Areas of Parallelograms and Triangles

OLYMPIAD EXCELLENCE BOOK **MATHEMATICS**

QUESTIONS

1. The difference of the areas of two squares drawn on two line segments of different lengths is 51 sq. cm. Find the length of the greater line segment if one is longer than the other by 3 cm.

(a) 7 cm (b) 9 cm (c) 11 cm (d) 16 cm

2. A kite in the shape of a square with a diagonal 32 cm attached to an equilateral triangle of the base 8 cm. approximately how much paper has been used to make it? (use $\sqrt{3} = 1.732$)

(a) 539.712 cm^2 (b) 538.721 cm^2 (c) 540.712 cm^2 (d) 539.217 cm^2

3. A field is in the shape of a trapezium whose parallel sides are 25m and 10m. The non parallel sides are 14m and 13m. Then the area of the field is

(a) 190 m^2 (b) 180 m^2 (c) 196 m^2 (d) 195 m^2

4. The area of a rhombus whose perimeter is 80 m and one of whose diagonal is 24 m, is

(a) 380 m^2 (b) 370 m^2 (c) 374 m^2 (d) 384 m^2

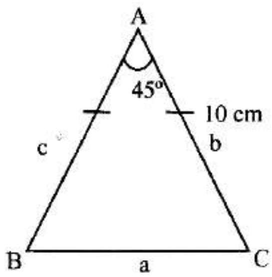
5. The length of a room floor exceeds its breadth by 20 m. The area of the floor remains unaltered when the length is decreased by 10 m but the breadth is increased by 5 m. The area of the floor (in square metres) is

(a) 280 (b) 325 (c) 300 (d) 420

6. The length and breadth of a rectangle are increased by 20 % and 10% respectively. The increase in the area of the resulting rectangle will be

(a) 60% (b) 50% (c) 40% (d) 32%

7. In the given figure an isosceles triangle, the measure of each of equal sides is 10 cm and the angle between them is 45°, the area of the triangle is



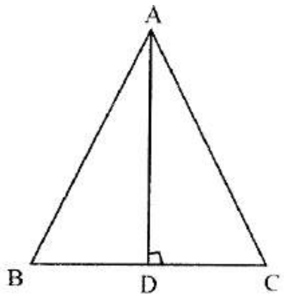
(a) 25 cm^2 (b) $\frac{25}{2}\sqrt{2}\,cm^2$ (c) $25\sqrt{2}\ cm^2$ (d) $25\sqrt{3}\ cm^2$

8. ABC is an equilateral triangle of side 4 cm. with A, B, C as vertex and radius 2 cm three arcs are drawn. The area of the region within the triangle bounded by the three area is

(a) $\left(3\sqrt{3}-\frac{\pi}{2}\right) cm^2$ (b) $\left(\sqrt{3}-\frac{3\pi}{2}\right) cm^2$

(c) $4\left(\sqrt{3}-\frac{\pi}{2}\right) cm^2$ (d) $\left(\frac{\pi}{2}-\sqrt{3}\right) cm^2$

9. The area of an isosceles triangle is 4 square unit. If the length of the third side is 4 unit, the length of each equal side is



(a) 4 units (b) $2\sqrt{3}$ units (c) $2\sqrt{2}$ units (d) $3\sqrt{2}$ units

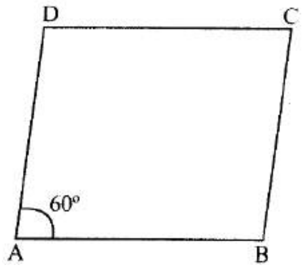
10. A parallelogram has sides 15 cm and 7 cm long. The length of one of the diagonals is 20 cm. The area of the parallelogram is

(a) 42 cm^2 (b) 60 cm^2 (c) 84 cm^2 (d) 96 cm^2

11. **Sides of a parallelogram are in the ratio 5 : 4. Its area is 1000 sq. units. Altitude on the greater side is 20 units. Altitude on the smaller side is**

