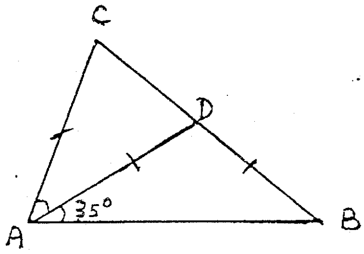
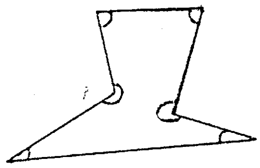
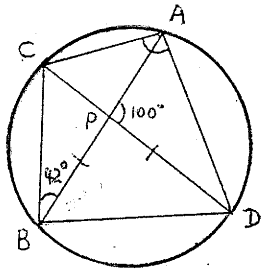
1. (83) In the figure, D is a point on BC and AC=AD=BD. ∠CAD =
   A. 20°
   B. 25°
   C. 30°
   D. 35°
   E. 40°



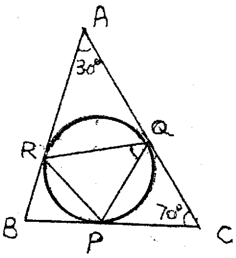
2. (83) The sum of the six marked angles in the figure is
   A. 360°
   B. 540°
   C. 600°
   D. 720°
   E. 900°



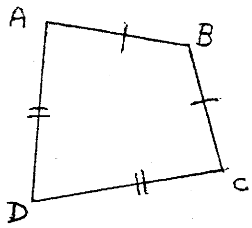
3. (83) In the figure, chords AB and CD intersect at P. BP=DP. ∠CAD =
   A. 58°
   B. 86°
   C. 88°
   D. 92°
   E. 142°



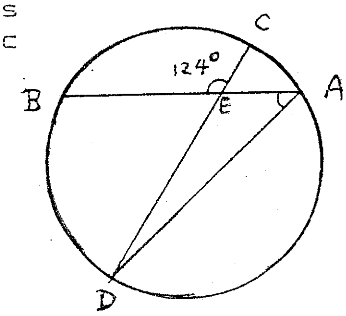
4. (83) In the figure, the three sides of △ABC touch the circle at the points P, Q and R. ∠PQR =
   A. 30°
   B. 50°
   C. 55°
   D. 70°
   E. 75°



5. (83) In the figure, ABCD is a quadrilateral with AB=BC and AD=DC. Which of the following is/are true ?
   (1) ∠BAD = ∠BCD (2) AC⊥BD
   (3) BD bisects AC
   A. (1) only
   B. (1) and (2) only
   C. (1) and (3) only
   D. (2) and (3) only
   E. (1), (2) and (3)

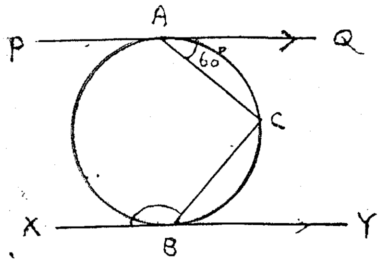


6. (83) In the figure, chords AB and CD intersect at E. The length of the minor arc BD is three times the length of the minor arc AC. ∠BAD =
   A. 31°
   B. 35°
   C. 42°
   D. 45°
   E. 56°



7\. (83) In the figure, PQ and XY touch the circle at A and B respectively, PQ // XY and $\angle QAC = 60°$. $\angle CBX$ =

A. 150°
B. 135°
C. 120°
D. 110°
E. 100°

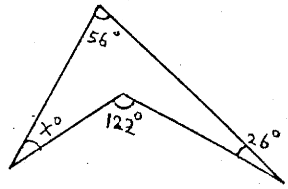


8\. (84) The sum of the interior angles of a convex polygon is greater than the sum of the exterior angles by 360°. How many sides has the polygon ?

A. 3 B. 4 C. 5 D. 6 E. 8

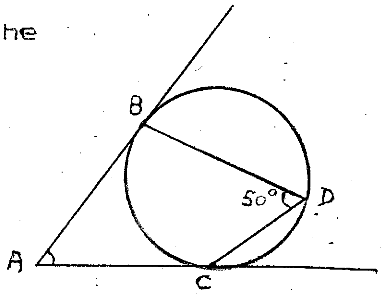
9\. (84) In the figure, x = ?

