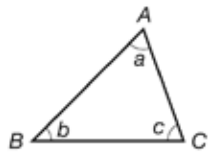
Useful Knowledge and Formulas

Chapter 5 Introduction to Geometry

In ΔABC, $a + b + c = 180°$.

(Reference: $\angle$ *sum of* Δ)



Chapter 7 Percentages (I)

1. $$\text{Percentage change} = \frac{\text{New value} - \text{Original value}}{\text{Original value}} \times 100\%$$
2. (a) New value = Original value × (1 + Percentage increase)
   (b) New value = Original value × (1 − Percentage decrease)
3. Profit and loss
   $$\text{Percentage change} = \frac{\text{Selling price} - \text{Cost price}}{\text{Cost price}} \times 100\%$$
   If the percentage change > 0, then there is a profit.
   If the percentage change < 0, then there is a loss.
4. Selling price = Cost price × (1 + Profit percentage)
   or
   = Cost price × (1 − Loss percentage)
5. $$\text{Discount percentage} = \frac{\text{Marked price} - \text{Selling price}}{\text{Marked price}} \times 100\%$$
6. Selling price = Marked price × (1 − Discount percentage)

Chapter 9 Areas and Volumes (I)

1. Volume of a prism = Base area × Height
2. Total surface area of a prism = Areas of all lateral faces + Base area × 2

Chapter 1
Basic Mathematics

Warm Up Zone

1. (a) Simplify each of the following by dividing both numerator and denominator by the same number.

(i) $\frac{312}{507}$

(ii) $\frac{143}{1375}$

(iii) $\frac{247}{299}$

(b) Simplify each of the following by expressing the numerator and denominator as a product of prime factors.

(i) $\frac{1155}{8645}$

6. Consider the natural numbers A, B, C, D, E, F and G.

(a) It is given that the number of factors of A is 5, and the three smallest factors of A are 1, 3 and 9. What is A?

(b) B is a factor of C. What is the H.C.F. of B and C?

(c) D is a multiple of E. What is the L.C.M. of D and E?

(d) The largest factor of F is 15 and the third multiple of G is 81. What is the L.C.M. of F and G?

7. ♥ 201 7♥3 is a 7-digit number. If the number is divided by 12, the remainder is 11. Find the product of all the possible values of ♥.

8. When subtracting $\frac{3}{5}$ from a fraction, the numerator is twice the denominator. After adding the original fraction to $\frac{2}{5}$, which multiple of the denominator is the numerator?

Elite Zone

Level Up Questions

1. Calculate the following expressions.

(a) $0.\dot{9}0\dot{9} - 0.\dot{3} \times 2 - 0.0\dot{1}\dot{2}$ (Leave the answer in fraction form.)

(b) $0.\dot{1}\dot{2} \times 2 + 0.\dot{1} \times 3 - 0.\dot{2} \times 2$ (Express the answer as recurring decimal.)

(c) $1.1 \times 1.1 + 2.2 \times 2.2 + 3.3 \times 3.3 + 4.4 \times 4.4$

(d) $6 \times 5^3 \div 2 \times 5^3$

(e) $6 \times 5^3 \div (2 \times 5^3)$

6. There are 102 boys and 289 girls sitting in a classroom. The students are divided into groups such that each group has the same number of boys and the same number of girls.

   (a) Find the largest possible number of groups. Try Elite Zone Q.12

   (b) Hence, find the number of students in each group.

7. If the H.C.F. and L.C.M. of $2^5 \times 3^4 \times 7^4 \times 97^3$, $2^3 \times 3^5 \times 7^4$ and ☆ are $2^2 \times 3^3 \times 7^4$ and $2^5 \times 3^5 \times 7^6 \times 97^3$ respectively, find all the possible value(s) of ☆. (Leave the answer(s) in index notation.)

Special Scenario

8. When a four-digit number is divided by 4, the remainder is 2. When it is divided by 9, the remainder is 7. Find the largest possible value of the four-digit number.

Special Scenario

10. In each of the following, find the values of the letters and symbols. (Each letter/symbol represents different values.)

(a)

$$\begin{array}{cccccccc} & K & \odot & \bigstar & S & I & R \\ \times & & & & & & R \\ \hline & \checkmark & \checkmark & \checkmark & \checkmark & \checkmark & \checkmark \end{array}$$

(b)

$$\begin{array}{cccccc} & & & M & \odot & D \\ \times & & & & A & D \\ \hline & & Y & U & M & \\ + & & L & Y & R & A \\ \hline & L & L & A & M & A \end{array}$$

Challenging Questions

11. The buses of three bus routes leave the bus terminus at time intervals of 12-minutes, 24-minutes and 32-minutes respectively. If the first departure time of each of the three bus routes is 7:12 a.m., how many times will the buses of the three bus routes leave the bus terminus together before 10:09 p.m.?

12. There are 72 pencils, 89 erasers, 136 pens in a shop. The shopkeeper, Heron, wants to share the stationeries among a group of children so that each child gets the same number of each kind of stationery. If there are 12 pencils, 16 pens and 14 erasers left, find

    (a) the maximum number of children in the group,

    (b) the least number of stationeries that each child gets.