

Please show your work so that I can follow it. Circle the final answer.

1. Find the real solutions of $x - 4\sqrt{x} = 0$

Solution:

a. Try a substitution to make this a quadratic equation.

Target equation: $u^2 - 4u = 0$

b. Substitution to try: $u = \sqrt{x}$.

Then $u^2 = (\sqrt{x})^2 = x$ so $u^2 - 4u = x - 4\sqrt{x} = 0$

The substitution works.

c. Solve $u^2 - 4u = 0$.

Factoring: $u(u - 4) = 0$ so solutions are $u = 0$ and $u = 4$.

d. Derive solutions for x from the solutions for u .

Since $u = \sqrt{x}$, then the solution $u = 0$ means $x = 0^2 = 0$ and the solution $u = 4$ means $x = 4^2 = 16$.

So the solutions are $x = 0$ and $x = 16$.

e. Check the solutions: $0 - 4\sqrt{0} = 0 - 4 * 0 = 0 - 0 = 0$

and $16 - 4\sqrt{16} = 16 - 4 * 4 = 16 - 16 = 0$

so both solutions check.

Alternative method:

$$x - 4\sqrt{x} = 0$$

Add $4\sqrt{x}$

$$x = 4\sqrt{x}$$

Square both sides

$$x^2 = 16x$$

Subtract $16x$

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

Factor

$$x(x - 16) = 0$$

Solutions are $x = 0$ and $x = 16$

Check the solutions: $0 - 4\sqrt{0} = 0 - 4 * 0 = 0 - 0 = 0$

and $16 - 4\sqrt{16} = 16 - 4 * 4 = 16 - 16 = 0$

so both solutions check.

2. Solve for x :

$$-5 \leq 4 - 3x \leq 2$$

Express your result as an interval and draw it on a number line.

Solution:

a. Subtract 4:

$$\begin{aligned} -5 - 4 &\leq 4 - 3x - 4 \leq 2 - 4 \\ -9 &\leq -3x \leq -2 \end{aligned}$$

b. Divide by -3 and reverse the inequalities:

$$\begin{aligned} \frac{-9}{-3} &\geq \frac{-3x}{-3} \geq \frac{-2}{-3} \\ 3 &\geq x \geq \frac{2}{3} \end{aligned}$$

$\frac{2}{3} \leq x \leq 3$

c. Express as an interval: $[\frac{2}{3}, 3]$

d. Draw on a number line: 

0