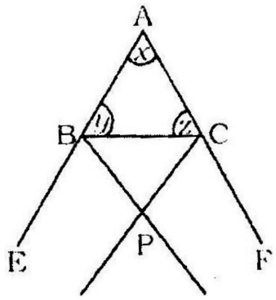
Triangles, Quadrilateral and Circles Solution

1	C	8	C	15	B	22	D
2	B	9	B	16	B	23	D
3	B	10	B	17	A	24	C
4	D	11	B	18	D	25	C
5	B	12	D	19	C	26	c
6	B	13	D	20	D	27	a
7	b	14	D	21	B		

1. (C) In $\triangle$ ABC,



$\angle$A=x, $\angle$B=y, $\angle$C=z.
In $\triangle$ PBC
$\angle$PBC+$\angle$PCB+$\angle$BPC=180º

$\Rightarrow \frac{1}{2}\angle EBC + \frac{1}{2}\angle FCB + \angle BPC = 180^\circ$

$\Rightarrow \angle EBC + \angle FCB + 2\angle BPC = 360^\circ$

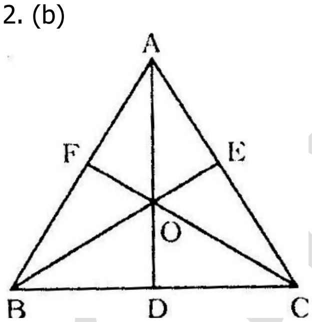
$\Rightarrow (180^\circ - y) + (180^\circ - z) + 2\ \angle BPC = 360^\circ)$

$\Rightarrow$ 360º-(y+z)+2$\angle$BPC=360º
$\Rightarrow$ $\angle$BPC=y+z
$\Rightarrow$ 180º-$\angle$BAC

$\therefore$ $\angle$BPC=90º-$\frac{1}{2}\angle BAC$

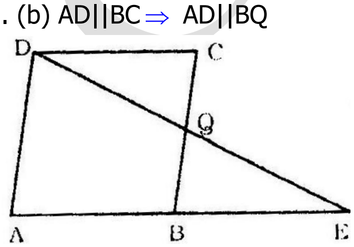
= 90º-50º=40º

2. (b)



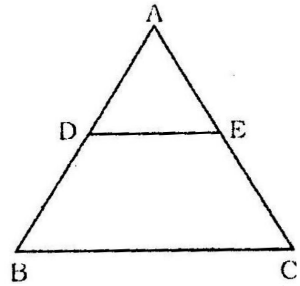
Area of quadrilateral BDOF =2×15=30 sq. cm.

3. (b) AD||BC$\Rightarrow$ AD||BQ



Point B is the mid point of AE.
So that Q is the mid point of DE.
In $\triangle$s DQC and BQE
$\angle$DQC = $\angle$BQE
$\angle$DCQ= $\angle$QBE
$\angle$CDQ= $\angle$QEB
So that both triangle $\triangle$ DQC and $\triangle$ BQE are similar.
So that DQ/QE=CQ/BQ=1:1.

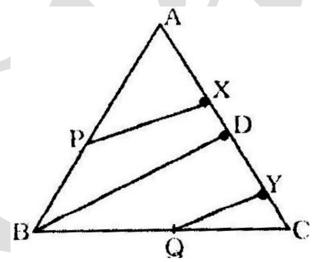
4. (d) $\frac{AD}{AB} = \frac{AE}{AC} = \frac{1}{3}$



So that DE/BC=1/3
$\Rightarrow$ DE=15/3=5 cm.

5. (b)

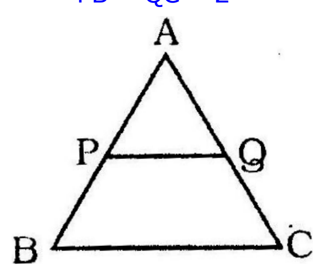
PX||BD and PX=$\frac{1}{2}$BD



QY||BD and QY=$\frac{1}{2}$ BD

So that PX:QY=1:1.

