FACTORING POLYNOMIALS

Take out GCF First

Left with   Left with   Left with

Binomial   **Trinomial**   **Polynomial with 4 or More Terms**

Difference of Squares

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

$a^2-16=(a-4)(a+4)$

$9k^2-25m^2=(3k-5m)(3k+5m)$

Coefficient of 1

$x^2+(a+b)x+ab=(x+a)(x+b)$

$x^2+5x+6 =$

    ↓   ↓

sum   product

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

$x^2+2x-8 = (x+4)(x-2)$

$x^2-x-12 = (x-4)(x+3)$

$x^2-8x+15 = (x-5)(x-3)$

Coefficient of Other Two

$acx^2+(ad+bc)x+bd=(ax+b)(cx+d)$

$4x^2+8x+3$

    12

6   2

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

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

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

$6x^2+13x-5$

    -30

2   -15

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

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

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

Grouping 2 and 2

$ax+ay+bx+by=a(x-y)+b(x+y)$

    $=(x+y)(a+b)$

$5x+5y-kx-ky$

$=5(x+y)-k(x+y)$

$=(x+y)(5-k)$

$x^2+xy+3x+3y$

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

$=(x+y)(x+3)$

Difference of Squares 3 and 1

$a^2x^2+2abx+b^2-y^2=(ax+b)^2-y^2$

    $=(ax+b-y)(ax+b+y)$

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

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

Perfect Square Trinomial
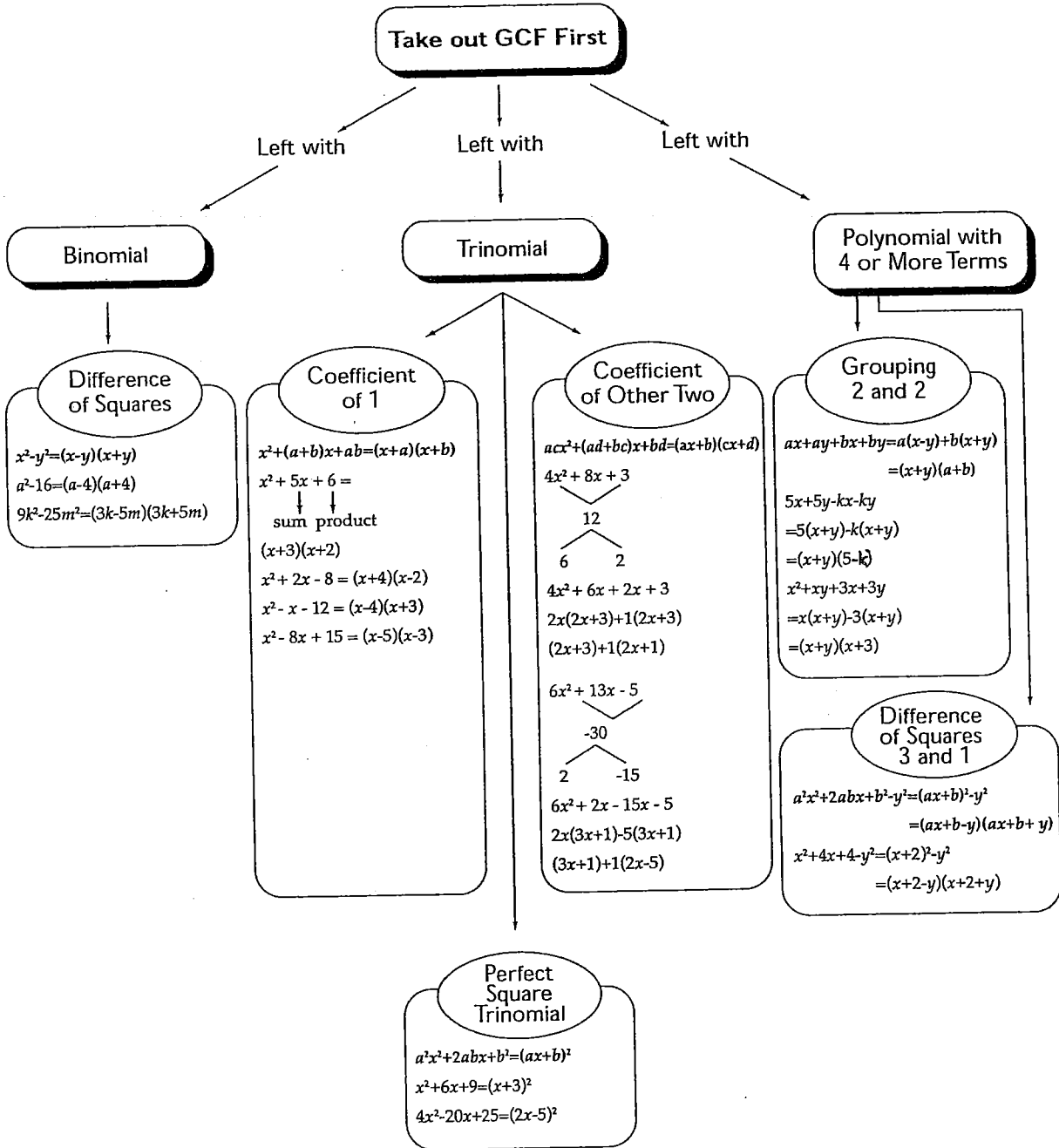
$a^2x^2+2abx+b^2=(ax+b)^2$

