Every Kind of Root

QF06-V2 · storyboard · QF06 Quadratic formula. Read each picture with its sentences.

Picture 1

Solve $2x^2 - 8x + 7 = 0.$

$$b^2 - 4ac = 64 - 56 = 8$$ not a square

$$x = \frac{8 \pm \sqrt{8}}{4} = \frac{8 \pm 2\sqrt{2}}{4}$$ $\sqrt{8} = 2\sqrt{2}$

$$\boxed{x = 2 \pm \frac{\sqrt{2}}{2}}$$ divide every term by 4

1. Solve 2 x squared minus 8 x plus 7 equals 0.
2. First the part under the root: 64 minus 56 is 8.
3. 8 isn't a square.
4. So x is 8 plus or minus root 8, all over 4, and root 8 is 2 root 2.
5. Divide every term by 4: x equals 2, plus or minus root 2 over 2.

Picture 2

Solve $5x^2 + 3x + 9 = 0.$

$$b^2 - 4ac = 9 - 180 = -171$$ negative

$$x = \frac{-3 \pm 3i\sqrt{19}}{10}$$

$\sqrt{-171} = i\sqrt{171} = 3i\sqrt{19}$

6. Solve 5 x squared plus 3 x plus 9 equals 0.
7. The part under the root is 9 minus 180, which is negative 171.
8. Root negative 171 is 3 i root 19.
9. So there are two complex roots: negative 3, plus or minus 3 i root 19, all over 10.

Picture 3

Solve $9x^2 - 42x + 49 = 0$.

$$b^2 - 4ac = 1764 - 1764 = 0$$

$$\boxed{x = \frac{42}{18} = \frac{7}{3}}$$

one double root:

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

10. Solve 9 x squared minus 42 x plus 49 equals 0.
11. The part under the root is 1764 minus 1764, which is 0.
12. Plus or minus 0 changes nothing, so there is one double root: 42 over 18, which is 7 thirds.

Picture 4

Trap $\dfrac{8 \pm 2\sqrt{2}}{4}$

$\times\ 8 \pm \frac{\sqrt{2}}{2}$

$\checkmark\ \ 2 \pm \frac{\sqrt{2}}{2}$

13. Watch for the trap.
14. Divide not just the root by 4: the whole top is over 2 a.

Picture 5

Trap $b^2 - 4ac = -171$

$\times$ no solution

$\checkmark$ two complex roots

15. And a negative number under the root means not no solution, but two complex roots.