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:

$$x + x + 1 + x + 2 = 42$$
$$3x + 3 = 42$$
$$3x = 42 - 3$$
$$3x = 39$$
$$x = \frac{39}{3}$$
$$x = 13$$

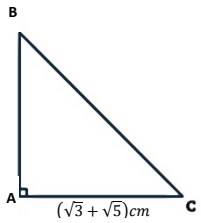
Also,

$x + 1 = 13 + 1 = 14$

$x + 2 = 13 + 2 = 15$

13,14,15 (Answer)

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



$$\overline{AC} = (\sqrt{3}+\sqrt{5})cm$$
$$Area = (1+\sqrt{15})cm^2$$
$$\overline{AB} = ?$$
$$Area = \frac{\overline{AB}\times\overline{AC}}{2}$$
$$(1+\sqrt{15}) = \frac{\overline{AB}\times(\sqrt{3}+\sqrt{5})}{2}$$
$$\overline{AB} = \frac{2(1+\sqrt{15})}{(\sqrt{3}+\sqrt{5})}$$
$$\overline{AB} = \frac{2(1+\sqrt{15})}{(\sqrt{3}+\sqrt{5})}\times\frac{(\sqrt{3}-\sqrt{5})}{(\sqrt{3}-\sqrt{5})}$$
$$= \frac{2(\sqrt{3}-\sqrt{5}+\sqrt{15\times3}-\sqrt{15\times5})}{(\sqrt{3})^2-(\sqrt{5})^2} \quad \because a^2-b^2=(a+b)(a-b)$$
$$= \frac{2(\sqrt{3}-\sqrt{5}+\sqrt{45}-\sqrt{75})}{3-5}$$
$$= \frac{\cancel{2}(\sqrt{3}-\sqrt{5}+\sqrt{9\times3}-\sqrt{25\times3})}{-\cancel{2}}$$
$$= -(\sqrt{3}-\sqrt{5}+3\sqrt{3}-5\sqrt{3})$$
$$= -\sqrt{3}+\sqrt{5}-3\sqrt{3}+5\sqrt{3}$$
$$\overline{AB} = 4\sqrt{3}-2\sqrt{5}$$

(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.

$$length = l = 2+\sqrt{18}\,m$$
$$l = 2+\sqrt{9\times 2}\,m$$
$$l = 2+3\sqrt{2}\,m$$
$$breadth = b = 5-\frac{4}{\sqrt{2}}\,m$$
$$b = 5-\frac{2\times 2}{\sqrt{2}}\,m \quad \because 2=\sqrt{2}\times\sqrt{2}$$
$$b = 5-\frac{2\sqrt{2}\times\sqrt{2}}{\sqrt{2}}\,m$$
$$b = 5-2\sqrt{2}\,m$$
$$Area\ of\ rectangle = l\times b$$
$$= \left(2+3\sqrt{2}\right)\times\left(5-2\sqrt{2}\right)$$
$$= 2\left(5-2\sqrt{2}\right)+3\sqrt{2}\left(5-2\sqrt{2}\right)$$
$$= 10-4\sqrt{2}+15\sqrt{2}-6\left(\sqrt{2}\right)^2$$
$$= 10+11\sqrt{2}-(6\times 2)$$
$$= 10+11\sqrt{2}-12$$
$$Area = (11\sqrt{2}-2)m^2$$

(Answer)

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

Let, two numbers are: $x,\ y$

According to question:

$x+y=68$ _____(A)

$22+y+y=68$

$2y=68-22$

$2y=46$

$y=\frac{46}{2}$

$y=23$

put in equation (B)

using equation (B),

$x=22+23$

$x=45$

$x-y=22$

$x=22+y$ _____(B)

put in equation (A)

23,45 (Answer)

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, ($°F = \frac{9}{5}°C + 32$) find the temperature as Fahrenheit scale.

Temperature in °C = 48°C

$$\because °F = \frac{9}{5}°C + 32$$
$$= \frac{9}{5}\times 48+32$$
$$= 86.4+32$$
$$°F = 118.4°$$

(Answer)

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,

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

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,

Age of son $= 26 - 6 = 20$ years (Answer)

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

$$CP = 1500\ Rs$$
$$SP = 1520\ Rs$$
$$Profit = SP - CP$$
$$= 1520 - 1500$$
$$= 20\ Rs$$
$$\%\ Profit = \frac{Profit}{CP} \times 100\%$$
$$= \frac{20}{1500} \times 100\%$$
$$= 0.0133 \times 100\%$$
$$= 1.33\% \quad \text{(Answer)}$$

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%?

$$\text{Annual Income} = 9{,}60{,}000\ Rs$$
$$\text{Exempted Amount} = 1{,}30{,}000\ Rs$$
$$\text{Taxable Income} = 9{,}60{,}000 - 1{,}30{,}000$$
$$= 8{,}30{,}000\ Rs$$
$$\text{Tax rate} = 0.075\%$$
$$\text{Tax amount} = 0.075\% \times 8{,}30{,}000$$
$$= \frac{0.075}{100} \times 8{,}30{,}000$$
$$= 6225\ Rs \quad \text{(Answer)}$$

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

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

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

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

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

$$\text{Profit/Compound Markup} = \frac{Principal\ Amount \times time \times rate}{100}$$

$$= \frac{3{,}75{,}000 \times 1 \times 14}{100}$$

$$= 52500\ Rs$$ (Answer)