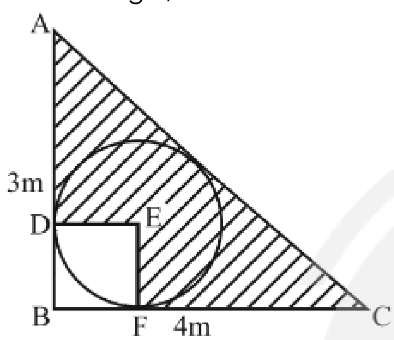
MBA PRO 2024

QUANTITATIVE APTITUDE

DPP -04

Triangles 4

Q1 A circle is inscribed in a right angled triangle as shown in the figure. If $DF = \sqrt{2}m$, then find the area of shaded region (Given E is centre of the circle and D, F are the points where circle touch triangle).

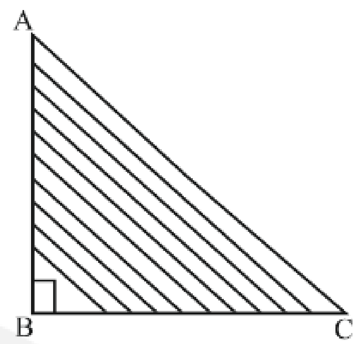


(A) $\left(6 - \frac{\pi}{4}\right) m^2$
(B) $5m^2$
(C) $\left(6 - \frac{\pi}{5}\right) m^2$
(D) πm^2

Q2 If the circumradius and inradius of a right angled triangle are 50 cm and 12 cm respectively, find the area of the triangle in sq. cm

(A) 1250
(B) 1344
(C) 40
(D) 382

Q3 A right angled triangle of hypotenuse $10cm$ is drawn as shown. BC = 8 cm and each of AB, BC is divided into t equal parts as shown in the figure. Find the possible value of t if the hypotenuse length of the smallest right angled triangle so formed is n, such that $2 < n < 3$.



(A) 2
(B) 3
(C) 4
(D) None of these

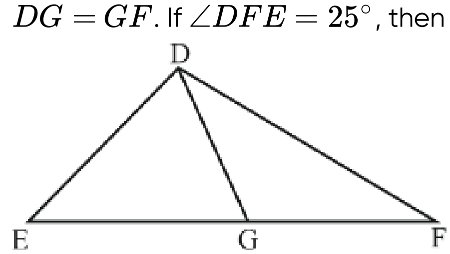
Q4 Find the maximum number of triangles having integral sides, that can be drawn if two of its sides are $6cm$ and $11cm$.

(A) 5
(B) 7
(C) 11
(D) 13

Q5 Find the length of each side of a triangle inscribed in a circle of radius $\frac{2\sqrt{3}}{3}cm$, if the triangle drawn is an equilateral triangle.

(A) $2cm$
(B) $3cm$
(C) $\sqrt{5}cm$
(D) $\sqrt{6}cm$

Q6 In a triangle DEF as shown, $DE = DG$ and $DG = GF$. If $\angle DFE = 25°$, then $\angle EDF =$



(A) 95°
(B) 105°
(C) 110°
(D) 115°

Q7 In $\triangle ABC, AD$ is a median and $AB = 5cm, BC = 11\ cm$ and $AC = 10cm$. Find the approx. length of AD.

(A) $5.7cm$ (B) $6.3cm$
(C) $6.5cm$ (D) $7.1cm$

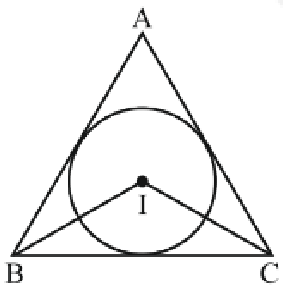
Q8 Perimeter of a triangle having none of the sides equal to each other is $17cm$. Find the absolute difference between maximum possible longest integral side and minimum possible longest integral side. (Assume other sides are also in integer form)

(A) $2cm$ (B) $3cm$
(C) $4cm$ (D) None of these

Q9 $\triangle ABC \sim \triangle DEF$. If $AB = 6cm, ED = 15cm$, and $Ar\ \triangle ABC = 108cm^2$, find $Ar\triangle DEF$.

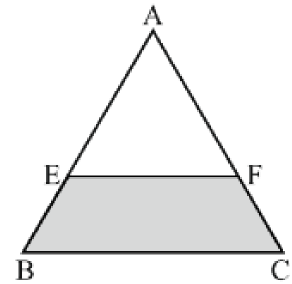
(A) $450cm^2$ (B) $675cm^2$
(C) $715cm^2$ (D) $760cm^2$

Q10 I is the centre of incircle as shown. Given $\angle A = 55^\circ$. What is reflex $\angle BIC$?



