Answer key

The method: Quadratics with complex roots

Use the quadratic formula. The square root of a negative number gives i. Write x = a ± bi.

$x^2 + 10x + 41 = 0$ $x = -5 \pm 4i$

$a = 1,\ b = 10,\ c = 41$

$10^2 - 4(1)(41) = -64$ $b^2 - 4ac$ is negative

$x = \frac{-10 \pm \sqrt{-64}}{2}$ $x = (-b \pm \sqrt{(b^2 - 4ac)}) \div 2a$

$x = \frac{-10 \pm 8i}{2}$ $\sqrt{-64} = 8i$

$x = -5 \pm 4i$ divide both parts

$2x^2 + 8x + 40 = 0$ $x = -2 \pm 4i$

$a = 2,\ b = 8,\ c = 40$

$8^2 - 4(2)(40) = -256$ $b^2 - 4ac$ is negative

$x = \frac{-8 \pm \sqrt{-256}}{4}$ $x = (-b \pm \sqrt{(b^2 - 4ac)}) \div 2a$

$x = \frac{-8 \pm 16i}{4}$ $\sqrt{-256} = 16i$

$x = -2 \pm 4i$ divide both parts

Answer key

Problems 1 and 2 worked out · Version 0A

$2x^2 - 8x + 16 = 0 \quad x = 2 \pm 2i$

$a = 2,\ b = -8,\ c = 16$

$(-8)^2 - 4(2)(16) = -64$ $b^2 - 4ac$ is negative

$x = \dfrac{8 \pm \sqrt{-64}}{4}$ $x = (-b \pm \sqrt{(b^2 - 4ac)}) \div 2a$

$x = \dfrac{8 \pm 8i}{4}$ $\sqrt{-64} = 8i$

$x = 2 \pm 2i$ divide both parts

$2x^2 - 20x + 100 = 0 \quad x = 5 \pm 5i$

$a = 2,\ b = -20,\ c = 100$

$(-20)^2 - 4(2)(100) = -400$ $b^2 - 4ac$ is negative

$x = \dfrac{20 \pm \sqrt{-400}}{4}$ $x = (-b \pm \sqrt{(b^2 - 4ac)}) \div 2a$

$x = \dfrac{20 \pm 20i}{4}$ $\sqrt{-400} = 20i$

$x = 5 \pm 5i$ divide both parts

Quadratics with complex roots · Version 0A

1) $x = 2 \pm 2i$ 2) $x = 5 \pm 5i$ 3) $x = 3 \pm 5i$
4) $x = -6 \pm 6i$ 5) $x = \pm 5i$ 6) $x = -2 \pm 5i$
7) $x = 2 \pm 4i$ 8) $x = \pm 4i$ 9) $x = -4 \pm 5i$