A. 31
B. 34
C. 40
D. 48
E. It cannot be determined.



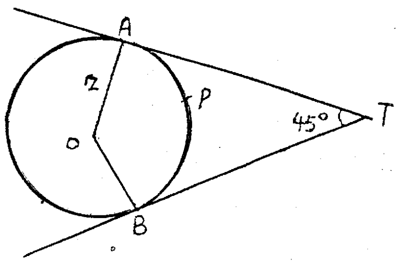
10\. (84) In the figure, AB and AC touch the circle at B and C respectively. $\angle A$ =

A. 30°
B. 40°
C. 50°
D. 80°
E. 85°



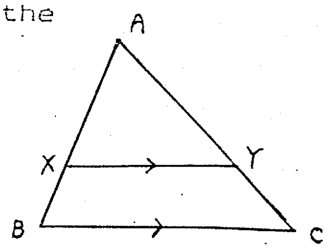
11\. (84) In the figure, O is the centre of the circle. TA and TB touch the circle at A and B respectively. OA = 2. The length of the arc APB is

A. $\pi/4$
B. $\pi/2$
C. $3\pi/4$
D. $3\pi/2$
E. 3π



12\. (84) In the figure, XY // BC. AX:XB=2:1. If the area of the trapezium BCYX = 20, then the area of $\triangle ABC$ =

A. 80
B. 60
C. 45
D. 40
E. 36



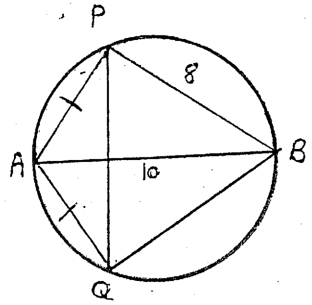
13\. (84) In $\triangle ABC$, BC=a, AC=b, AB=c and a > b > c. Which of the following must be true ?

(1) $\angle A > \angle B > \angle C$ (2) b+c > a (3) $\angle B + \angle C > \angle A$

A. (1) only B. (2) only C. (1) and (2) only
D. (2) and (3) only E. (1),(2) and (3)

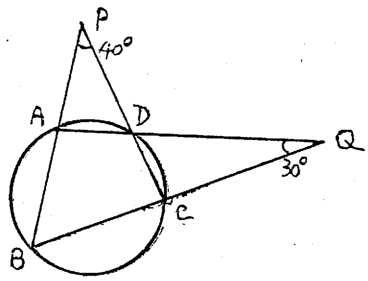
14. (84) In the figure, AB is a diameter of the circle. AP = AQ. AB = 10 and BP = 8. PQ =

A. 5
B. 6
C. 6.4
D. 8
E. 9.6



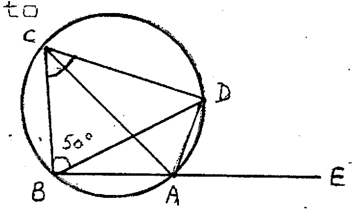
15. (84) In the figure, the chords BA and CD, when produced, meet at P. The chords AD and BC, when produced, meet at Q. $\angle B$ =

A. 35°
B. 40°
C. 45°
D. 50°
E. 55°



16. (85) In the figure, ABCD is a cyclic quadrilateral. BA is produced to E. DA bisects $\angle CAE$. $\angle BCD$ =

A. 40°
B. 45°
C. 50°
D. 55°
E. 65°

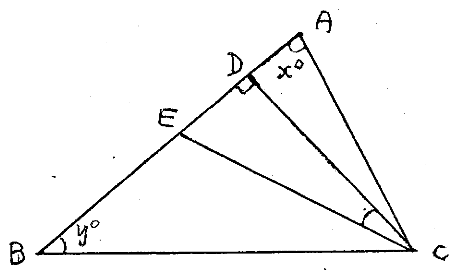


17. (85) The exterior angles of a pentagon are x°, 2x°, 3x°, 4x° and 5x°. The smallest interior angle of the pentagon is

