

Subtract 2 from both sides

$$3b + 2 - 2 = 10 - b - 2$$

Simplify

$$3b = -b + 8$$

Add b to both sides

$$3b + b = -b + 8 + b$$

Simplify

$$4b = 8$$

Divide both sides by 4

$$\frac{4b}{4} = \frac{8}{4}$$

Simplify $b = 2$

Verify

$$\text{If } b = 2 \text{ then } \sqrt{3b + 2} = \sqrt{10 - b}$$

therefore

$$b = 2$$