Name:_____ Date:_____

Class/Home worksheet: Alg2H

Factoring : Perfect cubes + Grouping + Solving Equations

(page 224 and beyond)

Perfect Cubes (P. 224)

$$A^3 + B^3 = (A + B) \cdot (A^2 - AB + B^2)$$

$$A^3 - B^3 = (A - B) \cdot (A^2 + AB + B^2)$$

SOAP : Same , Opposite , Always-Positive (Adin rule)

Factor:

$x^3 + 125 =$

$A = x \quad B = 5$

$(x+5)(x^2 - 5x + 25)$

Factor:

$x^3 - 27y^3 =$

$A = x \quad B = 3y$

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

Factor:

$-8x^3 + 27y^3 = 27y^3 - 8x^3 =$

$A = 3y \quad B = 2x$

$= (3y - 2x)(9y^2 + 6xy + 4x^2)$

Factor:

$12x^2y^3 - 20x^3y =$

$12x^2y^3 - 27x^2y =$

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

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

Problems denoted with ** mark are taken from Exeter Phillips Academy (NH) math curriculum.

Factor by grouping : When you have polynomial with 4 or more terms.

Factor:

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

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

$\boxed{(x+2)(x+3)}$

Factor:

$$x^2y + 5xy + 4x + 20 =$$

$xy(x+5)+4(x+5)=$

$=\boxed{(x+5)(4+xy)}$

Factor:
(hint: Reorder)

$$5y^2 + 2y + 10y + 4 =$$

$5y^2+10y+2y+4=$

$=5y(y+2)+2(y+2)=\boxed{(5y+2)(y+2)}$

Factor (page 223, prob 55):

$$xy + xz + wy + wz =$$

$x(y+z)+w(y+z)=$

$=\boxed{(x+w)(y+z)}$

Factor

Factor (page 223, prob 68):
(hint: Don't stop)

$$a^{16} - 1 =$$

$(a^8-1)(a^8+1)=(a^4-1)(a^4+1)(a^8+1)=$

$=(a^2-1)(a^2+1)(a^4+1)(a^8+1)=$

$=\boxed{(a-1)(a+1)(a^2+1)(a^4+1)(a^8+1)}$

Factor (page 223, prob 56):

$$b^3 - b^2 + 2b - 2 =$$

$b^2(b-1)+2(b-1)=$

$=\boxed{(b^2+2)(b-1)}$

Factor (page 223, prob 48):
(Challenging)

$$a^2 + 2ab + b^2 - 9 =$$

$(a+b)^2-9=$

$=\boxed{(a+b+3)(a+b-3)}$

Factor (page 223, prob 74):
(Challenging)

$$-225x + x^3 =$$

$x(x^2-225)=$

$=\boxed{x(x+15)(x-15)}$

Solving by factoring (principle of zero product)

Question 1

what is x?

$$x^2 - 3x - 28 = 0$$

Answer:

M	A	T
-28	-3	-7, 4

$x^2 - 7x + 4x - 28 = x(x-7) + 4(x-7) = (x+4)(x-7) = 0$

$x + 4 = 0 \Rightarrow x = -4$ or

$x - 7 = 0 \Rightarrow x = 7$

Question 2

one less than

The square of a number equals twice the number minus 1. find the number.

Answer:

$x^2 = 2 \cdot (x - 1)$

$x^2 = 2x - 1$

$x^2 - 2x + 1 = 0$

M	A	T
1	-2	-1, -1

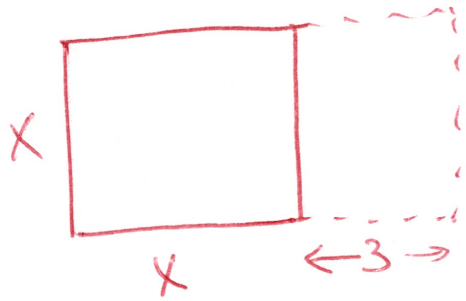
$(x-1)^2 = 0$

$x = 1$

Question 3 (Question 1, page 234)

A house has a square living room. In remodeling, one wall is moved 3 meters to extend the room into a rectangular shape, with a resulting area of 180 m^2.
What are the dimensions of the square room?

Answer:



$x \cdot (x+3) = 180$

$x^2 + 3x = 180$

$x^2 + 3x - 180 = 0$

M	A	T
-180	3	15, -12

$x^2 + 15x - 12x - 180 = 0$

$x(x+15) - 12(x+15) = 0$

$(x-12)(x+15) = 0$

$x = 12$ or $x = -15$