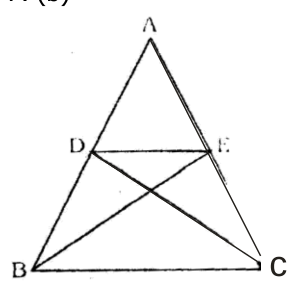
6.(b) $\frac{AP}{PB} = \frac{AQ}{QC} = \frac{1}{2}$



$\Rightarrow \frac{QC}{AQ} = \frac{2}{1} \Rightarrow \frac{QC + AQ}{AQ} = \frac{3}{1}$

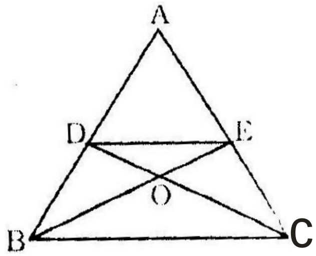
=AC=3AQ=9 cm.

7. (b)



Δ DBC and Δ EBC lie on the same base and between ame paallel lines.
So that Δ DBC= Δ BEC
$\Rightarrow$ Δ ABC ~ Δ DBC
= Δ ADE= Δ ABE=36 sq. cm.

8. (c) In Δ s ODE and BOC



$\angle BOC = \angle DOE$

$\angle BOC = \angle DOE$

$\angle DEO = \angle OBC : \angle ODE = \angle OCB$

So that Both triangles are similar.

So that $\frac{\Delta ODE}{\Delta BOC} = \frac{DE^2}{BC^2}$

DE||BC and $DE = \frac{1}{2}BC$

And area of Δ ABC
=3×Area of Δ OBC

So that $\frac{\Delta ODE}{\Delta ABC} = \frac{1}{3} \times \frac{1}{4} = \frac{1}{12}$

$\Rightarrow$ 1:12.

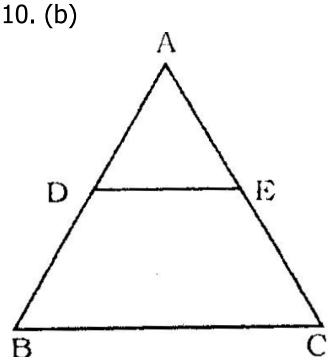
9. (B) AB+BC=12.
BC+CA=14.
CA+AB=18.
So that 2(AB+BC+CA)
$\Rightarrow$ AB+BC+CA=22.

$\Rightarrow 2\pi R = 22$

$\Rightarrow 2 \times \frac{22}{7} \times r = 22$

$\Rightarrow r = \frac{7}{2}$ cm

10. (b)



DE||BC
$\angle$ ADE= $\angle$ ABC
$\angle$ AED= $\angle$ ACB
So that Δ ADE ~ Δ ABC

So that $\frac{\square BDEC}{\Delta ADE}$ +1=1+1

$\Rightarrow \frac{\Delta ABC}{\Delta ADE} = 2 = \frac{AB^2}{AD^2}$.

$\frac{AB}{AD} = \sqrt{2}$

$\Rightarrow \frac{AB}{AD} - 1 = \sqrt{2} - 1$

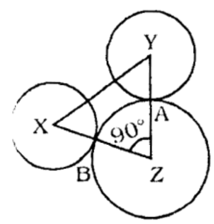
$\Rightarrow \frac{BD}{AD} = \sqrt{2} - 1$

$\Rightarrow \frac{AD}{BD} = \frac{1}{\sqrt{2} - 1}$

$1 : \sqrt{2} - 1$

11. (b)

$XZ = r + 9$



:Z = r + 2

$\therefore XY^2 = XZ^2 + ZY^2$

$\Rightarrow 17^2 = (r + 9)^2 + (r + 2)^2$

$\Rightarrow 289 = r^2 + 18r + 81 + r^2 + 4r + 4$

$\Rightarrow 2r^2 + 22r + 85 - 289 = 0$

$\Rightarrow 2r^2 + 22r - 204 = 0$

$\Rightarrow r^2 + 11r - 102 = 0$

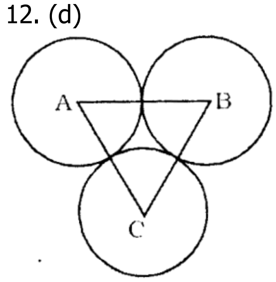
$\Rightarrow r^2 + 17r - 6r - 102 = 0$

$\Rightarrow r(r + 17) - 6(r + 17) = 0$

$\Rightarrow (r - 6)(r + 17) = 0$

$\Rightarrow r = 6$ cm

12. (d)



