Solve using the quadratic formula.

a. $m^2 + 2m - 3 = 0$

b. $w^2 - 5w + 6 = 0$

c. $x^2 + 2x + 1 = 0$

d. $h^2 - 6h + 9 = 0$

e. $s^2 + s + 1 = 0$

f. $3u^2 + 3u - 6 = 0$

g. $2d^2 + 4d - 6 = 0$

h. $2q^2 + 8q + 8 = 0$

i. $3k^2 + k + 2 = 0$

j. $3x^2 - 12x - 15 = 0$

KEYS

a. $m^2 + 2m - 3 = 0$

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

$$m = \frac{-2 \pm \sqrt{2^2 - 4(1)(-3)}}{2(1)}$$ Plug in $a = 1, b = 2, and\ c = -3$

$$m = \frac{-2 \pm \sqrt{4 + 12}}{2}$$ Multiply

$$m = \frac{-2 \pm \sqrt{16}}{2}$$ Add

$m = \frac{-2+\sqrt{16}}{2}$ or $m = \frac{-2-\sqrt{16}}{2}$ Split $\pm$ into + or -

$m = \frac{-2+4}{2}$ or $m = \frac{-2-4}{2}$ Take the square root

m = 1 or m = -3 Simplify

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b. $w^2 - 5w + 6 = 0$

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

$$w = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(6)}}{2(1)}$$ Plug in $a = 1, b = -5, and\ c = 6$

$$w = \frac{5 \pm \sqrt{25 - 24}}{2}$$ Multiply

$$w = \frac{5 \pm \sqrt{1}}{2}$$ Add

$w = \frac{5+\sqrt{1}}{2}$ or $w = \frac{5-\sqrt{1}}{2}$ Split $\pm$ into + or -

$w = \frac{5+1}{2}$ or $w = \frac{5-1}{2}$ Take the square root

w = 3 or w = 2	Simplify

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c. $x^2 + 2x + 1 = 0$

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

$$x = \frac{-2 \pm \sqrt{2^2 - 4(1)(1)}}{2(1)}$$ Plug in $a = 1, b = 2, and\ c = 1$

$$x = \frac{-2 \pm \sqrt{4 - 4}}{2}$$ Multiply

$$x = \frac{-2 \pm \sqrt{0}}{2}$$ Add

$x = \frac{-2+\sqrt{0}}{2}$ or $x = \frac{-2-\sqrt{0}}{2}$ Split $\pm$ into + or -

$x = \frac{-2+0}{2}$ or $x = \frac{-2-0}{2}$ Take the square root

x = - 1 Simplify

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d. $h^2 - 6h + 9 = 0$

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

$$h = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(9)}}{2(1)}$$ Plug in $a = 1, b = -6, and\ c = 9$

$$h = \frac{6 \pm \sqrt{36 - 36}}{2}$$ Multiply

$$h = \frac{6 \pm \sqrt{0}}{2}$$ Add

$h = \frac{6 + \sqrt{0}}{2}$ or $h = \frac{6 - \sqrt{0}}{2}$ Split $\pm$ into + or -

h = $\frac{6+0}{2}$ or h = $\frac{6-0}{2}$ Take the square root

h = 6 Simplify

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e. $s^2 + s + 1 = 0$

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

$$s = \frac{-1 \pm \sqrt{1^2 - 4(1)(1)}}{2(1)}$$ Plug in $a = 1, b = 1, and\ c = 1$

$$s = \frac{-1 \pm \sqrt{1 - 4}}{2}$$ Multiply

$$s = \frac{-1 \pm \sqrt{-3}}{2}$$ Add

No real solution

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f. $3u^2 + 3u - 6 = 0$

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

$$u = \frac{-3 \pm \sqrt{3^2 - 4(3)(-6)}}{2(3)}$$ Plug in $a = 3, b = 3, and\ c = -6$

$$u = \frac{-3 \pm \sqrt{9 + 72}}{6}$$ Multiply

$$u = \frac{-3 \pm \sqrt{81}}{6}$$ Add

u = $\frac{-3 + \sqrt{81}}{6}$ or u = $\frac{-3 - \sqrt{81}}{6}$ Split $\pm$ into + or -

u = $\frac{-3+9}{6}$ or u = $\frac{-3-9}{6}$ Take the square root

u = 1 or u = -2 Simplify

g. $2d^2 + 4d - 6 = 0$

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

$$d = \frac{-4 \pm \sqrt{4^2 - 4(2)(-6)}}{2(2)}$$ Plug in $a = 2, b = 4, and\ c = -6$

$$d = \frac{-4 \pm \sqrt{16 + 48}}{4}$$ Multiply

$$d = \frac{-4 \pm \sqrt{64}}{4}$$ Add

$d = \frac{-4 + \sqrt{64}}{4}$ or $d = \frac{-4 - \sqrt{64}}{4}$ Split $\pm$ into + or -

$d = \frac{-4+8}{4}$ or $d = \frac{-4-8}{4}$ Take the square root

d = 1 or d = - 3 Simplify

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h. $2q^2 + 8q + 8 = 0$

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

$$q = \frac{-8 \pm \sqrt{8^2 - 4(2)(8)}}{2(2)}$$ Plug in $a = 2, b = 8, and\ c = 8$

$$q = \frac{-8 \pm \sqrt{64 - 64}}{4}$$ Multiply

$$q = \frac{-8 \pm \sqrt{0}}{4}$$ Add

$q = \frac{-8 + \sqrt{0}}{4}$ or $q = \frac{-8 - \sqrt{0}}{4}$ Split $\pm$ into + or -

$q = \frac{-8+0}{4}$ or $q = \frac{-8-0}{4}$ Take the square root

q = – 2	Simplify

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i. $3k^2 + k + 2 = 0$

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

$$k = \frac{-1 \pm \sqrt{1^2 - 4(3)(2)}}{2(3)}$$ Plug in $a = 3, b = 1, and\ c = 2$

$$k = \frac{-1 \pm \sqrt{1 - 24}}{6}$$ Multiply

$$k = \frac{-1 \pm \sqrt{-23}}{6}$$ Add

No real solution

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j. $3x^2 - 12x - 15 = 0$

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

$$x = \frac{-(-12) \pm \sqrt{(-12)^2 - 4(3)(-15)}}{2(3)}$$ Plug in $a = 3, b = -12, and\ c = -15$

$$x = \frac{12 \pm \sqrt{144 + 180}}{6}$$ Multiply

$$x = \frac{12 \pm \sqrt{324}}{6}$$ Add

$x = \frac{12 + \sqrt{324}}{6}$ or $x = \frac{12 - \sqrt{324}}{6}$ Split $\pm$ into + or -

$x = \frac{12+18}{6}$ or $x = \frac{12-18}{6}$ Take the square root

x = 5 or x = -1 Simplify
