

MCR 3U

3.5: SOLVING QUADRATIC EQUATIONS...

① BY FACTORING

ZERO PRODUCT PROPERTY:

If $(a)(b) = 0$, then $a = 0$ or $b = 0$

FACTORING TECHNIQUES:

difference of squares, common factoring, simple/complex trinomials

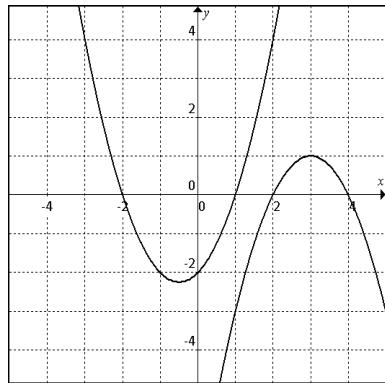
② BY FORMULA

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

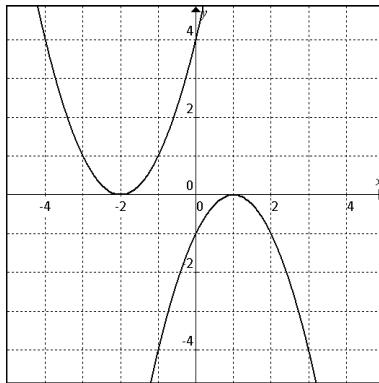
③ BY VERTEX FORM →

write equation in vertex form, then solve for x.

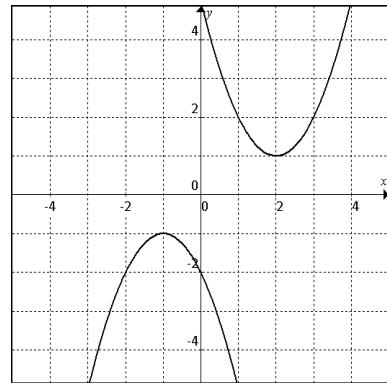
To determine the number of possible solutions (# of zeros), use the **discriminant** of the quadratic formula.



2 zeros exist



1 zero exists



no zeros exist

$$b^2 - 4ac > 0$$

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

$$b^2 - 4ac < 0$$

EXACT SOLUTIONS = *simplify the radical using 3.4 skills*

- NO decimal is permitted unless the solutions require a decimal answer.

SOLVE EACH OF THE FOLLOWING EQUATIONS – EXACT VALUES ONLY.

[Some questions have been done for you.]

1. $3x(x - 2) = 0$

8. $(3p - 1)(2p - 3) = -2$

$3x = 0 \quad \text{or} \quad x - 2 = 0$

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

2. $(5w + 2)(2w - 1) = 0$

9. $(3p - 1)(2p - 3) = 4 - p$

$$\begin{aligned}6p^2 - 11p + 3 &= 4 - p \\6p^2 - 10p - 1 &= 0\end{aligned}$$

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

$$\begin{aligned}a &= 6, \quad b = -10, \quad c = -1 \\b^2 - 4ac &= (-10)^2 - 4(6)(-1) \\&= 124\end{aligned}$$

4. $(n + 2)(4n - 3) = 3$

$$p = \frac{10 \pm \sqrt{124}}{12} = \frac{10 \pm 2\sqrt{31}}{12} = \frac{5 \pm \sqrt{31}}{6}$$

10. $(3p - 1)(2p - 3) = -3$

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

$$\begin{aligned}(2x - 3)(2x + 3) &= 0 \\2x - 3 &= 0 \quad \text{or} \quad 2x + 3 = 0 \\x &= \frac{3}{2} \quad \quad \quad \text{or} \quad x = -\frac{3}{2}\end{aligned}$$

11. $(3x + 1)(x - 2) = 3x$

6. $81d^2 = 1$

7. $8x^2 - 1 = 0$

12. $(2x - 1)(x - 3) = 2x(1 - x) + 7$

Answers: $\frac{2}{5}, \frac{1}{2}; \quad 0, \frac{1}{2}; \quad -\frac{9}{4}, 1; \quad \pm \frac{1}{9}; \quad \pm \frac{\sqrt{2}}{2}; \quad 1, \frac{5}{6}; \quad \text{no solution}; \quad \frac{4 \pm \sqrt{22}}{3}; \quad \frac{9 \pm \sqrt{145}}{8}$