1-5 HW Answer Key

1. $(x+2)(2x+3)$
2. $(4x-3)(4x+1)$
3. $(x-6)(x-1)$
4. $(x-3)(x+2)$
5. $2x(x+1)(x+2)$
6. $3x(x+1)(x+3)$
7. $3y(y-5)(y+1)$
8. $4m(m+4)(m-4)$
9. x^2-3x+1
10. $-2x^2-7x+16$
11. $-9x^2+2x-2$
12. $-10x^3y^4z^3-35x^3y^2z^5+15x^2y^3z^4-25x^5yz^3$

Alg 2 Homework 1-5 Name Key

Factor and check #s 2 and 4. Remember to check by multiplying the factors.

1. $2x^2+7x+6$ $p=12, s=7$, $3,4$

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

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

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

ch

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

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

$=2x^2+7x+6$ ✓

2. $16x^2-8x-3$ $p=48$, $s=-8$ $4,-12$

$=16x^2-12x+4x-3$

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

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

ch

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

$=16x^2+4x-12x-3$

$=16x^2-8x-3$ ✓

3. x^2-7x+6 $p=6$, $s=-7$, $-6,-1$

$=(x-6)(x-1)$

ch

$(x-6)(x-1)$

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

$=x^2-7x+6$ ✓

4. x^2-x-6 $p=-6$, $s=-1$, $-3,2$

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

ch

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

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

$=x^2-x-6$ ✓

Factor the following expressions completely.

5. $2x^3+6x^2+4x$ $p=2, s=3$ $1,2$

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

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

6. $3x^3+12x^2+9x$ $p=3, s=4$ $1,3$

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

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

7. $3y^3-12y^2-15y$ $p=-5, s=-4$ $-5,1$

$=3y(y^2-4y-5)$

$=3y(y-5)(y+1)$

8. $4m^3-64m$

$=4m(m^2-16)$

$=4m(m+4)(m-4)$

Simplify by re-writing each polynomial in standard form after applying the operations in the appropriate order.

9. $(x^3 - 7x^2 + 13x - 4) \div (x-4)$

$$x-4 \;\overline{)\; x^3 - 7x^2 + 13x - 4}$$

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

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

$$-3x^2 + 13x$$

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

$$x - 4$$

$$-x + 4$$

$$0$$

10. $(5x^2 - 4x + 7) + (-3x + 9 - 7x^2)$

$= -2x^2 - 7x + 16$

11. Subtract $(3x^2 - 2x + 9)$ from $(7 - 6x^2)$

$(7 - 6x^2) - (3x^2 - 2x + 9)$

$= 7 - 6x^2 - 3x^2 + 2x - 9$

$= -9x^2 + 2x - 2$

12. $-5x^2yz^3(2xy^3 + 7xyz^2 - 3y^2z + 5x^3)$

$= -10x^3y^4z^3 - 35x^3y^2z^5 + 15x^2y^3z^4 - 25x^5yz^3$

$6x^2 - 13x - 5$

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

$3x(2x-5) + 1(2x-5)$

$(2x-5)(3x+1)$

Long Prod/Sum

Prod = $6(-5) = -30$

Sum = -13

30

~~1 30~~

2 -15

~~3 10~~

~~5 6~~

1-6: Sum/Difference of Cubes

Warm-up: Factor Completely.

1. $x^2 - 25$ DOTS

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

2. $x^4 - 625$

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

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

Is $x^3 - 8 = (x-2)(x-2)(x-2)$? Algebraically justify your answer.

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

x^3-4x^2+4x

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

$x^3-8 \neq x^3-6x^2+12x-8$

NO!

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

We can factor binomials that are sums or differences of cubes. First complete the following table to prepare for this factoring method.

Integer	Square	Cube
1	1	1
2	4	8
3	9	27
4	16	64
5	25	125

Factoring sum or difference of cubes:

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

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

S O AP

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

"SOAP"
S = Same sign
O = opp. sign
A > always positive
P

Example: Factor $x^3 - 8$

This is $x^3 - 2^3$, so we get:

$x^3 - 8 = \_\_^3 - \_\_^3$

$=$

$=$

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

$a = \sqrt[3]{x^3} = x$

$b = \sqrt[3]{8} = 2$

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

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

Try these. Remember $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$
$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

1. $x^3 + 8$ $(a+b)(a^2-ab+b^2)$

$a = \sqrt[3]{x^3} = x$
$b = \sqrt[3]{8} = 2$
$(x+2)(x^2-2x+4)$

2. $y^3 - 125$ $(a-b)(a^2+ab+b^2)$

$a = \sqrt[3]{y^3} = y$
$b = \sqrt[3]{125} = 5$
$(y-5)(y^2+5y+25)$

3. $x^3 - 64$ $(a-b)(a^2+ab+b^2)$

$a = \sqrt[3]{x^3} = x$
$b = \sqrt[3]{64} = 4$
$(x-4)(x^2+4x+16)$

4. $64 - x^3$ $(a-b)(a^2+ab+b^2)$

$a = \sqrt[3]{64} = 4$
$b = \sqrt[3]{x^3} = x$
$(4-x)(16+4x+x^2)$
OR
$(4-x)(x^2+4x+16)$

5. $64x^3+1$ $(a+b)(a^2-ab+b^2)$

$a=\sqrt[3]{64x^3}=4x$

$b=\sqrt[3]{1}=1$

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

$(4x+1)(16x^2-4x+1)$

6. $125y^3-1$ $(a-b)(a^2+ab+b^2)$

$a=5y$

$b=1$

$(5y-1)((5y)^2+5y+1)$

$(5y-1)(25y^2+5y+1)$

Factor the following and verify that the factored expression is equivalent to the original.

y^3+125 $(a+b)(a^2-ab+b^2)$

$a=y \quad b=5$

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

y^3-5y^2+25y

$5y^2-25y+125$

y^3+125 ✓

$x^3 + 64$