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Date _____
Algebra II

Polynomials/Factoring Review Sheet

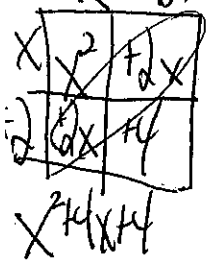
Prove the following identities

1. $(x+2)^2 + 2(x+2) - 8 = (x+6)x$

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

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

$x^2+6x=x^2+6x$ ✓

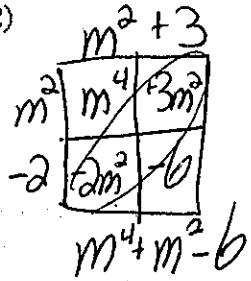


x^2+4x+4

2. $m^5 + m^3 - 6m = m(m^2+3)(m^2-2)$

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

$m^5+m^3-6m=m^5+m^3-6m$ ✓



m^4+m^2-6

Divide the following polynomials

3. $\dfrac{2x^3-x-2}{x-4}$ → missing term

$0x^2$

4	2	0	-1	-2
	↓	8	32	124
	2	8	31	122

$2x^2+8x+31+\dfrac{122}{x-4}$

4. $\dfrac{-3x^2+10x-6}{x+1}$

-1	-3	10	-6
	↓	3	-13
	-3	13	-19

$-3x+13-\dfrac{19}{x+1}$

Factor the follow expressions completely

5. $4t^2 - 25$ DOTS

$(2t+5)(2t-5)$

6. $m^2 - 8m + 15$ Trinomial

$(m-5)(m-3)$

7. $x^4 - 8x^2 - 9$ Trinomials

DOTS $(x^2-9)(x^2+1)$

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

8. $\frac{2x^2}{2} - \frac{50}{2}$ GCF

$2(x^2-25)$ DOTS

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

9. $2y^2 - 5y - 7$ PT Tricky Trinomial

$y^2 - 5y - 14$

$(y-\frac{7}{2})(y+\frac{2}{2})$

$(2y-7)(y+1)$

10. $6x^2 + x - 12$ PT Tricky Trinomial

$x^2 + 1x - 72$

$(x+\frac{9}{6})(x-\frac{8}{6})$

$(x+\frac{3}{2})(x-\frac{4}{3})$

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

11. $\frac{x^3}{x^2} + \frac{3x^2}{x^2} \frac{-9x}{-9} - \frac{27}{-9}$ Grouping

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

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

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

12. $\frac{t^4}{t^2} - \frac{3t^3}{t^2} - \frac{18t^2}{t^2} \frac{-t^2}{-1} + \frac{3t}{-1} + \frac{18}{-1}$ Grouping

$t^2(t^2-3t-18) - 1(t^2-3t-18)$

DOTS $(t^2-1)(t^2-3t-18)$ Trinomial

$(t+1)(t-1)(t-6)(t+3)$

13. $(x^2-2x)^2 - 11(x^2-2x) + 24$ Substitution Trinomial

$y = x^2 - 2x$ $y^2 - 11y + 24$

$(y-8)(y-3)$

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

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

$a=y$ $\sqrt[3]{y^3}$ $\sqrt[3]{125}$ Cubes

$b=5$ $a^3 - b^3 = (a-b)(a^2+ab+b^2)$

$y^3 - 125 = (y-5)(y^2+5y+25)$

Express the following in simplest terms

15. $\frac{2x+6}{x^2-9}$ GCF DOTS

$\frac{2(x+3)}{(x+3)(x-3)}$ $\frac{2}{x-3}$

16. $\frac{10-5x}{x^2+2x-8}$ GCF Trinomial

$\frac{5(2-x)(-1)}{(x+4)(x-2)}$ $\frac{-5}{x+4}$

Solve the following equations for the given variable:

17. $n^2=3n+18$

$-3n-18$

Trinomial $n^2-3n-18=0$

$(n-6)(n+3)=0$

$n-6=0$ $n+3=0$

$+6+6$ $-3-3$

$n=6$ $n=-3$

18. $(x^3+10x^2)(-9x-90)=0$ Grouping

$\frac{x^2}{x^2}\quad\frac{-9}{-9}$

$x^2(x+10)-9(x+10)=0$

DOTS $(x^2-9)(x+10)=0$

$(x+3)(x-3)(x+10)=0$

$x+3=0$ $x-3=0$ $x+10=0$

$-3-3$ $+3+3$ $-10-10$

$x=-3$ $x=3$ $x=-10$

Solve the following systems algebraically for all values of x and y:

