Factoring Trinomials #1

Looking back at expanding: $(x + a)(x + b)$

$x^2 + bx + ax + ab$

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

Notice the middle term is the sum of a and b and the last term is a product of a and b

Factoring is the opposite of expanding … so we will re-create the brackets
(we will be given $x^2 + Bx + C$ and need to create $(x + ?)(x + ?)$

We will use the rule: find 2 numbers that multiply to C and add to B

Factor the following

a) $x^2 + 7x + 10$

need 2 #'s that multiply to 10 (5 x 2) (10 x 1) but add to 7 → 5 x 2 work

make your life easier – bring down first sign and put bigger # first (then decide what do I need to do tp + 5 to make 7

$(x + 5)(x\ ?)$ **Answer:** $(x + 5)(x + 2)$

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b) $x^2 + 7x - 30$

need 2 #'s that multiply to 30 (15 x 2) (10 x 3) (6 x 5)(30 x 1) but add to 7 → 10 x 3 work

$(x + 10)(x\ ?)$ *need + 7 …* **Answer:** $(x + 10)(x - 3)$

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c) $x^2 - 4x - 21$

need 2 #'s that multiply to 21 (21 x 1) (7 x 3) but add to 4 → 7 x 3 work

$(x - 7)(x\ ?)$ *need - 4 …* **Answer:** $(x - 7)(x + 3)$

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d) $x^2 - x - 600$

need 2 #'s that multiply to 600 … I aint listing all of those but since they differ by 1
$\sqrt{600} = 24.494$ *… I bet the numbers are 24 and 25*

$(x - 25)(x\ ?)$ *need - 1 …* **Answer:** $(x - 25)(x + 24)$

Let's try the square technique again …

e) $x^2 + x - 1332$

need 2 #'s that multiply to 1332 $\sqrt{1332} = 36.4966$ *… I bet the numbers are 36 and 37*

$(x + 37)(x\ ?)$ *need + 1 …* **Answer:** $(x + 37)(x - 36)$

What if there are extra variables???

Procedure is the same

f) $x^2 - 2xy - 195y^2$

Just place x's at the front and y's at the back and them concentrate on the #'s

$(x - \ ?\ y)(x + \ ?\ y)$

need 2 #'s that multiply to 195 but differ by 2 $\sqrt{195} = 13.95$

maybe 13 x 15, or 14 x 16, or 12 x 14 might work ??? 15 x 13 = 195 😊

$(x - 15y)(x + \ ?\ y)$ *need – 2* **Answer:** $(x - 15y)(x + 13y)$

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g) $x^2 + 12xy + 35y^2$

$(x + ?\ y)(x + \ ?\ y)$ *7 x 5 = 35 …* $(x + 7)(x + \ ?\ y)$ *need 12*

Answer: $(x + 7y)(x + 5y)$

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h) $x^2y^2 + 3xy - 28$

x's and y's in first term … $(xy + ?)(xy + \ ?)$ *7 x 4 = 28 …*

$(xy + 7)(xy + \ ?\ )$ *need 3* **Answer:** $(xy + 7)(xy - 4)$

Silly one …

i) $x^4y^2 - x^2yz^4p^2 - 12z^8p^4$

Variables first: $(x^2y - \ ?\ z^4p^2)(x^2y - \ ?\ z^4p^2)$ *4 x 3 = 12*

$(x^2y - 4z^4p^2)(x^2y - \ ?\ z^4p^2)$ *need -1* **Answer:** $(x^2y - 4z^4p^2)(x^2y + 3z^4p^2)$

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2) *What numbers can be placed in the box so that following will factor*

a) $x^2 + \square x + 18$

its + 18 so both #'s + or both #'s - $(6 \times 3)(9 \times 2)(18 \times 1)$ **Answer:** $\pm 9, \pm 11, \pm 19$

a) $x^2 + \square x - 24$

its - 24 so 1 # = +, the other - $(6 \times 4)(8 \times 3)(24 \times 1)(12 \times 2)$

Answer: $\pm 2, \pm 5, \pm 23, \pm 10$

Not every trinomial will factor … $x^2 + 4x + 7$

but, we will focus on trinomials that do!

Assignment = worksheet

Factoring $x^2 + bx + c$

Did you hear about …

A	B	C	D
E	F	G	H
I	J	K	L
M	N	O	P ?

