First Name:_____   Last Name:_____

$\mathfrak{Polynomials} - \mathfrak{Mid\ Point\ Review}$

PART 1: Multiplying Polynomials

Q1. Simplify $x(x-2)$

$$x^2 - 2x$$

Q2. Simplify $3qr^2(5q-2r)$

$$15q^2r^2 - 6qr^3$$

Q3. Simplify $(n-3)(n+2)$ FOIL

$$n^2 + 2n - 3n - 6$$
$$n^2 - n - 6$$

Q4. Simplify $(2n-5)(2n+5)$ FOIL

$$4n^2 + 10n - 10n - 25$$
$$4n^2 - 25$$

Q5. Simplify $(2y+1)(3y-2) + (y+1)^2$

$$(2y+1)(3y-2) + (y+1)(y+1)$$
$$(6y^2 - 4y + 3y - 2) + (y^2 + 1y + 1y + 1)$$
$$6y^2 - y - 2 + y^2 + 2y + 1$$
$$7y^2 + y - 1$$

Q6. Simplify $(n-1)(n+1) - (n-1)^2$

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

PART 2: Finding the Greatest Common Factor (GCF)

Q7. Factor $2x^2 - 4x$

$$2x(x-2)$$

Q8. Factor $5q^3r^2 - 10qr^3$

$$5qr^2(q^2 - 2r)$$

Q9. Factor $4n(n+1) - 6(n+1)$

$$(n+1)(4n-6)$$
$$(n+1)(2)(2n-3)$$
$$2(n+1)(2n-3)$$

Q10. Find the GCF of $4y^5(x-3) + 8y^4(x-3)$

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

If factored (not necessary)...

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

PART 3: Factoring Polynomials

Q11. Factor $x^2 - 13x + 40$

$$\overset{-5}{\square} + \overset{-8}{\square} = -13$$
$$\square \times \square = 40$$

1,40
2,20
4,10
$\boxed{5,8}$

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

Q12. Factor $n^2 + 11n + 18$

$$\overset{+2}{\square} + \overset{+9}{\square} = 11$$
$$\square \times \square = 18$$

1,18
$\boxed{12,9}$
3,6

$$(x+2)(x+9)$$

Q13. Factor $y^2 + 16y + 48$

$$\overset{+4}{\square} + \overset{+12}{\square} = 16$$
$$\square \times \square = 48$$

1,48
2,24
3,16
$\boxed{4,12}$

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

Q14. Factor $x^2 - 16$

Really $x^2 + 0x - 16$

$$\overset{+4}{\square} + \overset{-4}{\square} = 0$$
$$\square \times \square = -16$$

1,16
2,8
4,4

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

PART 4: Polynomials with Algebra Tiles

Q15. Multiply the following:

	X	-1	-1	-1
-X	$-x^2$	-x	-x	-x
1	x	-1	-1	-1
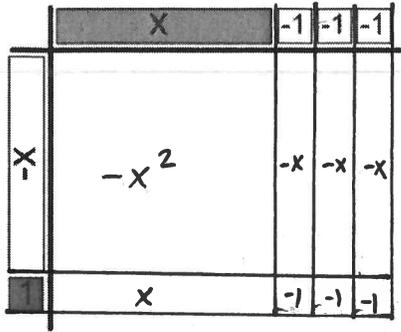
$$-x^2 - 2x - 3$$

Q16. Factor the following:

2x-1

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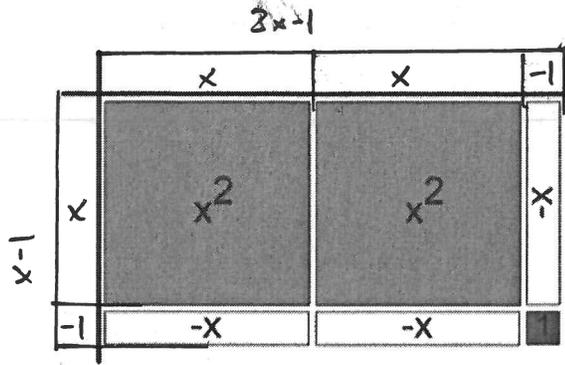
$$(x-1)(2x-1)$$

Q17. Factor using Algebra Tiles and draw a picture below: $x^2 - 2x - 8$

x-4

x+2	X	-1	-1	-1	-1
X	x^2	-x	-x	-x	-x
+1	+x	-1	-1	-1	-1
+1	+x	-1	-1	-1	-1
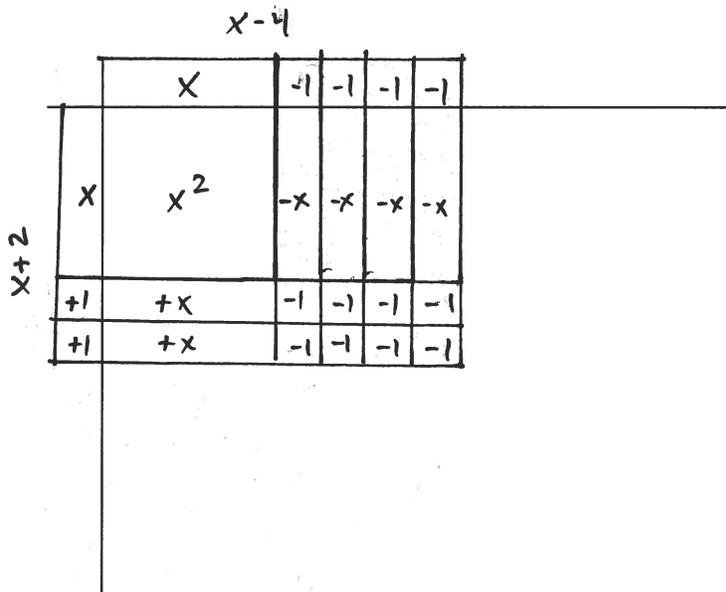
Algebra

$$\boxed{+2} + \boxed{-4} = -2$$

$$\boxed{} \times \boxed{} = -8$$

1,8
2,4

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

PART 5: Word Problems

Q18. Below is a rectangle of area $x^2 - 19x + 90$.
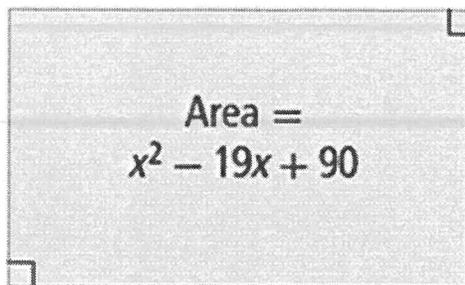
Area =
$x^2 - 19x + 90$

a) Determine the length and width of the rectangle by factoring. HINT: Area = Length * Width

$$-6 \quad -15$$
$$\square + \square = -19$$
$$\square \times \square = 90$$

$$1, 90$$
$$2, 45$$
$$3, 30$$
$$5, 18$$
$$\boxed{6, 15}$$

$$(x-6)(x-15) \longrightarrow \text{Length} = (x-6)$$
$$\text{Width} = (x-15)$$

b) Write an expression for determining the perimeter of the rectangle.

$$P = L*w + L*w$$
$$= (x-6) + (x-15) + (x-6) + (x-15)$$
$$= 4x - 42$$

c) If $x = 20$, what would the area of the rectangle be? What would the perimeter be?

$$P = 4(20) - 42$$
$$= 80 - 42$$
$$= 38$$

Note that length $= (20) - 6 = +14$
width $= (20) - 15 = +5$

Both positive values, so we can feel some confidence that we factored properly.