1.5 Solving Quadratic Equations – Part 1: Solve by Factoring – Worksheet

MCR3U

Iensen

1) Solve by factoring

a) $x^2 + 8x + 12 = 0$

$(x+6)(x+2) = 0$

$x+6=0 \quad x+2=0$

$x=-6 \quad x=-2$

b) $h^2 + 9h + 18 = 0$

$(h+6)(h+3) = 0$

$h+6=0 \quad h+3=0$

$h=-6 \quad h=-3$

c) $m^2 + 3m = 0$

$m(m+3) = 0$

$m=0 \quad m+3=0$

$m=-3$

d) $w^2 - 18w + 56 = 0$

$(w-14)(w-4) = 0$

$w-14=0 \quad w-4=0$

$w=14 \quad w=4$

e) $x^2 - 2x = 0$

$x(x-2) = 0$

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

$x=2$

f) $c^2 - 17c + 30 = 0$

$(c-15)(c-2) = 0$

$c-15=0 \quad c-2=0$

$c=15 \quad c=2$

2) Solve

a) $3x^2 + 28x + 9 = 0$ S: 28 P: 27 (27 and 1)

$3x^2 + 27x + 1x + 9 = 0$

$(3x^2 + 27x) + (1x + 9) = 0$

$3x(x+9) + 1(x+9) = 0$

$(x+9)(3x+1) = 0$

$x+9=0 \quad 3x+1=0$

$x=-9 \quad x=-1/3$

b) $4k^2 + 19k + 15 = 0$ S: 19 P: 60 (4 and 15)

$4k^2 + 4k + 15k + 15 = 0$

$(4k^2 + 4k) + (15k + 15) = 0$

$4k(k+1) + 15(k+1) = 0$

$(k+1)(4k+15) = 0$

$k+1=0 \quad 4k+15=0$

$k=-1 \quad k=-15/4$

d) $16b^2 - 1 = 0$ D.O.S.

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

$4b-1=0 \qquad 4b+1=0$

$b = 1/4 \qquad b = -1/4$

f) $4x^2 - 12x + 9 = 0$ P.S.T. $a^2 - 2ab + b^2 = (a-b)^2$

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

$2x-3=0$

$x = 3/2$

3) Solve each quadratic equation by factoring

a) $x^2 + 2x - 3 = 0$ S:2 P:-3 (3 and -1)

$(x+3)(x-1) = 0$

$x+3=0 \qquad x-1=0$

$x=-3 \qquad x=1$

b) $x^2 + 3x - 10 = 0$ S:3 P:-10 (5 and -2)

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

$x+5=0 \qquad x-2=0$

$x=-5 \qquad x=2$

c) $4x^2 - 36 = 0$ D.O.S.

$(2x-6)(2x+6) = 0$

$2x-6=0 \qquad 2x+6=0$

$x=3 \qquad x=-3$

d) $6x^2 - 14x + 8 = 0$

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

$3x^2 - 7x + 4 = 0$ P:12 S:-7 (-3 and -4)

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

$(3x^2 - 3x) + (-4x + 4) = 0$

$3x(x-1) - 4(x-1) = 0$

$(3x-4)(x-1) = 0$

$x_1 = 4/3 \qquad x_2 = 1$

e) $15x^2 - 8x + 1 = 0$ S:-8 P:15 (-5 and -3)

$15x^2 - 5x - 3x + 1 = 0$

$(15x^2 - 5x) + (-3x + 1) = 0$

$5x(3x-1) - 1(3x-1) = 0$

$(3x-1)(5x-1) = 0$

$3x-1=0 \qquad 5x-1=0$

$x = 1/3 \qquad x = 1/5$

f) $6x^2 + 19x + 10 = 0$ S:19 P:60 (15 and 4)

$6x^2 + 15x + 4x + 10 = 0$

$(6x^2 + 15x) + (4x + 10) = 0$

$3x(2x+5) + 2(2x+5) = 0$

$(2x+5)(3x+2) = 0$

$2x+5=0 \qquad 3x+2=0$

$x = -5/2 \qquad x = -2/3$

4) Solve by factoring

a) $-x^2 - 10x - 16 = 0$

$-1(x^2+10x+16) = 0$

$x^2+10x+16 = 0$

$(x+2)(x+8) = 0$

$x+2=0 \quad x+8=0$

$x=-2 \quad x=-8$

b) $6d^2 + 15d = -9$

$6d^2+15d+9=0$

$3(2d^2+5d+3)=0$

$2d^2+5d+3=0$

$2d^2+2d+3d+3=0$

$(2d^2+2d)+(3d+3)=0$

$2d(d+1)+3(d+1)=0$

$(d+1)(2d+3)=0$

$d+1=0 \quad 2d+3=0$

$d=-1 \quad d=-3/2$

5) A rectangle has dimensions x+10 and 2x-3. Determine the value of x that gives an area of 54 cm²

$(x+10)(2x-3) = 54$

$2x^2-3x+20x-30=54$

$2x^2+17x-84=0$

$2x^2+24x-7x-84=0$

$(2x^2+24x)+(-7x-84)=0$

$2x(x+12)-7(x+12)=0$

$(x+12)(2x-7)=0$

$x+12=0$

$x=-12$

$2x-7=0$

$x=7/2$ or 3.5 cm

Answers

1) a) -2, -6 **b)** -3, -6 **c)** 0, -3 **d)** 14, 4 **e)** 0, 2 **f)** 15, 2

2) a) $\frac{-1}{3}$, -9 **b)** -1, $\frac{-15}{4}$ **d)** $\frac{1}{4}, \frac{-1}{4}$ **f)** $\frac{3}{2}$

3) a) -3, 1 **b)** -5, 2 **c)** -3, 3 **d)** $\frac{4}{3}$, 1 **e)** $\frac{1}{5}, \frac{1}{3}$ **f)** $-\frac{5}{2}, -\frac{2}{3}$

4) a) -8, -2 **b)** -1, $\frac{-3}{2}$

5) 3.5