$x^2+6x+9=(x+3)^2$

$4x^2-20x+25=(2x-5)^2$

Why Didn't Klutz Do Any Homework on Saturday?

Either multiply or factor, as directed, and find your answer in the adjacent answer column. Write the letter of that exercise in the box that contains the number of the answer.

Multiply:

I. $(a+5)(a-5)$

D. $(2+3a)(2-3a)$

E. $(7a-1)(7a+1)$

N. $(a^2-6)(a^2+6)$

A. $(4a+b)(4a-b)$

O. $(2a^2-5b)(2a^2+5b)$

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4. $16a^2-b^2$

13. $49a^2-1$

6. a^2-25

17. $4a^4-25b^2$

15. $4-9a^2$

12. $4a^4-36$

24. a^4-36

Factor:

S. x^2-y^2

I. $4x^2-49y^2$

W. $81x^2-100y^2$

E. $36x^2-121y^2$

O. $9x^2-64y^2$

N. x^4-400

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3. $(9x+10y)(9x-10y)$

5. $(x+y)(x-y)$

7. $(x^2+20)(x^2-20)$

11. $(6x+11y)(6x-11y)$

16. $(3x+7y)(3x-7y)$

22. $(2x+7y)(2x-7y)$

23. $(3x+8y)(3x-8y)$

Factor:

E. n^2-49

A. n^2-1

N. $81-n^2$

H. $4n^2-9$

I. $49n^2-16$

E. $144-25n^2$

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1. $(2n+3)(2n-3)$

10. $(12+5n)(12-5n)$

8. $(n+1)(n-1)$

5. $(7n+3)(7n-3)$

2. $(n+7)(n-7)$

18. $(9+n)(9-n)$

20. $(7n+4)(7n-4)$

Factor:

T. a^6-b^4

C. $25a^8-9b^4$

W. a^2b^2-36

D. $16-a^4b^6$

K. $a^2b^4-c^8$

N. $4a^{16}-225$

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19. $(4+a^2b^3)(4-a^2b^3)$

14. $(2a^8+15)(2a^8-15)$

21. $(a^3+b^2)(a^3-b^2)$

12. $(ab^2+c^4)(ab^2-c^4)$

9. $(ab+6)(ab-6)$

16. $(5a^4+3b^2)(5a^4-3b^2)$

10. $(4+ab^4)(4-ab^4)$

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

OBJECTIVE 3–h: To simplify products of the form $(a+b)(a-b)$; to factor differences of squares.

A DRASTIC WAY TO DIET

AN EXTREME BUT EFFECTIVE WAY TO DIET IS HIDDEN IN THE LETTERS BELOW. TO FIND IT:

Factor each trinomial below. Find the factored form in the set of answers under the exercise and cross out the letter above it. When you finish, the diet will remain. You might call it the "Algebra diet."

