2. Multiplication and Division of Integers

- **Multiplication of integers**

  Rules for the product of integers:

    (i)The product of two positive integers is always positive.

    (ii) The product of one positive integer and one negative integer is always negative.

    For example, $5 \times (–9) = – (5 \times 9) = –45$

    (iii) The product of two negative integers is always positive.
    (iv) If the number of negative integers in a product is even, then the product is a positive integer. If the number of negative integers in a product is odd, then the product is a negative integer.

    For example, $(–1) \times (–2) \times (–3) = –6$, $(–7) \times (–2) = 14$ etc.

- **Division of integers**
    - To divide a positive integer by a negative integer or a negative integer by a positive integer, the division is carried out as in whole numbers and then a negative sign (–) is put before the quotient.

For example, $(12) \div (–4) = (–12) \div 4 = –3$

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    - When a negative integer is divided by another negative integer or a positive integer is divided by another positive integer, a positive quotient is obtained.

For example, $(–6) \div (–3) = 6 \div 3 = 2$

Properties of Division

Property 1: If a and b are two integers, then $a \div b$ might not be an integer.

Property 2: If a is an integer and $a \neq 0$, then $a \div a = 1$.

Property 3: If a is an integer and $a \neq 0$, then $a \div 1 = a$

Property 4: If a is an integer and $a \neq 0$, then $0 \div a = 0$

Property 5: If a is a non-zero integer, then $a \div 0$ is not defined.

Property 6: If a, b and c are non-zero integers, then
$(a \div b) \div c \neq a \div (b \div c)$ except when $c = 1$
Note: when $c = 1$, $(a \div b) \div c = a \div (b \div c)$

Property 7: If a, b and c are integers, such that
(i) $a > b$ and c is positive, then $(a \div c) > (b \div c)$