SECTION A

1. Choose and write the correct option in the following questions. **$(3 \times 1 = 3)$**

(*i*) If the base and height of a triangle are doubled, then its area

(*a*) becomes 2 times (*b*) becomes 4 times

(*c*) is halved (*d*) does not change

(*ii*) The length of each side of an equilateral triangle having an area of $9\sqrt{3}$ cm^2 is [*NCERT Exemplar*]

(*a*) 8 cm (*b*) 36 cm (*c*) 4 cm (*d*) 6 cm

(*iii*) The area of triangle of base 35 cm is 420 cm^2. Its altitude is equal to

(*a*) 12 cm (*b*) 24 cm (*c*) 36 cm (*d*) 10 cm

■ **Solve the following questions.** **$(2 \times 1 = 2)$**

2. The length of side of an equilateral triangle is 8 cm. Find the length of its altitude.

3. If the length of hypotenuse of an isosceles right triangle is $5\sqrt{2}$ cm, what will be its area?

SECTION B

■ **Solve the following questions.** **$(4 \times 2 = 8)$**

4. If the perimeter of an equilateral triangle is 90m, find its area.

5. Find the area of right triangle whose hypotenuse is 41 cm and one side is 9 cm.

6. What will be area of a triangle whose side are 3 cm, 4 cm and 5 cm.

7. Find the area of the triangle given in the Fig. 10.19.

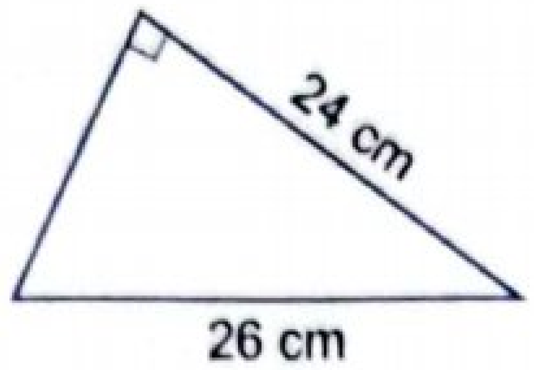


Fig. 10.19

■ **Solve the following questions.** **($9 \times 3 = 27$)**

8. The sides of a triangle are in the ratio 25 : 17 : 12 and its perimeter is 540 m. Find the area of the triangle.

9. The perimeter of an isosceles triangle is 42 cm and its base is $\left(\frac{3}{2}\right)$ times each of the equal sides. Find the length of each side of the triangle, area of the triangle and the height of the triangle.

10. Find the percentage increase in the area of a triangle if its each side is doubled.

11. The unequal side of an isosceles triangle measures 24 cm and its area is 60 cm2. Find the perimeter of the given isosceles triangle.

12. Find the area of the triangular field of sides 25 m, 60m and 65 m. Also, find the cost of laying the grass in the triangular field at the rate of ₹8 per m^2.

13. The perimeter of a triangular field is 144 m and its sides are in the ratio 3 : 4 : 5. Find the length of the perpendicular from the opposite vertex to the side whose length is 60m.

14. Find the area of the shaded region in the fig. 10.20.

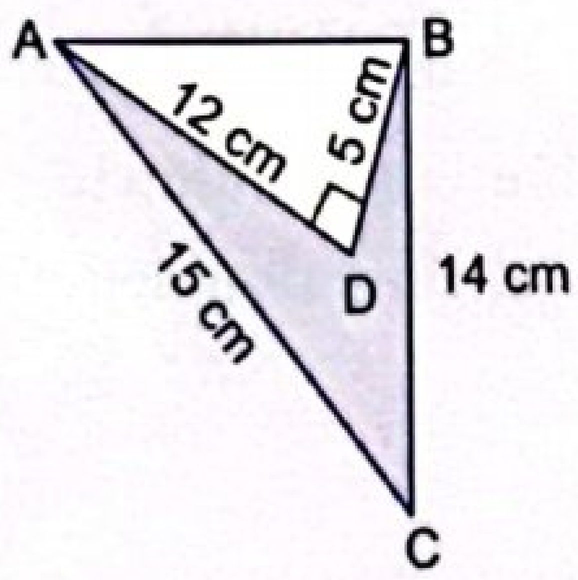


Fig. 10.20

15. If two sides of triangle are 48 cm and 70 cm and its perimeter is 154 cm. Find its area.

16. The difference between the sides other than hypotenuse in a right angled triangle is 14 cm. The area of the triangle is 120 cm^2. What will be its perimeter.

