Task 3: Solving Quadratic Equations by Factoring Practice

1. Solve each quadratic equation by factoring. Follow along the steps in the first two examples.

a. $x^2 + 7x + 12 = 0$

simple trinomial

$(x + 4)(x + 3) = 0$

$x + 4 = 0 \quad x + 3 = 0$

$x = -4$ and $x = -3$

- factor the expression as appropriate (common, simple, tricky, difference of squares)
- set each factor equal to zero
- solve each of these equations for x.

b. $10x^2 + 8x = 0$

common factoring

$2x(5x + 4) = 0$

$2x = 0 \quad 5x + 4 = 0$

$5x = -4$

$x = 0$ and $x = -\frac{4}{5}$

c. $x^2 - 8x + 16 = 0$

M | A | N
16 | -8 | -4, -4

$(x-4)(x-4)=0$

$x-4=0 \quad x-4=0$

$x=4 \quad x=4$

$\therefore \{4\}$ or $x=4$

d. $6x^2 + 9x = 0$

GCF $= 3x$

$3x(2x+3)=0$

$3x=0 \quad 2x+3=0$

$\frac{3x}{3}=\frac{0}{3} \quad -3 \quad -3$

$x=0 \quad \frac{2x}{2}=\frac{-3}{2}$

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

$\therefore \{-\frac{3}{2}, 0\}$

g. $x^2 - 16 = 0$

$(x+4)(x-4)=0$

$x+4=0 \quad x-4=0$

$x=-4 \quad x=4$

$\therefore \{-4, 4\}$

f. $4x^2 - 4x + 1 = 0$

M | A | N
4 | -4 | -2, -2

$4x^2-2x-2x+1=0$

$2x(2x-1)-(2x-1)=0$

$(2x-1)(2x-1)=0$

$2x-1=0$

$x=\frac{1}{2}$

$\therefore \{\frac{1}{2}\}$

Note: Sometimes, you will need to put your equations into standard form first before you factor it.

i. $3x^2 - 2 = -7x + 4$

Collect all the terms where the leading term is positive.

$3x^2+7x-2-4=0$

$3x^2+7x-6=0$

Factor the tricky tri

AA | A | N
-18 | +7 | -2, +9

$3x^2-2x+9x-6=0$

$x(3x-2)+3(3x-2)=0$

$(3x-2)(x+3)=0$

$3x-2=0 \quad x+3=0$

$3x=2 \quad x=-3$

$x=\frac{2}{3}$

$\therefore \{-3, \frac{2}{3}\}$

j. $4x(x + 1) = 9 + 4x$

FOIL (expand)

Collect terms LS

simplify

Factor DOS

$4x^2+4x=9+4x$

$4x^2+4x-9-4x=0$

$4x^2-9=0$

$(2x+3)(2x-3)=0$

$2x+3=0 \quad 2x-3=0$

$2x=-3 \quad 2x=3$

$x=-\frac{3}{2} \quad x=\frac{3}{2}$

$\therefore \{-\frac{3}{2}, \frac{3}{2}\}$

Solving by Factoring Fun!

1) $(r-4)(r+1)=0$

$r-4=0$ $r+1=0$ $\{-1,4\}$
$r=4$ $r=-1$

2) $(3a-2)(a+2)=0$

$3a-2=0$ $a+2=0$ $\{-2, \frac{2}{3}\}$
$3a=2$ $a=-2$
$a=\frac{2}{3}$

3) $(b-5)(b+2)=0$

$b-5=0$ $b+2=0$ $\{-2,5\}$
$b=5$ $b=-2$

4) $(4n+1)(4n-5)=0$

$4n+1=0$ $4n-5=0$ $\{-\frac{1}{4}, \frac{5}{4}\}$
$4n=-1$ $4n=5$
$n=-\frac{1}{4}$ $n=\frac{5}{4}$