① $m^2 + 8m + 7$

② $m^2 + 5m + 6$

③ $m^2 + 10m + 9$

④ $m^2 - 6m + 8$

⑤ $m^2 - 8m + 12$

⑥ $m^2 + 11m + 24$

⑦ $d^2 - 8d + 15$

⑧ $d^2 - 12d + 20$

⑨ $d^2 + 14d + 13$

⑩ $d^2 - 13d + 36$

⑪ $d^2 + 17d + 30$

⑫ $d^2 + 9d + 18$

⑬ $x^2 + 5xy + 4y^2$

⑭ $x^2 - 18xy + 32y^2$

⑮ $x^2 - 13xy + 40y^2$

⑯ $x^2 + 7xy + 12y^2$

⑰ $x^2 - 27xy + 26y^2$

⑱ $x^2 + 19xy + 60y^2$

Letter	Factored form
T	$(x - 26y)(x - y)$
L	$(x - 2y)(x - 13y)$
N	$(x - 5y)(x - 8y)$
A	$(x + 20y)(x + 3y)$
I	$(x + 4y)(x + 3y)$
G	$(x + y)(x + 4y)$
E	$(x + 2y)(x + 4y)$
R	$(x + 4y)(x + 15y)$
O	$(x - 16y)(x - 2y)$
T	$(d + 6)(d + 3)$
A	$(d - 4)(d - 9)$
M	$(d - 5)(d - 4)$
O	$(d - 2)(d - 18)$
E	$(d - 10)(d - 2)$
L	$(d - 5)(d - 3)$
U	$(d + 2)(d + 15)$
N	$(d + 2)(d + 9)$
F	$(d + 1)(d + 13)$
Y	$(m - 2)(m - 8)$
O	$(m + 8)(m + 3)$
T	$(m + 2)(m + 3)$
U	$(m + 3)(m + 4)$
S	$(m + 7)(m + 1)$
A	$(m - 2)(m - 6)$
B	$(m + 8)(m + 1)$
E	$(m + 9)(m + 1)$
G	$(m - 2)(m - 4)$

OBJECTIVE 3–I: To factor trinomials of the form $x^2 + bx + c$, where c is positive.

What Happened When the Boarding House Blew Up?

Factor each trinomial below. Find one of the factors in **each** column of binomials. Notice the letter next to one factor and the number next to the other. Write the letter in the box at the bottom of the page that contains the matching number.

① $3x^2 + 7x + 2$

② $2x^2 + 5x + 3$

③ $3x^2 - 16x + 5$

④ $7x^2 - 9x + 2$

⑤ $6u^2 + 5u + 1$

⑥ $8u^2 - 9u + 1$

⑦ $10u^2 + 17u + 3$

⑧ $9u^2 - 9u + 2$

⑨ $5u^2 + 11u + 6$

⑤ $(5u + 3)$ Ⓨ $(3u - 2)$

③ $(x - 1)$ Ⓔ $(x - 5)$

⑧ $(3x + 1)$ Ⓖ $(8u - 1)$

⑭ $(3u - 1)$ Ⓞ $(7x - 2)$

⑥ $(2u + 3)$ Ⓡ $(5u + 1)$

⑮ $(x + 1)$ Ⓦ $(x + 2)$

⑨ $(5u + 6)$ Ⓛ $(7x + 2)$

⑦ $(2u + 1)$ Ⓘ $(2x + 3)$

⑪ $(3x - 1)$ Ⓔ $(u + 1)$

⑰ $(u - 1)$ Ⓢ $(3u + 1)$

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⑩ $3n^2 + 2n - 1$

⑪ $5n^2 - 4n - 1$

⑫ $2n^2 + 5n - 3$

⑬ $7n^2 - 13n - 2$

⑭ $3t^2 + 14t - 5$

⑮ $4t^2 - 11t + 7$

⑯ $6t^2 + 5t - 1$

⑰ $3t^2 - 20t - 7$

⑫ $(3t - 1)$ Ⓝ $(n + 3)$

⑤ $(n - 1)$ Ⓡ $(t - 1)$

④ $(3t + 1)$ Ⓟ $(2t + 1)$

⑩ $(n - 2)$ Ⓞ $(n + 1)$

⑬ $(t + 1)$ Ⓕ $(t + 5)$

② $(3n - 1)$ Ⓔ $(5n + 1)$

⑯ $(2n - 1)$ Ⓜ $(t - 7)$

④ $(3t - 7)$ Ⓡ $(7n + 1)$

① $(4t - 7)$ Ⓛ $(6t - 1)$

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

OBJECTIVE 3–o: To factor trinomials of the form $ax^2 + bx + c$, where a is a positive integer greater than 1.

91