

## Exercise 1.3

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

$$\text{Let first integer} = x$$

$$\text{Second integer} = x + 1$$

$$\text{Third integer} = x + 2$$

According to question

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

$$3x + 3 = 42$$

$$3x = 42 - 3$$

$$3x = 39$$

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

$$x = 13$$

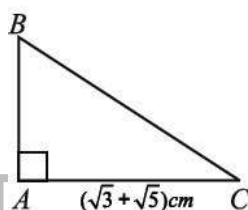
Hence

$$\text{First integer} = x = 13$$

$$\text{Second integer} = x + 1 = 13 + 1 = 14$$

$$\text{Third integer} = x + 2 = 13 + 2 = 15$$

2. The diagram shows right angled  $\triangle ABC$  in which the length of  $\overline{AC}$  is  $(\sqrt{3} + \sqrt{5})$  cm. The area of  $\triangle ABC$  is  $(1 + \sqrt{15})$  cm<sup>2</sup>. Find the length of  $\overline{AB}$  in the form of  $(a\sqrt{3} + b\sqrt{5})$  cm, where  $a$  and  $b$  are integers.



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

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

$$\overline{AB} = ?$$

$$\text{Area of } \triangle ABC = \frac{1}{2} \times \text{base} \times \text{height}$$

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

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

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

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

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

$$\overline{AB} = \frac{2\sqrt{3} - 2\sqrt{5} + 2\sqrt{45} - 2\sqrt{75}}{3 - 5}$$

$$\overline{AB} = \frac{2\sqrt{3} - 2\sqrt{5} + 2\sqrt{9 \cdot 5} - 2\sqrt{25 \cdot 3}}{-2}$$

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

$$\overline{AB} = \frac{2\sqrt{3} - 2\sqrt{5} + 6\sqrt{5} - 10\sqrt{3}}{-2}$$

$$\overline{AB} = \frac{-8\sqrt{3} + 4\sqrt{5}}{-2}$$

$$\overline{AB} = \frac{-8\sqrt{3}}{-2} + \frac{4\sqrt{5}}{-2}$$

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

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

$$\text{Length of rectangle} = l = 2 + \sqrt{18} m$$

$$l = 2 + \sqrt{9 \cdot 2} m$$

$$l = 2 + 3\sqrt{2} m$$

$$\text{Breadth} = b = 5 - \frac{4}{\sqrt{2}} m$$

$$b = 5 - \frac{4}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} m$$

$$b = 5 - \frac{4\sqrt{2}}{(\sqrt{2})^2} m$$

$$b = 5 - \frac{4\sqrt{2}}{2} m$$

$$b = 5 - 2\sqrt{2} m$$

$$\text{Area of } \square = l \times b$$

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

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

$$= 10 - 4\sqrt{2} + 15\sqrt{2} - 6(\sqrt{2})^2$$

$$= 10 + 11\sqrt{2} - 6(2)$$

$$= 10 + 11\sqrt{2} - 12$$

$$= -2 + 11\sqrt{2}$$

$$= (11\sqrt{2} - 2) m^2$$

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

$$\text{Let first numbers} = x$$

$$\text{Second number} = y$$

According to question

$$x + y = 68 \quad \dots (i)$$

$$x - y = 22$$

$$x = 22 + y \quad \dots (ii)$$

Putting value of  $x$  in equation (i)

$$22 + y + y = 68$$

$$2y = 68 - 22$$

$$2y = 46$$

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

$$y = 23$$

Putting value of  $y$  in equation (ii)

$$x = 22 + 23$$

$$x = 45$$

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

$$^{\circ}\text{F} = \frac{9}{5}^{\circ}\text{C} + 32$$

$$= \frac{9}{5} \times 48 + 32$$

$$= 86.4 + 32$$

$$^{\circ}\text{F} = 118.4^{\circ}\text{F}$$

**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 present

$$\text{Age of son} = x$$

$$\text{Age of father} = y$$

Six years ago

$$\text{Age of son} = x - 6$$

$$\text{Age of father} = y - 6$$

According to question,

$$x + y = 72 \quad \dots (i)$$

And

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

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

$$y = 2x - 6$$

Putting value of  $y$  in equation (i)

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

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

$$3x = 72 + 6$$

$$3x = 78$$

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

$$x = 26$$

$$\text{Six years ago age of son} = x - 6$$

$$= 26 - 6$$

$$= 20 \text{ years}$$

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

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

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

$$\text{Profit} = SP - CP$$

$$\text{Profit} = 1520 - 1500$$

$$\text{Profit} = 20 \text{ Rs}$$

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

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

$$= 1.33 \%$$

**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%?**

$$\text{Annual Income} = 960000 \text{ Rs}$$

$$\text{Exempted Amount} = 130000 \text{ Rs}$$

$$\text{Taxable Income} = 960000 - 130000$$

$$= 830000 \text{ Rs}$$

$$\text{Tax rate} = 0.75 \%$$

$$\text{Tax amount} = 0.75\% \times 830000$$

$$= \frac{0.75}{100} \times 830000$$

$$= 6225 \text{ Rs}$$

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

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

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

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

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

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

$$= \frac{375000 \times 1 \times 14}{100}$$

$$= 52500 \text{ Rs}$$