Area

Solution

1. **Ans.(C)**

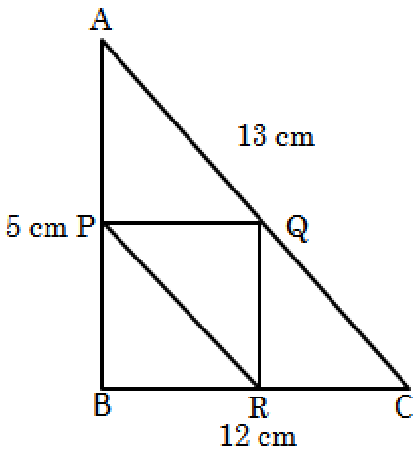
The largest side of the triangle = 13 cm
Other sides are 5 cm and 12 cm.

$\because (13)^2 = (12)^2 + (5)^2$

$169 = 169$

Hence, it will be a right angle triangle.
Triangle PQR made by joining the midpoints of the three sides.

Area = $\frac{Area\ of\ \Delta ABC}{4}$



Area of Δ PQR = $\frac{\frac{1}{2}\times5\times12}{4}$

$= \frac{30}{4} = 7.5\ cm^2$

2. **Ans.(C)**

$s = \frac{a+b+c}{2}$ (where, a = 72, b = 30, c = 78)

$= \frac{72 + 30 + 78}{2} = 90m$

Area of triangle = $\sqrt{s(s-a)(s-b)(s-c)}$

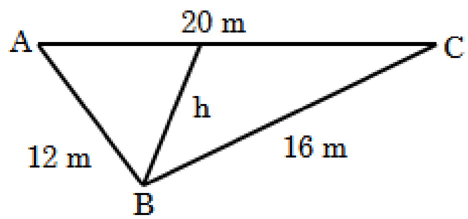
$= \sqrt{90(90-72)(90-30)(90-78)}$

$= \sqrt{90 \times 18 \times 60 \times 12}$

$= \sqrt{1166400} = 1080$

$\therefore\ cost\ price = 1080 \times \frac{1}{5} = Rs. 216$

3. **Ans.(B)**



Area of an equilateral triangle

$= \sqrt{s(s-a)(s-b)(s-c)}$

Where, $s = \frac{a+b+c}{2}$

$s = \frac{16 + 12 + 20}{2} = 24$

$\therefore$ Area = $\sqrt{24(24-16)(24-12)(24-20)}$

$= \sqrt{24 \times 8 \times 12 \times 4}$

$= 96m^2$

$\therefore$ Length of longest side (h) = $\frac{2\times\ \text{area}}{\text{base}}$

$= \frac{2 \times 96}{20}$

$= \frac{96}{10} = 9.6m$

4. **Ans.(B)**

$(s) = \frac{7.8 + 5 + 11.2}{2} = \frac{24}{2} = 12$

Area of triangle = $\sqrt{s(s-a)(s-b)(s-c)}$

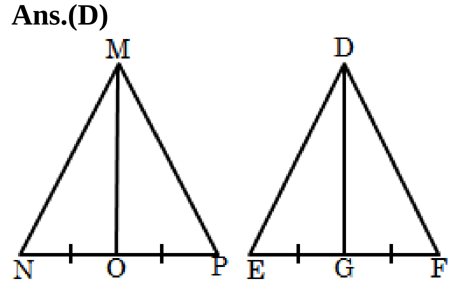
$= \sqrt{12(12-7.8)(12-5)(12-11.2)}$

$= \sqrt{12 \times 4.2 \times 7 \times .8}$

$= \sqrt{282.24}$

$= 16.8cm^2$

5. **Ans.(D)**



$\Delta MNP \sim \Delta DEF$

By the law of homogeneity

$\frac{Area\ of\ \Delta\ MNP}{Area\ of\ \Delta\ DEF} = \frac{(Longest\ side\ of\ \Delta\ MNP)^2}{(Longest\ side\ of\ \Delta\ DEF\ )^2}$

$\Rightarrow \sqrt{\frac{1024}{144}} = \left(\frac{64}{long\ side\ of\ \Delta DEF}\right)$

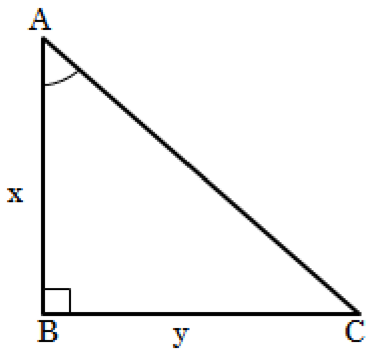
$\Rightarrow \frac{32}{12} = \frac{64}{long\ side\ of\ \Delta DEF}$