A. 120° B. 60° C. 48° D. 36° E. 24°

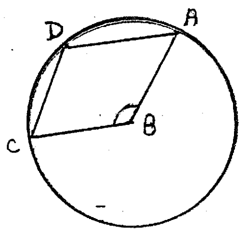
18. (85) In the figure, A, D, E and B lie on a straight line. CE bisects $\angle ACB$ and $CD \perp AB$. $\angle DCE$ =

A. $\frac{1}{2}(x° - y°)$
B. $\frac{1}{2}(x° + y°)$
C. $x° - y°$
D. $90° - \frac{1}{2}(x° + y°)$
E. $90° - (x° - y°)$



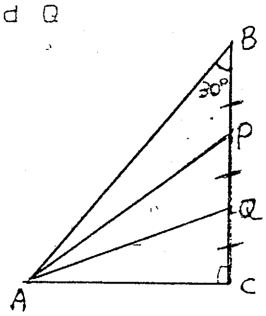
19. (85) In the figure, ABCD is a rhombus. B is the centre of the circle. $\angle ABC$ =

A. 105°
B. 120°
C. 130°
D. 135°
E. 150°

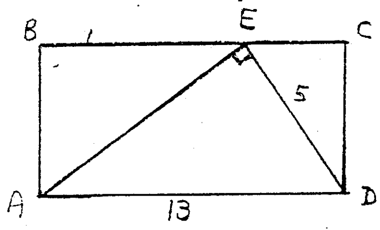


20. (85) In the figure, $\angle C = 90°$. P and Q are points on BC such that BP = PQ = QC. $\angle CAQ$ =

A. 30°
B. 25°
C. 22°
D. 20°
E. 15°

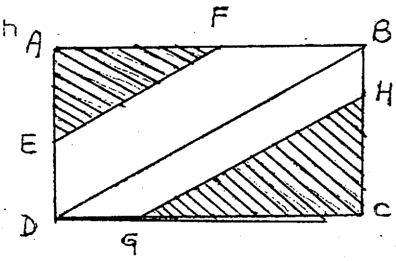


21. (85) In the figure. ABCD is a rectangle. E is a point on BC such that $\angle AED=90°$. AD = 13 and DE = 5. The area of ABCD=



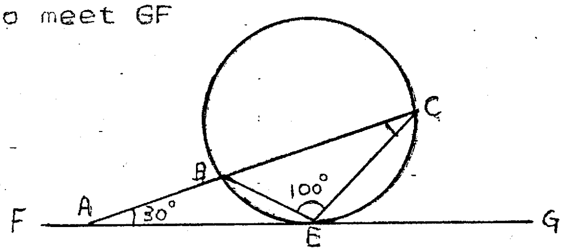
A. 30
B. 52
C. 60
D. 65
E. 120

22. (85) In the figure, ABCD is a rectangle. E,F, G and H are points on the four sides such that EF // DB // GH. AF = FB and HC = 2BH. What fraction of the area of ABCD is shaded ?



A. 13/36 B. 3/12 C. 25/36
D. 25/72 E. 47/72

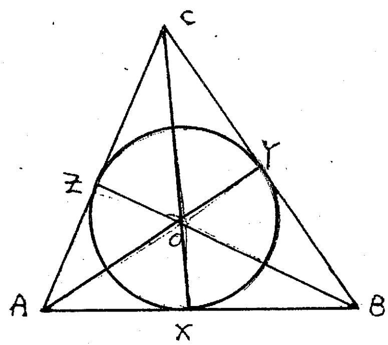
23. (85) In the figure, FG touches the circle at E. The chord CB is produced to meet GF at A. $\angle ACE$ =



A. 10°
B. 20°
C. 25°
D. 30°
E. 35°

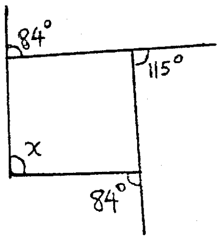
24. (85) In the figure, the circle touches the sides of $\triangle ABC$ at X,Y and Z. O is the centre of the circle. Which of the following must be true ?

