Solution

S1. Ans.(c)
Sol.

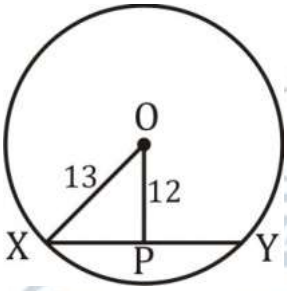
$R = \frac{a}{2\ SinA}$

$= \frac{6}{2\ Sin\ 135}$

$= \frac{6}{2 \times \frac{1}{\sqrt{2}}}$

$= 3\sqrt{2}$ cm

S2. Ans.(c)
Sol.



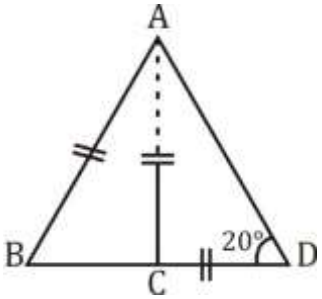
$PX = \sqrt{13^2 - 12^2}$

= 5 cm

XY = PX + PY

= 5 + 5 = 10 cm

S3. Ans.(a)
Sol.



AC = CD

$\angle CAD = \angle ADC = 20°$

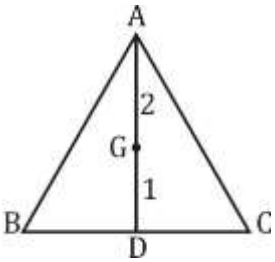
$\angle ACB = 180° - 140° = 40°$

$\therefore AB = AC$

$\therefore \angle ABC = \angle ACB = 40°$

S4. Ans.(d)

Sol.



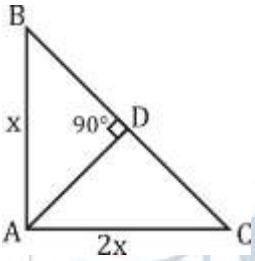
$\frac{AG}{AD} = \frac{2}{3}$

$AG = \frac{2}{3} \times 12$

$= 8$ cm

S5. Ans.(b)

Sol.



$AB = x$ $AC = 2x$

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

$= \sqrt{4x^2 + x^2}$

$= \sqrt{5x}$

Δ ABD & Δ ABC are similar.

$\frac{AB}{BC} = \frac{BD}{AB}$

$\frac{x}{\sqrt{5x}} = \frac{BD}{x}$

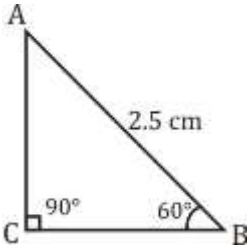
$BD = \frac{x}{\sqrt{5}}$

$= \frac{\sqrt{5}x}{5}$

$= \frac{BC}{5}$

S6. Ans.(a)

Sol.



$\text{Cos B} = 0.5 = \frac{5}{10} = \frac{1}{2}$

$\text{CosB} = \text{Cos}\,60°$

$\text{B} = 60°$

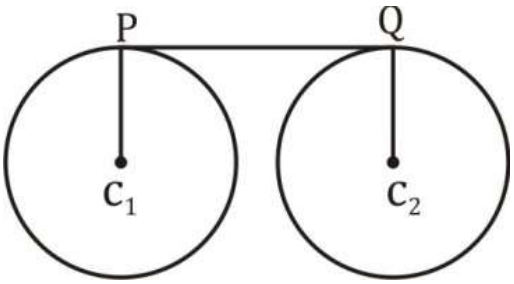
$\text{Sin}60 = \frac{\text{AC}}{\text{AB}}$

$\frac{\sqrt{3}}{2} = \frac{\text{AC}}{\frac{5}{2}}$

$\text{AC} = \frac{5\sqrt{3}}{4}$

S7. Ans.(d)

Sol.