$\Rightarrow long\ side\ of\ \Delta DEF = \frac{64\times12}{32}$

$= 2 \times 12 = 24$ cm

6. **Ans.(C)**

Given –



Difference between height of triangle and base = 7

x – y = 7.........(i)

Area of triangle = = 30 cm^2

Thus, area of right triangle = $\frac{1}{2}$ × base × height

$30 = \frac{1}{2}xy \Rightarrow xy = 60\ \ldots\ldots..(ii)$

$x + y = \sqrt{(x-y)^2 + 4xy}$

$= \sqrt{49 + 240}$

$= \sqrt{289}$

$x + y = 17\ \ldots..$ (iii)

From equation (i) and (iii)

x = 12 cm

y = 5 cm

Now from the Pythagoras theorem in triangle ABC

$AC^2 = AB^2 + BC^2$

$AC^2 = (12)^2 + (5)^2$

$AC^2 = 144 + 25$

$AC^2 = 169$

$AC = 13$ cm

Hence the perimeter of the triangle

= 13 + 12 + 5 = 30 cm

7. **Ans.(C)**

Let the sides of the equilateral triangle be a cm.

According to Question,

Area of Δ equilateral = perimeter of Δ × 2,

$\frac{\sqrt{3}a^2}{4} = (3a) \times 2$

$\frac{\sqrt{3}a}{4} = 6$

$a = \frac{24\sqrt{3}}{3}$

$a = 8\sqrt{3}cm$

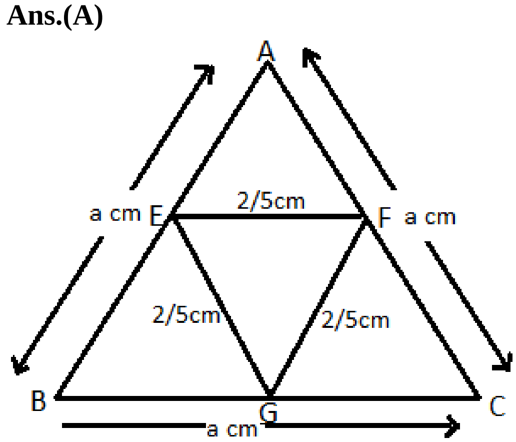
∴ Area of equilateral Δ = $\frac{\sqrt{3}}{4}a^2$

$= \frac{\sqrt{3}}{4} \times 8\sqrt{3} \times 8\sqrt{3}$

$= 2 \times 3 \times 8\sqrt{3}$

$= 48\sqrt{3}cm^2$

8. **Ans.(A)**



Area of equilateral triangle ABC = $\frac{\sqrt{3}}{4}a^2$ cm

Areas of smaller equilateral ΔAEF, ΔBEG and ΔCFG.

$= \frac{\sqrt{3}}{4}\left\{\left(\frac{2a}{5}\right)^2 + \left(\frac{2a}{5}\right)^2 + \left(\frac{2a}{5}\right)^2\right\}$

$= \frac{3\sqrt{3}}{4} \times \frac{4a^2}{25}$

$= \frac{3\sqrt{3}}{25} a^2$ cm

$\frac{Area\ of\ \Delta ABC.}{\text{Areas of three smaller } \Delta} = \frac{\frac{\sqrt{3}}{4a^2}}{\frac{3\sqrt{3}}{25a^2}}$

$\frac{Area\ of\ \Delta ABC.}{\text{Areas of three smaller } \Delta} - 1 = \frac{25}{12} - 1$

$\frac{Area\ of\ \Delta ABC. - \text{Areas of three smaller } \Delta.}{\text{Areas of three smaller } \Delta.} = \frac{25-12}{12}$

$= \frac{\text{The area of the remaining part of the triangle.}}{\text{Areas of three smaller } \Delta.} = \frac{13}{12}$

$= \frac{\text{Areas of three smaller } \Delta.}{\text{Area of Remnant of Triangle}} = \frac{12}{13}$

9. Ans.(C)

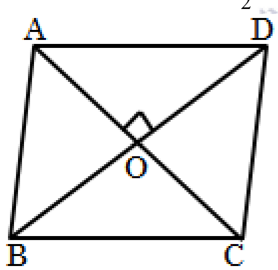
Given –

Diagonal length of rhombus (d_1) = 24 cm,

d_2 = ?.