(a) 30 units (b) 25 units (c) 10 units (d) 15 units

12. The perimeter of a rhombus is 16 cm and the measure of an angle is $60°$, then the area of it is

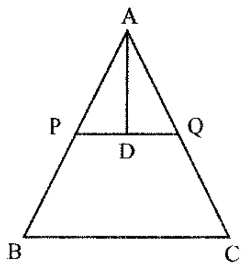


(a) $100\sqrt{3}$ cm^2 (b) $8\sqrt{3}$ cm^2 (c) $160\sqrt{3}$ cm^2 (d) 100 cm^2

13. If the side of a square is increased by 20%, then its area is increased by :

(a) 25% (b) 55% (c) 44 % (d) 56.25%

14. ABC is an equilateral triangle. P and Q are two points on $\overline{AB}$ and $\overline{AC}$ respectively such that $PQ \parallel BC$. If $\overline{PQ} = 3$ cm, then area of ΔAPQ is:



(a) $\frac{25}{4}$ sq.cm (b) $\frac{25}{\sqrt{3}}$ sq.cm (c) $\frac{9\sqrt{3}}{4}$ sq.cm (d) $25\sqrt{3}$ sq.cm

15. ABCD is a parallelogram. BC is produced to Q such that BC = CQ. Then

(a) area (ΔBCP) = area (ΔDPQ)

(b) area (ΔBCP) > area (ΔDPQ)

(c) area (ΔBCP) < area (ΔDPQ)

(d) area (ΔBCP) + area (ΔDPQ) = area (ΔBCD)

16. In ΔPQR, the line drawn from the vertex P intersects QR at a point S. If QR = 4.5 cm and SR = 1.5 cm then the ratios of the area of triangle PQS and triangle PSR is

(a) 4 : 1 (b) 3 : 1 (c) 3 : 2 (d) 2 : 1

17. ABCD is a parallelogram X and Y are the mid points of sides BC and CD respectively. If the area of ΔABC is $16\,cm^2$, then the area of ΔAXY is

(a) 12 cm^2 (b) 8 cm^2 (c) 9 cm^2 (d) 10 cm^2

18. PQR is a right angles triangle Q being the right angle. Mid-points of QR and PR are respectively Q' and P' Area of $\Delta P'Q'R'$ is

(a) $\frac{1}{2} \times area\ of\ \Delta PQR$ (b) $\frac{2}{3} \times area\ of\ \Delta PQR$

(c) $\frac{1}{4} \times area\ of\ \Delta PQR$ (d) $\frac{1}{8} \times area\ of\ \Delta PQR$

19. From any point inside an equilateral triangle, the lengths of perpendiculars 015 the sides are 'a' cm 'b' cm and 'c' cms. Its area (in cm^2) is

(a) $\frac{\sqrt{2}}{3}(a+b+c)$ (b) $\frac{\sqrt{3}}{3}(a+b+c)^2$

(c) $\frac{\sqrt{3}}{3}(a+b+c)$ (d) $\frac{\sqrt{2}}{3}(a+b+c)^2$

20. ABCD is a square. Draw a triangle QBC on side BC considering BC as base and draw a triangle PAC on AC as its base such that $\Delta QBC \sim PAC$.

Then, $\frac{Area\,of\ \Delta QBC}{Area\,of\ \Delta PAC}$ is equal to

(a) $\frac{1}{2}$ (b) $\frac{2}{1}$ (c) $\frac{1}{3}$ (d) $\frac{2}{3}$

21. A rectangular park 60 metre long and 40 metre wide has two concrete crossroads running in the middle of the park and rest of the park has been used as a lawn. If the area of the lawn is 2109 metre^2 then the width of the road is

(a) 3 metre (b) 5 metre (c) 6 metre (d) 2 metre

Direction (Question 22 to 23): Each of the questions Mow consists of a questions followed by statements. You have to study the questions and the statements and decide which of the statement (s) is/are necessary to answer the question?

