## Exponents and Powers

1. Find the value of $9^3$.

2. $9^3$ can be written as $9 \times 9 \times 9$. But it can also be written as: $a \times a \times a \times a \times a \times a$. Find the value of $a$.

3. Work out the values of: $1^3, (-1)^4, (-1)^5$. Can you fill in the blanks?
   a) $1^{any\ number} = $ ___
   b) $(-1)^{odd\ number} = $ ___
   c) $(-1)^{even\ number} = $ ___

4. Express the following in exponential form:
   a) $5 \times 5 \times 7 \times 7 \times 7$
   b) $2 \times 2 \times a \times a$

5. Express the following numbers using exponential notation:
   a) 343
   b) 3125

6. Identify the greater number:
   a) $5^3\ or\ 3^5$
   b) $2^8\ or\ 8^2$
   c) $100^2\ or\ 2^{100}$
   d) $9 \times 10^{16}\ or\ 3 \times 10^{17}$

7. Express the following numbers as a product of powers of their prime factors:
   a) 405
   b) 3600

8. Simplify:
   a) $3^2 \times 10^4$
   b) $-3 \times (-2)^3$
   c) $(-3)^2 \times (-10)^3$

## Laws of Exponents

Take different values of $a, b, m$ and $n$ to verify if the following statements (9 to 12) are true.

9. $a^m \times a^n = a^{m+n}$

10. $a^m \div a^n = a^{m-n}$

11. $(a^m)^n = a^{mn}$

12. $a^m \times b^m = (ab)^m$

13. Can you suggest a reason why $a^0 = 1$?

14. Can you prove that $a^{-m} = \frac{1}{a^m}$?