According to Question,

Area of rhombus $= \frac{1}{2} \times d_1 \times d_2$



AO = 12cm

DO = 9cm

$216 = \frac{1}{2} \times 24 \times d_2$

d_2 = 18cm

In Δ AOD ,

By the Pythagoras theorem

$AD^2 = 12^2 + 9^2$ {Diagonal of rhombus}

$AD^2 = 144 + 81$

$AD^2 = 225$

AD = 15 cm

So, The length of each side of rhombus will be 15 cm.

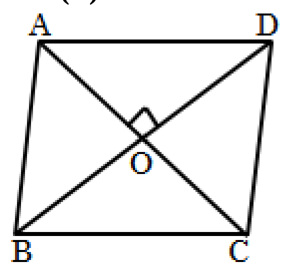
10. Ans.(A)

Area of parallelogram = (base × height)

= 20× 5.4 m^2

Area = 108 m^2

11. Ans.(B)



Diagonal = d_1 = 2.8m

Each sides = 5m

In Δ AOD

$AO = \frac{2.8}{2} = 1.4m$

AD = 5m

Diagonals of rhombus intersect each other at 900 angles.

From the Pythagoras theorem,

$OD^2 = (5)^2 - (1.4)^2$

$OD^2 = 23.04$

$OD = 4.8m$

So diagonal $d_2 = 4.8 \times 2 = 9.6m$

Hence, the area of rhombus. $= \frac{1}{2} \times d_1 \times d_2$

$= \frac{1}{2} \times 9.6 \times 2.8$

Area $= 13.44\ m^2$

12. Ans.(B)

Area of rhombus $= \frac{1}{2} d_1 d_2$

$= \frac{1}{2} d_1 d_2 = 840$

$d_1 d_2 = 1680 \ldots i)$

$d_1^2 + d_2^2 = (\text{side})^2 \times 4$

$d_1^2 + d_2^2 = 37 \times 37 \times 4$

$d_1^2 + d_2^2 = 5476 ----(ii)$

$\therefore (d_1 + d_2)^2 = d_1^2 + d_2^2 + 2d_1 d_2$

From equation (i) and (ii) –

$\Rightarrow (d_1 + d_2)^2 = 5476 + 2 \times 1680$

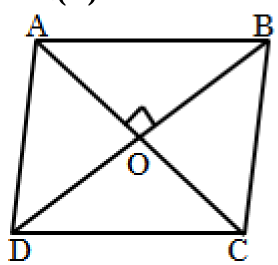
$\Rightarrow (d_1 + d_2)^2 = 5476 + 3360$

$\Rightarrow (d_1 + d_2)^2 = 8836$

$\Rightarrow (d_1 + d_2)^2 = (94)^2$

$\Rightarrow d_1 + d_2 = 94cm$

13. **Ans.(C)**



OD = 13cm

Perimeter of rhombus = 56 cm

4 a = 56

Side (a) = 14 cm

From the Pythagoras theorem

$(AO)^2 = (AD)^2 - (DO)^2$

$(AO)^2 = (14)^2 - (13)^2$

$(AO)^2 = 196 - 169$

$(AO)^2 = 27$

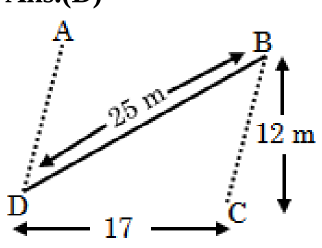
$AO = \sqrt{27}$

Diagonal (AC) = 2 ×AO

Diagonal (AC) = $2 \times \sqrt{27}$

(AC) = $6\sqrt{3}cm$

14. **Ans.(D)**



s of Δ BCD = $\frac{12 + 25 + 17}{2} = \frac{54}{2} = 27$

Area of Δ BCD= $\sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{27(27-12)(27-25)(27-17)}$

$= \sqrt{27 \times 15 \times 2 \times 10}$

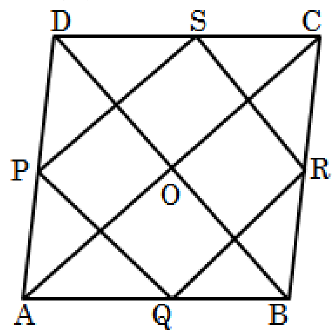
$= \sqrt{3 \times 9 \times 3 \times 5 \times 2 \times 2 \times 5}$

$= 9 \times 5 \times 2 = 90$

Area of parallelogram ABCD. = 2 × Δ BCD

$= 90 \times 2 = 180m^2$

15. **Ans.(C)**



Area of rhombus = $\frac{1}{2} \times d_1 \times d_2$

Area = $\frac{1}{2} \times 12 \times 16$

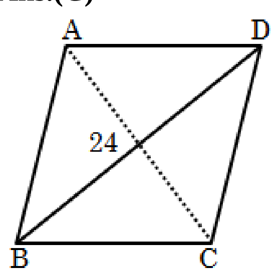
Area = 96 cm^2

A rhombus is formed by joining the midpoints of all the sides of the rhombus and the area of that rhombus

