



GRADE 11 Quadratic equations

11.4 Solving quadratic equations

1. Solving quadratic equations through factorization

A. Difference between squares

(a) $6x^2 - 294 = 0$

(b) $7c^2 - 175 = 0$

(c) $5x^2 - 20 = 0$

B. Trinomials

(a) $2w^2 - 4w + 2 = 0$

(b) $3c^2 + 11c + 6 = 0$

(c) $4y^2 - 8y = -4$

(d) $2z^2 - 6z + 2 = -2$

(e) $3x^2 + 5x + 4 = 2$

C. Equations with fractions

(a) $x - 20 = -\frac{96}{x}$

(b) $d + 2 = \frac{80}{d}$

(c) $\frac{v}{v+6} = \frac{-2}{v-10}$

(d) $\frac{z}{z-12} = \frac{-2}{z-4}$

(e) $\frac{x-10}{x-2} = \frac{-2}{x-2}$



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D. Quadratic formula

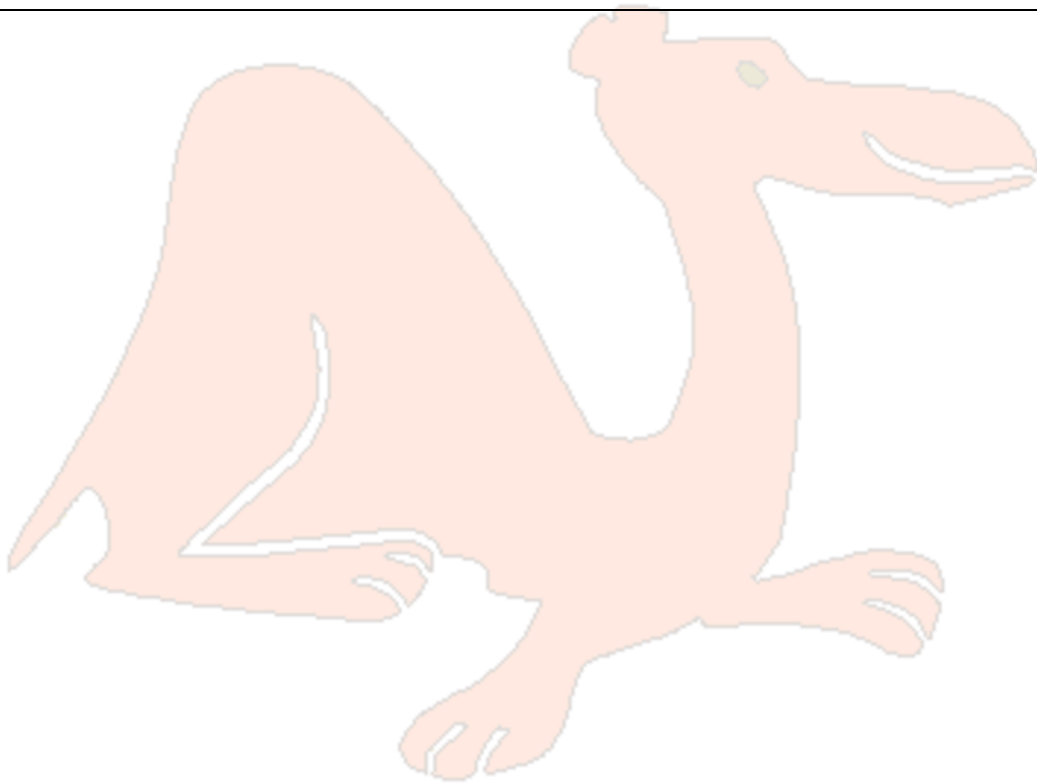
(a) $0 = x^2 + 4x - 21$

(b) $0 = 2h^2 + 10h + 8$

(c) $0 = -4x^2 - 52x - 144$

(d) $0 = 2w^2 - 28w + 90$

(e) $-3x^2 + 6x + 192 = 0$





MEMO

1. Solving quadratic equations through factorization

A. Difference between squares [4.2.5.4]

(a)

$$6x^2 - 294 = 0$$

$$6(x^2 - 49) = 0$$

$$6(x+7)(x-7) = 0$$

$$\therefore (x+7)(x-7) = 0$$

$$x = -7; x = 7$$

(b)

$$7c^2 - 175 = 0$$

$$7(c^2 - 25) = 0$$

$$7(c+5)(c-5) = 0$$

$$\therefore c = -5; c = 5$$

(c)