22. What is the area of rectangular field?

I. The perimeter of the field is 110 metres.

II. The length is 5 metres more than the width.

III. The ratio between length and width is 6:5 respectively,

(a) I and II only
(b) Any two of the three
(c) I, and either II or III only
(d) None of these

23. A path runs around a rectangular lawn. What is the width of the path?

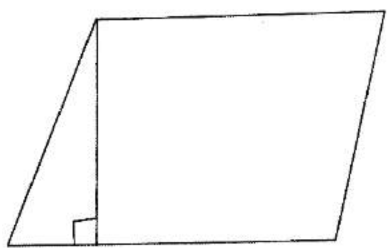
I. The length and breadth of the lawn are in the ratio of 2:1 respectively,,

II. The width of the path is twenty times the length of the lawn.

III. The cost of gravelling the path @ Rs. 50 per nr is Rs. 4416.

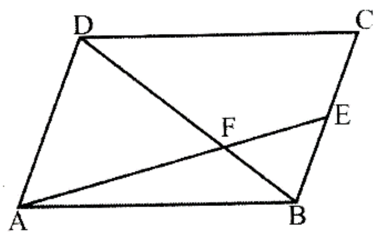
(a) All I, II and III
(b) III, and either I or II
(c) I and III only
(d) II and III only

24. The area of a rectangle lies between $40\,cm^2$ and $45\,cm^2$. If one of the sides is 5cm, then its diagonal lies between



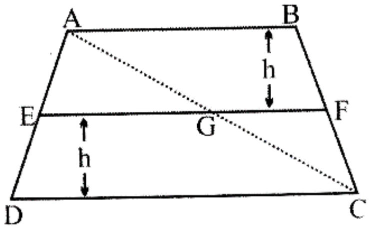
(a) 8 cm and 10 cm
(b) 9 cm and 11 cm
(c) 10 cm and 12 cm
(d) 11 cm and 13 cm

25. ABCD is a parallelogram. E is a point BC such that BE : EC = m : n. If AE and BD intersect in F, then what is the ratio of the area of ΔPEB to the area of ΔAFD?



(a) m/n
(b) $(m/n)^2$
(c) $(n/m)^2$
(d) $\left[m/(n+m)^2\right]^2$

26. ABCD is a trapezium with parallel sides AB = 2cm and DC = 3cm. E and F are the mid- points of the non-parallel sides. The ratio of area of ABFE to area of EFCD is



(a) 9:10 (b) 8:9 (c) 9:11 (d) 11:9

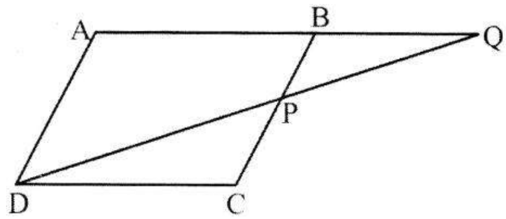
27. Let LMNP be a parallelogram and NR be perpendicular to LP. If the area of the parallelogram is six times the area of ΔRNP and RP = 6 cm then LR is equal to

(a) 15 cm (b) 12cm (c) 9 cm (d) 8 cm

28. In the given figure, ABCD is a quadrilateral with AB parallel to DC and AD parallel to BC, ADC is a right angle. If the perimeter of the ΔABE is 6 units, what is the of the quadrilateral?

(a) $2\sqrt{3}$ sq units (b) 4 sq units (c) 3 sq units (d) $4\sqrt{3}$ sq units

29. In the figure given below, ABCD is a parallelogram. P is a point in BC such that PR : PC = 1 : 2, DP produced meets AB produced at Q, If the area of the ΔBPQ is 20 SQ units, what is the area of the ΔDCP?



(a) 20 sq units
(b) 30 sq units
(c) 40 sq units
(d) none of the above

30. From a point within an equilateral triangle, perpendicular are drawn to its sides. The lengths of these perpendicular are 6 m, 7m and 8m. Find the area of the triangle

(a) 160 sq. m (b) $147\sqrt{3}$ sq. m (c) $210\sqrt{3}$ sq.m. (d) $27\sqrt{3}$ sq.nz

ANSWER KEY & HINTS

1. (b): Let the length of the smaller line segment =x cm. The length of larger line segment $=(x+3)$ cm.

According to the question,

$(x+3)^2-x^2=51$

$\Rightarrow x^2+6x-9-x^2=51$

$\Rightarrow 6x=51-9=42$

$\Rightarrow \ x=\frac{42}{6}=7$

The required length

$=x+2=7+2=9$ cm.