5) $(p+5)(2p-1)=0$

$p+5=0$ $2p-1=0$ $\{-5, \frac{1}{2}\}$
$p=-5$ $2p=1$
$p=\frac{1}{2}$

6) $(x-5)(x-4)=0$

$x-5=0$ $x-4=0$ $\{4,5\}$
$x=5$ $x=4$

7) $n^2-7n+12=0$

$(n-3)(n-4)=0$ $\{3,4\}$
$n=3$ $n=4$

8) $a^2-4a-32=0$

$(a+4)(a-8)=0$ $\{-4,8\}$
$a=-4$ $a=8$

9) $r^2+10r+21=0$

$(r+3)(r+7)=0$ $\{-7,-3\}$
$r=-3$ or $r=-7$

10) $v^2-3v-10=0$

$(v+2)(v-5)=0$ $\{-2,5\}$
$v=-2$ $v=5$

11) $m^2+2m=0$

$m(m+2)=0$ $\{-2,0\}$
$m=0$ $m+2=0$
$m=-2$

12) $x^2-64=0$

$(x+8)(x-8)=0$
$x+8=0$ $x=-8$ $x-8=0$ $x=8$ $\{-8,8\}$

13) $p^2-6p=0$

$p(p-6)=0$ $\{0,6\}$
$p=0$ $p-6=0$
$p=6$

14) $a^2-4=0$

$(a+2)(a-2)=0$ $\{-2,2\}$
$a+2=0$ $a-2=0$
$a=-2$ $a=2$

15) $3v^2+3v-60=0$

$3(v^2+v-20)=0$ $v-4=0$ $v=4$ $v+5=0$ $v=-5$ $\{-5,4\}$
$3(v-4)(v+5)=0$

16) $3r^2-27=0$

$3(r^2-9)=0$ $r+3=0$ $r=-3$ $r-3=0$ $r=3$ $\{-3,3\}$
$3(r+3)(r-3)=0$

17) $5v^2-2v-7=0$

M | A | N
-35 | -2 | $5,7$

$5v^2+5v-7v-7=0$ $v+1=0$ $v=-1$ $5v-7=0$ $5v=7$ $v=\frac{7}{5}$ $\therefore \{-1, \frac{7}{5}\}$
$5v(v+1)-7(v+1)=0$
$(v+1)(5v-7)=0$

18) $5a^2-2a=0$

$a(5a-2)=0$
$a=0$ $5a-2=0$ $a=\frac{2}{5}$ $\{\frac{2}{5}, 0\}$

19) $3n^2+11n-4=0$

M | n | n
-12 | 11 | $-1,+12$

$3n^2-n+12n-4=0$ $\therefore \{-4, \frac{1}{3}\}$
$n(3n-1)+4(3n-1)=0$
$(3n-1)(n+4)=0$
$3n-1=0$ $n=\frac{1}{3}$ $n+4=0$ $n=-4$

20) $5n^2+43n+24=0$

M | A | N
120 | 43 | $3,40$

$5n^2+3n+40n+24=0$ $\therefore \{-8, -\frac{3}{5}\}$
$n(5n+3)+8(5n+3)=0$
$(5n+3)(n+8)=0$
$5n+3=0$ $n=-\frac{3}{5}$ $n+8=0$ $n=-8$

21. $7m^2 - 13m - 24 = 0$

M | A | N
-168 | -13 | 8, -21

$7m^2 - 21m + 8m - 24 = 0$
$7m(m-3) + 8(m-3) = 0$
$(m-3)(7m+8) = 0$
$m-3=0$ $\quad 7m+8=0$
$m=3$ $\quad m=-8/7$
$\therefore \{-\frac{8}{7}, 3\}$

168
2 | 84
3 | 56
4 | 42
6 | 28
7 | 24
8 | 21

22. $5k^2 - 3k = 0$ GCF: k

$k(5k-3) = 0$
$k=0$ $\quad 5k-3=0$
$k=3/5$
$\therefore \{0, 3/5\}$

23. $5x^2 + 12x - 9 = 0$

M | A | N
-45 | 12 | -3, +15

$5x^2 - 3x + 15x - 9 = 0$
$x(5x-3) + 3(5x-3) = 0$
$(5x-3)(x+3) = 0$
$5x-3=0$ $\quad x+3=0$
$x=3/5$ $\quad x=-3$
$\therefore \{-3, 3/5\}$

24. $15r^2 - 4r - 3 = 0$

M | A | N
-45 | -4 | +5, -9

$15r^2 - 9r + 5r - 3 = 0$
$3r(5r-3) + (5r-3) = 0$
$(5r-3)(3r+1) = 0$
$5r-3=0$ $\quad 3r+1=0$
$r=3/5$ $\quad r=-1/3$
$\therefore \{-1/3, 3/5\}$

25. $7p^2 - 4p = 0$

$p(7p-4) = 0$
$p=0$ $\quad 7p-4=0$
$p=4/7$
$\therefore \{0, 4/7\}$

26. $8x^2 - 15x + 7 = 0$

M | A | N
56 | -15 | -7, -8

$8x^2 - 8x - 7x + 7 = 0$
$8x(x-1) - 7(x-1) = 0$
$(x-1)(8x-7) = 0$
$x-1=0$ $\quad 8x-7=0$
$x=1$ $\quad x=7/8$
$\therefore \{\frac{7}{8}, 1\}$

27. $-4x^2 + 5x - 15 = -5x^2 - 1$ collect terms on LS

$5x^2 - 4x^2 + 5x - 15 + 1 = 0$
$x^2 + 5x - 14 = 0$
$(x-2)(x+7) = 0$
$x-2=0$ $\quad x+7=0$
$x=2$ $\quad x=-7$
$\therefore \{-7, 2\}$

28. $-b^2 + 11b + 30 = -2b^2$

$2b^2 - b^2 + 11b + 30 = 0$
$b^2 + 11b + 30 = 0$
$(b+5)(b+6) = 0$
$b+5=0$ $\quad b+6=0$
$b=-5$ $\quad b=-6$
$\{-6, -5\}$

29. $3x^2 + 8x = -2x - 21 + 2x^2$

$3x^2 - 2x^2 + 8x + 2x + 21 = 0$
$x^2 + 10x + 21 = 0$
$(x+3)(x+7) = 0$
$x+3=0$ $\quad x+7=0$
$x=-3$ $\quad x=-7$
$\therefore \{-7, -3\}$

30. $-7a^2 - 13a + 49 = 7 - 8a^2$

$8a^2 - 7a^2 - 13a + 49 - 7 = 0$
$a^2 - 13a + 42 = 0$
$(a-6)(a-7) = 0$
$a=6$ $\quad a=7$
$\therefore \{6, 7\}$

6, 7