

1. Use the given prime factorization of each number to determine the requested square root or cube root. Show the product that leads to the solution. (2 marks each)

a) $1728 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$

$(2 \cdot 2 \cdot 3)(2 \cdot 2 \cdot 3)(2 \cdot 2 \cdot 3)$

$\sqrt[3]{1728} = \underline{2 \cdot 2 \cdot 3} = \underline{12}$

b) $3600 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5$

$\sqrt{3600} = \underline{2 \cdot 2 \cdot 3 \cdot 5} = \underline{60}$

2. Determine each indicated root. (1 mark each)

a) $\sqrt{64}$

8

b) $\sqrt[3]{27}$

3

c) $\sqrt{\frac{25}{49}}$

$\frac{5}{7}$

d) $\sqrt[3]{\frac{1}{8}}$

$\frac{1}{2}$

e) $\sqrt{9x^2}$

$3x$

f) $\sqrt[3]{64q^3}$

$4q$

g) $\sqrt{36y^6}$

$6y^3$

h) $\sqrt[3]{1000z^{12}}$

$10z^4$

3. Simplify each expression to a power with single positive exponent. (1 mark each)

a) 3^{-2}

$\frac{1}{3^2}$

b) x^{-3}

$\frac{1}{x^3}$

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

b^6

d) $\left(\frac{2}{5}\right)^{-5}$

$\left(\frac{5}{2}\right)^5 = \frac{5^5}{2^5}$

e) $(3z)^{-4}$

$\frac{1}{(3z)^4} = \frac{1}{3^4 z^4}$

f) $3z^{-4}$

$\frac{3}{z^4}$

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

$\frac{x^4}{y^2}$

h) $5^{-2} \times 5^6$

5^4

i) $\frac{y^{-2}}{y^{-5}}$

y^3

j) $(2^{-3})^2$

$2^{-3 \cdot 2} = 2^{-6} = \frac{1}{2^6}$

k) $(x^3 x^{-1})^2$

$(x^{3-1})^2 = (x^2)^2 = x^{2 \cdot 2} = x^4$

l) $\left(\frac{(-3)^{-6}}{(-3)^{-1}}\right)^{-1} \left((-3)^{-6-1}\right)^{-1}$
 $\frac{5^4}{(-3)^{-7 \cdot -1}} = (-3)^7$

Quiz 4.1 & 4.2 (V2)

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1. Use the given prime factorization of each number to determine the requested square root or cube root. Show the product that leads to the solution. (2 marks each)

a) $324 = 2 \times 2 \times 3 \times 3 \times 3 \times 3$

$\sqrt{324} = 2 \times 3 \times 3 = 18$

$2 \times 3 \times 3$

$2 \times 3 \times 3$

b) $3600 = 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 5 \times 5 \times 5$

$\sqrt[3]{729000} = 2 \cdot 3 \cdot 3 \cdot 5 = 90$

$2 \times 3 \times 3 \times 5$

$2 \times 3 \times 3 \times 5$

$2 \times 3 \times 3 \times 5$

2. Determine each indicated root. (1 mark each)

a) $\sqrt{81}$

9

b) $\sqrt[3]{8}$

2

c) $\sqrt{\frac{16}{49}}$

$\frac{4}{7}$

d) $\sqrt[3]{-\frac{1}{27}}$

$-\frac{1}{3}$

e) $\sqrt[2]{4z^2}$

$2z$

f) $\sqrt[3]{125x^3}$

$5x$

g) $\sqrt{64y^8}$

$8y^4$

h) $\sqrt[3]{1000q^{15}}$

$10q^5$

3. Simplify each expression to a power with single positive exponent. (1 mark each)

a) 5^{-3}

$\frac{1}{5^3}$

b) y^{-7}

$\frac{1}{y^7}$

c) $\frac{1}{a^{-4}}$

a^4

d) $\left(\frac{3}{4}\right)^{-2}$

$\left(\frac{4}{3}\right)^2$

e) $(2x)^{-5}$

$\frac{1}{(2x)^5}$

f) $-2x^{-5}$

$-\frac{2}{x^5}$

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

$\frac{y^2}{x^4}$

h) $5^2 \times 5^{-6}$

$\frac{5^2}{5^6}$

$5^{2+(-6)}$

5^{-4}

$\frac{1}{5^4}$

i) $\frac{y^{-3}}{y^{-6}}$

$y^{-3-(-6)}$

y^3

j) $(2^3)^{-2}$

2^{-6}

$\frac{1}{2^6}$

k) $(x^{-3}x^1)^{-4}$

$(x^{-3+1})^{-4}$

$(x^{-2})^{-4}$

x^8

l) $\left(\frac{(-2)^{-5}}{-2^1}\right)^{-1} \left((-2)^{-5-1}\right)^{-1}$

$((-2)^{-6})^{-1}$

$(-2)^6$