(A) 200°
(B) 235.5°
(C) 242.5°
(D) Inadequate data

Q11 $\triangle ABC \sim \triangle AEF$ as shown, $\angle B = \angle C = 60^\circ$ and $AC = 6cm$. Find the area of shaded region if $EB = 2\ cm$.

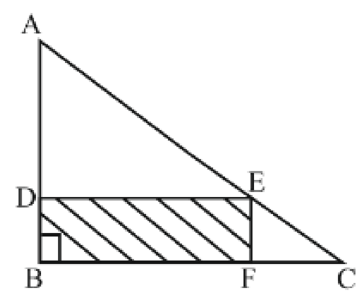


(A) $5\sqrt{3}cm^2$
(B) $4\sqrt{3}cm^2$
(C) $3\sqrt{3}cm^2$
(D) $2\sqrt{3}cm^2$

Q12 Aman is trying to calculate the total cost of mowing a triangular shaped field at Rs. $12/m^2$. But he is not able to find the area of field having sides as $15m, 18m$ and $21m$. Help him find the total cost of mowing and match the answer with the correct option.

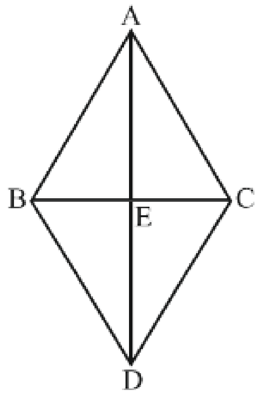
(A) Rs. $642\sqrt{6}$
(B) Rs. $644\sqrt{6}$
(C) Rs. $648\sqrt{6}$
(D) Rs. $658\sqrt{6}$

Q13 In $\triangle ABC$ given below, $DE \| BC$ and $EF \| AD$. Also $FC = 4cm, BC = 15cm$ and $AC = 17cm$. What is the approximate area of shaded region?



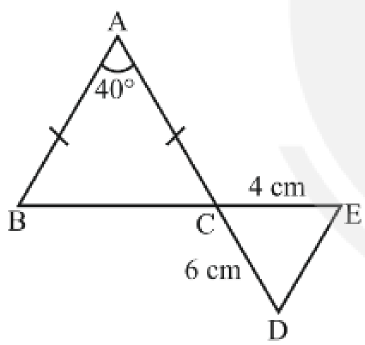
(A) $\frac{47}{2}cm^2$
(B) $\frac{45}{2}cm^2$
(C) $\frac{49}{3}cm^2$
(D) $\frac{53}{3}cm^2$

Q14 $\triangle ABC$ is congruent to $\triangle DBC$ as shown, Area of $\triangle ABC = 144cm^2$ and $BC = 24cm$. AE is the altitude of $\triangle ABC$ and DE is perpendicular on BC. Find AD.



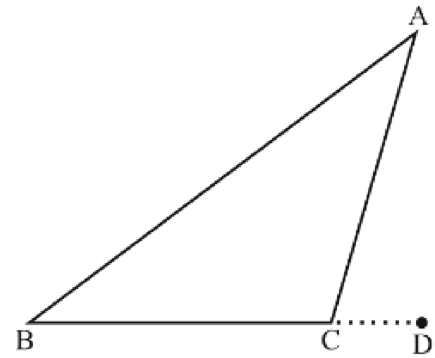
(A) $14cm$ (B) $16cm$
(C) $18cm$ (D) $24cm$

Q15 Side AC of $\triangle ABC$ is extended to meet at point D and side BC is extended to meet at point E. $AB = AC$ and $\triangle CDE$ is drawn as shown with sides $CE = 4cm$ and $CD = 6cm$. Find Ar $\triangle CDE$ (Given $\cos 20^\circ \approx 0.9$)



(A) $9.6cm^2$
(B) $10.8cm^2$
(C) $11.4cm^2$
(D) Data inadequate

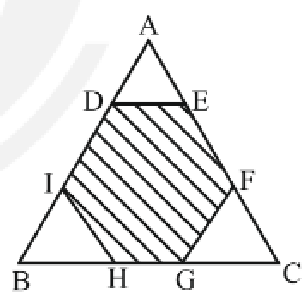
Q16 A triangle ABC is drawn as shown in the diagram. $Base BC = 6cm$, and side $AC = 13cm$, D is a point taken exactly below A, such that $CD = 5cm$. Find the area of $\triangle ABC$ if BD is a straight line.



(A) $24cm^2$ (B) $28cm^2$
(C) $32cm^2$ (D) $36cm^2$

Q17 STU is a right angled triangle right angled at T such that $TU = 21cm$ and ST $= 20cm$. An altitude TV is drawn on the base SU. Find its approximate length.
(A) $12cm$ (B) $12.8cm$
(C) $14.5cm$ (D) $15.6cm$

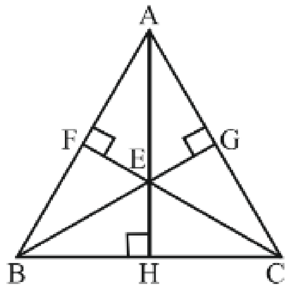
Q18 In equilateral $\triangle ABC, DE \| BC, FG \| AB$ and $IH \|$ AC. Also $IH = DE = FG, BC = 15cm$ and $HG = 10\ cm$. Find the area of shaded region.



