Exercise 1.3

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

Solution:

Let x, $x+1$, $x+2$ be three consecutive integers

By condition

$x + (x+1) + (x+2) = 42$

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

$3x + 3 = 42$

$3x = 42 - 3$

$3x = 39$

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

$x = 13$

Now the 1^{st} integer $= x = 13$

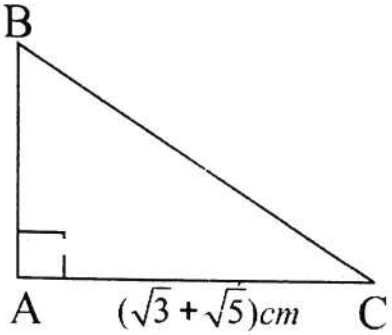
2^{nd} integer $= x+1 = 13+1 = 14$

3^{rd} integer $= x+2 = 13+2 = 15$

Thus 13,14 and 15 are required three consecutive integers.

Q.2 The diagram shows right angled ΔABC in which the length of $\overline{AC}$ is $(\sqrt{3}+\sqrt{5})$ cm. The area of Δ ABC is $(1+\sqrt{15})$ cm^2, Find the length $\overline{AB}$ in the

form $(a\sqrt{3}+b\sqrt{5})$ cm where *a* and *b* are integers.



Solution:

Given

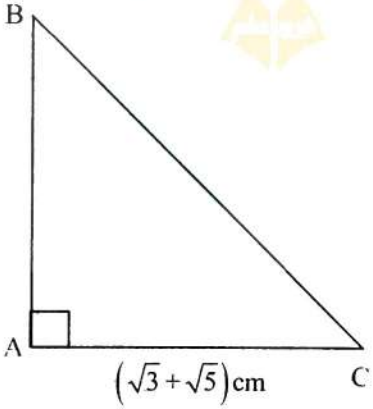
$m\overline{AC} = \left(\sqrt{3}+\sqrt{5}\right)$cm

Area of $\Delta ABC = \left(1+\sqrt{15}\right)$cm^2

To find = $m\overline{AB}$=?

We know that, Area of $\Delta = \frac{1}{2}(b \times h)$

Area of $\Delta ABC = \frac{1}{2}\left(m\overline{AC} \times m\overline{AB}\right)$



$$1+\sqrt{15} = \frac{1}{2}\left[\left(\sqrt{3}+\sqrt{5}\right) \times m\overline{AB}\right]$$

$$\Rightarrow \quad \frac{2\left(1+\sqrt{15}\right)}{\sqrt{3}+\sqrt{5}} = m\overline{AB}$$

$\Rightarrow$ Multiplying and dividing by $\left(\sqrt{3}-\sqrt{5}\right)$

$$\Rightarrow \quad m\overline{AB} = \frac{\left(2+2\sqrt{15}\right)}{\left(\sqrt{3}+\sqrt{5}\right)} \times \frac{\left(\sqrt{3}-\sqrt{5}\right)}{\sqrt{3}-\sqrt{5}}$$

$$= \frac{2\sqrt{3}-2\sqrt{5}+2\sqrt{15}\times\sqrt{3}-2\sqrt{15}\times\sqrt{5}}{\left(\sqrt{3}\right)^2-\left(\sqrt{5}\right)^2}$$

$\because a^2-b^2 = (a+b)(a-b)$

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

$$= \frac{2\left(\sqrt{3}-\sqrt{5}+\sqrt{9\times5}-\sqrt{25\times3}\right)}{-2}$$

$$= \frac{\sqrt{3}-\sqrt{5}+3\sqrt{5}-5\sqrt{3}}{-1}$$

$$= \frac{-4\sqrt{3}+2\sqrt{5}}{-1}$$

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

Thus $m\overline{AB} = \left(4\sqrt{3}-2\sqrt{5}\right)$cm.

