Section 2.5 – Practice Problems

Square the expression

1. $\sqrt{x+2}$

$\sqrt{x+2}^2 =$ $x+2$

2. $\sqrt{x}+2$

$(\sqrt{x}+2)^2 \rightarrow (\sqrt{x}+2)(\sqrt{x}+2)$

$x+4\sqrt{x}+4$

3. $\sqrt{3x-5}$

$3x-5$

4. $\sqrt{3x}-5$

$(\sqrt{3x}-5)(\sqrt{3x}-5)$

$3x-10\sqrt{3x}+25$

5. $\sqrt{1-4x}$

$1-4x$

6. $1-4\sqrt{x}$

$(1-4\sqrt{x})(1-4\sqrt{x})$

$1-8\sqrt{x}+16x$

7. $x-3$

$(x-3)(x-3)$

x^2-6x+9

8. $\sqrt{x}-\sqrt{3}$

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

$x-2\sqrt{3x}+3$

Determine the restriction on the radical equation

9. $\sqrt{x+5}=4$

$x \geq -5$

can't be negative under the radical

10. $\sqrt{9-x}=5$

$x \leq 9$

11. $\sqrt{2x+3} = 6$

$2x+3 \geq 0$

$2x \geq -3$

$\boxed{x \geq -\frac{3}{2}}$

12. $\sqrt{10x-8} = 3\sqrt{x}$

needs to satisfy both so

$10x-8 \geq 0$

$x \geq 8/10$

$\sqrt{x} \geq 0$

$x \geq 0$

$x \geq 8/10$

$\boxed{x \geq 4/5}$

13. $\sqrt{5x-5} = \sqrt{4x-1}$

$5x-5 \geq 0$

$x \geq 1$ ← satisfies both

$4x-1 \geq 0$

$x \geq 1/4$

$\boxed{x \geq 1}$

14. $\sqrt{3x+3} = \sqrt{5x-1}$

$3x+3 \geq 0$

$x \geq -1$

$\boxed{x \geq 1/5}$

$5x-1 \geq 0$

$x \geq 1/5$ ← satisfies both

Solve the radical equation

15. $\sqrt{2t-3} = 5$

square both sides

$2t-3 = 25$

$2t = 28$

$\boxed{t = 14}$

16. $\sqrt{3t+4} = -2$

NOT POSSIBLE

SQUARE ROOT CANNOT RESULT IN A NEGATIVE

17. $\sqrt{1-3x} = -2$

Same as #16

18. $2\sqrt{x-1} = x$

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

$4x-4 = x^2$

$-4x+4$

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

$(x-2)^2 = 0$

$\boxed{x = 2}$

19. $\sqrt{2x+3} - \sqrt{x+2} = 2$

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

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

$2x+3 = 4 + 4\sqrt{x+2} + x + 2$

$2x+3 = 6 + x + 4\sqrt{x+2}$

$(x-3 = 4\sqrt{x+2})^2$

$x^2 - 6x + 9 = 16(x+2)$

$x^2 - 6x + 9 = 16x + 32$

$x^2 - 22x - 23 = 0$

$(x-23)(x+1) = 0$

$x = 23$

$x = -1$ ← Reject doesn't satisfy

20. $(-\sqrt{x+3} = \sqrt{3x+5})^2$

$x + 3 = 3x + 5$

$2x = -2$

$x = -1$ ← Reject

check and $-\sqrt{2} = \sqrt{2}$

NO SOLUTION

21. $\sqrt{2x+1} = x - 7$

$2x+1 = (x-7)^2$

$2x+1 = x^2 - 14x + 49$

$x^2 - 16x + 48 = 0$

$(x-12)(x-4) = 0$

$x = 12$

$x = 4$ ← Reject RHS goes negative

22. $\sqrt{3x+10} + 5 = 2x$

$\sqrt{3x+10} = 2x - 5$

$3x + 10 = (2x-5)^2$

$3x + 10 = (2x-5)(2x-5)$

$3x + 10 = 4x^2 - 20x + 25$

$4x^2 - 23x + 15 = 0$

$x^2 - 23x + 60 = 0$

$(x-20)(x-3) = 0$

$\left(x - \frac{20}{4}\right)\left(x - \frac{3}{4}\right) =$

$(x-5)(4x-3) = 0$

$x = 5$

$x = 3/4$ ← reject

23. $x + 3 = (\sqrt{x+1})(\sqrt{x+6})$

$(x+3)^2 = (x+1)(x+6)$

$x^2 + 6x + 9 = x^2 + 7x + 6$

$x = 3$

24. $\sqrt{y-8} + \sqrt{y} = 2$

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

$y - 8 = (2-\sqrt{y})(2-\sqrt{y})$

$y - 8 = 4 - 4\sqrt{y} + y$

$-12 = -4\sqrt{y}$

$3 = \sqrt{y}$

$y = 9$ ← does not satisfy eqn

NO SOLUTION

25. The maximum distance, d, in kilometers that a person can see from a height, h, in kilometers above the ground is $d = 111.7\sqrt{h}$. Find the height in meters that would allow a person to see 75 kilometers.

$75 = 111.7\sqrt{h}$

$\frac{75}{111.7} = \sqrt{h}$

$\left(\frac{75}{111.7}\right)^2 = h$

$h = 0.451\ km$

$\downarrow$

$\boxed{451\ m}$

26. The formula $v = \sqrt{2gh}$ relates velocity, V, in meters per second of an object after h meters accelerated by gravity, g, in meters per second squared. If g is approximately $9.8 m/s^2$, how far has an object fallen if its velocity is $30 m/s$?

$30 = \sqrt{2(9.8)h}$

$900 = 2(9.8)h$

$900 = 19.6h$

$45.92 = h$

$\boxed{h = 45.9\ m}$