(A) $51.56\sqrt{3}cm^2$
(B) $54.36\sqrt{3}cm^2$
(C) $55.48\sqrt{3}cm^2$
(D) $56.48\sqrt{3}cm^2$

Q19 Circumcircle of a triangle is drawn with radius 6 cm. Find the ratio of product of length of all sides to it's area.
(A) $12 : 1$ (B) $24 : 1$
(C) $28 : 1$ (D) $30 : 1$

Q20 $\angle A$ in the figure $= 50^\circ$, and $\angle EBC = 25^\circ$, then find $\angle ECB$.

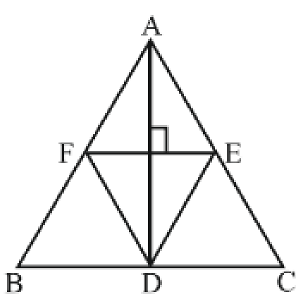


(A) 35°
(B) 30°
(C) 25°
(D) 20°

Q21 A wire of length $21cm$ is used to form an equilateral triangle. What is the radius of incircle drawn inside this triangle?

(A) $\frac{\sqrt{3}}{6}cm$
(B) $\frac{7\sqrt{3}}{6}cm$
(C) $\frac{11\sqrt{3}}{6}cm$
(D) $\frac{13\sqrt{3}}{6}cm$

Q22 ABC is a triangle as shown, in which 4 congruent equilateral triangles (AFE, BFD, DFE and CED) are drawn. AD is equal to $8cm$. The area of $\triangle ABC$ is $\frac{K\sqrt{3}}{3}cm^2$. What is the value of K ?



(A) 64
(B) 58
(C) 49
(D) 46

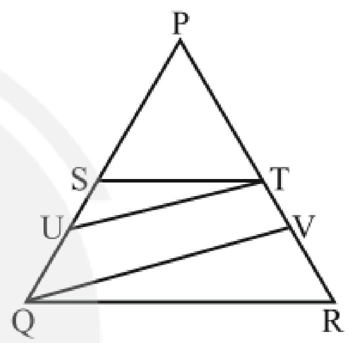
Q23 In a $\triangle ABC, BC$ is extended such that it meets the external angle bisector of $\angle A$ at a point P. If $AB = 7cm, AC = 6cm,$ and $BP = 8cm,$ then find BC.

(A) $\frac{5}{7}cm$
(B) $\frac{6}{7}cm$
(C) $1cm$
(D) $\frac{8}{7}cm$

Q24 What can be the minimum integral value of the sum of all medians of a triangle having sides $4cm, 7cm$ and $9cm$?

(A) $18cm$
(B) $16cm$
(C) $14cm$
(D) $13cm$

Q25 A $\triangle PQR$ is drawn such that ST is $\|$ to base QR as shown. $PS = 6cm, TR = 7cm$ and $TV = 3cm$. Find UQ if $PS = PT$ and $UT \| QV$.



(A) $\frac{13}{3}cm$
(B) $4cm$
(C) $\frac{11}{3}cm$
(D) $\frac{8}{3}cm$

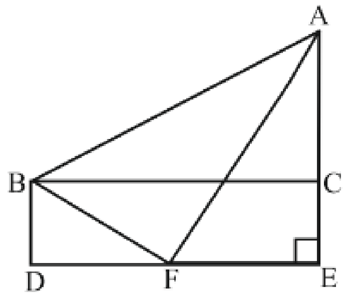
Q26 A right angled triangle is drawn in such a way that two of its angle are 30° and 60°. Find the ratio of length of it's sides in the order of side opposite to $(30^\circ, 90^\circ, 60^\circ)$.

(A) $1 : 2 : \sqrt{2}$
(B) $1 : \sqrt{2} : 1.2$
(C) $1 : \sqrt{3} : \sqrt{2}$
(D) $1 : 2 : \sqrt{3}$

Q27 An agricultural field is in triangular form and its sides are $10m, 13m$ and $15m$. There's another field of equal area but with only two equal sides, each of length $\sqrt{150}m$. Find it's third side.

(A) $8m$ (B) $12m$
(C) $14m$ (D) $15m$

Q28 In the figure given below, $BC||DE$ and $BD||AE$. Also, $AE = 9cm, DE = 9cm, FE = 6cm$ and $CE = 4cm$. Find $Ar\triangle ABF$.



