S1.1

53. $2a + 1 = -\sqrt{17}$

$(x+y)^2 = x^2 + 2xy + y^2$

$(2a+1)^2 = \left(-\sqrt{17}\right)^2$

$4a^2+4a-16=0$ $\quad ax^2+bx+c=0$

$a=4,\ b=4,\ c=-16$

$(2a)^2 + 2(2a)(1) + 1^2 = 17$ $\quad b^2-4ac = 4^2-4(1)(-16)$

$2^2a^2 + 4a + 1 = 17$ $\quad = 16+64$

$= 80$

$4a^2+4a-16=0$

$4\left(a^2+a-4\right)=0$ is better

So $\sqrt{80}$

$= 2\cdot 2\sqrt{5}$

$= 4\sqrt{5}$

$2 \,|\, 80$, $2 \,|\, 40$, $2 \,|\, 20$, $2 \,|\, 10$, 5

So $a = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$

$= \dfrac{-4 \pm 4\sqrt{5}}{2(4)} = \dfrac{\cancel{4}(1\pm\sqrt{5})}{2(\cancel{4})} = \dfrac{1\pm\sqrt{5}}{2}$

$\Rightarrow a = \dfrac{1\pm\sqrt{5}}{2} \to \dfrac{1+\sqrt{5}}{2},\ \dfrac{1-\sqrt{5}}{2}$

Note:

$2a+1 = -\sqrt{17}$

$2a = \underbrace{-\sqrt{17}-1}$

Negative, so $2a<0$, so $a<0$

But $\dfrac{1+\sqrt{5}}{2} > 0$, so it's extraneous.

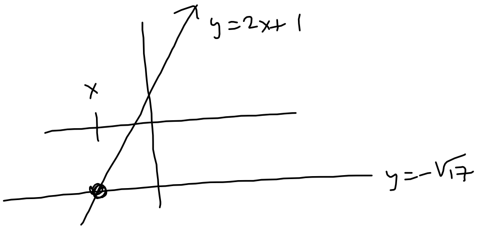
$a = \dfrac{1-\sqrt{5}}{2}$

$2a+1 = 2\left(\dfrac{1-\sqrt{5}}{2}\right)+1 = 1-\sqrt{5}+1 = \sqrt{5} \neq -\sqrt{17}$

No solution, by this work!

S1.1

53. $2a + 1 = -\sqrt{17}$



$$2x+1 = -\sqrt{17}$$

$$(2x+1)^2 = \left(-\sqrt{17}\right)^2$$

$$4x^2+4x+1 = 17$$

$$4x^2+4x-16 = 0$$

$$4(x^2+x-4) = 0$$

$$a=1,\ b=1,\ c=-4$$

$$b^2-4ac = 1^2-4(1)(-4)$$

$$= 1+16$$

$$= 17$$

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

$$= \frac{-1\pm\sqrt{17}}{2(1)} = \frac{1\pm\sqrt{17}}{2} \longrightarrow \frac{1-\sqrt{17}}{2}$$

b/c $x < 0$

$$2a+1 =$$

$$= 2\left(\frac{1-\sqrt{17}}{2}\right)+1$$

$$= 1-\sqrt{17}+1$$

$$= -\sqrt{17}$$