19. $x^2+y^2=10$

$x=y-4$

$(y-4)^2+y^2=10$

	y	-4
y	y^2	$-4y$
-4	$-4y$	$+16$

$y^2-8y+16$

$y^2-8y+16+y^2=10$

$2y^2-8y+16=10$

$-10\quad-10$

$\frac{2y^2-8y+6=0}{2}$

$y^2-4y+3=0$

$(y-3)(y-1)=0$

$y-3=0$ $y-1=0$

$+3+3$ $+1+1$

$y=3$ $y=1$

$y=3$: $x=y-4$, $x=3-4$, $x=-1$, $(-1,3)$

$y=1$: $x=y-4$, $x=1-4$, $x=-3$, $(-3,1)$

20. $(x+2)^2+(y-4)^2=40$

$y=x+2$

$(x+2)^2+(x+2-4)^2=40$

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

x^2+4x+4

$(x+2)^2+(x-2)^2=40$

	x	-2
x	x^2	$-2x$
-2	$-2x$	$+4$

x^2-4x+4

$x^2+4x+4+x^2-4x+4=40$

$2x^2+8=40$

$-40\quad-40$

$\frac{2x^2-32=0}{2}$

$x^2-16=0$

$(x+4)(x-4)=0$

$x+4=0$ $x-4=0$

$-4-4$ $+4+4$

$x=-4$ $x=4$

$x=-4$: $y=x+2$, $y=-4+2$, $y=-2$, $(-4,-2)$

$x=4$: $y=x+2$, $y=4+2$, $y=6$, $(4,6)$

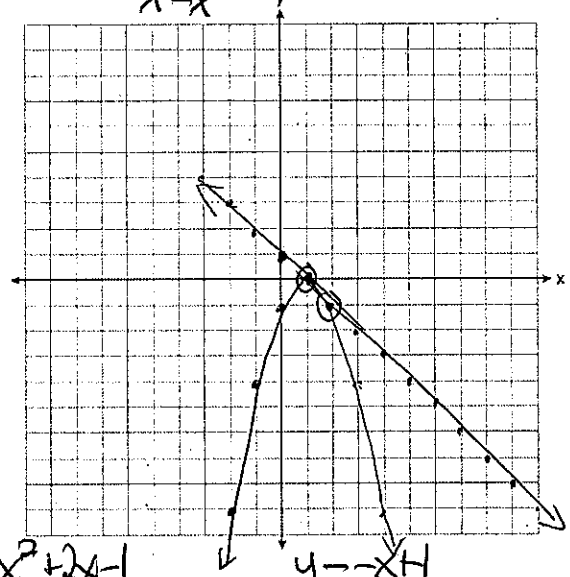
Solve the following systems graphically for all values of x and y:

21. $y = -x^2 + 2x - 1$

$y + x = 1$

$-x \quad -x$

$y = -x + 1$



$y = -x^2 + 2x - 1$

x	y
-2	-9
-1	-4
0	-1
1	0
2	-1
3	-4
4	-9

$y = -x + 1$

x	y
-2	3
-1	2
0	1
1	0
2	-1
3	-2
4	-3

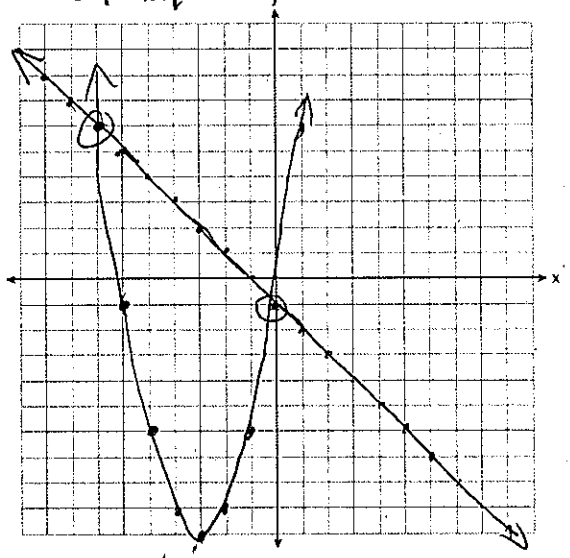
(1,0) and (2,-1)

22. $y = x^2 + 6x - 1$

$y + 1 = -x$

$-1 \quad -1$

$y = -x - 1$



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

x	y
-7	6
-6	-1
-5	-6
-4	-9
-3	-10
-2	-9
-1	-6
0	-1
1	6

$y = -x - 1$

x	y
-7	6
-6	5
-5	4
-4	3
-3	2
-2	1
-1	0
0	-1
1	-2

(-7,6) and (0,-1)