(A) $22cm^2$ (B) $23.5cm^2$
(C) $25.5cm^2$ (D) $26cm^2$

Q29 The difference between hypotenuse and second longest side of a right angled triangle is 2 cm, whereas the difference between the sides other than hypotenuse is 47 cm. Find it's smallest side.

(A) 16 cm (B) 18 cm
(C) 21 cm (D) 23 cm

Q30 Top of a ladder makes 60° with the wall. The length of wall from ground to the meeting point of ladder and wall is $16m$. What is the difference between length of ladder and the distance between bottom point of ladder on ground and the bottom point of wall on ground?

(A) $16(4-\sqrt{3})m$
(B) $16\sqrt{3}m$
(C) $16(3-\sqrt{3})m$
(D) $16(2-\sqrt{3})m$

Answer Key

Q1	(B)
Q2	(B)
Q3	(C)
Q4	(C)
Q5	(A)
Q6	(B)
Q7	(A)
Q8	(D)
Q9	(B)
Q10	(C)
Q11	(A)
Q12	(C)
Q13	(A)
Q14	(D)
Q15	(B)
Q16	(D)
Q17	(C)
Q18	(A)
Q19	(B)
Q20	(C)
Q21	(B)
Q22	(A)
Q23	(D)
Q24	(B)
Q25	(A)
Q26	(D)
Q27	(B)
Q28	(C)
Q29	(A)
Q30	(D)

Hints & Solutions

Q1 Text Solution:

Given, $AB = 3m$ and $BC = 4m$,

So, Area of triangle ABC

$$= \left(\frac{1}{2} \times 3 \times 4\right) m^2 = 6m^2$$

Also, $DE = EF$ (radius of circle)

So, In $\triangle DEF$,

$$DE^2 + EF^2 = DF^2$$
$$(F, D \text{ is at tangent point so}$$

$DE \perp EF)$

or DF = $\sqrt{2}$ m so, Radius $= 1m$

and $DEFB$ is a square,

$$\text{as } DE = EF = FB = DB$$

Therefore, area of shaded region

$$= \left(6m^2 - \text{ Area of square }\right)$$
$$= \left(6m^2 - 1m^2\right)$$
$$= 5m^2$$

$Ans.b$

Q2 Text Solution:

In a right angle triangle, circumradius(R)=

$\frac{c}{2} = 50 \Rightarrow c = 100$ ....(i)

inradius(r) = $\frac{a+b-c}{2} \Rightarrow 12 = \frac{a+b-c}{2}$

$\Rightarrow 24 = a + b - c \ldots (ii)$

From eqn. (i) and (ii),

a+b-100=24 $\Rightarrow a + b = 124$...(iii)

as per pythagoras theorem

$a^2 + b^2 = c^2 = 100^2$

$also,\ (a + b)^2 - 2ab = a^2 + b^2 = 100^2$

$(124)^2 - 2ab = 100^2$

$\Rightarrow 2ab = 124^2 - 100^2$

$also,\ (a - b)^2 = a^2 + b^2 - 2ab = 100^2$

$-\left(124^2 - 100^2\right)$

$(a - b)^2 = 20,000 - 15,376 = 4,624$

$\left(a - b\right) = 68 \ldots \left(iv\right)$

From eqn. (iii) and (iv)

we have,

2a=192

a=96

b=28

so area of the triangle = $\frac{1}{2} \times 28 \times 96 = 1344$

Q3 Text Solution:

Given that $AC = 10cm$, $BC = 8cm$ and $AB = 6cm$

Pythagorean Triplet $\rightarrow (6, 8, 10)$

Now, BC and AB is divided into t equal parts

So, length of each part in case of

$BC = \frac{8}{t}cm$ and in case of $AB = \frac{6}{t}cm$

For the smallest possible right triangle this new part is their side

i.e. $n^2 = \left(\frac{8}{t}\right)^2 + \left(\frac{6}{t}\right)^2$

or $n = \sqrt{\frac{64+36}{t^2}}$

$n = \frac{10}{t}$

Also given, $2 < n < 3$

or $2 < \frac{10}{t} < 3$

Only $t = 4$ satisfies

Q4 Text Solution:

Let a, b and c are the sides of triangle such that
$a = 6cm, b = 11cm$
We know that,

$$\begin{aligned}&a+b>c\\&\text{or } 6+11>c\\&\text{or } 17>c\\&\text{Also, } a+c>b\end{aligned}$$

(sum of two sides greater than third)
or $6 + c > 11$
or $c > 5$
This implies that
$c = 6, 7, 8, 9, 10, 11, 12, 13, 14,$ 15,16
Number of triangle possible
$= (16 - 6) + 1 = 11$

Q5 Text Solution:

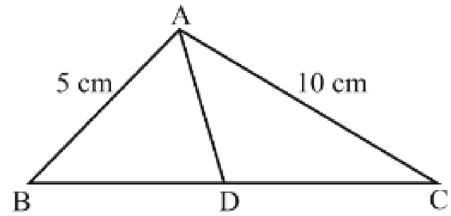
Given that the circumradius of equilateral triangle is $\frac{2\sqrt{3}}{3}$
Thus, if the length of side of an equilateral triangle is a, then $\frac{a}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$

$$a = 2\ cm$$

Q6 Text Solution:

As, $DG = GF$
So, $\triangle DGF$ is an isosceles triangle.
or $\angle DFE = \angle FDG = 25^\circ$
and $DE = DG$
So, $\triangle DEG$ is also an isosceles triangle or $\angle DEF = \angle DGE$
Also, $\angle DGE = 180^\circ - [180^\circ - (25^\circ + 25^\circ)]$
$= 50^\circ$
So, $\angle DEF = 50^\circ$
Therefore, $\angle EDF = 180^\circ - (25^\circ + 50^\circ)$
$= 105^\circ$

Q7 Text Solution:



Using Apollonius formula,

$$AB^2 + AC^2 = 2\left(AD^2 + BD^2\right)$$

We get,

$$5^2 + 10^2 = 2\left[AD^2 + \left(\frac{11}{2}\right)^2\right]$$
$$\text{or } \sqrt{\frac{125}{2} - \frac{121}{4}} = AD$$
$$\text{or } AD = \frac{\sqrt{129}}{2} \approx 5.67cm$$

Q8 Text Solution:

We know that,
If p is perimeter and ℓ the longest side of scalene triangle.
then,

$$\frac{p}{3} < \ell < \frac{p}{2}$$
$$\text{or } \frac{17}{3} < \ell < \frac{17}{2}$$

So, $\ell = 8$ (maximum)
and $\ell = 6$ (minimum)
But when $\ell = 6cm$, then other can be maximum 5 and $4cm$.
But $p \neq (6 + 5 + 4)cm$
or $17 \neq 15$
This means, $\ell = 7$ (minimum)
Therefore, required difference

$$= (8 - 7)cm = 1cm$$

Q9 Text Solution:

As $\triangle ABC \sim \triangle DEF$

So, $\left(\frac{AB}{DE}\right)^2 = \frac{108}{Ar\triangle DEF}$

or, $\mathrm{Ar}\,\triangle DEF = \left(108 \times \frac{225}{36}\right) cm^2 = 675cm^2$

Q10 Text Solution:

Angle BIC will be 90 + $\frac{A}{2}$

= $90 + \frac{55}{2}$

= 117.5

Therefore, reflex angle BIC will be 360 - 117.5

= 242.5

Q11 Text Solution:

As, $\triangle ABC \sim \triangle AEF$

So, $EF \| BC$

This means $\angle E = \angle F = 60^\circ$

And $\angle A = 60^\circ$ (Because other angles are 60°)

Both the triangles are equilateral

$$\text{Aera } \triangle ABC = \left[\frac{\sqrt{3}}{4} \times (6)^2\right] cm^2$$
$$= 9\sqrt{3}cm^2$$

and $\mathrm{Ar}\,\triangle AEF = \left[\frac{\sqrt{3}}{4} \times (6-2)^2\right] cm^2$

$= 4\sqrt{3}cm^2$

Therefore, area of shaded region $= 5\sqrt{3}cm^2$

Q12 Text Solution:

As none of the sides are equal to each other So, the field shape is of scalene triangle.

Suppose, $a = 15m, b = 18m$ and $c = 21m$ It's semi-perimeter, S (say)

$$= \frac{15+18+21}{2}$$
$$= 27m$$

Using Heron's formula,

$$\text{Area of field } = \sqrt{S(S-a)(S-b)(S-c)}$$
$$= \sqrt{27 \times 12 \times 9 \times 6m^2}$$
$$= \sqrt{3^3 \times 2^2 \times 3 \times 3^2 \times 3 \times 2m^2}$$
$$= \sqrt{3^7 \times 2^3 m^2} = 27 \times 2\sqrt{6}m^2$$
$$= 54\sqrt{6}m^2$$

Therefore, cost of mowing

$$= \text{Rs. } (12 \times 54\sqrt{6})$$

$=$ Rs. $648\sqrt{6}$

Q13 Text Solution:

Because,

$EF \| AB$, So $\triangle EFC \sim \triangle ABC$

and $DE \| BC$, So $\triangle ADE \sim \triangle ABC$

Now, using (i),

$$\frac{EF}{FC} = \frac{AB}{BC}$$

or $\frac{EF}{4cm} = \frac{\sqrt{17^2-15^2}}{15}$

or $EF = \left(\frac{8}{15} \times 4\right) cm$

$$= \frac{32}{15}cm$$

Area $\triangle EFC = \left(\frac{1}{2} \times \frac{32}{15} \times 4\right) cm^2$

$$= \frac{64}{15}cm^2$$

Also, $DE = BF = (BC - FC)$

$= (15-4)cm$

$= 11cm$

and $AD = (AB - DB)$
$= (AB - EF)$
$= \left(8 - \frac{32}{15}\right) cm$
$= \frac{88}{15} cm$

$$\text{Area } \triangle ADE = \left(\frac{1}{2} \times AD \times DE\right) cm^2$$
$$= \left(\frac{1}{2} \times \frac{88}{15} \times 11\right) cm^2$$
$$= \frac{484}{15} cm^2$$

