

Evaluate: (No Calculator!!)

$$1) -4^2 = -(4 \times 4) = -16$$

$$2) 3w^0 = 3(1) = 3$$

$$3) (-3)^4 = 81$$

$$4) 36^{\frac{1}{2}} = \sqrt{36} = 6$$

$$5) (-2w^3)^0 = 1$$

$$6) -27^{\frac{1}{3}} = -\sqrt[3]{27} \text{ or } \sqrt[3]{-27} = -3$$

# Important Property!!

## Powers with Rational Exponents

When  $m$  and  $n$  are natural numbers, and  $x$  is a rational number,

$$\begin{aligned}x^{\frac{m}{n}} &= \left(x^{\frac{1}{n}}\right)^m \\ &= \left(\sqrt[n]{x}\right)^m\end{aligned}$$

and

$$\begin{aligned}x^{\frac{m}{n}} &= \left(x^m\right)^{\frac{1}{n}} \\ &= \sqrt[n]{x^m}\end{aligned}$$

Handwritten diagram illustrating the property with a numerical example:

$$8^{5/3} \rightarrow \left(\sqrt[3]{8}\right)^5 \rightarrow \sqrt[3]{8^5}$$

Below  $\left(\sqrt[3]{8}\right)^5$ , the calculation is shown:

$$2^5 = 32$$

**NO CALCULATOR...Evaluate the following:**

$$36^{\frac{1}{2}} = \sqrt{36} \\ = 6$$

$$16^{0.25} = 16^{\frac{1}{4}} \\ = \sqrt[4]{16} \\ = 2$$

$$27^{\frac{2}{3}} = \left(\sqrt[3]{27}\right)^2 \\ = (3)^2 \\ = 9$$

$$32^{\frac{6}{5}} = \left(\sqrt[5]{32}\right)^6 \\ = (2)^6 \\ = 64$$

$$125^{\frac{4}{3}} = \left(\sqrt[3]{125}\right)^4 \\ = (5)^4 \\ = 625$$

$$4^{1.5} = 4^{\frac{3}{2}} \\ = \left(\sqrt{4}\right)^3 \\ = 2^3 \\ = 8$$

$$10^{7/8} = 7.49894\dots$$

$$7 \sqrt[9]{164} \approx$$

$$10 \sqrt[4]{x} (7/8)$$

$$\boxed{\wedge}$$

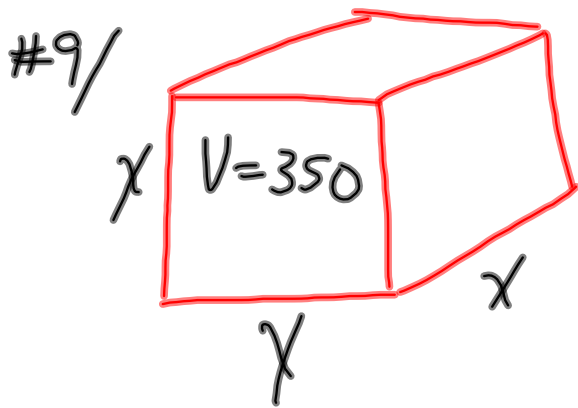
$$27^{4/5} = 13.97\dots$$

$$27^{4/3} = \underline{\underline{81}}$$

## Practice Problems...

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#8, 9, 10, 11, 12, 15, 17, 18, 20, 21, 22



$$\sqrt[3]{x^3} = \sqrt[3]{350}$$
$$x = \sqrt[3]{350}$$