## Calculus Quadratics Practice #2

**Solve, by completing the square:**

1. $10x^2 - 7x - 12 = 0$

2. $6x^2 - 7x - 20 = 0$

3. $100x^2 + 70x = 18$

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

4. $x^2 - 6x + 1 = 0$

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

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

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

7. $x^2 + 10x + 3 = 0$

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

9. $5x^2 - 7x - 4 = 0$

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

10. $2x^2 - 5x + k = 0$

11. $x^2 + kx + k = 0$

**Find the values of $k$ which do not give real solutions to the equation:**

12. $x^2 + 2kx + 11 = 0$

## Answers: Quadratics Practice #2

**Solve, by completing the square:**

1. $10x^2 - 7x - 12 = 0$ $(x - \frac{7}{20})^2 - (\frac{7}{20})^2 - \frac{12}{10} = 0$ $(x - \frac{7}{20}) = \pm\sqrt{\frac{529}{400}}$ $x = \frac{4}{5}$ or $\frac{3}{2}$

2. $6x^2 - 7x - 20 = 0$ $(x - \frac{7}{12})^2 - (\frac{7}{12})^2 - \frac{20}{6} = 0$ $(x - \frac{7}{12}) = \pm\sqrt{\frac{529}{144}}$ $x = \frac{4}{3}$ or $\frac{5}{2}$

3. $100x^2 + 70x = 18$ $(x - 0.35)^2 - 0.35^2 = 0.18$ $(x - 0.35) = \sqrt{30.25}$ $x = 0.2$ or $^-0.9$

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

4. $x^2 - 6x + 1 = 0$ $(x - 3)^2 - 3^2 + 1 = 0$ $(x - 3) = \pm\sqrt{8}$ $x = 3 \pm \sqrt{8}$

5. $x^2 + 7x + 2 = 0$ $(x + 3.5)^2 - 3.5^2 + 2 = 0$ $(x + 3.5)^2 = \sqrt{10.25}$ $x = ^-3.5 \pm \sqrt{10.25}$

6. $x^2 - x - 8 = 0$ $(x - 0.5)^2 - 0.5^2 - 8 = 0$ $(x - 0.5) = \sqrt{8.25}$ $x = 0.5 \pm \sqrt{8.25}$

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

7. $x^2 + 10x + 3 = 0$ $\frac{-10 \pm \sqrt{10^2 - 4 \times 1 \times 3}}{2 \times 1}$ $^-5 \pm \frac{\sqrt{88}}{2}$ $x = ^-5 \pm \sqrt{22}$

8. $3x^2 - x - 2 = 0$ $\frac{--1 \pm \sqrt{1^2 - 4 \times 3 \times -2}}{2 \times 3}$ $\frac{1}{6} \pm \frac{\sqrt{25}}{6}$ $x = 1$ or $\frac{-2}{3}$

9. $5x^2 - 7x - 4 = 0$ $\frac{--7 \pm \sqrt{7^2 - 4 \times 5 \times -4}}{2 \times 5}$ $0.7 \pm \frac{\sqrt{129}}{10}$ $x = 0.7 \pm \sqrt{1.29}$

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

10. $2x^2 - 5x + k = 0$ $(x - \frac{5}{4})^2 - (\frac{5}{4})^2 + \frac{k}{2} = 0$ $(x - \frac{5}{4}) = \pm\sqrt{(\frac{25}{16} - \frac{k}{2})}$ $k \leq \frac{25}{8}$

    or $b^2 - 4ac \geq 0$ $5^2 - 4 \times 2 \times k \geq 0$ $25 - 8k \geq 0$ $k \leq \frac{25}{8}$

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

    or $b^2 - 4ac \geq 0$ $k^2 - 4 \times 1 \times k \geq 0$ $k(k - 4) \geq 0$ $k \leq 0$ or $k \geq 4$

**Find the values of $k$ which do not give real solutions to the equation:**

12. $x^2 + 2kx + 11 = 0$ $(x + k)^2 - k^2 + 11 = 0$ $(x + k) = \pm\sqrt{(k^2 - 11)}$ $^-\sqrt{11} < k < \sqrt{11}$

    or $b^2 - 4ac < 0$ $(2k)^2 - 4 \times 1 \times 11 < 0$ $4k^2 - 44 < 0$ $^-\sqrt{11} < k < \sqrt{11}$

    (if $k^2 < 11$ then square rooting yields $k < \sqrt{11}$ but a negative reverses the sign, so $k > ^-\sqrt{11}$)