2. (a): Area of paper = Area of square + Area of equilateral triangle

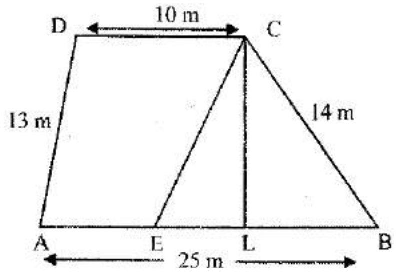
$=\frac{1}{2}(diagonal)^2+\frac{\sqrt{3}}{4}\times(side)^2$

$=\frac{1}{2}\times 32\times 32+\frac{\sqrt{3}}{4}\times 8\times 8$

$512+16\times 1.732$

$512+27.712=539.712\ cm^2$

3. (c):



From C, draw $CE \parallel DA$. Clearly, ADCE is a parallelogram having $AD \parallel CE$ and $DC \parallel AE$ such that $AD=13$ m and $DC=10$ m.

$\therefore\ AE=DC=10$ m and $CE=AD=13$ m

$\Rightarrow BE=AB-AE=(25-10)m=15$ m

Thus in ΔBCE, we have

$BC=14$ m, $CE=13$ m and $BE=15$ m

Let's be the semi - perimeter of ΔBCE. Then,

$2s=BC+CE+BE=14+13+15=42$

$\Rightarrow s = 21$

Area of

$\Delta BCE = \sqrt{21 \times (21-14) \times (21-13) \times (21-15)}$

$\Rightarrow$ Area of $\Delta BCE = \sqrt{21 \times 7 \times 8 \times 6}$

$\Rightarrow$ Area of $\Delta BCE = \sqrt{7^2 \times 3^2 \times 4^2 = 84}$ m^2

Also, Area of $\Delta BCE = \frac{1}{2}(BE \times CL)$

$\Rightarrow 84 = \frac{1}{2} \times 15 \times CL \Rightarrow CL = \frac{168}{15} = \frac{56}{5}$

$\Rightarrow$ Height of parallelogram $ADCE = CL = \frac{56}{5}$ m

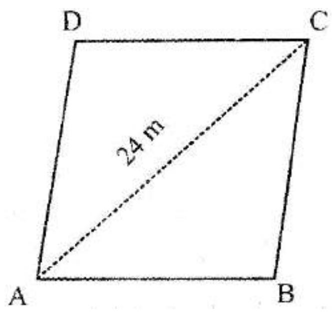
$\therefore$ Area of parallelogram ADCE = Base $\times$ Height

$= AE \times CL = 10 \times \frac{56}{5} = 112 m^2$

Hence, Area of trapezium ABCE = Area of parallelogram ABCE = Area of parallelogram ADCE + Area of ΔBCE

$= (112 + 84) m^2 = 196 m^2$

4. (d):



Let ABCD be the rhombus of perimeter 80 m and diagonal $AC = 24$ m

We have,

$AB + BC + CD + DA = 80$

$\Rightarrow 4AB = 80 \qquad [\therefore A.B = BC = CD = DA]$

$\Rightarrow AB = 20$ m

In ΔABC, we have

$2s = AB + BC + AC = 20 + 20 + +24 = 64$

$\Rightarrow s = 32$

$\therefore \Delta_1 = Area\, of\, \Delta ABC = \sqrt{32 \times 12 \times 12 \times 8} = 16 \times 12 = 192 m^2$

Hence, area of rhombus $ABCD = 2 \times 192 m^2 = 384 m^2$.

5. (c): Let the breadth of floor be x metre.

$\therefore$ Length $=(x+20)$ metre

$\therefore$ Area of the floor

$(x+20)x$ sq. metre

According to question,

$(x+10)(x+5)=x(x+20)$

$\Rightarrow x^2+15x+50=x^2+20x$

$\Rightarrow 20x=15x+50$

$\Rightarrow 5x=50$

$\Rightarrow x=10$ metre

$\therefore$ Length $=x+20=10+20=30$ metre

$\therefore$ Area of the floor $=30\times10=300$ sq. metre

6. (d):

