Quadratic Relations: Factoring

When we want to factor the equation $y = x^2 + bx + c$, we need to find two numbers,

r and s, that __add__ to the middle number (b), and __multiply__ to the last

number (c).

1. Complete the table:

Multiply to	Add to	Possible answers, circle the correct one
20	9	1,20 2,10 (4,5)
21	-10	-1,-21 (-3,-7)
6	5	1,6 (2,3)
6	-7	(-1,-6)
2	3	(1,2)
28	-11	-1,-28 -2,-14 (-4,-7)
-15	2	-1,15 (-3,5)

both negative (for row 21, -10)
both negative (for row 6, -7)
both negative (for row 28, -11)
one positive one negative, larger is positive (for row -15, 2)

2. Write each equation in factored form:

a) $y = x^2 + 5x + 6$

3 and 2

multiplies to __+6__

adds to __+5__

✱ both ⊕

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

b) $y = x^2 + 7x + 6$

1 and 6

multiplies to __+6__

adds to __+7__

✱ both ⊕

$$y = (x+1)(x+6)$$

c) $y = x^2 - 8x + 12$

-6 and -2

multiplies to __+12__

adds to __-8__

✱ both ⊖

$$y = (x-6)(x-2)$$

d) $y = x^2 + 4x - 5$

+5 and -1

multiplies to __-5__

adds to __+4__

✱ one ⊖, one ⊕

✱✱ larger ⊕

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

e) $y = x^2 - 7x + 12$

-4 and -3

multiplies to __+12__

adds to __-7__

✱ both ⊖

$$y = (x-4)(x-3)$$

f) $y = x^2 - 2x - 15$

-5 and +3

multiplies to __-15__

adds to __-2__

✱ one ⊖, one ⊕

✱✱ larger is ⊖

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

Given the standard form of the quadratic relation, identify the value of the sum and product needed to factor. Express the relation in factored form, identify the *x*-intercepts and *y*-intercept, and use these results to make a sketch of each parabola.

	Standard Form	Product and Sum	Pair of Numbers	Factored Form	*x*-intercepts	*y*-intercept
A	$y = x^2 + 6x + 5$	$r \times s = 5$ $r + s = 6$	$r = 1,$ $s = 5$	$y = (x+1)(x+5)$	−1 and −5	5
B	$y = x^2 - 4x - 5$	$r \times s = -5$ $r + s = -4$				
C	$y = x^2 + 4x - 5$	$r \times s = -5$ $r + s = 4$				
D	$y = x^2 - 6x + 5$	$r \times s = 5$ $r + s = -6$				
E	$y = x^2 + 7x + 6$	$r \times s = 6$ $r + s = 7$				
F	$y = x^2 - 6x + 9$	$r \times s =$ $r + s =$				
G	$y = x^2 - x - 6$	$r \times s =$ $r + s =$				
H	$y = x^2 + 13x + 12$	$r \times s =$ $r + s =$				
I	$y = x^2 - 4x - 12$	$r \times s =$ $r + s =$				
J	$y = x^2 + x - 12$	$r \times s =$ $r + s =$				

Sketch of the relation

A   5

-5   -1

B

C

D

E

F

G

H

I

J