

1. Use exponent laws to simplify each expression:

a) $3^4 \times 3^5$

f) $\frac{15a^6b^7}{3ab^4}$

i) $\frac{(a^9b^7)^2}{(a^4b)^3}$

b) $\frac{x^6}{x^2}$

g) $(3q^3)^4$

c) $(5^2)^3$

j) 15^0

d) $(ab)^5$

h) $(5x^2y^3)^2(2xy)^3$

k) -15^0

e) $(-3x^2y^7)(2xy^3)$

2. Use a factor tree to state the prime factorization of each number:

a) 54

b) 42

c) 210

3. Use the prime factorization to determine the GCF and LCM of each group of numbers:

a) 54 & 42

b) 42 & 210

c) 54, 42 & 210

4. Use the prime factorizations given to determine if each number represented is a perfect square, perfect cube, both or neither. Determine (using the prime factorization) any square root or cube root value as appropriate.

a) $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 5 \times 5 \times 5$

b) $2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 7 \times 7 \times 7 \times 7 \times 7 \times 7$

c) $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$

d) $5 \times 5 \times 5 \times 7 \times 7$

5. Determine each root:

a) $\sqrt{169x^2y^{10}}$

b) $\sqrt[3]{125x^6y^9}$

c) $\frac{\sqrt{25^{-16}}}{\sqrt[4]{81b^{12}}}$

6. A cube has volume 216 cm^3 . Determine the surface area of the cube.

7. The surface area of a cube is 864 m^2 . Determine the diagonal distance across one face of the cube.

8. Write each expression with positive exponent:

a) x^{-5}

b) $(-5)^{-3}$

c) $\frac{1}{q^{-6}}$

d) $\left(\frac{5}{4}\right)^{-4}$

e) $(3x)^{-3}$

f) $3x^{-3}$

g) a^5b^{-7}

h) $\frac{-5a^2b^{-4}c^{-1}}{2d^{-3}e^5}$

9. Simplify each expression:

a) $(x^{-3})(x^5)$

c) $\frac{5^{-4}}{5^{-7}}$

e) $(m^3)^{-2}$

g) $(2x^{-3}y^4)^{-2}$

b) $(y^5)(y^{-7})$

d) $\frac{(-3)^4}{(-3)^7}$

f) $(n^{-3})^{-4}$

h) $\left(\frac{k^8}{k^{-2}}\right)^3$

10. Simplify then evaluate each expression (no decimal answers):

a) $(0.75^2)^{-3}$

b) $[3^3 \times 3^{-5}]^2$

c) $\left[\frac{(-2)^{-10}}{(-2)^{-8}}\right]^{-3}$

11. A colony of beetles has a current population of 48,600 and triples every year.

a) Write a formula that will determine the population P after n number of years.

b) Use your formula to determine the number of beetles in 7 years.

c) Use your formula to determine the number of beetles 5 years ago