Answers

1. (*i*) (*b*) (*ii*) (*d*) (*iii*) (*b*) **2.** $4\sqrt{3}$ cm **3.** 12.5 cm^2

4. $225\sqrt{3}$ m^2 **5.** 180 cm^2 **6.** 6 cm^2 **7.** 120cm^2 **8.** 9000 m^2

9. 12 cm, 12 cm, 18 cm, $27\sqrt{7}$ cm^2, $3\sqrt{7}$ cm **10.** 300%

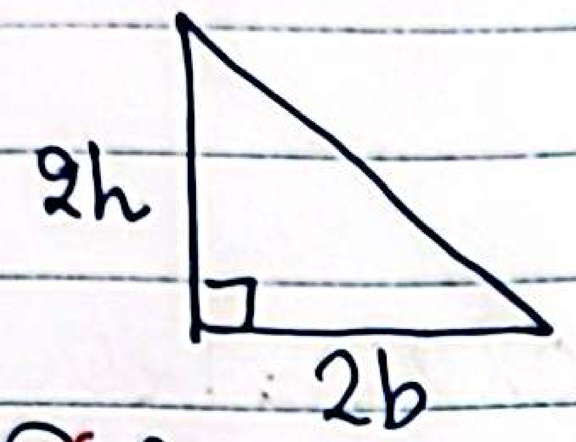
11. 50 cm **12.** 750 m^2, ₹6000 **13.** 28.8m **14.** 54 cm^2

15. 800.54cm^2 **16.** 60 cm.

IX H.W-9 (Answers)

1)

(i)



area $= \frac{1}{2} \times 2b \times 2h = 4\left(\frac{1}{2}bh\right) =$ becomes 4 times (b)

(ii) $\frac{\cancel{\sqrt{3}}a^2}{4} = 9\cancel{\sqrt{3}}$

$a^2 = 9 \times 4$

$a = \sqrt{9 \times 4} = 3 \times 2 = 6cm$ (d)

(iii) Area $= \frac{1}{2}bh = 420$

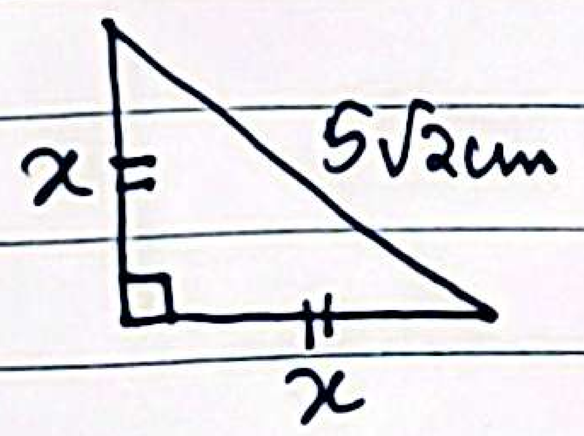
$\Rightarrow \frac{1}{2} \times 35 \times h = 420$

$\therefore h = \frac{\overset{60}{\cancel{420}} \times 2}{\underset{5}{\cancel{35}}} = 24cm$ (b)

2) $a = 8cm$

altitude of an equilateral $\Delta = \frac{\sqrt{3}a}{2} = \frac{8\sqrt{3}}{2} = \underline{\underline{4\sqrt{3}cm}}$

3)



Using Pythagoras Theorem,

$x^2 + x^2 = (5\sqrt{2})^2$

$\Rightarrow 2x^2 = 50$

$x^2 = 25$

$x = 5cm$

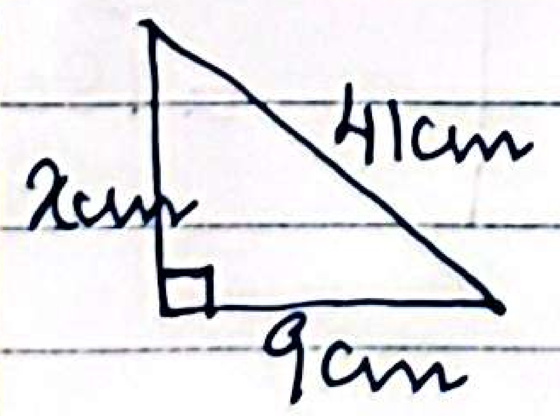
area $= \frac{1}{2} \times b \times h = \frac{1}{2} \times x \times x = \frac{25}{2} = \underline{\underline{12.5cm^2}}$