Thereforc, arca of shaded region
$$= (Ar\Delta ABC - Ar\Delta EFC - Ar\Delta ADE)$$
$$= \left[\left(\frac{1}{2} \times 8 \times 15\right) - \frac{64}{15} - \frac{484}{15}\right] cm^2$$
$$= \left(60 - \frac{548}{15}\right) cm^2 \approx 23.5 cm^2$$

Q14 Text Solution:

Given,

$$\triangle ABC \cong \triangle DBC$$

and $AE \perp BC$ (AE is altitude)
So, $DE \perp BC$
And $AE = ED$
Now, $\frac{1}{2} \times BC \times AE = 144$

$$\Rightarrow AE = \left(\frac{144 \times 2}{24}\right) cm$$
$$= 12 cm$$

Therefore, $AD = (2 \times 12) cm = 24 cm$

Q15 Text Solution:

Given, $AB = AC$
or $\angle B = \angle ACB$
So, $\angle ACB = \frac{180^\circ - 40^\circ}{2} = 70^\circ$
And $\angle ACB = \angle DCE = 70^\circ$
(Vertically opposite angle)
Therefore area of $\triangle CDE$

$$= \frac{1}{2} \times 4 \times 6 \times \sin 70^\circ$$
$$= 12 \sin 70^\circ$$
$$= 12 \cos 20^\circ$$
$$= (12 \times .9)$$
$$= 10.8 cm^2$$

Q16 Text Solution:

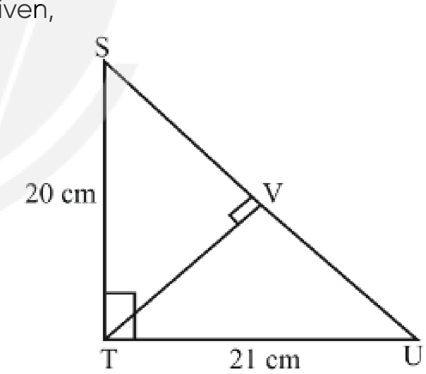
Because D is just below A
So, for $\triangle ACD$ it is a height
Also, $AC = 13 cm, CD = 5 cm$
So, using Pythagoras theorem,

$$AD = \sqrt{13^2 - 5^2} cm = 12 cm$$

Area of $\triangle ACD = \left(\frac{1}{2} \times 12 \times 5\right) cm = 30 cm^2$
and Area of
$\triangle ABD = \left[\frac{1}{2} \times 12 \times (5+6)\right] cm^2 = 66 cm^2$
Therefore area of $\triangle ABC$
$= (66 - 30) cm^2$
$= 36 cm^2$

Q17 Text Solution:

Given,



$$SU = \sqrt{20^2 + 21^2} = 29 cm$$

Also, area of the ΔSTU

$$= \left(\frac{1}{2} \times 20 \times 21\right) cm^2$$
$$= 210 cm^2$$

Because, $TV \perp SU$

So, TV $= \frac{2\times \text{ Area}}{\text{Hypotenuse}}$

$$= \frac{2 \times 210}{29} cm$$
$$\approx 14.5 cm$$

Q18 Text Solution:

Given, $\triangle ABC$ is an equilateral triangle, $IH \| AC$, $DE \| BC$ and $FG \| AB$

Also, $IH = FG = DE$

So, each of the smaller triangle are equilateral triangle of equal sides.

So, $GC = \frac{15-(HG)}{2}$

$$= \frac{15-10}{2}$$
$$= \frac{5}{2} cm$$

and area of $\triangle ABC$

$$= \left[\frac{\sqrt{3}}{4} \times (15)^2\right] cm^2$$
$$= \frac{225\sqrt{3}}{4} cm^2$$

Also, area of each smaller triangle

$$= \left[\frac{\sqrt{3}}{4} \times \left(\frac{5}{2}\right)^2\right] cm^2$$
$$= \frac{25\sqrt{3}}{16} cm^2$$

Therefore, aera of shaded region

$$= \left[\frac{225\sqrt{3}}{4} - \left(3 \times \frac{25\sqrt{3}}{16}\right)\right] cm^2$$
$$= \left(\frac{225\sqrt{3}}{4} - \frac{75\sqrt{3}}{16}\right) cm^2]$$
$$= \left[\frac{(900-75)\sqrt{3}}{16}\right] cm^2$$
$$= \frac{825\sqrt{3}}{16} cm^2$$
$$\approx 51.56\sqrt{3} cm^2$$

Q19 Text Solution:

We know that,

Circumradius $= \frac{\text{Product of length of all sides}}{4\times \text{ Area of triangle}}$

or $6 \times 4 = \frac{\text{Product of length of all sides}}{\text{Area of triangle}}$

or (Product of length of all sides) : (Area of triangle) $= 24 : 1$

Q20 Text Solution:

Because FC, BG and AH are the altitude.

