Multiplication of Radicals

1. $\sqrt{2} \cdot \sqrt{3} = \sqrt{6}$

2. $\sqrt{5} \cdot \sqrt{7} = \sqrt{35}$

3. $\sqrt{7} \cdot \sqrt{11} = \sqrt{77}$

4. $\sqrt{5} \cdot \sqrt{5} = \sqrt{5^2} = 5$

5. $\sqrt{7} \cdot \sqrt{7} = \sqrt{7^2} = 7$

6. $\sqrt{8} \cdot \sqrt{6} = \sqrt{2^3} \cdot \sqrt{2 \cdot 3} = \sqrt{2^4 \cdot 3} = 2^2 \sqrt{3}$

7. $\sqrt{10} \cdot \sqrt{30} = \sqrt{2 \cdot 5} \cdot \sqrt{2 \cdot 3 \cdot 5} = \sqrt{2^2 \cdot 3 \cdot 5^2} = 2 \cdot 5\sqrt{3}$

8. $\sqrt{5} \cdot \sqrt{15} = \sqrt{5} \cdot \sqrt{3 \cdot 5} = \sqrt{3 \cdot 5^2} = 5\sqrt{3}$

9. $\sqrt{14} \cdot \sqrt{35} = \sqrt{2 \cdot 7} \cdot \sqrt{5 \cdot 7} = \sqrt{2 \cdot 5 \cdot 7^2} = 7\sqrt{2 \cdot 5}$

10. $\sqrt{32} \cdot \sqrt{40} = \sqrt{2^5} \cdot \sqrt{2^3 \cdot 5} = \sqrt{2^8 \cdot 5} = 2^4 \sqrt{5}$

11. $3\sqrt{5} \cdot 2\sqrt{6} = 3\sqrt{5} \cdot 2\sqrt{2 \cdot 3} = 6\sqrt{2 \cdot 3 \cdot 5} \Rightarrow 6\sqrt{30}$

12. $5\sqrt{7} \cdot 2\sqrt{21} = 5\sqrt{7} \cdot 2\sqrt{3 \cdot 7} = 10\sqrt{3 \cdot 7^2} = 10 \cdot 7\sqrt{3} \Rightarrow 70\sqrt{3}$

13. $-2\sqrt{3} \cdot 4\sqrt{2} = -8\sqrt{3 \cdot 2} = -8\sqrt{6}$

14. $6\sqrt{6} \cdot 4\sqrt{12} = 6\sqrt{2 \cdot 3} \cdot 4\sqrt{2^2 \cdot 3} = 4 \cdot 6\sqrt{2^3 \cdot 3^2} = 4 \cdot 6 \cdot 2 \cdot 3\sqrt{2} \Rightarrow 144\sqrt{2}$

15. $\sqrt{x} \cdot \sqrt{x} = \sqrt{x^2} = x$

16. $\sqrt{x^2 y^3} \cdot \sqrt{x^5 y^2} = \sqrt{x^7 y^5} = x^3 y^2 \sqrt{xy}$

17. $\sqrt{6xy^3} \cdot \sqrt{4x^7 y^4} = \sqrt{2 \cdot 3xy^3} \cdot \sqrt{2^2 x^7 y^4} = \sqrt{2^3 \cdot 3 \cdot x^8 y^7} = 2x^4 y^3 \sqrt{2 \cdot 3 \cdot y}$

18. $\sqrt{5x^2} \cdot 3\sqrt{10x^3} \cdot 2\sqrt{2x^5} = \sqrt{5x^2} \cdot 3\sqrt{2 \cdot 5x^3} \cdot 2\sqrt{2x^5} = 3 \cdot 2\sqrt{2^2 \cdot 5^2 x^8} = 3 \cdot 2 \cdot 2 \cdot 5x^4 = 60x^4$

19. $\sqrt{3}\left(\sqrt{2} + 1\right) = \sqrt{6} + \sqrt{3}$

20. $\sqrt{3}\left(\sqrt{6} - 2\right) = \sqrt{3}\left(\sqrt{2 \cdot 3} - 2\right) = \sqrt{2 \cdot 3^2} - 2\sqrt{3} = 3\sqrt{2} - 2\sqrt{3}$

21. $2\sqrt{5}\left(\sqrt{5} + 3\right) = 2\sqrt{5^2} + 6\sqrt{5} = 2 \cdot 5 + 6\sqrt{5} = 10 + 6\sqrt{5}$

22. $-4\sqrt{7}\left(2\sqrt{7} - 3\sqrt{2}\right) = -8\sqrt{7^2} + 12\sqrt{2 \cdot 7} = -8 \cdot 7 + 12\sqrt{2 \cdot 7} = -56 + 12\sqrt{14}$

