Quadratic Expressions and Equations - www.m4ths.com
If answers cannot be expressed as exact fractions or integers give them to 3 significant figures.

Task 1
Factor the following expressions:
(1) $x^2 + x$
(2) $2x^2 + x$
(3) $2x^2 - x$
(4) $2x^2 - 4x$
(5) $2x^2 + 5x$
(6) $3x + x^2$
(7) $3x - x^2$
(8) $6x - 3x^2$
(9) $6x - 5x^2$

Task 2
Factor the following expressions:
(1) $x^2 + 5x + 6$
(2) $x^2 + 5x + 4$
(3) $x^2 + 5x - 14$
(4) $x^2 + x - 12$
(5) $x^2 - x - 12$
(6) $-12 - x + x^2$
(7) $x^2 - 2x - 8$
(8) $x^2 + 2x - 8$
(9) $x^2 - 5x + 6$
(10) $x^2 - 10x + 16$
(11) $x^2 - 10x + 21$
(12) $4 - 3x - x^2$
(13) $4 + 3x - x^2$

Task 3
Solve the following equations:
(1) $x^2 + 5x = 0$
(2) $x^2 - 5x = 0$
(3) $x^2 = 5x$
(4) $x^2 + 3x = 0$
(5) $3x + x^2 = 0$
(6) $5x^2 + 4x = 0$
(7) $5x^2 = 4x$

Task 4
Solve the following equations:
(1) $x^2 - x - 30 = 0$
(2) $x^2 - x = 30$
(3) $x^2 + 2x - 8 = 0$
(4) $x^2 - 2x = 8$
(5) $4 + 3x = x^2$
(6) $2x^2 - 20x + 42 = 0$

Task 5
Factor the following expressions:
(1) $2x^2 + 7x + 3$
(2) $4x^2 + 11x + 6$
(3) $3x^2 + 7x + 2$
(4) $3x^2 + 8x - 3$
(5) $2x^2 - 5x - 3$
(6) $4x^2 - 9x + 2$
(7) $6x^2 - x - 1$
(8) $12x^2 - 13x + 3$
(9) $-2 + 18x^2 - 5x$

Task 6
Solve the following equations:
(1) $2x^2 + 3x - 2 = 0$
(2) $3x^2 + 11x + 6 = 0$
(3) $6x^2 - 5x + 1 = 0$
(4) $4x^2 + 4x - 3 = 0$
(5) $3 = 4x^2 + 4x$
(6) $13x - 2 = 15x^2$

Task 7
Factor the following expressions:
(1) $x^2 - 9$
(2) $x^2 - 100$
(3) $4x^2 - 25$

Task 8
Solve the following equations:
(1) $x^2 - 9 = 0$
(2) $x^2 - 100 = 0$
(3) $4x^2 - 25 = 0$

Task 9
Solve the following equations using the quadratic equation:
(1) $3x^2 + 5x - 10 = 0$
(2) $7x^2 - 3x - 6 = 0$
(3) $5x^2 - 3 = x$
(4) $5 - 8x^2 = 2x$
(5) $7 = 2x(x - 3)$

Task 10
Complete the square for the following expressions:
(1) $x^2 + 2x + 5$
(2) $x^2 + 4x + 5$
(3) $x^2 - 4x + 5$
(4) $x^2 - 4x + 1$
(5) $x^2 - 4x - 8$
(6) $x^2 + 3x + 9$
(7) $x^2 + 5x - 7$
(8) $x^2 + 9x + 1$

**Task 11**
Complete the square to solve the following equations:
(Leave your answer in surd form)
(1) $x^2 + 6x + 2 = 0$
(2) $x^2 - 2x - 5 = 0$
(3) $x^2 - 2x = 5$
(4) $x^2 + 3x + 1 = 0$

Task 12 (Some are very tough!)
Answer each of the following questions:

(1) Solve $2x^2 = 72$

(2) Factorise $-x^2 + 6 - x$

(3) Solve $-15x^2 + 8 + 14x = 0$ without using a calculator

(4) Write $100x^2 - 9$ in the form $(ax + b)(ax - b)$.

(5) Complete the square for $2 - x + x^2$

(6) Given that the area of the rectangle below is 21, without a calculator:
(a) Find the value of x.

(b) Justify why you chose the answer for x that you did.

$(2x - 1)$ [rectangle] $(3x + 1)$
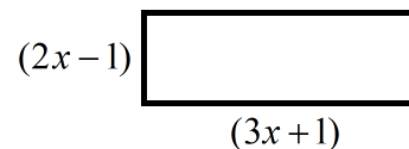
(7) Find the **area** of the right angled triangle below.

$(x - 1)$, $(2x - 3)$, x
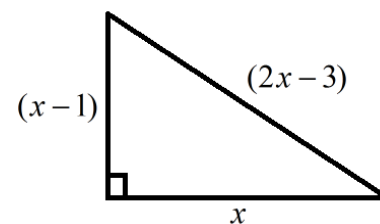
(8) Using algebra, show that the difference between the squares of 2 consecutive odd numbers is always a multiple of 8.

(9) Solve the following equation:
$$\frac{2x + 1}{x} + \frac{3x + 5}{2} = 4x$$

(10) Sketch the graph of $y = x^2 + 2x - 6$ stating the minimum point and any points the curve crosses the coordinate axes.