AB = 4 + 6 = 10 cm
BC = 6 + 8 = 14 cm
CA = 8 + 4 = 12 cm
$\therefore$ Semi-perimeter(s)

$= \frac{10 + 14 + 12}{2}$

= 18 cm

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

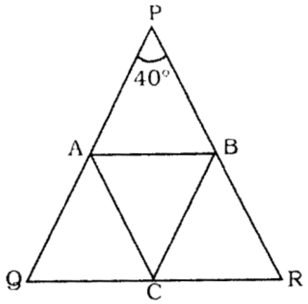
$= \sqrt{18(18-10)(18-14)(18-12)}$

$= \sqrt{18 \times 8 \times 4 \times 6}$

$= 3 \times 2 \times 2 \times 2\sqrt{6}$

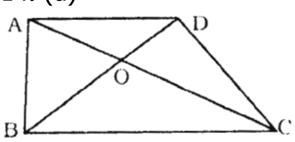
$= 24\sqrt{6}$ sq.cm.

13. (d)



AC = QC
$\therefore \angle QAC = \angle CQA = x$
CR = CB
$\therefore \angle CBR = \angle CRB = y$
$\therefore$ From Δ PQR,
$\angle x + \angle y + 40° = 180$
$\angle x + \angle y = 140°$ ......(i)
Again,
$\angle ACQ + \angle ACB + \angle BCR = 180°$
$\Rightarrow 180° - 2x + \angle ACB + 180° - 2y$
$= 180°$
$\Rightarrow \angle ACB = 2(x + y) - 180°$
$= 2 \times 140 - 180° = 100°$

14. (d)



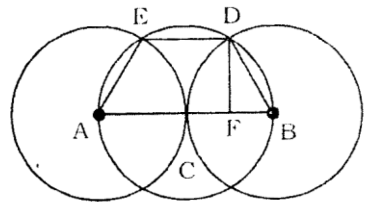
$\Delta AOD \sim \Delta BOC$

$$\therefore \frac{BO}{OC} = \frac{OD}{OA}$$

$$\Rightarrow \frac{3x - 19}{x - 3} = \frac{x - 5}{3}$$

$\Rightarrow 9x - 57 = x^2 - 8x + 15$
$\Rightarrow x^2 - 17x + 72 = 0$
$\Rightarrow x^2 - 8x - 9x + 72 = 0$
$\Rightarrow x(x - 8) - 9(x - 8) = 0$
$\Rightarrow (x - 8)(x - 9) = 0$
$\Rightarrow x = 8$ or 9

15. (b)



ABDE will be a trapezium
AB = 4 units

$DE = \frac{1}{2}$ AB = 2 units

FB = 1 units, BD = 2 units.

$\therefore DF = \sqrt{2^2 - 1^2} = \sqrt{3}$ units

$\therefore$ Area of ABDE

$= \frac{1}{2}(AB + DE) \times DF$

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

$= 3\sqrt{3}$ sq. units

16. (b)

$$\frac{\Delta ABC}{\Delta DEF} = \frac{AB^2}{DE^2} = \frac{100}{64} = \frac{25}{16}$$

25 : 16

17. (a)

From Δ AOE,

$OE = \sqrt{13^2 - 5^2} = \sqrt{169 - 25}$

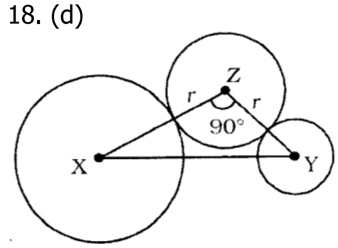
$= \sqrt{144} = 12$ cm

From Δ COF,

$OF = \sqrt{13^2 - 12^2} = \sqrt{25} = 5$ cm

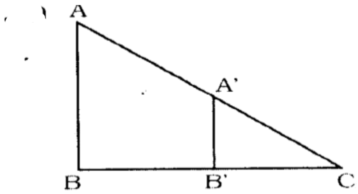
$\therefore$ EF = OE + OF = 17 cm

18. (d)