23. $\sqrt{3}\left(\sqrt{27}-\sqrt{3}\right)=\sqrt{3}\left(\sqrt{3^3}-\sqrt{3}\right)=\sqrt{3^4}-\sqrt{3^2}=3^2-3=9-3=6$

24. $\sqrt{y}\left(\sqrt{y}-\sqrt{3}\right)=\sqrt{y^2}-\sqrt{3y}=y-\sqrt{3y}$

25. $\left(\sqrt{2}+3\right)\left(\sqrt{3}+4\right)=\sqrt{2}\left(\sqrt{3}+4\right)+3\left(\sqrt{3}+4\right)=\sqrt{6}+4\sqrt{2}+3\sqrt{3}+12$

26. $\left(\sqrt{5}-\sqrt{3}\right)\left(\sqrt{2}+3\right)=\sqrt{5}\left(\sqrt{2}+3\right)-3\sqrt{3}\left(\sqrt{2}+3\right)=\sqrt{10}+3\sqrt{5}-3\sqrt{6}-9\sqrt{3}$

27. $\left(2+\sqrt{x}\right)\left(2-\sqrt{x}\right)=2\left(2-\sqrt{x}\right)+\sqrt{x}\left(2-\sqrt{x}\right)=4-2\sqrt{x}+2\sqrt{x}-\sqrt{x^2}=4-x$

28. $\left(2\sqrt{x}-3\right)\left(3\sqrt{x}+5\right)=2\sqrt{x}\left(3\sqrt{x}+5\right)-3\left(3\sqrt{x}+5\right)=6\sqrt{x^2}+10\sqrt{x}-9\sqrt{x}-15=6x+\sqrt{x}-15$

29. $\left(2\sqrt{6}+3\right)\left(2\sqrt{2}-1\right)=2\sqrt{2\cdot3}\left(2\sqrt{2}-1\right)+3\left(2\sqrt{2}-1\right)=4\sqrt{2^2\cdot3}-2\sqrt{2\cdot3}+6\sqrt{2}-3=$
$4\cdot2\sqrt{3}-2\sqrt{6}+6\sqrt{2}-3=8\sqrt{3}-2\sqrt{6}+6\sqrt{2}-3$

30. $\left(4\sqrt{5}+3\sqrt{3}\right)\left(4\sqrt{5}-3\sqrt{3}\right)=4\sqrt{5}\left(4\sqrt{5}-3\sqrt{3}\right)+3\sqrt{3}\left(4\sqrt{5}-3\sqrt{3}\right)=$
$15\sqrt{5^2}-12\sqrt{3\cdot5}+12\sqrt{3\cdot5}-9\sqrt{3^2}=15\cdot5-9\cdot3=75-27=48$

31. $\left(\sqrt{2}-1\right)^2=\left(\sqrt{2}-1\right)\left(\sqrt{2}-1\right)=\sqrt{2}\left(\sqrt{2}-1\right)-1\left(\sqrt{2}-1\right)=\sqrt{2^2}-\sqrt{2}-\sqrt{2}+1=$
$2-2\sqrt{2}+1=3-2\sqrt{2}$

32. $\left(5+\sqrt{3}\right)^2=\left(5+\sqrt{3}\right)\left(5+\sqrt{3}\right)=5\left(5+\sqrt{3}\right)+\sqrt{3}\left(5+\sqrt{3}\right)=25+5\sqrt{3}+5\sqrt{3}+\sqrt{3^2}$
$25+10\sqrt{3}+3=28+10\sqrt{3}$

33. $\left(\sqrt{3}-\sqrt{7}\right)^2=\left(\sqrt{3}-\sqrt{7}\right)\left(\sqrt{3}-\sqrt{7}\right)=\sqrt{3}\left(\sqrt{3}-\sqrt{7}\right)-\sqrt{7}\left(\sqrt{3}-\sqrt{7}\right)=$
$\sqrt{3^2}-\sqrt{21}-\sqrt{21}-\sqrt{7^2}=3-2\sqrt{21}-7=-4-2\sqrt{21}$

34. $\left(2\sqrt{3}+4\right)^2=\left(2\sqrt{3}+4\right)\left(2\sqrt{3}+4\right)=2\sqrt{3}\left(2\sqrt{3}+4\right)+4\left(2\sqrt{3}+4\right)=$
$4\sqrt{3^2}+8\sqrt{3}+8\sqrt{3}+16=4\cdot3+16\sqrt{3}+16=12+16\sqrt{3}+16=28+16\sqrt{3}$