$$5x^2 - 20 = 0$$

$$5(x^2 - 4) = 0$$

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

$$\therefore x = -2; x = 2$$

B. Trinomials [4.2.5.5; 4.2.5.6]

(a)

$$2w^2 - 4w + 2 = 0$$

$$2(w^2 - 2w + 1) = 0$$

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

$$\therefore w = 1$$



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(b)

$$3c^2 + 11c + 6 = 0$$

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

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

(c)

$$4y^2 - 8y = -4$$

$$4y^2 - 8y + 4 = 0$$

$$4(y^2 - 2y + 1) = 0$$

$$4(y - 1)(y - 1) = 0$$

$$\therefore y = 1$$

(d)

$$2z^2 - 6z + 2 = -2$$

$$2z^2 - 6z + 4 = 0$$

$$2(z^2 - 3z + 2) = 0$$

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

$$\therefore z = 2; z = 1$$

(e)

$$3x^2 + 5x + 4 = 2$$

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

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

$$x = -\frac{2}{3}; x = -1$$

C. Equations with fractions [4.2.6.1; 4.2.6.2; 4.2.6.3]

(a)

$$x - 20 = -\frac{96}{x}; x \neq 0$$

$$x^2 - 20x = -96$$

$$x^2 - 20x + 96 = 0$$

$$(x - 8)(x - 12) = 0$$

$$x = 8; x = 12$$



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(b)

$$d + 2 = \frac{80}{d}; d \neq 0$$

$$d^2 + 2d = 80$$

$$d^2 + 2d - 80 = 0$$

$$(d + 10)(d - 8) = 0$$

$$d = -10; d = 8$$

(c)

$$\frac{v}{v+6} = \frac{-2}{v-10}; v \neq -6; v \neq 10$$

$$v(v-10) = -2(v+6)$$

$$v^2 - 10v = -2v - 12$$

$$v^2 - 8v + 12 = 0$$

$$(v-6)(v-2) = 0$$

$$v = 6; v = 2$$

(d)

$$\frac{z}{z-12} = \frac{-2}{z-4}; z \neq 12; z \neq 4$$

$$z(z-4) = -2(z-12)$$

$$z^2 - 4z = -2z + 24$$

$$z^2 - 2z - 24 = 0$$

$$(z-6)(z+4) = 0$$

$$z = 6; z = -4$$

(e)

$$\frac{x-10}{x-2} = \frac{-2}{x-2}; x \neq 2$$

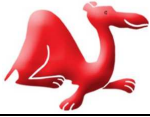
$$(x-10)(x-2) = -2(x-2)$$

$$x^2 - 12x + 20 = -2x + 4$$

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

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

$$x = 8; x \neq 2$$



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D. Quadratic formula [4.2.10.1; 4.2.10.2; 4.2.10.3; 4.2.10.4]

(a) $0 = x^2 + 4x - 21$
$$x = \frac{-4 \pm \sqrt{(4)^2 - 4(1)(-21)}}{2(1)}$$
$$x = 3; x = -7$$

(b) $0 = 2h^2 + 10h + 8$
$$h = \frac{-10 \pm \sqrt{(10)^2 - 4(2)(8)}}{2(2)}$$
$$h = -1; h = -4$$

OR $0 = h^2 + 5h + 4$
$$h = \frac{-5 \pm \sqrt{5^2 - 4(1)(4)}}{2}$$
$$h = -1; h = -4$$

(c) $0 = -4x^2 - 52x - 144$ OR
$$x = \frac{-(-52) \pm \sqrt{(-52)^2 - 4(-4)(-144)}}{2(-4)}$$
$$x = -9; x = -4$$

$0 = x^2 + 13x + 36$
$$x = \frac{-13 \pm \sqrt{13^2 - 4(1)(36)}}{2}$$
$$x = -9; x = -4$$

(d) $0 = 2w^2 - 28w + 90$ OR
$$w = \frac{-(-28) \pm \sqrt{(-28)^2 - 4(2)(90)}}{2(2)}$$
$$w = 9; w = 5$$

$0 = w^2 - 14w + 45$
$$w = \frac{-(-14) \pm \sqrt{(-14)^2 - 4(1)(45)}}{2}$$
$$w = 9; w = 5$$

(e) $-3x^2 + 6x + 192 = 0$ OR
$$x = \frac{-6 \pm \sqrt{6^2 - 4(-3)(192)}}{2(-3)}$$
$$x = -7.06; x = 9.06$$

$x^2 - 2x - 64 = 0$
$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-64)}}{2}$$
$$x = 9.06; x = -7.06$$