Worksheet

1. Choose the correct option.

   a. $(-1)^{101}$ = _____ .

   i. 1 ii. –1 iii. 101 iv. –101

   b. $\left(\frac{2}{5}\right)^{-2}$ = _____ .

   i. $\frac{-4}{25}$ ii. $\frac{25}{4}$ iii. $\frac{4}{25}$ iv. $\frac{-25}{4}$

   c. $1^0 + 2^0 + 3^0 + 4^0$ = _____ .

   i. 10 ii. 0 iii. 4 iv. 1

   d. If $(2^{-3x})^2 = 4^3$, then x = _____ .

   i. – 1 ii. 1 iii. $\frac{-1}{2}$ iv. $\frac{1}{2}$

   e. $(3^{-a} \times 3^a)^{-1}$ = _____ .

   i. 1 ii. $\frac{1}{2}$ iii. 0 iv. $\frac{1}{3}$

2. Fill in the blanks.

   a. The reciprocal of $\left(\frac{2}{3}\right)^{-4}$ is _____ .

   b. If $648 = 2^m \times 3^n$, then m = _____, and n = _____ .

   c. $(3^0 + 4^0)(3^0 - 4^0)$ = _____ .

   d. $\left[\left(\frac{1}{2}\right)^{-4}\right]^0$ = _____ .

   e. If $(a^2)^{-4} = \frac{1}{256}$, then a = _____ .

3. Express the following in the exponential form:

   a. $\frac{a}{3} \times \frac{a}{3} \times \frac{a}{3} \times \frac{a}{3} \times \frac{b}{4} \times \frac{b}{4} \times \frac{b}{4} \times \frac{b}{4}$

   b. $\frac{4}{9} \times \frac{4}{9} \times \frac{4}{9} \times \frac{4}{9} \times \frac{4}{9} \times \frac{4}{9} \times \frac{4}{9}$

   c. $(-5) \times (-5) \times (-5) \times (-5) \times (-5) \times (-5) \times (-5) \times (-5) \times (-5)$

   d. $ab \times ab \times ab \times ab \times ab \times ab$

4. Simplify:

   a. $\frac{\left(x^2 \times y^3\right)^2}{xy}$

   b. $\frac{\left[(-2)^3 \times 5^3\right]^3}{(-10)^6}$

   c. $\left(\frac{1}{2^3} \times 2^5\right)^4$

   d. $\left(a^{-13} \times \frac{1}{a^{13}}\right)^{-1}$

5. Evaluate:

a. $\dfrac{\left(3^2\right)^{-3} \times 2^3}{2^2 \times \left(3^{-2}\right)^{-3}}$

b. $\dfrac{2^0 \times \left(3^2\right)^0 - \left(3^0\right)^2 + \left(3^{-2}\right)^3}{\left(3^3 \div 3^3\right) \times 2^{-2}}$

6. Find the value of the following:

a. $(10^2 - 10^0) \times 10^2$

b. $(5^{-6} \times 5^6)^4$

c. $(17^0 - 7^0) \times 10^0$

d. $\left((7)^{-3}\right)^0$

7. Simplify:

a. $\left(\dfrac{9a^2}{10}\right)^{-4} \div \left(\dfrac{3a}{10}\right)^{-8}$

b. $\left(\dfrac{-3}{7b^3}\right)^3 \div \left(\dfrac{-9}{21b^3}\right)^{-2}$

8. Simplify and then find the reciprocal of the following.

a. $\left(\dfrac{8}{9}\right)^4 \div \left(\dfrac{4}{3}\right)^{-6}$

b. $\left(\dfrac{5}{7}\right)^6 \times \left(\dfrac{10}{14}\right)^{-3}$

9. By what number should $\left(\dfrac{7}{15}\right)^{-3}$ must be multiplied to get $\left(\dfrac{5}{14}\right)^3$?

10. If $x = \left[\left(\dfrac{4}{9}\right)^3\right]^{-3} \times \left[\left(\dfrac{2}{9}\right)^2\right]^3 \times \left(\dfrac{1}{9}\right)^{-3}$, then find (x^{-1}).

11. Simplify and express the answer in positive exponents only:

$$\frac{\left(\dfrac{11}{15}\right)^6 \times \left(\dfrac{11}{15}\right)^{-11}}{\left(\dfrac{11}{15}\right)^4}$$

12. Simplify: $\left(\dfrac{-4}{5}\right)^3 \div \left(\dfrac{-2}{30}\right)^3 \times \left(\dfrac{1}{2}\right)^3$

13. If $n = -1$, then find the value of $\left(\dfrac{4^n}{12^n}\right)^{-4}$.

14. Simplify and find the value of $\dfrac{4^3 x^{-7} y^4}{x^{10} y^6} \times \dfrac{x^4 y^{11}}{6^3 x^2 y^{-6}} \div \left(\dfrac{2y}{3x^2}\right)^{-2}$ when $x = -1$ and $y = 1$.

15. Simplify and write the following in exponential form:

a. $\dfrac{3^5 \times 6^{-2}}{9 \times 12^2}$

b. $\dfrac{(-3)^2 \times 4^{-3} \times 15}{225 \times 3^3 \times 4^{-2}}$

c. $\left[\left(3^3 \div 3^2\right)\right] \times \left[\left(5^2\right)^{-3} \times 12^2\right]$

d. $2^0 \times (4^2)^5 - (4^2)^0 + (3^2)^3$

Answers to Worksheet

1. a. ii b. ii c. iii d. i e. i

2. a. $\left(\frac{3}{2}\right)^{-4}$ b. 3, 4 c. 0 d. 1 e. 2

3. a. $\left(\frac{ab}{12}\right)^{4}$ b. $\left(\frac{4}{9}\right)^{7}$ c. $(-5)^{9}$ d. $(ab)^{6}$

4. a. x^3y^5 b. $(-10)^3$ c. 2^8 d. a^{26}

5. a. $\frac{2}{3^{12}}$ b. $\frac{2^2}{3^6}$

6. a. 9900 b. 1 c. 0 d. 1

7. a. 10^{-4} b. $\left(\frac{-3}{7b^3}\right)^{5}$

8. a. $\frac{2^{24}}{3^{14}}, \frac{3^{14}}{2^{24}}$ b. $\left(\frac{5}{7}\right)^{3}, \left(\frac{7}{5}\right)^{3}$

9. $\left(\frac{1}{6}\right)^{3}$

10. $\left(\frac{2}{3}\right)^{12}$

11. $\left(\frac{15}{11}\right)^{9}$

12. 6^3

13. $\frac{1}{81}$

14. $\frac{-32}{243}$

15. a. $2^{-6} \times 3^{-1}$ b. $\frac{1}{2^2 \times 3^2 \times 5}$ c. $\frac{2^4 \times 3^3}{5^6}$ d. $4^{10} + 3^6 - 1$