

Chapter # 1

Real Numbers

Exercise # 1.3

Question # 1: The sum of three consecutive integers is forty-two, find the three integers.

Let, three consecutive integers are: $x, x + 1, x + 2$

According to question:

$$x + x + 1 + x + 2 = 42$$

$$3x + 3 = 42$$

$$3x = 42 - 3$$

$$3x = 39$$

$$x = \frac{39}{3}$$

$$x = 13$$

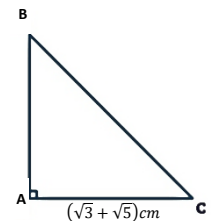
Also,

$$x + 1 = 13 + 1 = 14$$

$$x + 2 = 13 + 2 = 15$$

$$13, 14, 15 \quad (\text{Answer})$$

Question # 2: The diagram shows right angled ΔABC in which the length of \overline{AC} is $(\sqrt{3} + \sqrt{5})\text{cm}$. The area of ΔABC is $(1 + \sqrt{15})\text{cm}^2$. Find the length of \overline{AB} in the form of $(a\sqrt{3} + b\sqrt{5})\text{cm}$, where a and b are integers.



$$\overline{AC} = (\sqrt{3} + \sqrt{5})\text{cm}$$

$$\text{Area} = (1 + \sqrt{15})\text{cm}^2$$

$$\overline{AB} = ?$$

$$\text{Area} = \frac{\overline{AB} \times \overline{AC}}{2}$$

$$(1 + \sqrt{15}) = \frac{\overline{AB} \times (\sqrt{3} + \sqrt{5})}{2}$$

$$\overline{AB} = \frac{2(1 + \sqrt{15})}{(\sqrt{3} + \sqrt{5})}$$

$$\overline{AB} = \frac{2(1 + \sqrt{15})}{(\sqrt{3} + \sqrt{5})} \times \frac{(\sqrt{3} - \sqrt{5})}{(\sqrt{3} - \sqrt{5})}$$

$$= \frac{2(\sqrt{3} - \sqrt{5} + \sqrt{15} \times 3 - \sqrt{15} \times 5)}{(\sqrt{3})^2 - (\sqrt{5})^2} \quad \because a^2 - b^2 = (a + b)(a - b)$$

$$= \frac{2(\sqrt{3} - \sqrt{5} + \sqrt{45} - \sqrt{75})}{3 - 5}$$

$$= \frac{2(\sqrt{3} - \sqrt{5} + \sqrt{9 \times 3} - \sqrt{25 \times 3})}{-2}$$

$$= -(\sqrt{3} - \sqrt{5} + 3\sqrt{3} - 5\sqrt{3})$$

$$= -\sqrt{3} + \sqrt{5} - 3\sqrt{3} + 5\sqrt{3}$$

$$\overline{AB} = 4\sqrt{3} - 2\sqrt{5}$$

(Answer)

Question # 3: A rectangle has sides of length $2 + \sqrt{18} m$ and $\left(5 - \frac{4}{\sqrt{2}}\right) m$. Express the area of rectangle in the form $a + b\sqrt{2}$, where a and b are integers.

$$\begin{aligned}
 \text{length} = l &= 2 + \sqrt{18} m \\
 &= 2 + \sqrt{9 \times 2} m \\
 &= 2 + 3\sqrt{2} m \\
 \text{breadth} = b &= 5 - \frac{4}{\sqrt{2}} m \\
 &= 5 - \frac{2 \times 2}{\sqrt{2}} m \\
 &= 5 - \frac{2\sqrt{2} \times \sqrt{2}}{\sqrt{2}} m \quad \because 2 = \sqrt{2} \times \sqrt{2} \\
 &= 5 - 2\sqrt{2} m \\
 \text{Area of rectangle} &= l \times b \\
 &= (2 + 3\sqrt{2}) \times (5 - 2\sqrt{2}) \\
 &= 2(5 - 2\sqrt{2}) + 3\sqrt{2}(5 - 2\sqrt{2}) \\
 &= 10 - 4\sqrt{2} + 15\sqrt{2} - 6(\sqrt{2})^2 \\
 &= 10 + 11\sqrt{2} - (6 \times 2) \\
 &= 10 + 11\sqrt{2} - 12 \\
 \text{Area} &= (11\sqrt{2} - 2)m^2 \quad \text{(Answer)}
 \end{aligned}$$

Question # 4: Find two numbers whose sum is 68 and difference is 22.

