Maths Assignment 12, Std VII

Laws of Exponents

Law 1 : $a^m \times a^n = a^{m+n}$

eg $2^3 \times 2^4 = 2^{3+4} = 2^7$

Law 2 : $a^m \div a^n = a^{m-n}$; $m > n$

or $\frac{a^m}{a^n} = a^{m-n} \Rightarrow$ eg $\frac{3^4}{3^2} = 3^{4-2} = 3^2$

Law 3 : $(a^m)^n = a^{m \times n}$

eg $(2^3)^4 = 2^{3 \times 4} = 2^{12}$

Law 4 : $a^0 = 1$

eg $7^0 = 1$

Law 5 : $a^n \times b^n = (ab)^n$

eg $4^5 \times 7^5 = (4 \times 7)^5 = 28^5$

Law 6 : $a^n \div b^n = \left(\frac{a}{b}\right)^n$

or $\frac{a^n}{b^n} = \left(\frac{a}{b}\right)^n$

eg $\frac{2^3}{5^3} = \left(\frac{2}{5}\right)^3$

Law 7 : $a^{-n} = \frac{1}{a^n}$

eg $2^{-3} = \frac{1}{2^3}$

$4^{-1} = \frac{1}{4^1} = \frac{1}{4}$

Example 1 : Simplify and write in the exponential form:

(i) $4^3 \times 4^5$

$= 4^{3+5}$ $\quad (a^m \times a^n = a^{m+n})$

$= 4^8$

(ii) $(-4)^{100} \times (-4)^{20}$

$= (-4)^{100+20}$ $\quad (a^m \times a^n = a^{m+n})$

$= (-4)^{120}$

(iii) $9^{11} \div 9^7$

$= 9^{11-7}$ $\quad (a^m \div a^n = a^{m-n})$

$= 9^2$

(iv) $(-p)^5 \div (-p)^2$

$= (-p)^{5-2}$ $\quad (a^m \div a^n = a^{m-n})$

$= (-p)^3$

(v) $2^3 \times 2^4 \times 2^5$

$= 2^{3+4+5}$ $\quad (a^m \times a^n \times a^p = a^{m+n+p})$

$= 2^{12}$

(vi) $(6^2)^4$

$= 6^{2\times 4}$ $\quad \{(a^m)^n = a^{m\times n}\}$

$= 6^8$

vii) $\left[\left(-\frac{4}{5}\right)^2\right]^3$

$= \left(-\frac{4}{5}\right)^{2\times 3}$ $\quad \{(a^m)^n = a^{m\times n}\}$

$= \left(-\frac{4}{5}\right)^6$

Maths Worksheet 12, Std VII

Q-1 Simplify and write in exponential form

i) $2^7 \times 2^4$

ii) $(-5)^9 \times (-5)^3$

iii) $x^4 \times x^3$

iv) $7^5 \div 7^3$

v) $(-8)^{13} \div (-8)^9$

vi) $3^4 \times 3^5 \times 3^2$

vii) $(5^3)^4$

viii) $\left[\left(\frac{-5}{9}\right)^2\right]^4$