Chapter 12: Exponents and Powers

Question 1

Evaluate

1. 2^{-2}
2. $(-2)^{-2}$
3. $(3/2)^{-5}$

Answer

As we know that

$b^{-n} = 1/b^n$

(i) $2^{-2} = 1/2^2 = 1/4$

(ii) $(-2)^{-2} = 1/(-2)^2 = 1/4$

(iii) $(3/2)^{-5} = 3^{-5}/2^{-5} = 2^5/3^5 = 32/243$

Question 2

Simplify and express the result in power notation with positive exponent.

(i) $(-2)^5 \div (-2)^4$

(ii) $(1/2)^2 \times (2/5)^2$

(iii) $(-5)^2 \times (3/5)$

Answer

(i) $(-2)^5 \div (-2)^4$

$= (-2)^5 / (-2)^4$

$= (-2)^{5-4}$

$= -2$

(ii) $(1/2)^2 \times (2/5)^2$

$= (1/4) \times (4/25)$

$= 1/25$

iii) $(-5)^2 \times (3/5)$

$= 25 \times (3/5) = 15$

Question 3

Find the value of.

1. $(4^0 + 4^{-1}) \times 2^2$
2. $(3^{-1} \times 9^{-1}) \div 3^{-2}$
3. $(11^{-1} + 12^{-1} + 13^{-1})^0$

Answer

1. $(4^0 + 4^{-1}) \times 2^2 = (1+1/4) \times 4$

   $= 4+1=5$

2. $(3^{-1} \times 9^{-1}) \div 3^{-2} = [(1/3) \times (1/9)] \div (1/9)$

   $=1/3$

3. $(11^{-1} + 12^{-1} + 13^{-1})^0$

   $=1$ as $a^0 =1$

Question 4

Find the value of x here

$(11/9)^3 \ \times \ (9/11)^6 = (11/9)^{2x-1}$

Answer

$(11/9)^3 \ \times (11/9)^{-6} = (11/9)^{2x-1}$

$(11/9)^{3-6} = (11/9)^{2x-1}$

$-3=2x-1$

Or

$x=-1$

Question 5

Find the value of m for which $2^m \div 2^{-4} = 4^5$

Answer

$2^m \div 2^{-4} = 4^5$

$2^m \times (1/2^{-4}) = 2^{10}$

$2^{m+4} = 2^{10}$

So $m+4=10$

$m=6$

Question 6

Express the following numbers in standard form.

(i) 0.0000000015 (ii) 0.00000001425

(iii) 102000000000000000

Answer

1. $0.0000000015 = 1.5 \times 10^{-9}$

2. 0.00000001425

   $= 1.425 \times 10^{-8}$

3. 102000000000000000

$= 1.02 \times 10^{17}$

Question 7

Express the following numbers in usual form.

(i) 34.02 x 10^{-5} (ii) 9.5 x 10^5

(iii) 9 x 10^{-4} (iv) 2.0001 x 10^8

Answer

1. $34.02 \times 10^{-5} = .0003402$

2. 9.5×10^5

   $= 950000$

3. 9×10^{-4}

   $= .0009$

4. 2.0001×10^8

$= 200010000$