New effect on area of rectangle

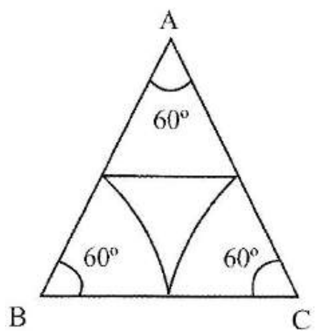
$=\left(20+10+\dfrac{20\times10}{100}\right)\%=32\%$ $\left[\therefore \text{Net}\,\%\,\text{change}=\dfrac{a+b+ab}{100}\right]\%$

7. (c): $AB=AC=10$ cm

$Area=\dfrac{1}{2}bc\,sinA=\dfrac{1}{2}\times10\times10\,sin45^{\circ}$

$=\dfrac{50}{\sqrt{2}}=\dfrac{50\times\sqrt{2}}{\sqrt{2}\times\sqrt{2}}=25\sqrt{2}\ cm^2$

8. (c):



Each angle of the triangle $=60^{\circ}$

Required area of the three sectors

$= 3 \times \frac{60}{360} \times \pi(2)^2 = 2\pi cm^2$

Area of triangle $= \frac{\sqrt{3}}{4} \times 16 = 4\sqrt{3} cm^2$

$\therefore$ Required Area $= (4\sqrt{3} - 2\pi) cm^2$

9. (c): Let, $AB = AC = x$ units

$BD = DC = 2$ *unit* $[\therefore BC = 4 \text{ units}]$

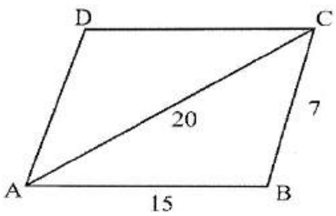
Now, $AD = \sqrt{AB^2 - BD^2} = \sqrt{x^2 - 1}$

$\therefore \frac{4}{2} \times BC \times AD = 8$

$\Rightarrow \frac{1}{2} \times 4 \times \sqrt{x^2 - 1} = 8 \Rightarrow \sqrt{x^2 - 1} = 4$

$\Rightarrow x^2 - 1 = 16 \Rightarrow x^2 = 17 \Rightarrow x = \sqrt{17}$ units

10. (c):



Area of parallelogram ABCD = Area of 2 ΔABC

Semi- perimeter of $\Delta ABC, S = \frac{20 + 7 + 15}{2} = \frac{42}{2} = 21 cm$

$\therefore$ area of $\Delta ABC = \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{21(21-7)(21-20)(21-15)}$

$= \sqrt{21 \times 14 \times 6} = 42$ sq.cm.

$\therefore$ Area of parallelogram $= 2 \times 42 = 84$ sq.cm.

11. (b): Let the sides of parallelogram be $5x$ and $4x$

$Base \times Height = Area\ of\ parallelogram$

$5x \times 20 = 1000 \Rightarrow x = \frac{1000}{5 \times 20} = 10$

$\Rightarrow$ sides = 50 and 40 units

$\therefore 40 \times h = 1000 \Rightarrow h = \dfrac{1000}{40} = 25$ units

12. (b): $Side = \dfrac{16}{4} = 4cm$ but, $AB = AD = 4$ cm

$\angle DAB = \angle DCB = 60^\circ$

$\therefore$ Area of the rhombus $= 2 \times \dfrac{\sqrt{3}}{4} \times (4)^2$

$= 2 \times \dfrac{\sqrt{3}}{4} \times 4 \times 4 = 8\sqrt{3}\, cm^2$

13. (c): Let the side of a square is increased $x\%$ by, its area is increased by $\left(2x + \dfrac{x^2}{100}\right)\%$

Here, $x = 20\%$

$\therefore$ Effective increase in area

$= \left(2 \times 20 + \dfrac{20 \times 20}{100}\right)\% = 44\%$

14. (c): $PQ \parallel BC$

Also, $\angle APQ = \angle ABC = 60^\circ$

$\angle AQP = \angle ACB = 60^\circ$

$\therefore$ Area of $\Delta APQ = \dfrac{\sqrt{3}}{4} \times (PQ)^2 = \dfrac{\sqrt{3}}{4} \times (3)^2 = \dfrac{9\sqrt{3}}{4}$ sq.cm

