Solve quadratic equations by factorization, completing the square and by use of the formula.



1) Solve giving answer in exact form [P2]

a) $(x-7)(x+4) = 0$. [1]

b) $(y+1)^2 = 4$ [2]

c) $(x-3)^2 = 5$ [2]

d) $\frac{5}{x} - \frac{8}{x+1} = 1$ [4]

e) $\frac{2x+3}{x-4} + \frac{x+40}{x^2-16} = 2$ [4]

f) $\frac{2(t+3)}{t} - \frac{t}{t+3} = 1$ [5]

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2) Solve giving your answer in 3 significant figures [P4]

a) $\frac{1}{x} - \frac{2}{x+1} = 3$ [7]

b) $\frac{3}{m+4} - \frac{4}{m} = 6$ [7]

c) $\frac{2}{2x+11} - \frac{1}{x-4} = \frac{1}{2}$ [8]

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3) Solve by factorising.

a) $3x^2 - 7x - 20 = 0$ [3]

b) $3x^2 + 2x - 8 = 0$. [3]

c) $5x^2 + 17x - 12 = 0$ [3]

d) $5x^2 + x - 18 = 0$ [3]

e) $x^2 - 7x + 6 = 0$ [3]

f) $10r^2 - 23r + 9 = 0$ [3]



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4) Solve the equations.
Show all your working and give your answers correct to 2 decimal places. [P4]



a) $2x^2 + 7x - 3 = 0$ [4]

b) $3x^2 + 7x - 11 = 0$ [4]

c) $3x^2 - 2x - 2 = 0$ [4]

d) $5x^2 + 10x + 2 = 0$ [4]

e) $3x^2 - 11x + 4 = 0$ [4]

f) $x^3 + 4x^2 - 17x = x^3 - 9$ [5]

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5) Find the value of *a* and the value of *b*.



a) $x^2 + 4x - 9 = (x + a)^2 + b$ [3]

b) $x^2 + 4x - 6 = (x + a)^2 + b$ [3]

c) $x^2 + 12x - 7 = (x + p)^2 - q$ [3]

d) $x^2 + 7x - 5 = (x + a)^2 + b$ [3]

e) $x^2 - 9x + 12 = (x - p)^2 - q$ [3]

f) $x^2 - 12x + a = (x + b)^2$ [3]

g) $x^2 - 16x + a = (x + b)^2$ [3]

h) $2x^2 + 5x - 3 = 2(x + a)^2 + b$ [3]

(i) $(x + a)^2 = x^2 + 22x + b$ [2]

(j) $x^3 - 4x^2 + 4x = x(x - a)^2$ [3]

(k) $18 - 3x - x^2 = b - (a + x)^2$ [3]

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6) (i) Write $x^2 + 4x + 1$ in the form $(x + p)^2 + q$. [2]
(ii) Use your answer to part (b)(i) to solve the equation $x^2 + 4x + 1 = 0$, give answer in 3 Significant figures [2]
(iii) Use your answer to part (b)(i) to write down the coordinates of the minimum point on the graph of $y = x^2 + 4x + 1$. [2]
0580/43/M/J/21 Q7)



Do not use calculator in the remaining questions



7) (a) Write $x^2 - 18x - 27$ in the form $(x + k)^2 + h$ [2]
(b) Use your answer to **part (a)** to solve the equation $x^2 - 18x - 27 = 0$, give answer in simplified surd form [2]
0580/23/M/J/20 Q18

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8) (a) (i) Write $x^2 + 8x - 9$ in the form $(x + k)^2 + h$ [2]

(ii) Use your answer to **part (a)(i)** to solve the equation $x^2 + 8x - 9 = 0$ [2]



(b) The solutions of the equation $x^2 + bx + c = 0$ are $\frac{-7+\sqrt{61}}{2}$ and $\frac{-7-\sqrt{61}}{2}$

Find the value of b and the value of c. [2]

0580/42/M/J/20 Q9

9) (a) Write x^2 -7x + 5 in the form (x - a)^2 - b [2]

(b) Hence write down the minimum value of x^2 -7x + 5 [1]

4024/12/M/J/19 Q14)

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10) (a) $x^2 - 9x + 12 = (x - p)^2 - q$. Find the value of p and the value of q. [3]

(b) Write down the minimum value of $x^2 - 9x + 12$ [1]

(c) Write down the equation of the line of symmetry of the graph of $y = x^2 - 9x + 12$ [1]

0580/41/O/N/14 Q4(d)

11) The expression $5 + 12x - 2x^2$ can be written in the form $q - 2(x + p)^2$.

(i) Find the value of p and the value of q. [3]

(ii) Write down the coordinates of the maximum point of the curve $y = 5 + 12x - 2x^2$.[1]

0580/42/O/N/21 Q6 (d)

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12) Find the turning point of $y = x^2 + 4x - 3$ by completing the square [4]
0580/02/SP/20 Q25)

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Answers

Q1) (a) 7 and -4 (b) 1 and -3 (c) $3 \pm \sqrt{5}$(d) -5 and 1 (e)-7 (f)-2	Q7) (a) $(x-9)^2 - 108$ (b) $9 \pm 6\sqrt{3}$
Q2) (a) -1.55 and 0.215 (b) -0.79 and -3.38 (c) -2.64 and 1.14	Q8) (a)(i) $(x+4)^2 - 25$ (ii) $x + 4 = \pm 5$ leading to $x = 1\ and\ -9$ (b) b = 7 and c = -3
Q3) (a) 4 and -5/3(b) $1\frac{1}{3}$ and -2 (c) 3/5 and -4 (d) $1\frac{4}{5}$ and -2 (e) 1 and 6 (f) $1\frac{4}{5}$ and ½	Q9) $(x$ - 7/2)^2 - 29/4 (b) -29/4
Q4) (a) 0.39 and -3.89 (b)-3.41 and 1.08 (c)-0.55 and 1.22 (d)-0.23, -1.77 (e) 0.41 and 3.26 (f) 0.62 and 3.63	Q10) (a) p = 4.5 , q = 8.25 (b) - 8.25 (c) x = 4.5
Q5) (a) 2, -13 (b) 2 , -10 (c) 6, 43 (d) 3.5 , -17.25 (e) 4.5 , 8.25 (f) 36 , -6 (g) 64 , -8 (h) $1\frac{1}{4}$, $-6\frac{1}{8}$ (i) 11, 121 (j)2 (k) 1.5 , 20.25	Q11) (i) $p = -3$ and $q = 23$ (d)(ii) $(3,23)$
Q6)(i) $(x+2)^2 - 3$ (ii)-3.37 , -0.268 (iii) (-2,-3)	Q12) $(x$ + 2)^2 – 7 leading to (-2,-7)

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