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

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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. $4m^3-64m$
$=4m(m^2-16)$
$=4m(m+4)(m-4)$

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

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

$x-4 \;|\; x^3-7x^2+13x-4$

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. $-5x^2yz^3(2xy^3+7xyz^2-3y^2z+5x^3)$
$=-10x^3y^4z^3-35x^3y^2z^5+15x^2y^3z^4-25x^5yz^3$

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1-6: Sum/Difference of Cubes

Warm-up: Factor Completely.

1. x^2-25
$=(x-5)(x+5)$

2. x^4-625
$=(x^2-25)(x^2+25)$
$=(x-5)(x+5)(x^2+25)$

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

No

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

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

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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

Math → 4

$\sqrt[3]{125}=5$

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Factoring sum or difference of cubes:

$a^3+b^3=(a+b)(a^2-ab+b^2)$ (keep, change, plus)

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

Memorize!

"keep, change, plus!"

Example: Factor x^3-8

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

$x^3-8=(x)^3-(2)^3$ a: x, b: 2

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

$=(x-2)(x^2+2x+4)$ → never factorable

$\sqrt[3]{8}$ not $\sqrt[3]{-8}$

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

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

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

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

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5. $64x^3 + 1$: $(4x+1)(16x^2-4x+1)$
a: $\sqrt[3]{64x^3} : 4x$ $: (4x+1)(16x^2-4x+1)$
b: $\sqrt[3]{1} : 1$

6. $125y^3 - 1$
a: $\sqrt[3]{125y^3} : 5y$
b: $\sqrt[3]{1} = 1$
$: (5y-1)(25y^2+5y+1)$

Factor the following and verify that the factored expression is equivalent to the original.
$y^3 + 125$

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$x^3 + 64$

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