Powers and Roots

Evaluate Powers and Roots of Numbers

Starter Questions

If a = 5, b = 2 , c = 4 and d = 1, evaluate the following:

a) a^b b) b^a c) b^c d) a^c e) $b^2 \times b^3$ f) $b^2 + c^2$

g) $2b^2$ h) $(2b)^2$ i) $\sqrt{c}$ k) $\sqrt[3]{a^b + b}$ l) $\sqrt[4]{c^b}$ m) $\frac{d^c}{\sqrt{c^b}}$

Harder Questions

If p = - 1, q = 2 and r = 4, evaluate the following:

a) p^2 b) p^3 c) p^{100} d) $\frac{pqr}{q^r+pr}$ e) $(p^q)^r$ f) $\sqrt[3]{p^2qr}$

Extension Question

a) Evaluate the formula: $R = \sqrt[3]{\frac{x^y}{x^2+y^2-2z}}$

given that x = 4 , y = 3 and z = -1

b) Substitute the values $a = \frac{1}{2}$, $b = \frac{2}{3}$, $d = \frac{1}{4}$ into the formula.

$$T = \frac{a^3+b^2}{d}$$

Investigate

The three numbers (3 , 4 , 5) are called a Pythagorean Triple because $3^2 + 4^2 = 5^2$

How many Pythagorean Triples can you find?

Can you solve $x^3 + y^3 = z^3$. Research this equation

Powers and Roots

Answers

Starter Questions

a) a^b = 25

b) b^a = 32

c) b^c = 16

d) a^c = 625

e) $b^2 \times b^3$ = 32

f) $b^2 + c^2$ = 20

g) $2b^2$ = 8

h) $(2b)^2$ = 16

i) $\sqrt{c}$ = 2

k) $\sqrt[3]{a^b + b}$ = 3

l) $\sqrt[4]{c^b}$ = 2

m) $\frac{d^c}{\sqrt{c^b}}$ $= \frac{1}{4}$

Harder Questions

If p = - 1, q = 2 and r = 4, evaluate the following:

a) $p^2 = 1$ = 1

b) p^3 = - 1

c) p^{100} = 1

d) $\frac{pqr}{q^r + pr}$ $= -\frac{1}{3}$

d) $(p^q)^r$ = 1

e) $\sqrt[3]{p^2 qr}$ = 2

Extension Questions

a) $R = \sqrt[3]{\frac{x^y}{x^2+y^2-2z}} = \frac{4}{3}$ $= \frac{4}{3}$

b) $a = \frac{1}{2}$, $b = \frac{2}{3}$, $d = \frac{1}{4}$

$$T = \frac{a^3+b^2}{d} = \quad = \frac{41}{18}$$

Investigation

There are an infinite number of solutions to $x^2 + y^2 = z^2$

There are no solutions to $x^3 + y^3 = z^3$.