Let, two numbers are: x, y

According to question:

$$\begin{aligned}
 x + y &= 68 \quad \text{--- (A)} & x - y &= 22 \\
 22 + y + y &= 68 & x &= 22 + y \quad \text{--- (B)} \\
 2y &= 68 - 22 & & \text{put in equation (A)} \\
 2y &= 46 \\
 y &= \frac{46}{2} \\
 y &= 23 \\
 \text{put in equation (B)} & & & \\
 \text{using equation (B),} & & & \\
 x &= 22 + 23 \\
 x &= 45 \\
 23, 45 & \quad \text{(Answer)}
 \end{aligned}$$

Question # 5: The weather in Lahore was usually warm during the summer of 2024. The TV news reported temperature as high as 48°C . By using the formula, $(^\circ\text{F} = \frac{9}{5}^\circ\text{C} + 32)$ find the temperature as Fahrenheit scale.

Temperature in $^\circ\text{C} = 48^\circ\text{C}$

$$\begin{aligned}
 \therefore ^\circ\text{F} &= \frac{9}{5}^\circ\text{C} + 32 \\
 &= \frac{9}{5} \times 48 + 32 \\
 &= 86.4 + 32 \\
 ^\circ\text{F} &= 118.4^\circ \quad \text{(Answer)}
 \end{aligned}$$

Question # 6: The sum of the ages of the father and son is 72 years. Six years ago, the father's age was 2 times the age of the son. What was son's age six years ago?

Let,

age of son = x and age of father = y

According to question,

$$x + y = 72 \text{ _____ (A)}$$

Before '6' years ago the ages of both were:

$$2(x - 6) = y - 6$$

$$2x - 12 = y - 6$$

$$2x - 12 + 6 = y$$

$$2x - 6 = y$$

put the value of 'y' in equation (A)

$$x + 2x - 6 = 72$$

$$3x = 72 + 6$$

$$3x = 78$$

$$x = \frac{78}{3}$$

$$x = 26 \text{ years}$$

Before six years ago,

$$\text{Age of son} = 26 - 6 = 20 \text{ years}$$

(Answer)

Question # 7: Mirha bought a toy for Rs. 1500 and sold for Rs. 1520. What was her profit percentage?

$$CP = 1500 \text{ Rs}$$

$$SP = 1520 \text{ Rs}$$

$$Profit = SP - CP$$

$$= 1520 - 1500$$

$$= 20 \text{ Rs}$$

$$\% \text{ Profit} = \frac{Profit}{CP} \times 100\%$$

$$= \frac{20}{1500} \times 100\%$$

$$= 0.0133 \times 100\%$$

$$= 1.33\% \quad (\text{Answer})$$

Question # 8: The annual income of Tayyab is Rs. 9,60,000 while the exempted amount is Rs. 1,30,000. How much tax would he have to pay at the rate of 0.75%?

$$\text{Annual Income} = 9,60,000 \text{ Rs}$$

$$\text{Exempted Amount} = 1,30,000 \text{ Rs}$$

$$\text{Taxable Income} = 9,60,000 - 1,30,000$$

$$= 8,30,000 \text{ Rs}$$

$$\text{Tax rate} = 0.075\%$$

$$\text{Tax amount} = 0.075\% \times 8,30,000$$

$$= \frac{0.075}{100} \times 8,30,000$$

$$= 6225 \text{ Rs} \quad (\text{Answer})$$

Question # 9: Find the compound markup on Rs. 3,75,000 for one year at the rate of 14% compounded annually.

$$\text{Principal Amount} = 3,75,000 \text{ Rs}$$

$$\text{Time} = 1 \text{ year}$$

$$\text{Rate} = 14\%$$

$$\text{Compound Markup} = ?$$

$$\begin{aligned} \text{Profit/Compound Markup} &= \frac{\text{Principal Amount} \times \text{time} \times \text{rate}}{100} \\ &= \frac{3,75,000 \times 1 \times 14}{100} \\ &= 52500 \text{ Rs} \quad (\text{Answer}) \end{aligned}$$