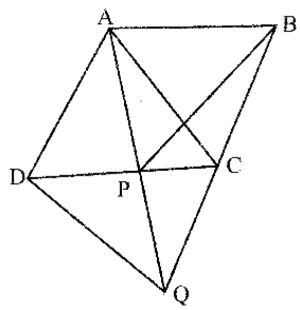
15. (a): Join AC & DQ $\therefore$ ΔAPC and ΔBCP lie on the same base PC and between the same parallels AB and PC

$\therefore ar(\Delta APC) = ar(\Delta BCP)$ ....(i)

Now, $AD \parallel CQ$ and $AD = CQ$

$\therefore$ ΔDQC is a parallelogram,

Again ΔADC and ΔDAQ are on the same base AD and between same parallels AD and CQ.



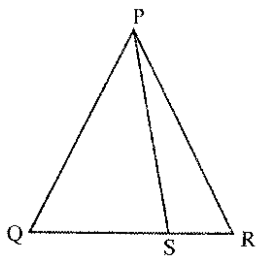
$\therefore ar(\Delta ADC) = ar(\Delta ADQ)$

Subtracting ar (DAP) from both sides, we get

$\text{ar}(\Delta APC) = \text{ar}(\Delta DPQ)$ .....(ii)

From (i) and (ii), we get ar (ΔBCP) = $\text{ar}(\Delta DPQ)$

16. (d):



$QR = 4.5\,\text{cm}$

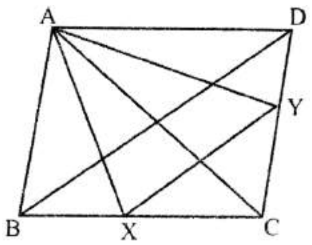
$SR = 1.5\,\text{cm}$

$\therefore QS = 4.5 - 1.5 = 3\,\text{cm}$

$$\frac{\Delta PQS}{\Delta PSR} = \frac{\frac{1}{2} \times h \times QS}{\frac{1}{2} \times h \times SR}$$

$$= \frac{3}{1.5} = 2:1$$

17. (a):

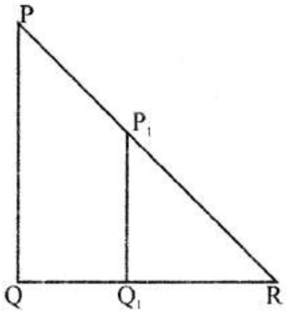


$$\Delta AXY = \frac{3}{8}([\ \ ]ABCD)$$

$$= \frac{3}{4}\Delta ABC$$

$$= \frac{3}{4} \times 16 = 12 \text{ sq.cm.}$$

18. (c):



In ΔPQR and ΔP_1Q_1R

$P_1Q_1 \parallel PQ$

$\angle Q_1 = \angle Q, \angle P_1 = \angle P$

$\therefore \Delta PQR \parallel \Delta P_1Q_1R$

$\Delta P_1Q_1 = \frac{1}{2}PQ.$

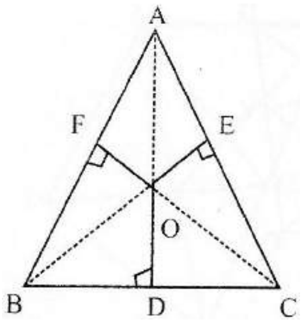
Area of $P_1Q_1R = \frac{1}{2} \times Q_1R \times P_1Q_1$

$= \frac{1}{2} \times \frac{1}{2}QR \times \frac{1}{2}pQ$

$= \frac{1}{4}\left(\frac{1}{2} \times QR \times PR\right)$

$= \frac{1}{4} \times (Area\, of\, \Delta PQR)$

19. (b):



$OD = a\ cm, OE = b\ cm.$

$OF = c$ cm.

