Stu

Solving equations of the form $a(x-h)^2+k=0$

when a quadratic is in "standard form" $a(x-b)^2+k=0$ we can solve directly or use the formula

$$x_1, x_2 = h \pm \sqrt{\frac{k}{a}}$$

example

$$4(x-1)^2-8=0$$

method 1

$4(x-1)^2-8=0$

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

$(x-1)(x-1)=2$

$(x-1)^2=\sqrt{2}$

$x-1=\sqrt{2}+1$

method 2 Formula

$x_1, x_2 = h \pm \sqrt{\frac{k}{a}}$

$= 1 \pm \sqrt{\frac{-8}{4}}$

$1 \pm \sqrt{2}$

example 2

Formula

$$-2(x-5)+2=0$$

$$h \pm \sqrt{\frac{k}{q}}$$

$$= 5 \pm \sqrt{\frac{2}{-2}}$$

$$5 \pm i$$

$$6, 4$$

Direct

$$-2(x-5)^2+2=-$$

$$\frac{-2(x-5)^2}{-2} = \frac{-2}{-2}$$

$$(x-5)^2 = 1$$

$$x-5=1 \quad x-5=-1$$

$$x_1, x_2 = 6, 4$$

p. 32, 33, # 6, 8, E7 challenge

Direct

$(x+3)^2+1=0$

$(x+3)^2=\sqrt{-1}$

No possibilities

Formula

$-3\pm\sqrt{\frac{-1}{1}}$

No solutions

$9(x-4)^2-36=0$

$9(x-4)^2=36$

$\frac{9(x-4)^2}{9}=\frac{36}{9}$

$(x-4)^2=\sqrt{4}$

$x-4=2 \qquad x-4=-2$

$x_1, x_2 = 6, 2$

p. 32

6.

a) $(x-3)^2 = 16$

$(x-3)(x-3) = \sqrt{16}$

$x-3=4 \quad x-3=-4$

$x_1, x_2 = 7, -1$

b) $2x+1^2 = 9$

$(2x+1)(2x+1) = \sqrt{9}$

$2x+1=3 \quad 2x+1=-3$

$x_1, x_2 = 2, -4$

c) $(2x-3)^2 - 1 = 0$

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

$2x-3=1 \quad 2x-3=-1$

$x_1, x_2 = 4, -2$

d) $2(x+1)^2 - 8 = 0 \quad x+1=+2 \quad x+1=-2$

$2(x+1)^2 = 8 \quad x_1, x_2 = 1, -3$

$(x+1)^2 = 4$

e) $-2(x-1)^2+18=0$

$-2(x-1)^2=-18$

$(x-1)(x-1)=9$

$x-1=-3 \quad x-1=3$

$x_1, x_2 = -2, 4$

7. $h=\sqrt{\frac{-k}{a}}, h+\sqrt{\frac{-k}{a}}$ if $\frac{-k}{a}>0$

this is only possible if a is negative

Let $\frac{-k}{a}=\sqrt{\frac{8}{2}}$.

$-2(x+2)^2+8=0$

$2=\sqrt{\frac{-8}{-2}}$

$2-2=0$

$-2+\sqrt{\frac{-8}{-2}}=0$

$-2+2=0$ (recharge signs of h)

8.

a) $(x-1)^2+9=0$

$(x-1)^2=-9$

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

$x-3=0$

$x=3$

c) $(2x-5)^2-25=0$

$2x-5=5 \quad 2x-5=-5$

$2x=10 \quad 2x=0$

$x_1, x_2 = 5, 0$

d) $2(x+1)^2-14=0$

$2(x+1)^2=14$

$(x+1)^2=7$

$x+1=\sqrt{7} \quad x+1=-\sqrt{7}$

$x_1, x_2 = \sqrt{7}-1, -\sqrt{7}-1$

e, $-2(2x+1)^2+32=0$

$-2(2x+1)^2=-32$

$(2x+1)^2=16$

$2x+1=4 \quad 2x+1=-4$

$2x=3$

$x=\frac{3}{2}, \frac{-5}{2}$

$x_1, x_2=\frac{3}{2}, \frac{-5}{2}$

f, $3(x-2)^2+27=0$

$3(x-2)^2=-27$

$(x-2)^2=-9$

No solutions