Exponents

$3x^2 = 3 \cdot x \cdot x \qquad (3x)^2 = 3x \cdot 3x = 9x^2$

$(4^2)^{-1} = 4^{-2} = \frac{1}{4^2} = \frac{1}{16}$

$(w^3 y^2)^3 = w^3 y^2 \cdot w^3 y^2 \cdot w^3 y^2 = w^9 y^6$

↳ $(w^3)^3 (y^2)^3$ is quicker

$(64^{1/2})^{-\frac{1}{3}}$ work from the inside out

$= (8)^{-\frac{1}{3}} = \frac{1}{8^{1/3}} = \frac{1}{(2^3)^{1/3}} = \frac{1}{2}$

-or- $(64)^{-1/6} = (2^6)^{-1/6} = \frac{1}{\sqrt[6]{2^6}} = \frac{1}{2}$

$\sqrt{24} = 24^{1/2} = (8 \cdot 3)^{1/2} = (4 \cdot 6)^{1/2} \quad 2\sqrt{6}$

sometimes you gotta mess around some

$\sqrt{50} = (25 \cdot 2)^{1/2} = (5^2 \cdot 2)^{1/2} = 5\sqrt{2}$ sometimes not

$\sqrt{52} = \sqrt{4 \cdot 13} = 2\sqrt{13}$

↑ prime

Exponents

power up

$$\left(\frac{1}{4}\right)^{-1} \cdot 3^2 = \left(4^{-1}\right)^{-1} \cdot 9 = 4 \cdot 9 = 36$$

$$\left(\frac{1}{9}\right)^{\frac{1}{2}} \left(\frac{6}{7}\right)^2 = \frac{1}{8} \cdot \frac{8 \cdot 6}{7 \cdot 7} = \frac{12}{49}$$

distances

$$\sqrt{\left(\tfrac{1}{2}-2\right)^2 + \left(\tfrac{1}{3}-2\right)^2} = \left(\left(-\tfrac{3}{2}\right)^2 + \left(-\tfrac{5}{3}\right)^2\right)^{1/2}$$

$\frac{1}{2}$ $\frac{4}{2}$ $\frac{1}{3}$ $\frac{6}{3}$

$$\left(\frac{9}{4} + \frac{5}{9}\right)^{1/2} = \left(\left(\frac{9}{4} \cdot \frac{9}{9}\right) + \left(\frac{5}{9} \cdot \frac{4}{4}\right)\right)^{1/2} = \left(\frac{81}{36} + \frac{20}{36}\right)^{1/2}$$

$$\left(\frac{101}{36}\right)^{1/2} = \frac{\sqrt{101}}{6}$$

prime

Who picked this problem?!

$$\sqrt{\left(\tfrac{21}{4}-\tfrac{3}{4}\right)^2 + \left(\tfrac{7}{2}-\tfrac{10}{2}\right)^2} = \sqrt{\left(\tfrac{18}{4}\right)^2 + \left(-\tfrac{3}{2}\right)^2} = \left(\frac{18}{16} + \frac{9}{4} \cdot \frac{4}{4}\right)^{1/2}$$

$$\left(\frac{18+36}{16}\right)^{1/2} \sqrt{\frac{54}{16}} = \frac{\sqrt{54}}{4} = \frac{\sqrt{2 \cdot 3^3}}{4} \qquad \frac{3\sqrt{2 \cdot 3}}{4} = \frac{3\sqrt{6}}{4}$$

$\frac{54}{2} = 27$