I. OA bisects $\angle BAC$
II. A,X,O and Z are concyclic
III. AX = AZ



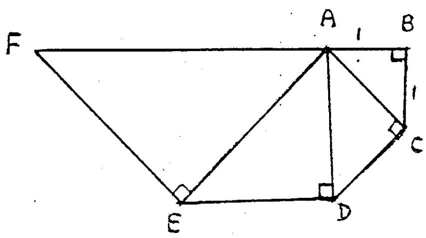
A. III only B. I and II only
C. I and III only D. II and III only
E. I, II and III.

25. (86) In the figure, x =



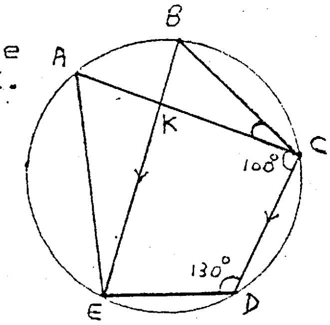
A. 77°
B. 84°
C. 96°
D. 103°
E. 115°

26. (86) In the figure, ABC, ACD, ADE and AEF are right-angled isosceles triangles. If AB=BC=1, how long is AF ?



A. $2\sqrt{5}$
B. 4
C. $2\sqrt{3}$
D. 3
E. $\sqrt{5}$

27. (86) In the figure, A, B, C, D and E lie on a circle. AC intersects BE at K. $\angle ACD = 100°$ and $\angle CDE = 130°$. If $BE \parallel CD$, then $\angle ACB =$

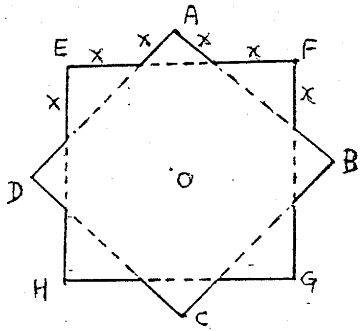


A. 25°
B. 30°
C. 36°
D. 40°
E. 42°

28. (86) If the five interior angles of a convex pentagon form an A.P. with a common difference of 10°, then the smallest interior angle of the pentagon is

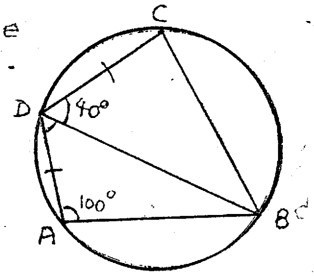
A. 52° B. 72° C. 88° D. 98° E. 108°

29. (86) In the figure, ABCD and EFGH are two squares of side 1. They are placed one upon the other with their centres both at O to form a star with 16 sides, each of length x. Find x.



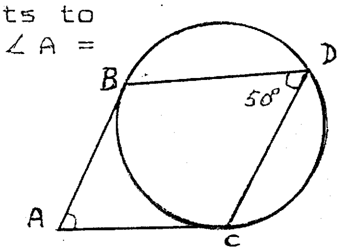
A. 2/7
B. 1/3
C. 2/5
D. $1/(2+\sqrt{2})$
E. $1/(1+\sqrt{2})$

30. (86) AD and DC are equal chords of the circle ABCD. $\angle CDB = 40°$, $\angle DAB = 100°$. $\angle ADB =$



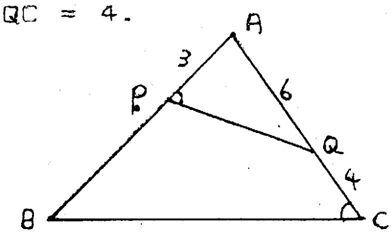
A. 20°
B. 25°
C. 30°
D. 35°
E. 40°

31. (86) In the figure, AB and AC are tangents to the circle BCD. If $\angle BDC = 50°$, then $\angle A =$



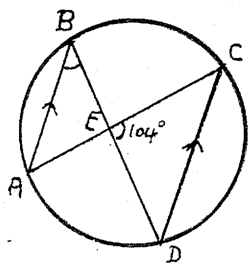
A. 130°
B. 100°
C. 85°
D. 80°
E. 50°

32. (86) In $\triangle ABC$, AP = 3, AQ = 6 and QC = 4. If $\angle APQ = \angle ACB$, then PB =



A. 7
B. 8
C. 10
D. 17
E. 20

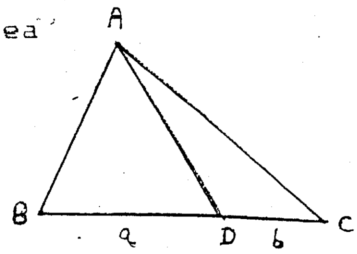
33. (87) In the figure, chords AC and BD meet at E and $AB \parallel DC$. If $\angle CED = 104°$, find $\angle ABD$.



