**Roots and Exponents**

1. Fill in the table of powers below. Try to do as many as you can without a calculator then use a calculator to check your work.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| a. $2^{2}=$ | b. $2^{3}=$ | c. $2^{4}=$ | d. $2^{5}=$ | e. $2^{6}=$ |
| f. $3^{2}=$ | g. $3^{3}=$ | h. $3^{4}=$ | i. $3^{5}=$ |  |
| j. $4^{2}=$ | k. $4^{3}=$ | l. $4^{4}=$ |  |  |
| m. $5^{2}=$ | n. $5^{3}=$ |  |  |  |
| o. $6^{2}=$ | p. $6^{3}=$ |  |  |  |
| q. $7^{2}=$ |  |  |  |  |
| r. $8^{2}=$ |  |  |  |  |
| s. $9^{2}=$ |  |  |  |  |
| t. $10^{2}=$ | u.$ 10^{3}=$ | v.$ 10^{4}=$ | w.$ 10^{5}=$ | x.$ 10^{6}=$ |

1. You learned in the previous activity that $9^{\frac{1}{2}}$ = 3. Explain how this is related to the answer in 1f.
2. Use the table above to find values for:

a. $49^{\frac{1}{2}}$ b. $27^{\frac{1}{3}}$ c. $32^{\frac{1}{5}}$ d.$ 1000^{\frac{1}{3}}$ e. $81^{\frac{1}{4}}$

1. Write an equation with a fractional exponent related to each of these powers from the table above.

a. 1s b. 1w c. 1n d. 1c

1. Find each of these powers of 64. Then arrange them in order from smallest to largest.

a. $64^{\frac{1}{2}}$ b. $64^{\frac{1}{3}}$ c. $64^{\frac{1}{6}}$ d. $64^{–1}$ e. $64^{0}$

1. As an extra challenge, find these powers of 64.

a. $64^{\frac{2}{3}}$ b. $64^{\frac{5}{6}}$

1. Find these square roots on a calculator. (On the TI-83, press 2nd $x^{2}$ to get $\sqrt{}$.)

a.$ \sqrt{4}$ b. $\sqrt{49}$ c.$ \sqrt{100}$ d. $\sqrt{25}$

1. Rewrite each square root in question 7 using a fractional exponent. Then identify which power in the table it is related to.

a. b. c. d.

1. Find the area of each square.



 a. b.



1. Find the side of each square.



 a. b.

1. Find these cube roots on a calculator. (Press MATH and scroll down to 4 to get $\sqrt[3]{}$.)

 a. $\sqrt[3]{27}$ b. $\sqrt[3]{216}$ c. $\sqrt[3]{8}$ d. $\sqrt[3]{125}$

1. Rewrite each cube root in question 11 using a fractional exponent. Then identify which power in the table it is related to.

 a. b. c. d.

1.  Find the volume of each cube.



 a. b.

1.  Find the edge of each cube.

 a. b.

1. Find these fourth roots on a calculator. (First enter the index 4, then scroll down to 5 to get $\sqrt[x]{}$).

 a. $\sqrt[4]{81}$ b. $\sqrt[4]{16}$ c. $\sqrt[4]{256}$

1. Rewrite each fourth root in question 15 using a fractional exponent. Then identify which power in the table it is related to.

a. b. c.