4) perimeter of an equilateral $\Delta = 3a = 90$

$a = 30m$

area $= \frac{\sqrt{3}a^2}{4} = \frac{\sqrt{3} \times 30 \times \overset{15}{\cancel{30}}}{\cancel{4}2} = \underline{\underline{225\sqrt{3}m^2}}$

5)



Using Pythagoras theorem,

$x^2 + 81 = 1681$

$x^2 = 1600$

$x = 40cm$

$\therefore$ area $= \frac{1}{2} \times b \times h = \frac{1}{\underset{1}{\cancel{2}}} \times 9 \times \overset{20}{\cancel{40}} = \underline{\underline{180cm^2}}$

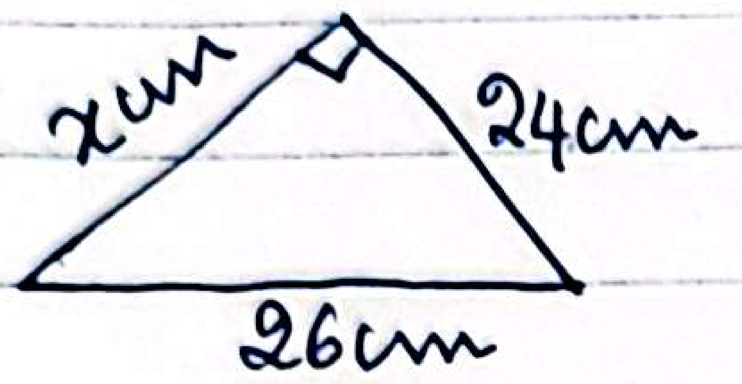
6) Let $a = 3cm$, $b = 4cm$, $c = 5cm$

$S = \frac{a+b+c}{2} = \frac{3+4+5}{2} = 6cm$

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

$= \sqrt{\underset{3 \times 2}{6} \times 3 \times 2 \times 1} = \underline{6cm^2}$

Using Pythagoras Theorem, $x^2+(24)^2=(26)^2$



$$\Rightarrow x^2+576=676$$
$$x^2=100$$
$$x=10\,cm$$
$$\text{Area}=\frac{1}{2}\times b\times h=\frac{1}{2}\times 10\times 24=\underline{\underline{120\,cm^2}}$$

Let the sides be $25x$, $17x$ and $12x$

$$25x+17x+12x=540$$
$$54x=540$$
$$x=10\,m$$

$\therefore$ The sides are 250m, 170m and 120m.

Let $a=250m$, $b=170m$, $c=120m$

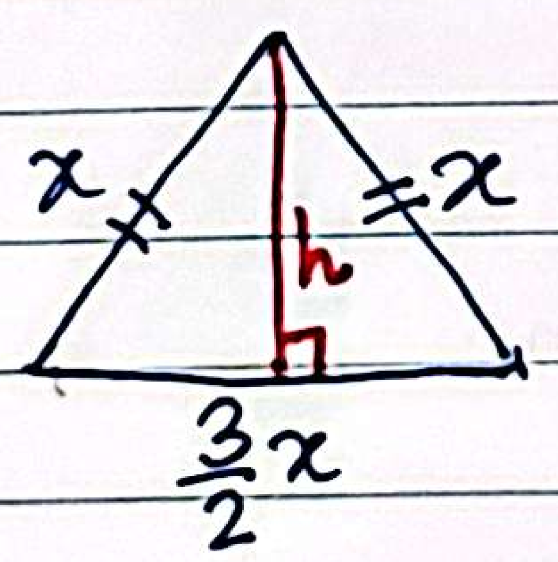
$$s=\frac{\text{perimeter}}{2}=\frac{540}{2}=270m$$

$$\text{area}=\sqrt{s(s-a)(s-b)(s-c)}$$
$$=\sqrt{270(270-250)(270-170)(270-120)}$$
$$=\sqrt{270\times 20\times 100\times 150}$$

3×90 $\quad 4\times 5$ $\quad 2\times 50$ $\quad 3\times 50$

$2\times 9\times 5$

$$=3\times 50\times 2\times 5\times 2\times 3$$
$$=\underline{\underline{9000\,m^2}}$$



$$\text{Perimeter}=x+x+\frac{3}{2}x=42$$
$$\Rightarrow 2x+\frac{3}{2}x=42$$
$$\Rightarrow \cancel{7}^{1}x=\cancel{42}^{6}\times 2$$
$$x=12\,cm$$

Then, $\frac{3}{2}x$

$$=\frac{3}{2}\times 12$$
$$=18\,cm$$

$\therefore$ The sides are 12cm, 12cm and 18cm.

