

Simplify:

1. $x^5 \cdot x^8 = \frac{x^{13}}{x^{5+8}}$	2. $x^3 \cdot x^{-6} = \frac{1/x^3}{x^{3+(-6)} = x^{-3}}$	3. $\frac{16x^3}{2x^2} = \frac{8x}{8x^{3-2}} = 8x^1$
4. $(3x^6)^3 = \frac{27x^{18}}{3^3 x^{6 \cdot 3}}$	5. $(-2x^4)^3 = \frac{-8x^{12}}{(-2)^3 (x^4)^3 = -8x^{12}}$	6. $\sqrt{16} = \frac{4}{\sqrt{4 \cdot 4}}$
7. $\sqrt[3]{16} = \frac{2\sqrt[3]{2}}{3\sqrt[3]{4 \cdot 4} = 3\sqrt[3]{2 \cdot 2 \cdot 2} \cdot 2}$ (no calculator!!)	8. $\sqrt{48} = \frac{4\sqrt{3}}{\sqrt{16 \cdot 3} = \sqrt{16} \sqrt{3}}$ (no calculator!!)	9. $\sqrt{x^4} = \frac{x^2}{\sqrt{x^2 \cdot x^2}}$ (no calculator!!)
10. $(x^3)^{1/6} = \frac{x^{1/2}}{x^{3/6} = x^{1/2}}$ <small>index of 2 is understood</small>	11. $(x)^{4/3} = \frac{x^3 \sqrt{x}}{3\sqrt{x^4} = 3\sqrt{x \cdot x \cdot x \cdot x}}$	12. $(x)^{6/5} = \frac{x^5 \sqrt{x}}{5\sqrt{x^6} = 5\sqrt{x \cdot x \cdot x \cdot x \cdot x \cdot x}}$
13. $\left(\frac{x^5 y^3}{x^{-7} y^{-6}}\right) = \frac{x^{12} y^9}{x^{5-(-7)} y^{3-(-6)}}$	14. $\left(\frac{x^5 y^3}{x^{-7} y^{-6}}\right)^{1/3} = \frac{x^4 y^3}{(x^{5-(-7)} y^{3-(-6)})^{1/3} = (x^{12} y^9)^{1/3} = x^{12 \cdot 1/3} y^{9 \cdot 1/3}}$	15. $\left(\frac{x^5 y^3}{x^{-7} y^{-6}}\right)^0 = \frac{1}{\text{anything to the 0 power is 1}}$

index of 3 means you need a group of 3

Solve:

16. $x^4 \cdot x^a = x^{10}$ $a = \underline{6}$ $x^{4+a} = x^{10}$ $4+a=10$	17. $(2^6)^a = 2^{18}$ $a = \underline{3}$ $2^{6a} = 2^{18}$ $6a=18$
18. $x^0 = \underline{1}$ → anything to the zero power is 1!!	19. $2^5 \cdot 2^a = 2^1$ $a = \underline{-4}$ $2^{5+a} = 2^1$ $5+a=1$
20. $2^5 \cdot 2^a = 1$ $a = \underline{-5}$ $2^{5+a} = 2^0$ $5+a=0$	21. $x^a = 0$ $a = \underline{\text{any value but 0}}$ $x=0$

Simplify:

<p>22. $\sqrt{3} + 3\sqrt{3} = \underline{4\sqrt{3}}$ $\sqrt{3} + 3\sqrt{3} = (1+3)\sqrt{3}$ \neq missing coefficient is 1</p>	<p>23. $5\sqrt{2} + 8\sqrt{2} = \underline{13\sqrt{2}}$ $(5+8)\sqrt{2}$</p>
<p>24. $4\sqrt{5} - 3\sqrt{2} + \sqrt{2} = \underline{4\sqrt{5} - 2\sqrt{2}}$ $4\sqrt{5} - 3\sqrt{2} + 1\sqrt{2}$ $4\sqrt{5} + (-3+1)\sqrt{2}$</p>	<p>25. $4\sqrt{2} \cdot 3\sqrt{8} = \underline{48}$ $4 \cdot 3\sqrt{2 \cdot 8}$ $12\sqrt{16}$ $12 \cdot 4$</p>
<p>26. $-8\sqrt{3} \cdot 2\sqrt{9} = \underline{-48\sqrt{3}}$ $-8 \cdot 2\sqrt{3 \cdot 9}$ $-16\sqrt{3 \cdot 3}$ $-16 \cdot 3\sqrt{3}$</p>	<p>27. $\sqrt{50} + \sqrt{8} = \underline{7\sqrt{2}}$ $\sqrt{25} \cdot \sqrt{2} + \sqrt{4} \cdot \sqrt{2}$ $5\sqrt{2} + 2\sqrt{2}$</p>

Rules:

* Study These !! *

$x^a \cdot x^b = x^{a+b}$	$\sqrt[a]{x^b} = x^{b/a}$	$(x^a)^b = x^{ab}$
$x^0 = 1$	$\left(\frac{x^a}{x^b}\right) = x^{a-b}$	$\sqrt{90} = \sqrt{9} \cdot \sqrt{10} = 3\sqrt{10}$