A. 76°
B. 52°
C. 38°
D. 14°
E. It cannot be determined.

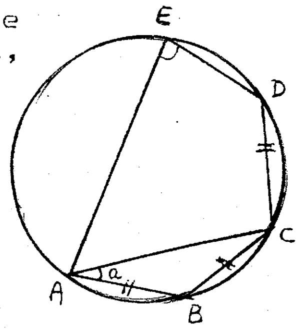
34. (87) In the figure, BD=a, DC=b and the area of $\triangle ABD=s$. Find the area of $\triangle ABC$.

A. $s(a+b)/a$
B. $s(a+b)/b$
C. $s(a+b)^2/a^2$
D. $s(a+b)^2/b^2$
E. $s(a^2+b^2)/a^2$



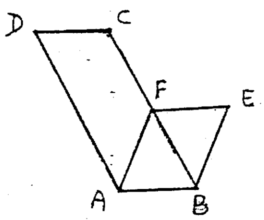
35. (87) In the figure, AB, BC and CD are three equal chords of a circle. If $\angle BAC = a$, then $\angle AED =$

A. 2a
B. 3a
C. $90° - a$
D. $180° - 2a$
E. $180° - 3a$



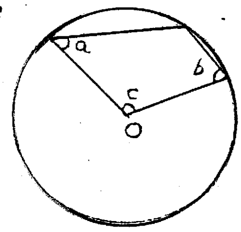
36. (87) In the figure, ABCD and ABEF are parallelograms. $\dfrac{\text{Area of ABCD}}{\text{Area of ABEF}} =$

A. AD/AF
B. BG/BF
C. BC/EF
D. AD^2/AF^2
E. BC^2/EF^2



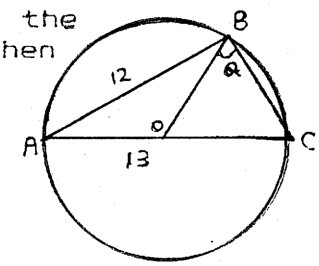
37. (87) In the figure, O is the centre of the circle. a + b =

A. 180°
B. c
C. c/2
D. $180° - c$
E. $180° - c/2$



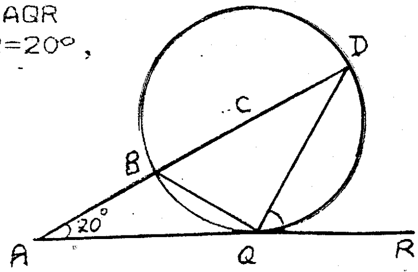
38. (87) In the figure, O is the centre of the circle. If AB = 12 and AC = 13, then $\cos\theta$ =

A. 5/12
B. 5/13
C. 12/13
D. 12/25
E. 13/25



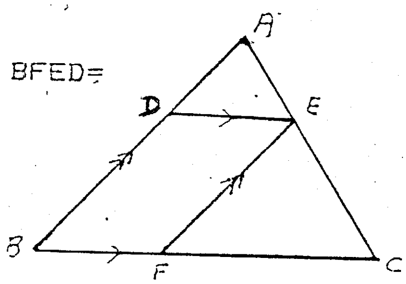
39. (87) In the figure, C is the centre of the circle. ABCD is a straight line. AQR touches the circle at Q. If $\angle DAR=20°$, then $\angle DQR$ =

A. 35°
B. 40°
C. 55°
D. 65°
E. 70°



40. In the figure, DE // BC and AB // EF.
(87) If AE : EC = 1 : 2, then area of $\triangle$ADE : area of parallelogram BFED =