Let $a=12cm$, $b=12cm$, $c=18cm$

$$S=\frac{a+b+c}{2}=\frac{42}{2}=21\,cm$$

$$\text{area}=\sqrt{s(s-a)(s-b)(s-c)}=\sqrt{21(21-12)(21-12)(21-18)}$$
$$=\sqrt{21\times 9\times 9\times 3}=3\times 9\sqrt{7}=\underline{\underline{27\sqrt{7}\,cm^2}}$$

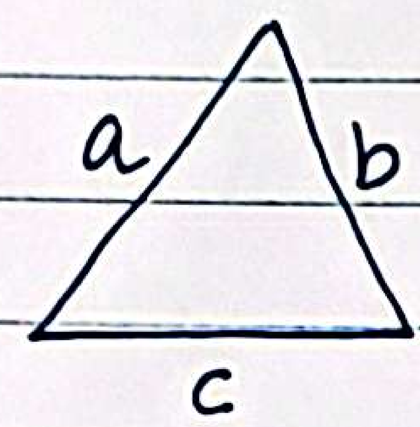
3×7

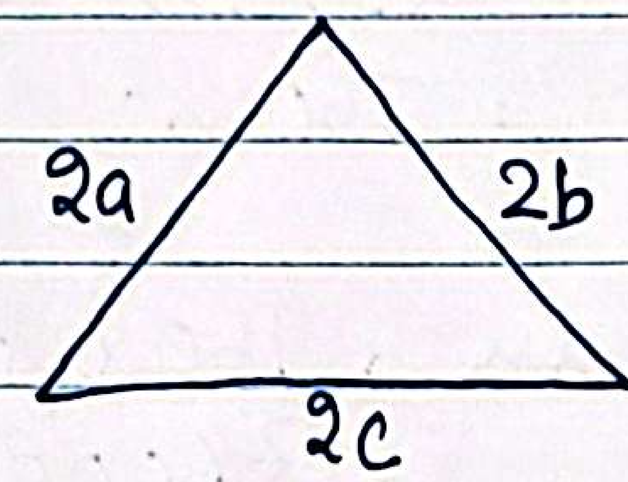
area of $\Delta = \frac{1}{2} \times b \times h$

$\Rightarrow 27\sqrt{7} = \frac{1}{\cancel{2}_1} \times \cancel{18}^{9} \times h$

$\therefore$ height, $h = \frac{27\sqrt{7}}{9} = \underline{\underline{3\sqrt{7}\,cm}}$

10)





$S = \frac{a+b+c}{2}$ | $S' = \frac{2a+2b+2c}{2} = 2\left(\frac{a+b+c}{2}\right) = 2S$

$A =$ area $= \sqrt{S(S-a)(S-b)(S-c)}$ | new area $= \sqrt{S'(S'-2a)(S'-2b)(S'-2c)}$

$A' = \sqrt{2S(2S-2a)(2S-2b)(2S-2c)}$

$= \sqrt{16S(S-a)(S-b)(S-c)}$

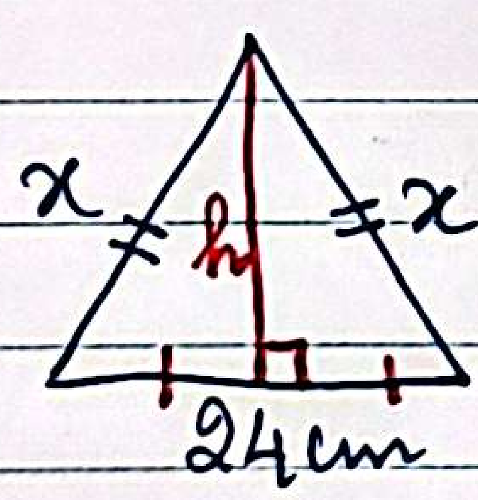
$= 4\sqrt{S(S-a)(S-b)(S-c)}$

$= 4A$

$\therefore$ Increase percentage $= \frac{\text{Change in value}}{\text{Original value}} \times 100\%$