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

Solution:

Let length of rectangle = L = $\left(2+\sqrt{18}\right)$m

Width of rectangle = W = $\left(5-\frac{4}{\sqrt{2}}\right)$m

We know that

Area of Rectangle = A = L × W

$$A = \left(2+\sqrt{18}\right)\times\left(5-\frac{4}{\sqrt{2}}\right)$$

$$A = \left(2+\sqrt{9\times2}\right)\times\left(5-\frac{2\times2}{\sqrt{2}}\right)$$

$$A = \left(2+3\sqrt{2}\right)\times\left(5-2\sqrt{2}\right) \qquad \left(\because \frac{a}{\sqrt{a}} = \sqrt{a}\right)$$

$$A = 10 - 4\sqrt{2} + 15\sqrt{2} - (3\sqrt{2})(2\sqrt{2})$$

$$A = 10 + 11\sqrt{2} - 6\sqrt{4}$$

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

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

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

Thus area of rectangle is $\left(-2+11\sqrt{2}\right)m^2$

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

Solution:

Sum = 68

Difference = 22

Let x and y be required numbers

By given conditions:

Sum: $x + y = 68$ _____ (i)

Diff. $x - y = 22$ _____ (ii)

Adding eq. (i) and (ii),

$$x + \cancel{y} = 68$$

$$\underline{x - \cancel{y} = 22}$$

$$2x = 90$$

$$x = \frac{90}{2}$$

$$x = 45$$

Put it in eq. (i),

$x + y = 68$

$45 + y = 68$

$y = 68 - 45$

$y = 23$

Thus required numbers are 45 and 23.

Q.5 The weather in Lahore was unusually warm during the summer of 2024. The TV news reported temperatures as high as 48°C. By using the formula, $\left(°F = \frac{9}{5}°C + 32\right)$ find the temperature as Fahrenheit scale.

Solution:

Temperature in degree centigrade = 48°C

formula: $°F = \frac{9}{5}°C + 32$

Temperature in Fahrenheit,

$$°F = \frac{9}{5} \times 48 + 32$$

$°F = 9 \times 9.6 + 32$

$°F = 86.4 + 32$

$°F = 118.4$

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

Solution:

Let father's age = x

Son's age = y

By condition:

$x + y = 72$ _____ (i)

Six year ago,

Father's age = $x - 6$

Son's age = $y - 6$

By condition:

Father's age = 2 times the son's age

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

$x - 6 = 2y - 12$

$x - 2y = 6 - 12$

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

Subtracting eq. (ii) from (i)

$$\cancel{x} + y = 72$$

$$\underline{\pm\cancel{x} \mp 2y = \mp 6}$$

$$3y = 78$$

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

$$\boxed{y = 26}$$

Put y = 26 in eq.(i)

$x + 26 = 72$

$x = 72 - 26$

$\boxed{x = 46}$

Six years ago,

Son's age = $y - 6 = 26 - 6 = 20$ years

Father's age = $x - 6 = 46 - 6 = 40$ years

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

Solution:

The cost price=CP=Rs.1500

The selling price=SP=Rs.1520

The profit amount=SP – CP

=Rs.1520 – Rs.1500=Rs.20

$$\text{Profit percentage} = \frac{\text{Profit}}{\text{C.P}} \times 100\%$$

$$\text{Profit percentage} = \frac{20}{1500} \times 100\%$$

$$= \frac{20}{15 \times \cancel{100}} \times \cancel{100}\% = 1.33\%$$

Q.8 The annual income of Tayab is Rs. 960,000, while the exempted amount is Rs. 130,000. How much tax would he have to pay at the rate of 0.75%.

Solution:

Annual income = Rs.9,60,000/-
Exempted amount = Rs.130,000/-
Tax rate = 0.75%
We know that
Taxable income
= Annual income – exempted amount
Taxable income = 960,000 – 130,000
Taxable income = 830,000
Tax amount = 0.75% of Taxable income

$$= \frac{0.75}{100} \times 830,000$$

$$= \frac{75}{100 \times 100} \times 830,000$$

$$= 75 \times 83$$

= Rs.6,225

Thus Tayab will pay tax of Rs.6,225.

Q.9 Find the compound markup on Rs. 375,000 for one year at the rate of 14% compounded markup annually.

Solution:

Principal amount = P = Rs.375,000/-
Time, = t = 1year
Rate, R = 14%
We know that
Compound markup = P×T×R

$$= 375,000 \times 1 \times 14\%$$

$$= 375,000 \times \frac{14}{100}$$

$$= 3,750 \times 14$$

= Rs. 52,500/-

Thus compound mark up is Rs.52,500/-