A $t^2 + 3t - 10$ ***B*** $t^2 + 4t - 21$

C $t^2 + 5t - 6$ ***D*** $t^2 - 2t - 8$

E $t^2 - 10t - 11$ ***F*** $t^2 + 4t - 12$

G $t^2 - 8t - 20$ ***H*** $t^2 - t - 72$ ***I*** $x^2 + 3x - 18$

J $x^2 - 17x - 18$ ***K*** $x^2 + 5x - 24$ ***L*** $x^2 - 10x - 24$

M $x^2 + 2xy - 15y^2$ ***N*** $x^2 - 5xy - 50y^2$ ***O*** $x^2 - 9xy - 36y^2$

P $x^2 + 5xy - 36y^2$

ANSWERS

$(t+3)(t-2)$ STARTED	$(x-18)(x+1)$ WANTED
$(t+6)(t-1)$ WHO	$(x+9y)(x-4y)$ KIT
$(t+6)(t-2)$ RED	$(x-18y)(x+2y)$ BAND
$(t+5)(t-2)$ THE	$(x-12y)(x+3y)$ AID
$(t-9)(t+8)$ BECAUSE	$(x+5y)(x-3y)$ A
$(t-4)(t+2)$ JOINED	$(x+8)(x-3)$ TO
$(t-4)(t+5)$ ARMY	$(x+6)(x-4)$ HELP
$(t-10)(t+2)$ CROSS	$(x+6)(x-3)$ IT
$(t+7)(t-3)$ CAT	$(x-25y)(x+2y)$ LION
$(t+4)(t-3)$ AFTER	$(x-12)(x+2)$ BE
$(t-11)(t+1)$ THE	$(x-10y)(x+5y)$ FIRST

When is the Wrestler "King of the Ring?"

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

1 $n^2 + 6n + 5$ ***2*** $n^2 + 7n + 10$ ***3*** $n^2 - 7n + 12$

4 $n^2 - 11n + 28$ ***5*** $n^2 + 2n - 15$ ***6*** $n^2 - 5n - 24$

7 $n^2 + n - 56$ ***8*** $t^2 + 10t + 16$ ***9*** $t^2 - 15t + 50$

10 $t^2 + 8t - 9$ ***11*** $t^2 - 7t - 30$ ***12*** $t^2 - t - 30$

13 $t^2 + 14t + 48$ ***14*** $t^2 + 8t - 48$ ***15*** $a^2 + 5ab + 6b^2$

16 $a^2 - 4ab - 21b^2$ ***17*** $a^2 + 6ab - 7b^2$

18 $a^2 - 14ab - 32b^2$ ***19*** $a^2 - 29ab + 100b^2$

20 $a^2 + 7ab - 18b^2$ ***21*** $a^2 + 2ab + b^2$

Answers:

(L) $(n + 2)(n + 6)$
(H) $(n + 5)(n - 3)$
(W) $(n + 5)(n + 1)$
(E) $(n - 3)(n - 4)$
(B) $(n - 1)(n + 15)$
(S) $(n + 8)(n - 7)$
(H) $(n + 2)(n + 5)$
(E) $(n - 8)(n + 3)$
(R) $(n - 12)(n - 2)$
(N) $(n - 7)(n - 4)$
(N) $(t - 6)(t + 5)$
(V) $(t - 25)(t + 2)$
(T) $(t - 5)(t - 10)$
(T) $(t + 6)(t + 8)$
(O) $(t - 10)(t + 3)$
(B) $(t + 15)(t - 2)$
(I) $(t + 8)(t + 2)$
(H) $(t - 4)(t + 12)$
(S) $(t + 9)(t - 1)$
(A) $(t - 24)(t + 2)$
(K) $(a - 8b)(a + 4b)$
(H) $(a + 7b)(a - b)$
(A) $(a - 20b)(a + 5b)$
(E) $(a + 2b)(a + 3b)$
(W) $(a + 9b)(a - 2b)$
(T) $(a - 7b)(a + 3b)$
(O) $(a - 25b)(a - 4b)$
(S) $(a + 6b)(a + 3b)$
(N) $(a + b)(a + b)$
(R) $(a - 16b)(a + 2b)$