$c_1c_2 = 9 + 4 = 13$ cm

$PQ = \sqrt{(c_1c_2)^2 - (r_1 - r_2)^2}$

$= \sqrt{169 - 25}$

$= \sqrt{144}$

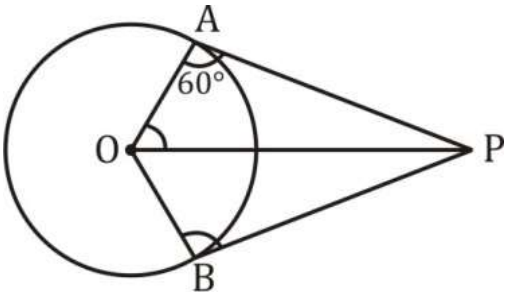
$= 12$ cm

Area of square = PQ^2

$= 144\ cm^2$

S8. Ans.(c)

Sol.



$OA \perp PA$

$\angle OAP = 90°$

$\angle APO = 180° - (90 + 60)$

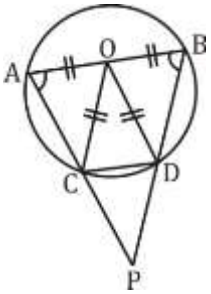
$= 30°$

Similarly,

$\angle BPO = 30°$

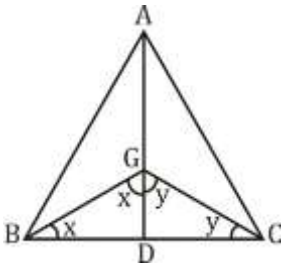
$\angle APB = 30° + 30° = 60°$

S9. Ans.(b)
Sol.



AO = OC = CD = OD
Δ COD is an equilateral triangle
In ΔOBD
OB = OD
∠OBD = ∠BDO = x
Similarly
∠BDC = x + 60°
In Δ AOC
AO = OC
∠A = ∠C = y
y + y = x + 60°
2y – x = 60°
In cyclic quadrilateral ABCD,
X + 60 + y= 180°
x + y = 120°
In ΔAPB
x + y + ∠APB = 180°
∠APB = 180° – 120° = 60°

S10. Ans.(b)
Sol.



AG = BC
BD = DC
$\frac{AG}{DG} = \frac{2}{1}$
∴ DG = BD = CD
∠DBG = ∠BGD =x
∠ DCG = ∠CGD = y
x + x + y + y = 180°
x + y = 90°
∠BGC = 90°

S11. Ans.(d)

Sol. $c_1\ c_2 = r_1 + r_2$

Length of straight common tangent

$PQ = \sqrt{(c_1c_2)^2 - (r_1 - r_2)^2}$

$= \sqrt{(r_1 + r_2)^2 - (r_1 - r_2)^2}$

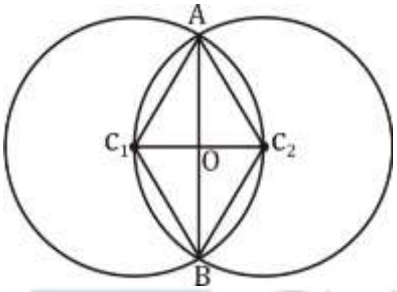
$= \sqrt{r_1^2 + r_2^2 + 2r_1r_2 - r_1^2 - r_2^2 + 2r_1r_2}$

$PQ = \sqrt{4r_1 + r_2}$

$PQ^2 = 4r_1r_2$

S12. Ans.(b)

Sol.



In $\Delta\ AC_1C_2$

$AC_1 = C_1\ C_2 = AC_2 = r$

$\therefore \Delta AC_1\ C_2$ is an equilateral triangle

$AO \perp C_1\ C_2$

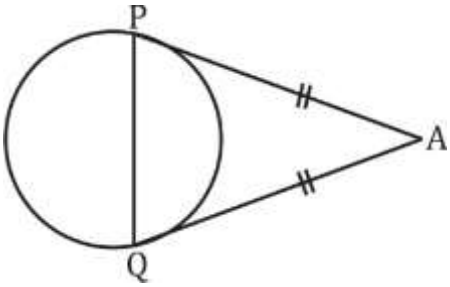
$AO = \frac{\sqrt{3}}{2} r$

$AB = 2\ AO$

$= \sqrt{3}r$

S13. Ans.(a)

Sol.



