) + (2)
= 6

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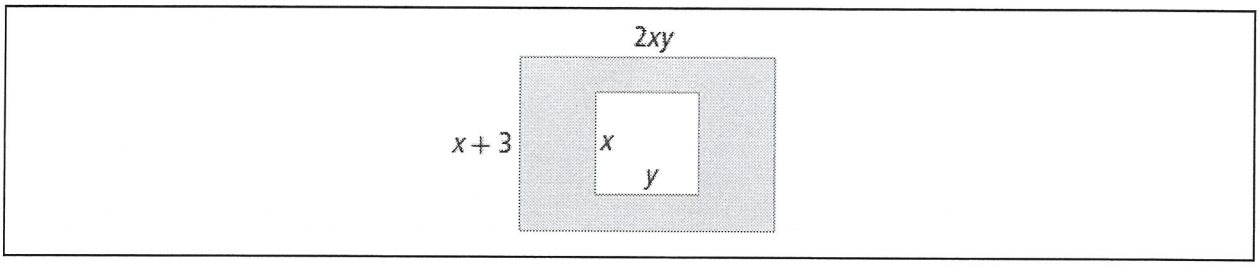
Use the following information to answer Q29:



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

$A_{BIG} = (L)(w)$
$= (2xy)(x+3)$
$= 2x^2y + 6xy$

$A_{SMALL} = (L)(w)$
$= (x)(y)$
$= xy$

$A_{SHADED} = A_{BIG} - A_{SMALL}$
$= (2x^2y + 6xy) - (xy)$
$= 2x^2y + 5xy$