$\angle XZY = 90°$
XY = $(9 + r)$ cm,
YZ = $(r + 2)$ cm
XY = 17 cm
$\therefore XY^2 = XZ^2 + ZY^2$
$\Rightarrow 17^2 = (9 + r)^2 + (r + 2)^2$
$\Rightarrow 289 = 81 + 18r + r^2 + r^2 + 4r + 4$
$\Rightarrow 2r^2 + 22r - 204 = 0$
$\Rightarrow r^2 + 11r - 102 = 0$
$\Rightarrow r^2 + 17r - 6r - 102 = 0$
$\Rightarrow r(r + 17) - 6(r + 17) = 0$
$\Rightarrow (r - 6)(r + 17) = 0$
$\Rightarrow r = 6$ cm

19. (c)



$A'B' = \frac{1}{2} AB$

$\Delta A'B'C \sim \Delta ABC$

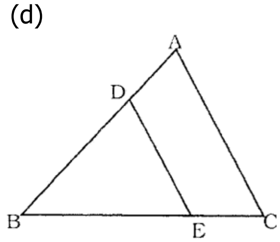
$\therefore \frac{\Delta ABC}{\Delta A'B'C} = \frac{4}{1}$

$\Rightarrow \frac{\Delta A'B'C}{\Delta ABC} = \frac{1}{4}$

$\Rightarrow 1 - \frac{\Delta A'B'C}{\Delta ABC} = 1 - \frac{1}{4}$

$\Rightarrow \frac{\square AA'B'B}{\Delta ABC} = \frac{3}{4}$

20. (d)



DE | | AC

$\Delta ABC \sim \Delta BDE$

$\therefore \frac{AB}{BD} = \frac{AC}{BE}$

$\Rightarrow \frac{AB}{BD} - 1 = \frac{AC}{BE} - 1$

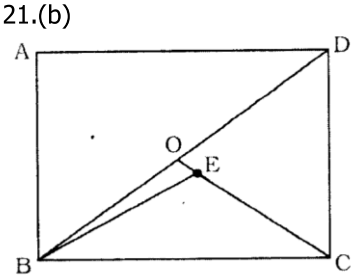
$\Rightarrow \frac{AD}{BD} = \frac{CE}{BE}$

$\Rightarrow \frac{BD}{AD} = \frac{BE}{CE}$

$\Rightarrow \frac{10-4}{4} = \frac{BE}{CE}$

$\Rightarrow \frac{BE}{CE} = \frac{3}{2}$

21.(b)



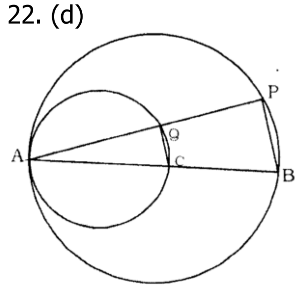
$\angle OBC = 45°$

$\angle OCB = 60°$

$\therefore \angle BOC = 180° - 60° - 45°$

$= 75°$

22. (d)



$\angle PAB = \angle QAC$

$\angle APB = \angle AQC = 90°$

$\angle QCA = \angle PBA; AC = BC$

$QC = \frac{1}{2} PB$

23. **Solution.** (d) The sides of a square congruent. If the perimeter is 80, each side must be 80/4=20. If each side is 20, the area is base times height =20×20=400.

24. **Solution (c)** The diagonals of a rhombus bisect each other and are perpendicular.
You see 4 right triangles in the center of the rhombus with sides of 5 and 12. Using the Pythagorean Thm, the third side of each triangle is 13. so the perimeter is 4(13)

25. **Explanation (c):** The square has 4 congruent sides. Each sside must be 6. The diagonal makes two right triangles. Use the Pyth. Thm to find the diagonal

26. **Solution :** The opposite sides of a parallelogram are equal. 2x+10=5x-20 (solve for x)
X=10. Now substitute 10 into the side you are looking to finf, 4x-1. Answe is 40-1=39.

27. Solution : The opposite angle of a parallelogram are . The consecutive angle are supplementary. There is one other angle of 60 and the remaining two angles are supplements of 60. (supplementary means add to 160).

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