

107 - Worksheet

Part 1: Math 20-2 Worksheet

Pg 222 #1acd: State any restrictions on x, then solve each equation.

$$\sqrt{x} = 4 \quad x \geq 0$$

Square both sides

$$x = 16$$

$$\sqrt{x+1} = 2 \quad \begin{array}{l} x+1 \geq 0 \\ x \geq -1 \end{array}$$

Square both sides

$$\begin{array}{r} x+1 = 4 \\ -1 \quad -1 \\ \hline x = 3 \end{array}$$

$$\sqrt{x+3} = 4 \quad \begin{array}{l} x+3 \geq 0 \\ -3 \quad -3 \\ \hline x \geq -3 \end{array}$$

Square both sides

$$\begin{array}{r} x+3 = 16 \\ -3 \quad -3 \\ \hline x = 13 \end{array}$$

Pg 222 #6acd: State any restrictions on x, then solve each equation.

$$\sqrt{x-3} = 5 \quad \begin{array}{l} x-3 \geq 0 \\ +3 \quad +3 \\ \hline x \geq 3 \end{array}$$

Square both sides

$$\begin{array}{r} x-3 = 25 \\ +3 \quad +3 \\ \hline x = 28 \end{array}$$

$$2\sqrt{5x+3} = 11 \quad \begin{array}{l} 5x+3 \geq 0 \\ -3 \quad -3 \\ \hline 5x \geq -3 \\ \div 5 \quad \div 5 \\ \hline x \geq -3/5 \end{array}$$

Square both sides

$$\begin{array}{r} \sqrt{5x+3} = \frac{11}{2} \\ 5x+3 = \frac{121}{4} \\ -3 \quad -3 \\ \hline 5x = \frac{121}{4} - 3\left(\frac{4}{4}\right) \\ 5x = \frac{121-12}{4} = \frac{109}{4} \\ 5x = \frac{109}{4} \quad \rightarrow \quad x = \frac{109}{20} \\ \div 5 \quad \div 5 \end{array}$$

$$\frac{1}{2}\sqrt{3x-2} = 4 \quad \begin{array}{l} 3x-2 \geq 0 \\ +2 \quad +2 \\ \hline 3x \geq 2 \\ \div 3 \quad \div 3 \\ \hline x \geq 2/3 \end{array}$$

Square both sides

$$\begin{array}{r} \sqrt{3x-2} = 8 \\ 3x-2 = 64 \\ +2 \quad +2 \\ \hline 3x = 66 \\ \div 3 \quad \div 3 \\ \hline x = 22 \end{array}$$

Pg 222 #8acd: State any restrictions on x, then solve each equation.

$$\sqrt{2x+17} = 5 \quad \begin{array}{l} 2x+17 \geq 0 \\ -17 \quad -17 \\ \hline 2x \geq -17 \\ \div 2 \quad \div 2 \\ \hline x \geq -17/2 \end{array}$$

Square both sides

$$\begin{array}{r} 2x+17 = 25 \\ -17 \quad -17 \\ \hline 2x = 8 \\ \div 2 \quad \div 2 \\ \hline x = 4 \end{array}$$

$$\sqrt{2(5x+3)} = -4 \quad \begin{array}{l} 2(5x+3) \geq 0 \\ \div 2 \quad \div 2 \\ \hline 5x+3 \geq 0 \\ -3 \quad -3 \\ \hline 5x \geq -3 \\ \div 5 \quad \div 5 \\ \hline x \geq -3/5 \end{array}$$

Square both sides

$$\begin{array}{r} 2(5x+3) = 16 \\ \div 2 \quad \div 2 \\ \hline 5x+3 = 8 \\ -3 \quad -3 \\ \hline 5x = 5 \\ \div 5 \quad \div 5 \\ \hline x = 1 \end{array}$$

$$\sqrt{33-6x} + 4 = 13 \quad \begin{array}{l} 33-6x \geq 0 \\ -4 \quad -4 \\ \hline \sqrt{33-6x} = 9 \end{array}$$

Square both sides

$$\begin{array}{r} 33-6x = 81 \\ -33 \quad -33 \\ \hline -6x = 48 \\ \div (-6) \quad \div (-6) \\ \hline x = -8 \end{array}$$

Extraneous Root

$$\sqrt{2(5 \cdot 1 + 3)} = -4$$

$$\sqrt{16} = -4$$

Only take positive roots
when confirming.

Pg 223 #11: A space station needs to rotate to create the illusion of gravity. A formula for determining the rotation rate to reproduce Earth's gravity is

$$N = \frac{42}{\pi} \sqrt{\frac{5}{r}}$$

where N represents the number of revolutions per minute and r represents the radius of the station in meters.

A station rotates 6.7 times per minute, producing an effect on the interior wall equivalent to Earth's gravity. Determine the radius of the space station.

$$\begin{aligned}
 6.7 &= \frac{42}{\pi} \sqrt{\frac{5}{r}} \\
 \cdot \pi & \quad \cdot \pi \\
 (6.7)\pi &= 42 \sqrt{\frac{5}{r}} \\
 \div 42 & \quad \div 42 \\
 \frac{6.7\pi}{42} &= \sqrt{\frac{5}{r}} \\
 0.25116 &= \frac{\sqrt{5}}{\sqrt{r}} \\
 \cdot r & \quad \cdot r \\
 (0.25116)r &= 5 \\
 \div 0.25116 & \quad \div 0.25116 \\
 r &= 19.9 \text{ m}
 \end{aligned}$$

Pg 225 #9ab: States the restrictions on x , then solve. Is the root extraneous? Explain.

$$\begin{aligned}
 \sqrt{16x+20} - 3 &= -1 \\
 +3 & \quad +3
 \end{aligned}$$

$$\sqrt{16x+20} = 2$$

Square both sides

$$\begin{aligned}
 16x+20 &= 4 \\
 -20 & \quad -20
 \end{aligned}$$

$$\begin{aligned}
 16x &= -16 \\
 \div 16 & \quad \div 16
 \end{aligned}$$

$$x = -1$$

$$\begin{aligned}
 16x+20 &\geq 0 \\
 -20 & \quad -20
 \end{aligned}$$

$$\begin{aligned}
 16x &\geq -20 \\
 \div 16 & \quad \div 16
 \end{aligned}$$

$$x \geq \frac{-20}{16}$$

$$x \geq \frac{-5}{4}$$

Not extraneous. Confirms in eqn.

