Memo 2019-9ℰB-00005(2)

(1) Simplify and write your answer as a positive exponent:

(a) $(-3xy^{-3}k^0)^3$

$= (-3)^3 \times (x^1)^3 \times (y^{-3})^3 \times (k^0)^3$

$= -27x^3y^{-9}k^0$

$= \frac{-27x^3(1)}{y^9}$

$= \frac{-27x^3}{y^9}$

(b) $\frac{a^{3\frac{1}{2}} \times a \times a^{\frac{1}{2}}}{b^3 \times b^{-6}}$

$= \frac{a^{3\frac{1}{2} + 1 + \frac{1}{2}}}{b^{3-6}}$

$= \frac{a^5}{b^{-3}}$

$= a^5b^3$

(c) $3^{x+2y} \cdot 9^{-y}$

$= 3^{x+2y} \cdot (3^2)^{-y}$

$= 3^{x+2y} \cdot 3^{-2y}$

$= 3^{x+2y-2y}$

$= 3^x$

(d) $\sqrt{9m^6 + 16m^6}$

$= \sqrt{25m^6}$

$= \sqrt{25} \times \sqrt[2]{m^6}$

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

$= 5m^3$

(2) Simplify and write your answer as a positive exponent:

(a) $\frac{5^0 \times m^{12} \times n^4 \times n^{-2}}{m^5 \times m \times n^6}$

$= \frac{1 \times m^{12} \times n^{4-2}}{m^{5+1} \times n^6}$

$= \frac{m^{12} \times n^2}{m^6 \times n^6}$

$= m^{12-6} \times n^{2-6}$

$= m^6 \times n^{-4}$

$= \frac{m^6}{n^4}$

(b) $\frac{(5^3)^2 \times (5 \times 7)^3}{(7^2 \times 5^{-4})^{-1}}$

$= \frac{5^6 \times 5^3 \times 7^3}{7^{-2} \times 5^4}$

$= \frac{5^9 \times 7^3}{7^{-2} \times 5^4}$

$= 5^{9-4} \times 7^{3-(-2)}$

$= 5^5 \times 7^{3+2}$

$= 5^5 \times 7^5$

(3) (a) Write in scientific notation: (b) Write as a number:

Without a calculator.

(i) $4\,320 = 4,32 \times 10^3$ (i) $1,1 \times 10^6 = 1\,100\,000$

(ii) $0,03166 = 3,166 \times 10^{-2}$ (ii) $5,08 \times 10^{-1} = 0,508$

(4) Simplify without using a calculator and write the answer in scientific notation:

(i) $(3,5 \times 10^{-5}) \div (7,0 \times 10^2)$

$= (3,5 \div 7,0) \times (10^{-5} \div 10^2)$

$= \left(\frac{3,5}{7,0}\right) \times (10^{-5\,-\,2})$

$= \frac{3,5^{\,1}}{7,0^{\,2}} \times (10^{-7})$

$= \frac{1}{2} \times 10^{-7}$

$= 0,5 \times 10^{-7}$

$= (5,0 \times 10^{-1}) \times 10^{-7}$

$= 5,0 \times 10^{-8}$

(ii) $(4,6 \times 10^3) + (3,2 \times 10^2)$

$= (4,6 \times 10^1 \times 10^2) + (3,2 \times 10^2)$

$= 10^2(4,6 \times 10^1 + 3,2)$

$= 10^2(46 + 3,2)$

$= 10^2(49,2)$

$= 49,2 \times 10^2$

$= 4,92 \times 10^1 \times 10^2$

$= 4,92 \times 10^3$

or $(4,6 \times 10^3) + (3,2 \times 10^2)$

$= 4\,600 + 320$

$= 4\,920$

$= 4,92 \times 10^3$

(5) Solve for $x$:

(a) $2^x = 8$

$2^x = 2^3$

EB $\Leftrightarrow$ EE

$\therefore x = 3$

(b) $5^x = 1$

$5^x = 5^0$

EB $\Leftrightarrow$ EE

$\therefore x = 0$

(c) $8^x = \frac{1}{16}$

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

$2^{3x} = 2^{-4}$

EB $\Leftrightarrow$ EE

$\therefore 3x = -4$

$\therefore x = \frac{-4}{3}$

(d) $x^4 = 81$

$x^4 = 3^4$

EE $\Leftrightarrow$ EB

$\therefore x = \pm 3$

$\rightarrow (+3)^4 = (+3)(+3)(+3)(+3) = +81$

$\rightarrow (-3)^4 = (-3)(-3)(-3)(-3) = +81$