Completing the Square

Q1. Use the method of completing the square to solve these equations. Leave your answer in its most exact form.

a) $x^2 - 6x + 9 = 0$

b) $x^2 + 4x - 21 = 0$

c) $x^2 + 2x - 1 = 0$

d) $x^2 - 4x - 7 = 0$

e) $x^2 - 10x - 5 = 0$

f) $x^2 + 9x + 12 = 0$

g) $x^2 - x - 1 = 0$

h) $x^2 + 3x - 2 = 0$

i) $x^2 - 5x - 10 = 0$

Q2. Use the method of completing the square to solve these equations. Leave your answer in its most exact form.

a) $2x^2 + 2x - 1 = 0$

b) $4x^2 — x - 8 = 0$

c) $2x^2 + 6x - 13 = 0$

d) $3x^2 - 10x - 2 = 0$

e) $3x^2 - 8x - 2 = 0$

f) $5x^2 - 3x - 1 = 0$

Q3. Use the method of completing the square to solve the following quadratic identities.

a) $x^2 + 4x + 9 \equiv (x + g)^2 + f$

b) $x^2 + 12x + 32 \equiv (x + b)^2 + c$

c) $x^2 - 10x + 34 \equiv (x + j)^2 + k$

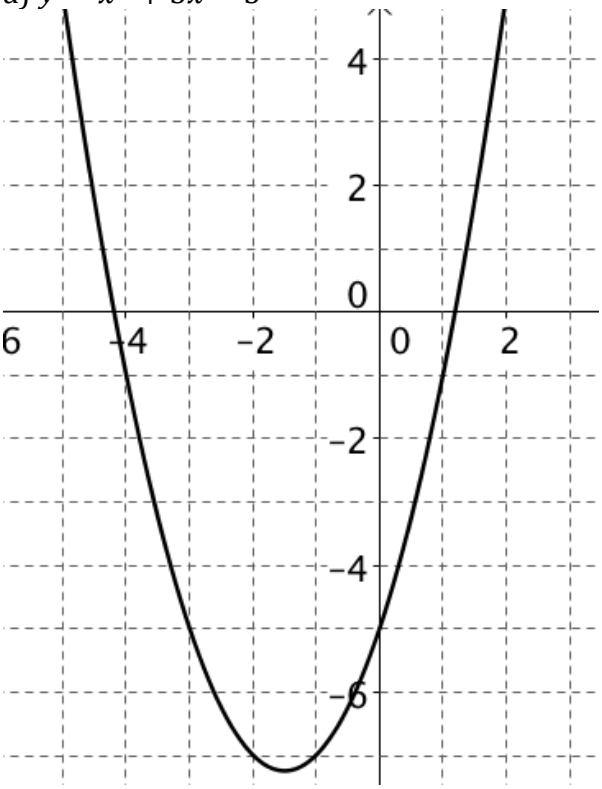
d) $3x^2 + 12x + 5 \equiv r(x + s)^2 + t$

e) $3x^2 + 6x - 1 \equiv a(x + b)^2 + c$

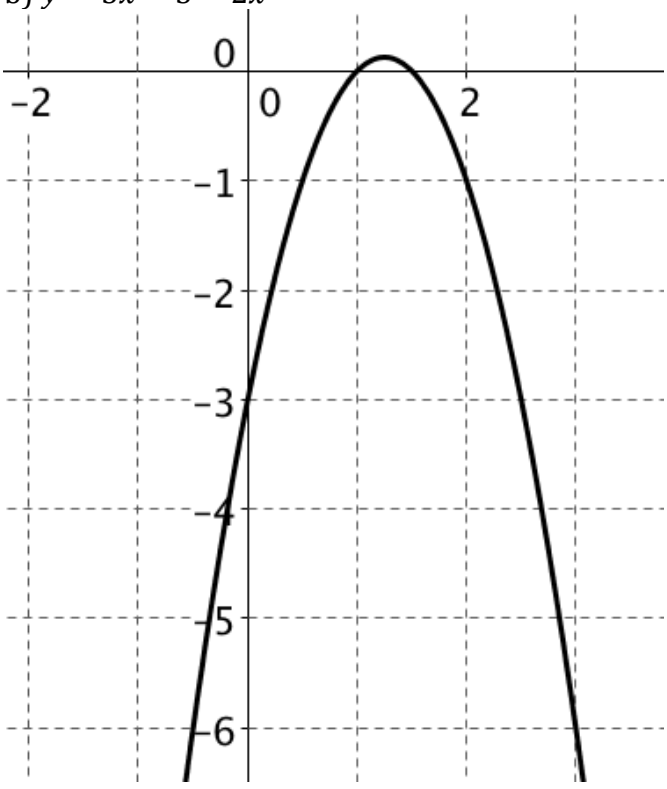
f) $4x^2 - 16x + 23 \equiv e(x + f)^2 + g$

Q4. Use the method of completing the square to determine coordinates of the turning point for each parabola.

a) $y = x^2 + 3x - 5$



b) $y = 5x - 3 - 2x^2$



Completing the Square

Solutions

Q1.

a) $x = 3$

b) $x = -7$ & 3

c) $x = -1 \pm \sqrt{2}$

d) $x = 2 \pm \sqrt{11}$

e) $x = 5 \pm \sqrt{30}$

f) $x = \frac{-9 \pm \sqrt{33}}{2}$

g) $x = \frac{1 \pm \sqrt{5}}{2}$

h) $x = \frac{-3 \pm \sqrt{17}}{2}$

i) $x = \frac{5 \pm \sqrt{65}}{2}$

Q2.

a) $x = \frac{-1 \pm \sqrt{3}}{2}$

b) $x = \frac{1 \pm \sqrt{129}}{8}$

c) $x = \frac{-3 \pm \sqrt{35}}{2}$

d) $x = \frac{5 \pm \sqrt{31}}{3}$

e) $x = \frac{4 \pm \sqrt{22}}{3}$

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

Q3.

a) $x^2 + 4x + 9 \equiv (x + \mathbf{2})^2 + \mathbf{5}$

b) $x^2 + 12x + 32 \equiv (x + \mathbf{6})^2 - \mathbf{4}$

c) $x^2 - 10x + 34 \equiv (x - \mathbf{5})^2 + \mathbf{9}$

d) $3x^2 + 12x + 5 \equiv \mathbf{3}(x + \mathbf{2})^2 - \mathbf{7}$

e) $3x^2 + 6x - 1 \equiv \mathbf{3}(x + \mathbf{1})^2 - \mathbf{4}$

f) $4x^2 - 16x + 23 \equiv \mathbf{4}(x - \mathbf{2})^2 + \mathbf{7}$

Q4.

a) Minimum = (-1.5,-7.25)

b) Maximum = (1.25, 0.125)