$= \frac{4A-A}{A} \times 100\% = \frac{3A}{A} \times 100\% = \underline{\underline{300\%}}$

11)



area $= \frac{1}{2} \times b \times h = 60$

$\Rightarrow \frac{1}{\cancel{2}_1} \times \cancel{24}^{12} \times h = 60$

$h = \frac{60}{12} = 5cm$

Using Pythagoras theorem, $h^2 + (12)^2 = x^2$

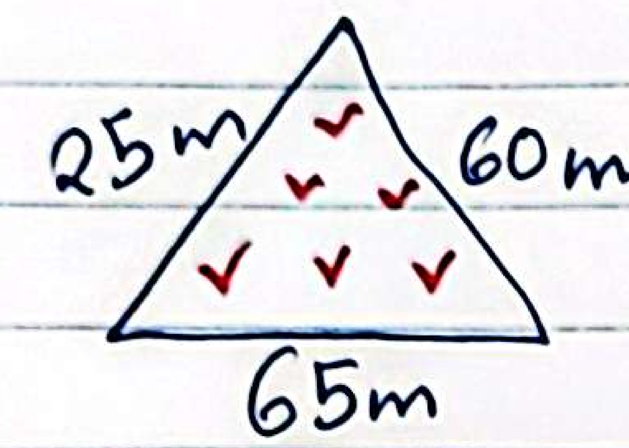
$\Rightarrow 25 + 144 = x^2$

$\Rightarrow x^2 = 169$

$x = 13cm$

$\therefore$ Perimeter $= 13 + 13 + 24 = \underline{\underline{50cm}}$

12)



Let $a = 25m$, $b = 65m$, $c = 60m$

$S = \frac{a+b+c}{2} = \frac{25+65+60}{2} = 75m$

$\text{area} = \sqrt{S(S-a)(S-b)(S-c)} = \sqrt{75(75-25)(75-65)(75-60)}$

$= \sqrt{75 \times 50 \times 10 \times 15} = 25 \times 3 \times 2 \times 5$

$\underline{25 \times 3}$ $\underline{25 \times 2}$ $\underline{2 \times 5}$ $\underline{3 \times 5}$ $= 750 m^2$

$\therefore$ Cost of laying the grass $= 750 \times 8$

$= \underline{₹6000}$

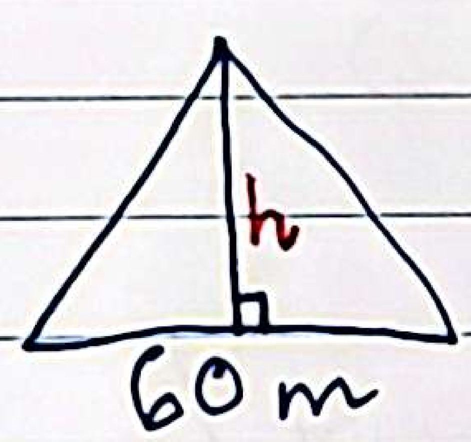
13) Let the sides be $3x$, $4x$ and $5x$

$3x + 4x + 5x = 144$

$12x = 144$

$x = 12m$

$\therefore$ The sides are 36m, 48m and 60m.



let $a = 36m$, $b = 48m$, $c = 60m$

$S = \frac{a+b+c}{2} = \frac{36+48+60}{2} = \frac{144}{2} = 72m$

$\text{area} = \sqrt{72(72-36)(72-48)(72-60)}$

$[\because \text{area} = \sqrt{S(S-a)(S-b)(S-c)}]$

$= \sqrt{72 \times 36 \times 24 \times 12}$

$\underline{36 \times 2}$ $\underline{12 \times 2}$

$= 36 \times 2 \times 12 = 864 m^2$

Also, area $= \frac{1}{2} bh = 864$

$\Rightarrow \frac{1}{2} \times 60 \times h = 864$

$h = \frac{\cancel{864}^{144} \times 2}{\cancel{60}_{10}} = \underline{28.8m}$

14) Using Pythagoras theorem, $AB^2 = AD^2 + BD^2 = 12^2 + 5^2 = 144 + 25$

$AB^2 = 169$

$AB = 13 cm$

area of $\triangle ADB = \frac{1}{2} \times AD \times DB = \frac{1}{2} \times 12 \times 5 = 30 cm^2$

Let $a = 15cm$, $b = 14cm$, $c = 13cm$