$= \frac{\text{Area of large rhombus}}{2}$

Area = $\frac{96}{2} = 48cm^2$

16. **Ans.(C)**



A C = 18 m

B D = 24 m

Area of Rhombus = $\frac{1}{2} \times AC \times BD$

$216 = \frac{1}{2} \times AC \times BD$

$\frac{1}{2} \times AC \times 24 = 216$

$AC = 18cm$

Length of each side of rhombus

$= \sqrt{(OC)^2 + (OB)^2}$

$= \sqrt{9^2 + 12^2}$

$= \sqrt{81 + 144}$

$= \sqrt{225} = 15$ Meter

17. **Ans.(A)**

Area of a parallelogram or trapezoid

$= \frac{1}{2}$ (sum of parallel sides) × distance

$= \frac{1}{2}(10 + 15) \times$ distance

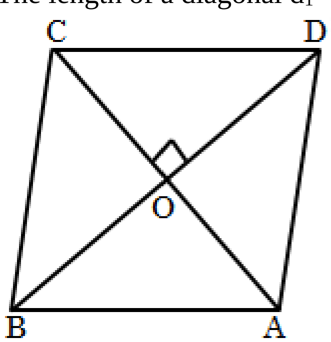
$150 = \frac{1}{2} \times 25 \times$ distance

distance $= \frac{300}{25} = 12$ meter

18. **Ans.(C)**

Area of rhombus = $324cm^2$

The length of a diagonal $d_1 = 36$ cm



Area of rhombus $= \frac{1}{2} \times d_1 \times d_2$

$324 = \frac{1}{2} \times 36 \times d_2$

$d_2 = 18$ cm

According to the image,

$(AB)^2 = (OA)^2 + (OB)^2$

$= 9^2 + 18^2$

$= 81 + 324$

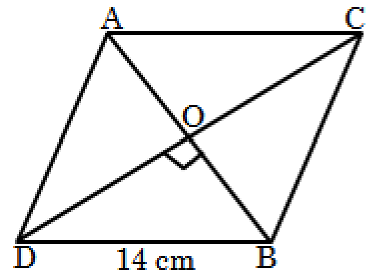
$(AB)^2 = 405$

$AB = 9\sqrt{5}cm$

Thus, the length of each side of rhombus is $9\sqrt{5}cm$.

19. **Ans.(C)**

The diagonals of a rhombus bisect each other.



$OB = OA = \frac{14}{2}cm = 7cm$

∴ From the Pythagoras theorem –

$DB^2 = OB^2 + OD^2$

$196 = 49 + OD^2$

$OD^2 = 147$

$OD = \sqrt{3 \times 7 \times 7}$

$= 7\sqrt{3}$

$DC = 2 \times 7\sqrt{3} = 14\sqrt{3}$

Area of rhombus = $\frac{1}{2} \times AB \times CD$

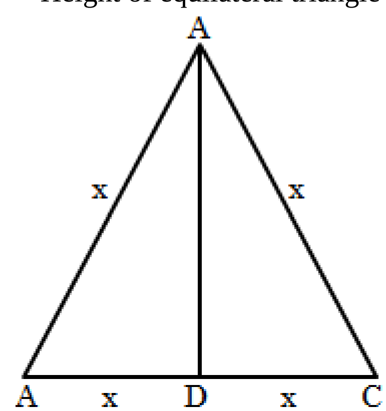
$= \frac{1}{2} \times 14 \times 14\sqrt{3} = 98\sqrt{3}cm^2$

20. **Ans.(B)**

Let the side of the square = a

∴ Diagonal of the square = a $\sqrt{2}$

∴ Height of equilateral triangle (h) = a$\sqrt{2}$



In equilateral ΔABC,

Let the side of Δ = x

$AD = a\sqrt{2}$

$AD^2 = AC^2 - DC^2$

$2a^2 = x^2 - \frac{x^2}{4}$

$2a^2 = \frac{3x^2}{4}$

$x^2 = \frac{8}{3}a^2$

Area of equilateral Δ $= \frac{\sqrt{3}}{4} \times x^2$

$= \frac{\sqrt{3}}{4} \times \frac{8}{3}a^2$

$= \frac{2}{\sqrt{3}}a^2$

Area of the square = a^2

Area of equilateral Δ : Area of the square

$= \frac{2}{\sqrt{3}}a^2 : a^2 = 2 : \sqrt{3}$