Calculus Quadratics Practice #1

Solve, by completing the square:

1. $4x^2 - 3x - 1 = 0$

2. $5x^2 - 41x + 42 = 0$

3. $9x^2 + 9x - 10 = 0$

Solve, by completing the square, to give solutions in exact form (a + √b for surds):

4. $x^2 - 16x - 7 = 0$

5. $x^2 + 8x + 2 = 0$

6. $x^2 - 3x - 8 = 0$

Solve, using the quadratic formula, to give solutions in exact form (a + √b for surds):

7. $x^2 - 5x + 3 = 0$

8. $4x^2 + x - 5 = 0$

9. $5x^2 + 2x - 1 = 0$

For what values of k do the following equations have real solutions?

10. $x^2 - \frac{1}{3}x + k = 0$

11. $x^2 - 4kx - k = 0$

Find the positive values of k which give whole number solutions to the equation:

12. $x^2 - 8x + k = 0$

Answers: Quadratics Practice #1

Solve, by completing the square:

1. $4x^2 - 3x - 1 = 0$ $(x - \frac{3}{8})^2 - (\frac{3}{8})^2 - 1 = 0$ $(x - \frac{3}{8}) = \pm\sqrt{\frac{25}{64}}$ $x = 1$ or $^-0.25$

2. $5x^2 - 41x + 42 = 0$ $(x - 4.1)^2 - 4.1^2 + 8.4 = 0$ $(x - 4.1 = \pm\sqrt{8.81}$ $x = 7$ or 1.2

3. $9x^2 + 9x - 10 = 0$ $(x - \frac{1}{2})^2 - (\frac{1}{2})^2 - \frac{10}{9} = 0$ $(x - \frac{1}{2}) = \pm\sqrt{\frac{49}{36}}$ $x = \frac{-5}{3}$ or $\frac{2}{3}$

Solve, by completing the square, to give solutions in exact form (a + √b for surds):

4. $x^2 - 16x - 7 = 0$ $(x - 8)^2 - 8^2 - 7 = 0$ $(x - 8) = \pm\sqrt{71}$ $x = 8 \pm \sqrt{71}$

5. $x^2 + 8x + 2 = 0$ $(x + 4)^2 - 4^2 + 2 = 0$ $(x + 4)^2 = \sqrt{14}$ $x = ^-4 \pm \sqrt{14}$

6. $x^2 - 3x - 8 = 0$ $(x - 1.5)^2 - 1.5^2 - 8 = 0$ $(x - 1.5) = \sqrt{10.25}$ $x = 1.5 \pm \sqrt{10.25}$

Solve, using the quadratic formula, to give solutions in exact form (a + √b for surds):

7. $x^2 - 5x + 3 = 0$ $\frac{--5 \pm \sqrt{5^2 - 4 \times 1 \times 3}}{2 \times 1}$ $2.5 \pm \frac{\sqrt{13}}{2}$ $x = 2.5 \pm \sqrt{3.25}$

8. $4x^2 + x - 5 = 0$ $\frac{-1 \pm \sqrt{1^2 - 4 \times 4 \times -5}}{2 \times 4}$ $\frac{-1}{8} \pm \frac{\sqrt{81}}{8}$ $x = 1$ or $\frac{-5}{4}$

9. $5x^2 + 2x - 1 = 0$ $\frac{-2 \pm \sqrt{2^2 - 4 \times 5 \times -1}}{2 \times 5}$ $^-0.2 \pm \frac{\sqrt{24}}{10}$ $x = ^-0.2 \pm \sqrt{0.24}$

For what values of k do the following equations have real solutions?

10. $x^2 - \frac{1}{3}x + k = 0$ $(x - \frac{1}{6})^2 - (\frac{1}{6})^2 + k = 0$ $(x - \frac{1}{6}) = \pm\sqrt{(\frac{1}{36} - k)}$ $k \leq \frac{1}{36}$

    or $b^2 - 4ac \geq 0$ $(\frac{1}{3})^2 - 4 \times 1 \times k \geq 0$ $\frac{1}{9} - 4k \geq 0$ $k \leq \frac{1}{36}$

11. $x^2 - 4kx - k = 0$ $(x - 2k)^2 - 4k^2 - k = 0$ $(x - 2k) = \pm\sqrt{(4k^2 + k)}$ $k \leq \frac{-1}{4}$ or $k \geq 0$

    or $b^2 - 4ac \geq 0$ $(^-4k)^2 - 4 \times 1 \times ^-k \geq 0$ $16k^2 + 4k \geq 0$ $k \leq \frac{-1}{4}$ or $k \geq 0$

Find the positive values of k which give whole number solutions to the equation:

12. $x^2 - 8x + k = 0$ $(x - 4)^2 - 4^2 + k = 0$ $(x - 4) = \pm\sqrt{(16 - k)}$ $k = 0, 7, 12, 15, 16$

    or $\frac{\sqrt{b^2 - 4ac}}{2a} \in \mathbb{N}$ $\frac{\sqrt{64 - 4k}}{2}$ is whole $\sqrt{16 - k}$ is whole $k = 0, 7, 12, 15, 16$

    (the solutions $4 \pm\sqrt{(16 - k)}$ are whole numbers when $16 - k > 0$ and is a square)