UNIT 2: POWERS AND ROOTS

Exercise 1: Work out:

a) $(-5)^{-3} =$ b) $\left(\frac{-1}{6}\right)^{-2} =$ c) $(-3)^{-1} =$

d) $3^{-5} =$ e) $\left(\frac{-2}{5}\right)^{-3} =$ f) $\left(\frac{1}{2}\right)^{-3} =$

Exercise 2: Work out:

a) $\left(x^{-7}\cdot x^{3}\right):\left(x^{-1}\cdot x^{-2}\right) =$ b) $(2^{4}\cdot 2^{-1}):(2^{-4}\cdot 2^{-5}) =$ c) $\left(w^{-5}\cdot w^{-7}\right):\left(w^{4}:w^{14}\right) =$

d) $(x^{7}\cdot x^{-9}):(x^{6}:x^{4}) =$ e) $\left(3^{-1}\cdot 3^{-3}\right):\left(3\cdot 3^{-5}\right) =$ f) $\left(x\cdot x^{-3}\right)\cdot\left(x^{-7}:x^{-9}\right):x^{-4} =$

g) $(2^{5}\cdot 2^{-7}):(2:2^{3}) =$ h) $(x^{-4}:x^{5})\cdot(x^{3})^{-2} =$ i) $(y\cdot y^{-3})^{-4}:y^{-8} =$

Exercise 3: Work out:

a) $\frac{2^{-10}\cdot 3^{17}\cdot 2^{3}\cdot 3^{-2}}{2^{4}\cdot 3^{-4}\cdot 2^{-1}\cdot 3^{10}} =$ b) $\frac{x^{5}\cdot y^{4}\cdot y\cdot x^{-2}}{x^{8}\cdot y^{7}\cdot x^{2}} =$ c) $\frac{a^{-5}\cdot b^{2}\cdot b^{-7}\cdot a^{3}}{a^{2}\cdot b\cdot a^{-4}\cdot b^{8}} =$

Exercise 4: Write the following numbers using scientific notation:

a) $3141592653589793238462643383279 50 =$
b) $0.000000027182818285 =$
c) $853.794\cdot 10^{-5} =$
d) $0.0032864\cdot 10^{7} =$
e) $42835.729\cdot 10^{4} =$
f) $4672314.25\cdot 10^{-9} =$
g) $0.00016234\cdot 10^{-7} =$
h) $345.7865\cdot 10^{4} =$

Exercise 5: Write the following numbers using scientific notation:

a) The Earth's mass: $5973600000000000000000000$ kg.
b) The mass of an electron: $0.000000000000000000000000000000911\,\text{kg}$.
c) 301000000000000000000000 molecules in a gram of hydrogen
d) The distance between Earth and Mars is $78\,339\,804.97$ km

Exercise 6: A person's hair grows at a speed of 10^{-8} m/s. If they don't cut it, what it would be its length a month later?

Exercise 7: The poliomyelitis virus has a diameter of $3.2\cdot 10^{-8}$ m. How many viruses could I place in a five kilometers distance? (and do not ask why)

Exercise 8: Work out:

a) $5.3 \cdot 10^{11} - 1.2 \cdot 10^{12} + 7.2 \cdot 10^{9} =$

b) $2.89 \cdot 10^{-5} - 3.17 \cdot 10^{-2} + 7.89 \cdot 10^{-6} =$

c) $9.25 \cdot 10^{12} - 3.14 \cdot 10^{9} + 2.71 \cdot 10^{11} =$

d) $3.74 \cdot 10^{5} + 8.3 \cdot 10^{7} - 1.63 \cdot 10^{8} =$

e) $-2.15 \cdot 10^{-3} + 4.29 \cdot 10^{-5} - 7.48 \cdot 10^{-6} =$

Exercise 9: Work out:

a) $5.12 \cdot 10^{2} - 4.37 \cdot 10^{5} + 1.83 \cdot 10^{7} =$

b) $-3.51 \cdot 10^{-2} + 7.92 \cdot 10^{-3} - 5.84 \cdot 10^{-6} =$

c) $2.51 \cdot 10^{4} - 7.43 \cdot 10^{5} - 8.31 \cdot 10^{7} =$

d) $5.84 \cdot 10^{-5} + 5.13 \cdot 10^{-3} + 7.9 \cdot 10^{-6} =$

Exercise 10: Work out:

a) $(7.35 \cdot 10^{4}) \cdot (7.15 \cdot 10^{-5}) =$

b) $(4.12 \cdot 10^{-9}) \cdot (7.35 \cdot 10^{4}) =$

c) $(4.48 \cdot 10^{3}) : (9.05 \cdot 10^{-8}) =$

d) $(3.72 \cdot 10^{-9}) : (9.4 \cdot 10^{-2}) =$

e) $(5.64 \cdot 10^{4}) : (7.95 \cdot 10^{-9}) =$

Exercise 11: Work out:

a) $(7.38 \cdot 10^{5}) \cdot (4.72 \cdot 10^{-9}) =$

b) $(3.57 \cdot 10^{3}) \cdot (5.71 \cdot 10^{-10}) =$

c) $(2.37 \cdot 10^{-5}) : (7.94 \cdot 10^{-7}) =$

d) $(3.2 \cdot 10^{5}) : (6.47 \cdot 10^{-2}) =$

e) $(4.75 \cdot 10^{-3}) \cdot (3.17 \cdot 10^{7}) =$

Exercise 12: Simplify the following roots:

a) $\sqrt{151200} =$

b) $\sqrt[7]{1024} =$

c) $\sqrt[5]{291600000} =$

d) $\sqrt[12]{\dfrac{x^{20} y^{36} z^{4}}{w^{30}}} =$

e) $\sqrt{\dfrac{7^{4}}{5^{3}}} =$

f) $\sqrt[7]{\dfrac{2^{14} \cdot 3^{21} \cdot 7^{35}}{5^{4} \cdot 11^{48}}} =$

g) $\sqrt[7]{625000} =$

h) $\sqrt[5]{\dfrac{a^{-10} \cdot b^{25}}{c^{17}}} =$

i) $\sqrt[7]{\dfrac{x^{16} \cdot y^{-39} \cdot z^{-12}}{w^{7}}} =$

Exercise 13: Work out:

a) $\sqrt{300} - 5\sqrt{27} + 7\sqrt{48} =$

b) $3\sqrt{32} - 9\sqrt{27} + 5\sqrt{243} + \sqrt{75} =$

c) $3\sqrt{27} - 9\sqrt{32} - \sqrt{75} + \sqrt{2} =$

d) $\sqrt{3} - 8\sqrt{27} + 7\sqrt{243} - \sqrt{27} + 5\sqrt{75} =$

e) $\sqrt{162} - 2\sqrt{175} + 5\sqrt{128} - \sqrt{343} =$

Exercise 14: Work out:

a) $3\sqrt{5}+3\sqrt{20}=$

b) $\sqrt{27}-3\sqrt{12}=$

c) $\sqrt{8}+4\sqrt{18}-\sqrt{50}=$

d) $\sqrt[3]{40}+2\sqrt[3]{135}-5\sqrt[3]{320}=$

Exercise 15: Work out:

a) $\sqrt{3}\cdot\sqrt[3]{3}\cdot\sqrt[4]{3}=$

b) $\dfrac{\sqrt[4]{3^5\cdot5^7}\cdot\sqrt[3]{3^2\cdot5}}{\sqrt{3\cdot5^3}}=$

c) $\dfrac{\sqrt{2^4\cdot5^3}\cdot\sqrt[5]{2\cdot3^7}}{\sqrt[3]{2^4\cdot5}}=$

d) $\dfrac{\sqrt{2^{-5}\cdot5^7}\cdot\sqrt[3]{7^2}}{\sqrt[5]{2^{-4}\cdot7^6}}=$

e) $\dfrac{\sqrt[6]{2^5\cdot7^{-3}}\cdot\sqrt[5]{7^{-4}\cdot5^3}}{\sqrt{2\cdot5^{-2}}}=$

f) $\dfrac{\sqrt[5]{3^2\cdot5^3}\cdot\sqrt[4]{7^{-3}\cdot3^5}}{\sqrt{5^4\cdot3^{15}}}=$

Exercise 16: Work out:

a) $\dfrac{\sqrt{2^3\cdot5^{-2}}\cdot\sqrt[6]{2^{-5}\cdot7^{-1}}}{\sqrt[4]{5^5\cdot7^{-4}}}=$

b) $\dfrac{\sqrt[4]{3^{-2}\cdot5^3}\cdot\sqrt[3]{7^3\cdot3^{-5}}}{\sqrt{5^4\cdot3^{-5}}}=$

c) $\dfrac{\sqrt[4]{2^{-3}\cdot3^5}\cdot\sqrt[6]{3^{-2}\cdot2^5}}{\sqrt{2^{-4}\cdot3}}=$

Exercise 17: Express as a radical:

a) $5^{2/7}=$

b) $x^{1/2}=$

c) $3^{-4/5}=$

d) $x^{-5/4}=$

e) $a^{10/7}=$

f) $y^{-9/5}=$

Exercise 18: Work out and express as a radical:

a) $3^{1/2} \cdot 3^{2/5} \cdot 3^{7/4} =$

b) $7^{2/3} \cdot 7^{-3/5} \cdot 7^{1/4} \cdot 7^{-2/3} =$

c) $\sqrt[3]{7^2} \cdot \sqrt{7^3} \cdot \sqrt[5]{7} =$

d) $\sqrt[5]{a^4} \cdot \sqrt{a} : \sqrt[3]{a^{10}} =$

e) $\dfrac{\sqrt[6]{x^5} \cdot \sqrt{x^7}}{\sqrt[9]{x^2}} =$

Exercise 19: Work out and express as a radical:

a) $b \cdot a^{7/3} \cdot b^{-2/5} \cdot a^{-1/2} =$

b) $x^{-2/5} \cdot y^{6/7} \cdot x^{1/10} \cdot y^{2/3} \cdot x^2 =$

c) $3^{2/5} \cdot 5^{3/2} \cdot 3^{5/6} \cdot 5^{1/10} =$

d) $2^{7/5} \cdot 5^{2/3} \cdot 2^{-5/4} \cdot 5^{-3/5} =$