

Key

① $(x+3)(x+6)$

$$x^2 + 9x + 18$$

② $(x+9)(x+2)$

$$x^2 + 11x + 18$$

③ $(x+7)(x+3)$

$$x^2 + 10x + 21$$

④ $(x+4)(x+6)$

$$x^2 + 10x + 24$$

⑤ $(x+5)(x+8)$

$$x^2 + 13x + 40$$

⑥ $(x+7)(x-9)$

$$x^2 - 2x - 63$$

⑦ $(x+10)(x-8)$

$$x^2 + 2x - 80$$

⑧ $(x-5)(x+2)$

$$x^2 - 3x - 10$$

⑨ $(x-9)(x-3)$

$$x^2 - 12x + 27$$

⑩ $(x-8)(x-2)$

$$x^2 - 10x + 16$$

Name: _____

Multiply:

1. $(x+3)(x+5)$

$$x^2 + 8x + 15$$

2. $(x+7)(x+8)$

$$x^2 + 15x + 56$$

3. $(x+2)(x+11)$

$$x^2 + 13x + 22$$

4. $(x-3)(x-7)$

$$x^2 - 10x + 21$$

5. $(x-8)(x-9)$

$$x^2 - 17x + 72$$

6. $(x+6)(x-8)$

$$x^2 - 2x - 48$$

7. $(x-4)(x+7)$

$$x^2 + 3x - 28$$

8. $(x-3)(x+4)$

$$x^2 + x - 12$$

9. $(x-7)(x+7)$

$$x^2 - 49$$

10. $(x+12)(x-4)$

$$x^2 + 8x - 48$$

11. $(3x+1)(x-2)$

$$3x^2 - 5x - 2$$

12. $(x-3)(2x+1)$

$$2x^2 - 5x - 3$$

13. $(2x-1)(2x+1)$

$$4x^2 - 1$$

14. $(3x-5)(4x+9)$

$$12x^2 + 7x - 45$$

15. $(6x+3)(2x-1)$

$$12x^2 - 3$$

16. $(7x+3)(4x+5)$

$$28x^2 + 47x + 15$$

17. $(6x-5)(3x-1)$

$$18x^2 - 21x + 5$$

18. $(2x+1)^2$

$$4x^2 + 4x + 1$$

19. $(3x-2)^2$

$$9x^2 - 12x + 4$$

20. $(5x-1)(3x+2)$

$$15x^2 + 7x - 2$$

Foil:

$$\textcircled{1} (2x+1)(3x+2)$$

$$6x^2 + 7x + 2$$

$$\textcircled{3} (3x+5)(4x+1)$$

$$12x^2 + 23x + 5$$

$$\textcircled{5} (x+3)(2x-1)$$

$$2x^2 + 5x - 3$$

$$\textcircled{7} (4x-3)(5x+2)$$

$$20x^2 - 7x - 6$$

$$\textcircled{9} (2x-3)(2x+3)$$

$$4x^2 - 9$$

$$\textcircled{11} (6x+1)(2x-7)$$

$$12x^2 - 40x - 7$$

$$\textcircled{2} (4x+3)(4x-3)$$

$$16x^2 - 9$$

$$\textcircled{4} (2x-7)(2x-5)$$

$$4x^2 - 24x + 35$$

$$\textcircled{6} (2x-5)^2$$

$$4x^2 - 20x + 25$$

$$\textcircled{8} (3x+4)^2$$

$$9x^2 + 24x + 16$$

$$\textcircled{10} (6x-5)(6x+5)$$

$$36x^2 - 25$$

$$\textcircled{12} (7x-3)^2$$

$$49x^2 - 42x + 9$$

Factor:

$$\textcircled{1} x^2 + 11x + 28$$
$$(x+4)(x+7)$$

$$\textcircled{2} r^2 + 9r + 20$$
$$(r+4)(r+5)$$

$$\textcircled{3} y^2 + 25y + 24$$
$$(y+24)(y+1)$$

$$\textcircled{4} s^2 - 12s + 20$$
$$(s-2)(s-10)$$

$$\textcircled{5} x^2 - 6x + 5$$
$$(x-5)(x-1)$$

$$\textcircled{6} c^2 - 15c + 14$$
$$(c-14)(c-1)$$

$$\textcircled{7} u^2 + 11u + 18$$
$$(u+9)(u+2)$$

$$\textcircled{8} p^2 - 5p + 6$$
$$(p-2)(p-3)$$

$$\textcircled{9} n^2 - 17n + 30$$
$$(n-2)(n-15)$$

$$\textcircled{10} x^2 - 14x + 24$$
$$(x-2)(x-12)$$

$$\textcircled{11} x^2 + 20x + 36$$
$$(x+2)(x+18)$$

$$\textcircled{12} x^2 - 22x + 72$$
$$(x-4)(x-18)$$

Factor:

$$\textcircled{1} x^2 + 3x - 4$$
$$(x+4)(x-1)$$

$$\textcircled{3} c^2 - c - 6$$
$$(c-3)(c+2)$$

$$\textcircled{5} y^2 - 5y - 14$$
$$(y-7)(y+2)$$

$$\textcircled{7} p^2 + 7p - 18$$
$$(p+9)(p-2)$$

$$\textcircled{9} a^2 + 5a - 24$$
$$(a+8)(a-3)$$

$$\textcircled{11} y^2 - 4y - 32$$
$$(y-8)(y+4)$$

$$\textcircled{2} x^2 - 4x - 12$$
$$(x-6)(x+2)$$

$$\textcircled{4} p^2 + p - 12$$
$$(p+4)(p-3)$$

$$\textcircled{6} r^2 - 2r - 8$$
$$(r-4)(r+2)$$

$$\textcircled{8} b^2 - 13b - 30$$
$$(b-15)(b+2)$$

$$\textcircled{10} x^2 - 6x - 40$$
$$(x-10)(x+4)$$

$$\textcircled{12} x^2 - 25x - 54$$
$$(x-27)(x+2)$$

Factor: (if not factorable, write "Prime")

$$\textcircled{1} a^2 + 18a + 81$$
$$(a+9)(a+9)$$

$$\textcircled{2} a^2 - 13a + 42$$
$$(a-6)(a-7)$$

$$\textcircled{3} u^2 - 10u + 25$$
$$(u-5)(u-5)$$

$$\textcircled{4} n^2 - 3n - 28$$
$$(n-7)(n+4)$$

$$\textcircled{5} x^2 - x - 2$$
$$(x-2)(x+1)$$

$$\textcircled{6} c^2 + 3c - 40$$
$$(c+8)(c-5)$$

$$\textcircled{7} y^2 - 15y + 44$$
$$(y-11)(y-4)$$

$$\textcircled{8} x^2 + 3x - 28$$
$$(x+7)(x-4)$$

$$\textcircled{9} c^2 - 11c - 26$$
$$(c-13)(c+2)$$

$$\textcircled{10} k^2 - k - 42$$
$$(k-7)(k+6)$$

$$\textcircled{11} a^2 + 13a - 68$$
$$(a+17)(a-4)$$

$$\textcircled{12} x^2 + 15x + 26$$
$$(x+2)(x+13)$$

$$\textcircled{13} x^2 + 22x - 40$$

Prime

$$\textcircled{14} x^2 - 3x - 54$$
$$(x-9)(x+6)$$

Factor: (Watch signs!)

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

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

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

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

$$x^2 - 10x - 24$$

$$(x-12)(x+2)$$

$$x^2 + 10x + 24$$

$$(x+4)(x+6)$$

$$x^2 + 13x - 30$$

$$(x+15)(x-2)$$

$$x^2 - 13x + 30$$

$$(x-10)(x-3)$$

$$x^2 - 15x + 54$$

$$(x-6)(x-9)$$

$$x^2 + 15x - 54$$

$$(x+18)(x-3)$$

Factor:

$$x^2 - 6x + 8$$
$$(x-4)(x-2)$$

$$x^2 + 9x + 20$$
$$(x+4)(x+5)$$

$$x^2 - 13x + 42$$
$$(x-6)(x-7)$$

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

$$x^2 - x - 56$$
$$(x-8)(x+7)$$

$$x^2 + 3x - 18$$
$$(x+6)(x-3)$$

$$x^2 - 7x + 6$$
$$(x-6)(x-1)$$

$$x^2 + 11x + 24$$
$$(x+3)(x+8)$$

$$x^2 - 15x + 54$$
$$(x-6)(x-9)$$

$$x^2 + 5x - 14$$
$$(x+7)(x-2)$$

$$x^2 - 4x - 45$$
$$(x-9)(x+5)$$

$$x^2 + 6x - 7$$
$$(x+7)(x-1)$$

$$x^2 - 10x + 21$$
$$(x-3)(x-7)$$

multiply:

$$\textcircled{1} 6(2x-7)=$$
$$12x-42$$

$$\textcircled{2} 5x(3x-2)=$$
$$15x^2-10x$$

$$\textcircled{3} -2(x^2-3x+6)=$$
$$-2x^2+6x-12$$

$$\textcircled{4} 3x(2x^2-x+6)$$
$$6x^3-3x^2+18x$$

$$\textcircled{5} 4x(3x^2-2x+1)$$
$$12x^3-8x^2+4x$$

$$\textcircled{6} x(5x^2-7x+6)$$
$$5x^3-7x^2+6x$$

Factor out the GCF:

$$\textcircled{7} 3x-6$$
$$3(x-2)$$

$$\textcircled{8} 5x^2-15x+25$$
$$5(x^2-3x+5)$$

$$\textcircled{9} 6x^2+4x-8$$
$$2(3x^2+2x-4)$$

$$\textcircled{10} 7x^2-6x$$
$$x(7x-6)$$

$$\textcircled{11} 9x^3-6x^2+3x$$
$$3x(3x^2-2x+1)$$

$$\textcircled{12} 10x^3-15x^2-60x$$
$$5x(2x^2-3x-12)$$

$$\textcircled{13} 6x^4-7x^3-2x^2$$
$$x^2(6x^2-7x-2)$$

$$\textcircled{14} 9x^2+6x+15$$
$$3(3x^2+2x+5)$$

$$\textcircled{15} 16x^2-64x+8$$
$$8(2x^2-8x+1)$$

$$\textcircled{16} 30x^3+24x^2+12x$$
$$6x(5x^2+4x+2)$$

Factor, if possible. (if not, write "Prime")

$$\textcircled{1} \quad x^2 - 9 \\ (x-3)(x+3)$$

$$\textcircled{2} \quad a^2 - 64 \\ (a+8)(a-8)$$

$$\textcircled{3} \quad 4x^2 - 9 \\ (2x-3)(2x+3)$$

$$\textcircled{4} \quad 9z^2 - 1 \\ (3z-1)(3z+1)$$

$$\textcircled{5} \quad x^2 + 16 \\ \text{Prime}$$

$$\textcircled{6} \quad a^2 - 4b^2 \\ (a-2b)(a+2b)$$

$$\textcircled{7} \quad x^2 - 80 \\ \text{Prime}$$

$$\textcircled{8} \quad 25a^2 - 49b^2 \\ (5a-7b)(5a+7b)$$

Factor Completely:

(look for GCF first!)

$$\textcircled{9} \quad 3a^2 - 48 \\ 3(a-4)(a+4)$$

$$\textcircled{10} \quad 75r^2 - 48 \\ 3(5r-4)(5r+4)$$

$$\textcircled{11} \quad 4x^2 - 36 \\ 4(x-3)(x+3)$$

$$\textcircled{12} \quad x^3 - 4x \\ x(x-2)(x+2)$$

$$\textcircled{13} \quad 20x^2 - 5 \\ 5(2x-1)(2x+1)$$

$$\textcircled{14} \quad 9x^2 - 81y^2 \\ 9(x-3y)(x+3y)$$

Factor completely: (look for GCF's!)

$$\textcircled{1} 3x^2 - 3x - 36$$
$$3(x-4)(x+3)$$

$$\textcircled{2} 8x^2 - 8x - 16$$
$$8(x-2)(x+1)$$

$$\textcircled{3} 6x^3 - 18x^2 + 12x$$
$$6x(x-2)(x-1)$$

$$\textcircled{4} 7x^2 - 28x + 28$$
$$7(x-2)(x-2)$$

$$\textcircled{5} x^2 + 16$$

Prime

$$\textcircled{6} 4x^2 + 8x - 32$$
$$4(x+4)(x-2)$$

$$\textcircled{7} 2x^2 - 50$$
$$2(x-5)(x+5)$$

$$\textcircled{8} x^3 - 7x^2 + 6x$$
$$x(x-6)(x-1)$$

$$\textcircled{9} 5x^3 - 45x$$
$$5x(x-3)(x+3)$$

$$\textcircled{10} 2x^2 + 2x - 60$$
$$2(x+6)(x-5)$$

$$\textcircled{11} 2x^2 + 10x + 8$$
$$2(x+4)(x+1)$$

$$\textcircled{12} x^2 - 13x + 40$$
$$(x-5)(x-8)$$

$$8(x-8)(x+1)$$

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

$$5(x-5)(x-9)$$

$$6x(x-3)(x-1)$$

$$4(x+1)(x-5)$$

Prime

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

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

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

$$6x(x-3)(x+3)$$

$$(2-x)(x-8)$$

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

Factor Completely:

Key

$$\textcircled{1} x^2 - 5x + 6$$

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

$$\textcircled{2} x^3 + 12x^2 + 27x$$

$$x(x+3)(x+9)$$

$$\textcircled{3} x^2 - 49$$

$$(x-7)(x+7)$$

$$\textcircled{4} 3x^2 - 6x$$

$$3x(x-2)$$

$$\textcircled{5} 3b^2 + 60b + 108$$

$$3(b+18)(b+2)$$

$$\textcircled{6} x^2 + 100$$

Prime

$$\textcircled{7} n^2 - 3n + 40$$

Prime

$$\textcircled{8} 2y^2 + 26y + 60$$

$$2(y+3)(y+10)$$

$$\textcircled{9} 5x^2 - 5x - 60$$

$$5(x-4)(x+3)$$

$$\textcircled{10} 4x^2 + 9$$

Prime

$$\textcircled{11} x^3 - 13x^2 - 30x$$

$$x(x-15)(x+2)$$

$$\textcircled{12} 4x^2 - 36$$

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

Factor Completely:

$$\textcircled{1} 13x + 26y$$
$$13(x + 2y)$$

$$\textcircled{2} x^2 - 9x - 36$$
$$(x - 12)(x + 3)$$

$$\textcircled{3} b^2 + 5b - 6$$
$$(b + 6)(b - 1)$$

$$\textcircled{4} r^2 - 9r + 18$$
$$(r - 3)(r - 6)$$

$$\textcircled{5} 25x^2 - 100$$
$$25(x - 2)(x + 2)$$

$$\textcircled{6} 2m^2 - 8m - 64$$
$$2(m - 8)(m + 4)$$

$$\textcircled{7} 24a^2b - 18ab$$
$$6ab(4a - 3)$$

$$\textcircled{8} y^3 + 13y^2 + 40y$$
$$y(y + 5)(y + 8)$$

$$\textcircled{9} x^2 + 9$$

Prime

$$\textcircled{10} 3m^3 - 3m^2 - 36m$$
$$3m(m - 4)(m + 3)$$

Factor Completely: (Look for GCF's)

$$\textcircled{1} 25a^2b^2 + 30ab^2$$
$$5ab^2(5a+6)$$

$$\textcircled{2} 27a^2b + 9b^3$$
$$9b(3a^2+b^2)$$

$$\textcircled{3} x^2 - 9x + 14$$
$$(x-2)(x-7)$$

$$\textcircled{4} x^2 - 5x - 24$$
$$(x-8)(x+3)$$

$$\textcircled{5} m^2 - 10m - 39$$
$$(m-13)(m+3)$$

$$\textcircled{6} y^3 + 2y^2 - 35y$$
$$y(y+7)(y-5)$$

$$\textcircled{7} 4x^2 + 36$$
$$4(x^2+9)$$

$$\textcircled{8} 9x^2 - 81y^2$$
$$9(x-3y)(x+3y)$$

$$\textcircled{9} 8t^2 + 32t + 24$$
$$8(t+3)(t+1)$$

$$\textcircled{10} 9x^2 + 18x - 27$$
$$9(x+3)(x-1)$$

Factor Completely: (Look for GCF's)

① $14d^2 + 49d$

$7d(2d+7)$

② $r^2 + 16r + 63$

$(r+7)(r+9)$

③ $5x^2 - 45$

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

④ $12t^2 - 75$

$3(2t-5)(2t+5)$

⑤ $4x^2 - 4x - 8$

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

⑥ $4x^2 + 9$

Prime

⑦ $2n^2 - 16n + 14$

$2(n-7)(n-1)$

⑧ $c^3 + 2c^2 - 3c$

$c(c+3)(c-1)$

⑨ $5a^2 - 20b^2$

$5(a-2b)(a+2b)$

⑩ $16y^3 - 4y$

$4y(2y-1)(2y+1)$

⑪ $2b^3 + 44b^2 + 42b$

$2b(b+1)(b+21)$

⑫ $v^2 + 24v - 52$

$(v+26)(v-2)$

Solve:

$$\textcircled{1} a(a-9)=0$$

$$a=0, 9$$

$$\textcircled{1} \text{Set } =0$$

$$\textcircled{2} \text{factor}$$

$$\textcircled{3} \text{Set each factor } =0$$

$$\textcircled{4} \text{Solve}$$

$$\textcircled{2} (y+3)(y-1)=0$$

$$y=-3, 1$$

$$\textcircled{3} (2x+3)(5x-2)=0$$

$$x=-\frac{3}{2}, \frac{2}{5}$$

$$\textcircled{4} 10x^2-20x=0$$

$$x=0, 2$$

$$\textcircled{5} a^2+3a-4=0$$

$$a=4, -1$$

$$\textcircled{6} y^2-y-42=0$$

$$y=7, -6$$

$$\textcircled{7} x^2-8x-20=0$$

$$x=10, -2$$

$$\textcircled{8} b^2+11b+24=0$$

$$b=-3, -8$$

$$\textcircled{9} r^2-13r-48=0$$

$$r=16, -3$$

Solve:

$$\textcircled{1} (4n-7)(3n+2)=0$$

$$n = \frac{7}{4}, -\frac{2}{3}$$

$$\textcircled{2} 3d(5d-2)=0$$

$$d = 0, \frac{2}{5}$$

$$\textcircled{3} 9n^2-4=0$$

$$n = \frac{2}{3}, -\frac{2}{3}$$

$$\textcircled{4} 25a^2-1=0$$

$$a = \frac{1}{5}, -\frac{1}{5}$$

$$\textcircled{5} n^2-9n=-18$$

$$n = 3, 6$$

$$\textcircled{6} z^2+2z=35$$

$$z = -7, 5$$

$$\textcircled{7} x^2=14x-33$$

$$x = 3, 11$$

$$\textcircled{8} x^2=49$$

$$x = \pm 7$$

$$\textcircled{9} 100d-4d^3=0$$

$$d = 0, 5, -5$$

$$\textcircled{10} 3r^3=48r$$

$$r = 0, 4, -4$$

Solve Each Equation:

① $(x+3)(x-7)=0$

$x = -3, 7$

② $(x-2)(x+8)=0$

$x = 2, -8$

③ $x^2 + 16x + 28 = 0$

$x = -2, -14$

④ $b^2 + 20b + 36 = 0$

$b = -2, -18$

⑤ $y^2 - 4y - 12 = 0$

$y = 6, -2$

⑥ $d^2 - 2d - 8 = 0$

$d = 4, -2$

⑦ $a^2 - 3a - 28 = 0$

$a = 7, -4$

⑧ $x^2 - 4x - 45 = 0$

$x = 9, -5$

⑨ $m^2 - 19m + 48 = 0$

$m = 3, 16$

⑩ $n^2 - 22n + 72 = 0$

$n = 18, 4$

Solve Each Equation:

① $2b(7b-4)=0$

$b=0, 4/7$

② $9x^2-25=0$

$x=5/3, -5/3$

③ $5y^2=9y$

$y=0, 9/5$

④ $h^2+16h=-15$

$h=-1, -15$

⑤ $x^2-x=20$

$x=5, -4$

⑥ $k^2+24=10k$

$k=4, 16$

⑦ $C^2-50=-23C$

$C=-25, 2$

⑧ $y^2-29y=-54$

$y=2, 27$

⑨ $x^2=25$

$x=5, -5$

⑩ $x^2-4x=0$

$x=0, 4$

Quad formula:

$$ax^2 + bx + c = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

① $x^2 - x - 6 = 0$

$a =$

$b =$

$c =$

$x = 3, -2$

② $x^2 - 5x + 6 = 0$

$a =$

$b =$

$c =$

$x = 3, 2$

③ $2x^2 - x - 15 = 0$

$a =$

$b =$

$c =$

$x = -5/2, 3$

④ $3x^2 - 5x - 2 = 0$

$a =$

$b =$

$c =$

$x = -1/3, 2$

⑤ $x^2 - 8x = 4$

$a =$

$b =$

$c =$

$x = 4 \pm 2\sqrt{5}$

⑥ $5x^2 - 3x - 1 = 0$

$a =$

$b =$

$c =$

$x = \frac{3 \pm \sqrt{29}}{10}$

$$\textcircled{7} x^2 - 8x + 13 = 0$$

$$x = 4 \pm \sqrt{3}$$

$$\textcircled{8} x^2 - 12 = 0$$

$$x = \pm 2\sqrt{3}$$

$$\textcircled{9} 3x^2 + 2x - 4 = 0$$

$$x = \frac{-1 \pm \sqrt{13}}{3}$$

$$\textcircled{10} x^2 + 4x - 1 = 0$$

$$x = -2 \pm \sqrt{5}$$

$$\textcircled{11} 2x^2 - 5x = 2$$

$$x = \frac{5 \pm \sqrt{41}}{4}$$

$$\textcircled{12} 3x^2 + 11x = 4$$

$$x = \frac{1}{3}, -4$$