Key

Quiz Review

1) Solve for x by getting the equation equal to 0 and then factor.

a) $x^2 + 11x = -30$

$x^2 + 11x + 30 = 0$

$(x+5)(x+6) = 0$

$x+5=0 \quad x+6=0$

$x = -5$, $x = -6$

b) $x^2 - 3x - 70 = 0$

$(x-10)(x+7) = 0$

$x-10=0 \quad x+7=0$

$x = 10 \quad x = -7$

c) $x^2 - 2x = 0$

$x(x-2) = 0$

$x = 0 \quad x-2=0$

$x = 2$

d) $3x^2 - 9x = 0$

$3x(x-3) = 0$

$3x = 0 \quad x-3=0$

$x = 0 \quad x = 3$

2) Solve for x with use of a graphing calculator.

a) $2x^2 - 7x - 3 = 0$

$x = -0.386$

$x = 3.89$

b) $2x^2 - 3x = 4 \rightarrow 2x^2 - 3x - 4 = 0$

$x = -0.85$

$x = 2.3$

3) Solve for x by isolating x^2, then taking square roots of both sides of the equation.

a) $5x^2 = 50$

$x^2 = 10$

$x = \pm\sqrt{10}$

b) $8x^2 - 64 = 0$ (Add 64 to both sides, then divide by 8).

$x^2 = 8$

$x = \pm\sqrt{8}$

4) Find the missing piece to complete the square. Use $\left(\frac{b}{2}\right)^2$.

a) $x^2 + 6x + \underline{9}$

$\left(\frac{6}{2}\right)^2 = (3)^2 = 9$

b) $x^2 - 4x + \underline{4}$

$\left(\frac{-4}{2}\right)^2 = (-2)^2 = 4$

Completing the square steps:

1. Rewrite the equation in the form $ax^2 + bx = c$
2. Divide each term by a if a is not 1.
3. Complete the square by adding $\left(\frac{b}{2}\right)^2$ to both sides of the equation.
4. Factor into a perfect square.
5. Solve for x

5) Solve for x by means of completing the square.

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

$x^2 + 4x = 3$

$x^2 + 4x + \left(\frac{4}{2}\right)^2 = 3 + \left(\frac{4}{2}\right)^2$

$x^2 + 4x + 4 = 7$

$(x+2)^2 = 7$

$x + 2 = \pm\sqrt{7} \rightarrow x = -2 \pm \sqrt{7}$

b) $x^2 - 4x - 12 = 0$

$x^2 - 4x = 12$

$x^2 - 4x + \left(\frac{-4}{2}\right)^2 = 12 + \left(\frac{-4}{2}\right)^2$

$x^2 - 4x + 4 = 16$

$(x-2)^2 = 16$

$x - 2 = \pm 4$

$x = 2 \pm 4 = 6$ and -2

c) $2x^2 + 16x = 16$

$\frac{2x^2}{2} + \frac{16x}{2} = \frac{16}{2}$

$x^2 + 8x = 8$

$x^2 + 8x + \left(\frac{8}{2}\right)^2 = 8 + \left(\frac{8}{2}\right)^2$

$x^2 + 8x + 16 = 24$

$(x+4)^2 = 24$

$x + 4 = \pm\sqrt{24}$

$x = -4 \pm \sqrt{24}$

6) Solve by using the quadratic formula.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

a) $x^2 + 6x + 9 = 0$

$a = 1 \quad b = 6 \quad c = 9$

$x = \frac{-6 \pm \sqrt{(6)^2 - 4(1)(9)}}{2(1)} = \frac{-6 \pm \sqrt{0}}{2}$

$x = -3$

b) $8x^2 - 7x + 1 = 0$

$a = 8 \quad b = -7 \quad c = 1$

$x = \frac{7 \pm \sqrt{(-7)^2 - 4(8)(1)}}{2(8)} = \frac{7 \pm \sqrt{17}}{16}$

6) (Continued) Solve by using the quadratic formula.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

c) $-2x^2 + 7x - 1 = 0$

$a=-2 \quad b=7 \quad c=-1$

$$x = \frac{-7 \pm \sqrt{(7)^2 - 4(-2)(-1)}}{2(-2)} = \boxed{\frac{-7 \pm \sqrt{41}}{-4}}$$

d) $4x^2 - 2x + 1 = 0$

$a=4 \quad b=-2 \quad c=1$

$$x = \frac{2 \pm \sqrt{(-2)^2 - 4(4)(1)}}{2(4)} = \frac{2 \pm \sqrt{-12}}{8}$$

$$\boxed{x = \frac{2 \pm i\sqrt{12}}{8}}$$

7) Evaluate the discriminant (part under the square root in the quadratic formula). Decide how many real solutions we will get (0, 1, or 2).

$$discriminant = b^2 - 4ac$$

We have the following three cases:

1. If the **discriminant > 0**, then we get **two real solutions.**
2. If the **discriminant = 0**, then we get **one real solution.**
3. If the **discriminant < 0**, then we get **no real solutions**

a) $x^2 - 6x + 9 = 0$

$a=1 \quad b=-6 \quad c=9$

$(-6)^2 - 4(1)(9) = 0$

One real solution

b) $5x^2 + 2x - 1 = 0$

$(2)^2 - 4(5)(-1) = 24 > 0$

Two real solutions

8) Simplify the following. $i^2 = -1$ $\quad i = \sqrt{-1}$

a) $(3 + 4i) - (2 + 11i)$

$3 + 4i - 2 - 11i$

$\boxed{1 - 7i}$

b) $(5 - i)(3 + 2i)$

$15 + 10i - 3i - 2i^2$

$15 + 10i - 3i - 2(-1) \ldots\ldots i^2 = -1$

$15 + 7i + 2$

$\boxed{17 + 7i}$

8) (Continued) Simplify the following.

c) (2 + 4i) + (5 + 9i)

$7 + 13i$

d) $\frac{4+2i}{3-5i}$ → Complex conjugate = $3+5i$

$$\frac{(4+2i)(3+5i)}{(3-5i)(3+5i)} = \frac{12+20i+6i+10i^2}{9+15i-15i-25i^2}$$

Minus sign →

$$= \frac{12+26i+10(-1)}{9+-25(-1)}$$

$$= \frac{2+26i}{34}$$

e) $\sqrt{-5} = \sqrt{-1 \cdot 5}$

$i\sqrt{5}$

f) $\sqrt{-49} = \sqrt{-1 \cdot 49}$

$7i$

Remember $\sqrt{-1} = i$

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