$BC = AC = AB$

Area of ΔABC

$= Area\ of\left(\Delta BOC + \Delta COA + \Delta BOA\right)$

$= \frac{1}{2} \times BC \times a + \frac{1}{2} AC \times b + \frac{1}{2} \times AB \times c$

$\frac{1}{2} BC(a+b+c)$ ....(i)

$(\therefore AB = BC = CA)$

Again, Area of ΔABC

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

$\therefore \frac{\sqrt{3}}{4} \times BC^2 = \frac{1}{2} BC(a+b+c)$

$\Rightarrow BC = \frac{2}{\sqrt{3}}(a+b+c)$

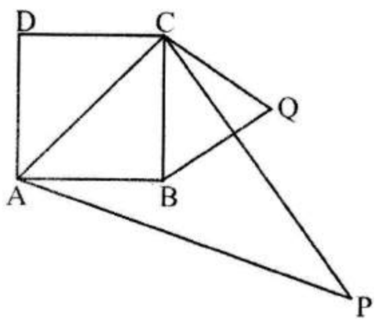
$\therefore$ Required area

$= \frac{1}{2} \times \frac{2}{\sqrt{3}}(a+b+c)^2$

$= \frac{\sqrt{3}}{\sqrt{3} \times \sqrt{3}} = (a+b+c)^2$

$= \frac{\sqrt{3}}{3} = (a+b+c)^2$ sq. units

20. (a):



From ΔABC

$AC = \sqrt{AB^2 + BC^2}$

$= \sqrt{AB^2 + BC^2}$

$= \sqrt{2} BC$

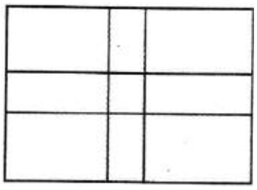
$\Delta QBC \parallel \Delta PAC$

$\therefore \frac{Area\ of\ \Delta QBC}{Area\ of\ \Delta PAC} = \frac{BC^2}{AC^2}$

$$= \frac{BC^2}{\left(\sqrt{2}BC\right)^2}$$

$$= \frac{BC^2}{2BC^2} = \frac{1}{2}$$

21. (a):



Area of rectangular park $= 60 \times 40 = 2400$ sq. metre

Let the width of cross road be x metre.

$\therefore$ Area of cross roads $= 60x + 40x - x^2 = 100x - x^2$

According to the question.

$$100x - x^2 = 2400 - 2109$$

$$\Rightarrow 100x - x^2 = 291$$

$$\Rightarrow x^2 - 100x + 291 = 0$$

$$\Rightarrow x^2 - 3x - 97x + 291 = 0$$

$$\Rightarrow x(x-3) - 97(x-3) = 0$$

$$\Rightarrow (x-3)(x-97) = 0$$

$$\Rightarrow \; x = 3 \text{ because } x \neq 97$$

22. (b): **I.** $1.2(l+b) = 110 \Rightarrow l + b = 55$

II. $l = (b+5) \Rightarrow l - b = 5.$

III. $\frac{l}{b} = \frac{6}{5} \Rightarrow 5l - 6b = 0$

These are three equations in l and b. We may solve then pair wise.

$\therefore$ Any two of the three will give the answer.

$\therefore$ Correct answer is (b).

23. (a): **III.** gives area of the path $= \frac{4416}{25}\ m^2$

II. gives width of path = 20 x (Length of the lawn).

I. gives length = 3x metres and breadth = x metres

Clearly, all the three will be required to find the width of the path.

$\therefore$ Correct answer is (a)

24. (b):- Area of rectangle lies between $40\,cm^2$ and $45\,cm^2$ Now one side = 5 cm

Since, area cannot be less than $40\,cm^2$

$\therefore$ Other side cannot be less than $= \frac{40}{5} = 8$ cm

Since, area cannot be greater than $45\,cm^2$

$\therefore$ Other side cannot be greater than $= \frac{45}{5} = 9$ cm

$\therefore$ Minimum value of diagonal $= \sqrt{8^2 + 5^2}$

Maximum value of diagonal $= \sqrt{9^2 + 5^2}$

$= \sqrt{106} = 10.3$ cm

So, diagonal lies between 9cm and 11 cm

25. (d):- In ΔAFD and ΔFEB

$\angle AFD = \angle BFE$ (Vertically opposite angles)

And $\angle ADC = \angle ABC$

$\therefore$ $\Delta AFD \sim \Delta BFE$

So, $\frac{ar(\Delta FED)}{ar(\Delta AFD)} = \frac{EB^2}{AD^2} = \frac{m^2}{(mn)^2} = \frac{m^2}{(mn)^2} = \left[\frac{m}{m+n}\right]^2$

26. (c):- Join AC.