Tangents drawn to a circle from the same point are equal

$AP = AQ$

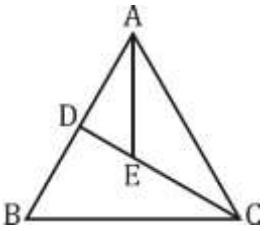
$\angle APQ = \angle AQP = x$

$x + x + 68° = 180°$

$2x = 112$

$x = 56°$

S14. Ans.(b)
Sol.



$\angle ACD = \angle BCD = \theta$
$\angle ADE = \angle ABC + \theta$
$= 50° + \theta$
$AD = AE$
$\therefore \angle AED = 50° + \theta$
$\angle CAE + \theta = 50° + \theta$
$\angle CAE = 50°$

S15. Ans.(a)
Sol. $\sin\theta + \cos\theta = 2$
Equation satisfies if $\sin\theta = 1$
$\therefore \sin 7\theta + \cos 7\theta = (1)^{\frac{7}{1}} + \frac{1}{(1)^7}$
$= 1 + 1 = 2$

S16. Ans.(b)
Sol. In ΔAPC and ΔABC,
$\angle ACP = \angle ABC$ (Given)
$\angle A = \angle A$ (common)
$\therefore \Delta APC \sim \Delta ACB$
$\therefore \frac{AP}{AC} = \frac{PC}{BC} \Rightarrow \frac{AP}{9} = \frac{12}{15}$
$\Rightarrow AP = 7.2$ cm

S17. Ans.(c)
Sol. $a = \frac{2}{\sqrt{3}}(P_1 + P_2 + P_3)$
$= \frac{2}{\sqrt{3}}(6 + 8 + 10)$
$= \frac{48}{\sqrt{3}} = 16\sqrt{3}$cm

S18. Ans.(a)
Sol. In ΔABC & ΔBNC,
$\angle ABC = \angle BNC = 90°$
and $\angle C = \angle C$ (common)
$\therefore \Delta ABC \sim \Delta BNC$
and $BC = \sqrt{10^2 - 6^2} = 8$cm
$\therefore \frac{AC}{BC} = \frac{BC}{NC}$
$\Rightarrow \frac{10}{8} = \frac{8}{NC}$

⇒ NC = 6.4
∴ AN = 10 – 6.4 = 3.6
∴ AN : NC = 3.6 : 6.4 = 9 : 16

S19. Ans.(a)
Sol. DE || BC (Given)
So ΔADE ~ ΔABC
AD : DB = 2 : 3
Then AB = AD + DB = 5
$\frac{\text{Area of } \Delta ADE}{\text{Area of } \Delta ABC} = \left(\frac{AD}{AB}\right)^2$
$= \left(\frac{2}{5}\right)^2 = \frac{4}{25}$
Area of □ DECB = Area of Δ ABC – Δ ADE
= 25 – 4 = 21
Area of Δ ADE : Area of □ DECB = 4 : 21

S20. Ans.(d)
Sol. Let the area of Δ ABC = 100 units AD is median
The,
Area of Δ ABD = $\frac{1}{2}$ × area of Δ ABC
= $\frac{1}{2}$ × 100 = 50 units
E is mid-point of AD
So, BE is median.
Area of Δ BED = Area of Δ BEA = $\frac{1}{2}$ × ABD
Area of Δ BEA = $\frac{1}{2}$ × 50 = 25 units
Area of Δ BEA : Area of Δ ABC = 25 : 100 = 1 : 4

