

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) $0 = 12 - x + x^2$
- (6) $4 + 3x = x^2$
- (7) $2x^2 - 20x + 42 = 0$

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:

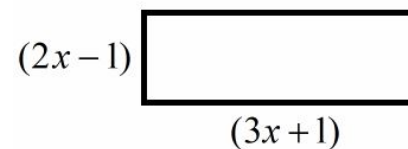
(Leave your answer in surd form)

- (1) $x^2 + 6x + 2 = 0$
- (2) $x^2 - 2x - 5 = 0$
- (3) $x^2 - 2x = 5$
- (4) $x^2 + 3x + 1 = 0$

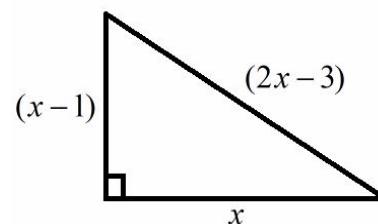
Task 12 (Some are very tough!)

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.



- (7) Find the area of the right angled triangle below.



- (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.