In $\Delta ACD.\ EG \parallel DC$ and E and G are mid-points of AD and AC, respective

$\therefore\ EG = \frac{1}{2}DC = \frac{3}{2}$

Similarly, in ΔABC

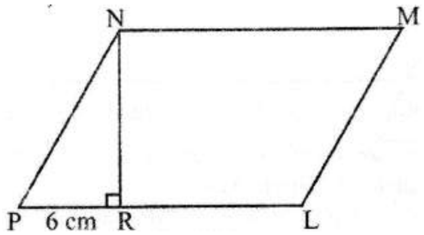
$GF = \frac{1}{2}AB = 1$

$EF = EG + GF = 1 + \frac{3}{2} = \frac{5}{2}$

$\therefore$ Area if trapezium $= \frac{1}{2}$ (Sum of parallel sides $\times$ Height)

Now, required ratio $= \frac{Area\ of\ ABFE}{Area\ of\ EFCD} = \frac{\frac{1}{2}\left(2 + \frac{5}{2}\right) \times h}{\frac{1}{2}\left(3 + \frac{5}{2}\right) \times h} = \frac{9}{11}$

27. (b):- by given condition,



Area of parallelogram $= 6 \times area\ of\ \Delta NPR$

$\therefore NR \times PL = 6 \times \frac{1}{2} \times NR \times pR$

$\Rightarrow PL = 3PR$ $\quad$ $(here, PL = PR + RL)$

$\Rightarrow PR + RL = 3PR$

$\Rightarrow RL = 2PR = 2 \times 6 = 12$ cm.

28. (a): $AB \| DC$ and $AD \| BC$

In ΔABE,

$\angle EAB = \angle ABE = 60^\circ$

$\Rightarrow \angle AE = 60^\circ$

$\Rightarrow \Delta ABE$ is an equilateral triangle.

Now, Perimeter of $\Delta ABE = 6$

$\Rightarrow AB + BE + EA = 2$

And in ΔADE, $AE^2 = AD^2 + ED^2$

$\Rightarrow 4 = AD^2 + 1$ $\quad$ (Since. E is mid-point of CD)

$\Rightarrow AD = \sqrt{3}$ units

Hence, area of quadrilateral $ABCD = AB \times AD$

$= 2 \times \sqrt{3} = 2\sqrt{3}$ sq units

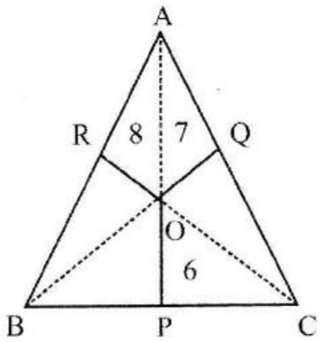
29. (d):- We know that, ratio of the areas of two similar triangles is equal to the ratios of squares their corresponding sides.

$\therefore \frac{Area(\Delta BPQ)}{Area(\Delta DPC)} = \frac{PB^2}{PC^2}$

$\Rightarrow \frac{20}{Area(\Delta DPC)} = \frac{1}{4}$

$\Rightarrow$ Area$(\Delta DPC) = 80$ sq units

30. (b): Let a the side of an equilateral triangle ABC.



Area of $\Delta OBC + area\, of\, \Delta OAC + area\, of\, \Delta OAB$

$= Area\, of\, \Delta ABC$

$$\frac{1}{2} \times a \times 6 + \frac{1}{2} \times a \times 7 + \frac{1}{2} \times a \times 8 = \frac{\sqrt{3}}{4} a^2$$

$$\frac{1}{2} a \times 21 = \frac{\sqrt{3}}{4} a^2$$

$$a = \frac{42}{\sqrt{3}} = \frac{42 \times \sqrt{3}}{3} = 14\sqrt{3}$$

$\therefore$ area of triangle $= \frac{\sqrt{3}}{4} \times a^2$

$$= \frac{\sqrt{3}}{4} \left(14\sqrt{3}\right)^2 = \frac{\sqrt{3}}{4} \times 196 \times 3 = 147\sqrt{3} \text{ sq.cm}$$