S21. Ans.(a)
Sol. Let AO = 4 unit (Large median)
then AK = $\frac{3}{2}$ AO = $\frac{3}{2}$ × 4 = 6 units
E and D are mid points
(Because CE and BD are median)
Then ED || BC
ED = $\frac{1}{2}$ BC
$\frac{AE}{AB} = \frac{\text{median of } \Delta AED}{\text{median of } \Delta ABC} = \frac{AM}{AK}$
$\frac{1}{2} = \frac{AM}{6}$
AM = 3 units
OM = AO – AM
= 4 – 3 = 1
So,
AM : MO
3 : 1

S22. Ans.(c)
Sol. According to the question
Given: ∠ACB = 55°, ∠ABC = 65°, ∠BIC = ?
∴ ∠ACB + ∠ABC + ∠BAC = 180°
∠BAC = 180° – 55° – 65°
∠BAC = 60°
We know that
$\angle BIC = 90 + \frac{1}{2}\angle A$
$\angle BIC = 90 + \frac{1}{2} \times 60 = 90 + 30$
∠BIC = 120°

S23. Ans.(b)
Sol.
$$\angle DAE = \frac{\angle B - \angle C}{2} = \frac{60° - 40°}{2} = 10°$$

S24. Ans.(a)
Sol. According to the questions,
Given: ∠BOC = 60°
As we know that
$\therefore \angle O = 90 - \frac{1}{2}\angle A$
$\frac{1}{2}\angle A = 90° - 60°$
$\frac{1}{2}\angle A = 30°$
∠A = 60°

S25. Ans.(d)
Sol. According to question
AD is the median and 'O' is the centroid
∴ AO = 10 cm
2 units = 10
1 units = 5
∴ OD = 5 cm

S26. Ans.(d)
Sol. In this type of question, we use direct formula.
$5BC^2 = AB^2 + AC^2$
$$BC = \sqrt{\frac{AB^2 + AC^2}{5}}$$
$$= \sqrt{\frac{(22)^2 + (19)^2}{5}} = \sqrt{\frac{484 + 361}{5}}$$
$$= \sqrt{\frac{845}{5}} = \sqrt{169} = 13 \text{ cm}$$

S27. Ans.(d)

Sol. Area of Δ ABC = $\frac{1}{2}$ BC × AD

= $\frac{1}{2}$ AC × BE = $\frac{1}{2}$ AB × CF

∴ AB : BC : AC = $\frac{1}{CF} : \frac{1}{AD} : \frac{1}{BE}$

$= \frac{1}{3} : \frac{1}{1} : \frac{1}{2} = 2 : 6 : 3$

S28. Ans.(b)

Sol. According to questions,

Given: ∠A = 70°

AEOF is a quadrilateral

∴ In a quadrilateral sum of all angles are 360°

∠A + ∠F + ∠O + ∠E = 360°

70° + 90° + ∠O + 90° = 360°

∠O = 360° – 250°

∠O = 110°

∠BOC = 110°

(Vertically Opposite angle)

S29. Ans.(a)

Sol. ABC is an equilateral triangle and AX, BY and CZ be the altitude so AX = BY = CZ

Area of ΔABC = $\frac{1}{2}$ × Base × height

= $\frac{1}{2}$ × AB × CZ = $\frac{1}{2}$ × BC × AX

= $\frac{1}{2}$ × AC × BY

CZ = AX = BY

∵ AB = BC = CA (Side of equilateral)

So, we can say if three latitudes are equal then the triangle is equilateral triangle.

S30. Ans.(a)

Sol. In Δ ABC, AD is the bisector of ∠A

∴ $\frac{BD}{DC} = \frac{AB}{AC}$ (Angle bisector theorem)

$\Rightarrow \frac{4}{3} = \frac{6}{AC} \Rightarrow 4AC = 18$

$\Rightarrow AC = \frac{18}{4} = 4.5$ cm