So, E is orthocentre (common meeting point)

And therefore,

$$\angle A + \angle BEC = 180^\circ$$
$$\Rightarrow \angle BEC = (180^\circ - 50^\circ)$$
$$= 130^\circ$$
$$\text{In } \triangle EBC, \angle ECB = [180^\circ - (130^\circ + 25^\circ)]$$
$$= 25^\circ$$

Q21 Text Solution:

Topic - Equilateral Triangles

Perimeter of triangle $=$ length of wire $= 21 cm$

Semi-perimeter $= \frac{21}{2} cm$

Area of equilateral triangle $= \left[\frac{\sqrt{3}}{4} \times \left(\frac{21}{3}\right)^2\right] cm^2$

$$= \frac{49\sqrt{3}}{4} cm^2$$

Therefore, radius of incircle $= \frac{\frac{49\sqrt{3}}{4}}{\frac{21}{2}} cm$

$$= \left(\frac{7\sqrt{3}}{2} \times \frac{1}{3}\right) cm$$
$$= \frac{7}{6}\sqrt{3} cm$$

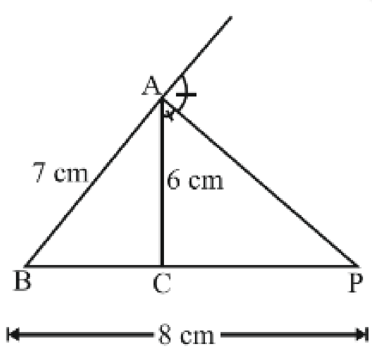
Q22 Text Solution:

$$AD = 8cm$$

Let AD intersect FE at G
Then, $AG = GD = \frac{8}{2} cm = 4cm$
(Congruent, so height equal)
or $\frac{\sqrt{3}}{2} \times$ side $=$ height of an equilateral triangle
or $4 = \frac{\sqrt{3}}{2} \times$ side
or side $= \frac{8}{\sqrt{3}} cm$
Therefore, Area of $\triangle ABC$

$$= \left[4 \times \frac{\sqrt{3}}{4} \times \left(\frac{8}{\sqrt{3}}\right)^2\right] cm^2$$
$$= \left(\sqrt{3} \times \frac{64}{3}\right) cm^2$$
$$= \frac{64\sqrt{3}}{3} cm^2$$

Q23 Text Solution:



We know that, external bisector of an angle of Δ divides the opposite side externally in the ratio of sides containing the angle.
or $\frac{AB}{AC} = \frac{BP}{PC}$
or $\frac{7}{6} = \frac{8}{PC}$
or $PC = \frac{48}{7} cm$
This implies, $BC = BP - PC$

$$= \left(8 - \frac{48}{7}\right) cm$$
$$= \frac{8}{7} cm$$

Q24 Text Solution:

Sum of medians of a triangle,
Say $(M_1 + M_2 + M_3) > \frac{3}{4}$ (Sum of all sides of a triangle)
or $(M_1 + M_2 + M_3) > \frac{3}{4}(4 + 7 + 9)$
or $(M_1 + M_2 + M_3) > 15$
So, $M_1 + M_2 + M_3$ can be $16cm$

Q25 Text Solution:

In $\triangle PQR$,
ST $\| QR$
So, $\frac{\mathrm{PS}}{\mathrm{SQ}} = \frac{\mathrm{PT}}{TR}$
(Using BPT)

$$\text{or } \frac{6}{SQ} = \frac{6}{7}$$
$$\text{or } SQ = 7cm$$

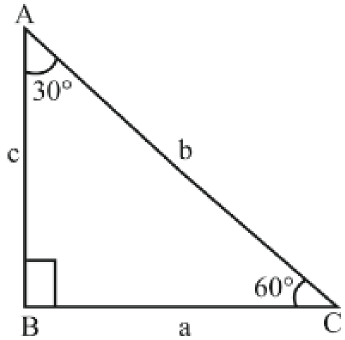
Now, Let $SU = xcm$, then, $UQ = (7 - x)cm$
So, in PQV,

$$\frac{PU}{UQ} = \frac{PT}{TV} \quad (\text{Using BPT, as UT } \| QV\ )$$
$$\text{or } \frac{PS + SU}{UQ} = \frac{6}{3}$$

or $\frac{6+x}{7-x} = 2$
or $14 - 2x = 6 + x$
or $8 = 3x$
or $x = \frac{8}{3}$
Therefore, UQ $= \left(7 - \frac{8}{3}\right) cm = \frac{13}{3} cm$

Q26 Text Solution:

Suppose ABC is a right angled triangle let $\angle A = 30°$ and $\angle C = 60°$.



Then, using sine rule

$$\frac{\operatorname{Sin} A}{a} = \frac{\operatorname{Sin} B}{b} = \frac{\operatorname{Sin} C}{c}$$
$$\text{or } \frac{\sin 30°}{a} = \frac{\sin 90°}{b} = \frac{\sin 60°}{c}$$
$$\text{or } \frac{1}{2a} = \frac{1}{b} = \frac{\sqrt{3}}{2c}$$
$$\text{or } a = \frac{b}{2} \text{ and } c = \frac{\sqrt{3}}{2}b$$

Therefore, $a : b : c$

$$= \frac{b}{2} : b : \frac{\sqrt{3}}{2}b$$
$$= \frac{1}{2} : 1 : \frac{\sqrt{3}}{2}$$
$$= 1 : 2 : \sqrt{3}$$

Q27 Text Solution:

None of the sides are equal

So, it is a scalene triangle

$$\text{Semi-perimeter } = \frac{(10 + 13 + 15)}{2}m$$
$$= 19m$$

Agricultural field area using Heron's formula

$$= \sqrt{19 \times (19 - 10) \times (19 - 13) \times (19 - 15)}m^2$$
$$= \sqrt{19 \times 9 \times 6 \times 4}m^2$$
$$= 6\sqrt{114}m^2$$

Now, suppose length of new field $= b$, other sides length is given.

Area of isosceles triangle shaped field

$$\Rightarrow \frac{b}{2}\sqrt{(\sqrt{150})^2 - \frac{b^2}{4}} = 6\sqrt{114}$$

At $b = 12$, the above equation satisfy Hence, other side length $= 12m$

Q28 Text Solution:

Because, $BC \| DE$ and $CE = 4cm$

$So, BD = 4cm$

$$\operatorname{Ar} \triangle BDF = \frac{1}{2} \times BD \times DF$$
$$= \left[\frac{1}{2} \times 4 \times (DE - FE)\right] cm^2$$
$$= \left[\frac{1}{2} \times 4 \times (9 - 6)\right] cm^2$$
$$= 6cm^2$$

$$\text{and } \operatorname{Ar} \triangle AEF = \left(\frac{1}{2} \times AE \times FE\right)$$
$$= \left(\frac{1}{2} \times 9 \times 6\right) cm^2$$
$$= 27cm^2$$

and $Ar\triangle ABC=\left(\frac{1}{2}\times AC\times BC\right)$

$=\left[\frac{1}{2}\times(AE-CE)\times DE\right]cm^2$

$=\left[\frac{1}{2}\times(9-4)\times 9\right]cm^2$

$=\frac{45}{2}cm^2$

Also, $Ar\square BDCE=(BD\times DE)$

$=(4\times 9)cm^2$

$=36cm^2$

Ar ΔAFB

$=\left[\left(36+\frac{45}{2}\right)-(6+27)\right]cm^2$

$=(58.5-33)cm^2$

Ans. $(58.5-33)cm^2$

$=25.5cm^2$

Q29 Text Solution:

Suppose, a, b and c are the sides of this triangle.

and, let $c>b>a$

Given, $c-b=2cm$

and $b-a=47cm$

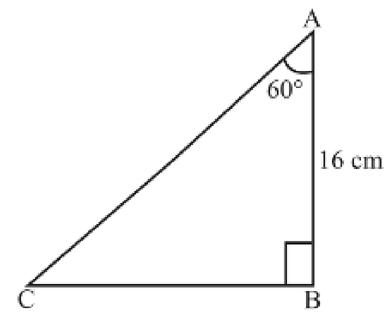
So, using Pythagoras Theorem,

$$c^2=b^2+a^2$$
$$\Rightarrow(2+b)^2=b^2+(b-47)^2$$
$$\Rightarrow b^2+4+4b=b^2+b^2+2209-94b$$
$$\Rightarrow b^2-98b+2205=0$$

At $b=63cm$, above equation is satisfied.

So, smallest side, $a=(63-47)cm=16cm$

Q30 Text Solution:



Then, $\frac{AB}{AC}=\cos 60^\circ$

$$\Rightarrow\frac{16}{AC}=\frac{1}{2}$$
$$\text{or } AC=32m$$

or $AC=32m$

and $\frac{BC}{AC}=\sin 60^\circ$

$$\Rightarrow\frac{BC}{32}=\frac{\sqrt{3}}{2}$$

$$\Rightarrow BC=16\sqrt{3}m$$

So, difference ($AC-BC$)

$$=(32-16\sqrt{3})m$$
$$=16(2-\sqrt{3})m$$