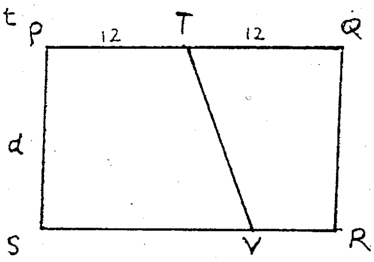
A. 1 : 2
B. 1 : 3
C. 1 : 4
D. 1 : 5
E. 1 : 6



41. In the figure, PQRS is a rectangle with
(88) PQ = 24 and PS = d. T is the mid-point of PQ. V is a point on SR and

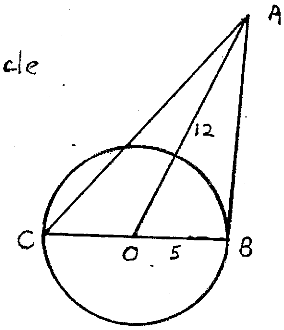
$$\frac{\text{area PTVS}}{\text{area TQRV}} = 2. \text{ SV} =$$

A. 14
B. 16
C. 18
D. 20
E. 22



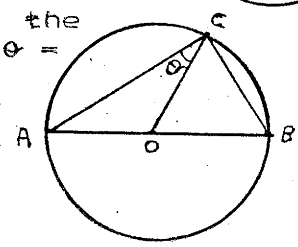
42. In the figure, O is the centre of the circle
(88) of radius 5. AB is a tangent and AO = 12. AC =

A. 13
B. 17
C. $\sqrt{219}$
D. $\sqrt{244}$
E. $\sqrt{269}$



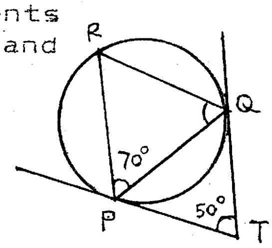
43. In the figure, O is the centre of the
(88) circle of diameter 13. AC=12. sinθ =

A. 5/12
B. 5/13
C. $\sqrt{313}/13$
D. 12/13
E. 13/12



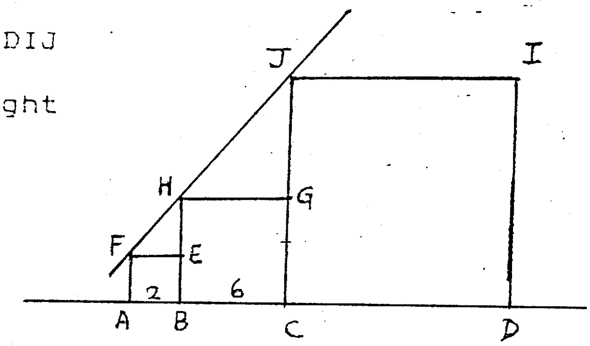
44. In the figure, TP and TQ are tangents
(88) to the circle PQR. If $\angle$RPQ = 70° and $\angle$PTQ = 50°, then $\angle$RQP =

A. 20°
B. 45°
C. 50°
D. 60°
E. 70°



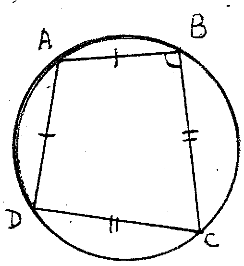
45. In the figure, ABEF, BCGH and CDIJ
(88) are three squares. If AB = 2, BC = 6 and F,H,J lie on a straight line, then CD =

A. 8
B. 10
C. 12
D. 16
E. 18



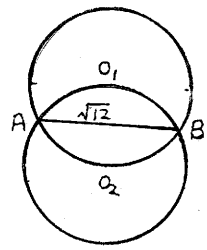
46. (88) ABCD is a cyclic quadrilateral with AB = AD and CB = CD. Find $\angle ABC$

A. 75°
B. 90°
C. 105°
D. 120°
E. It cannot be found.



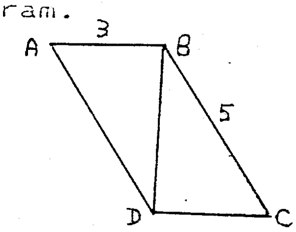
47. (88) In the figure, O_1 and O_2 are the centres of the two circles, each of radius r and AB = $\sqrt{12}$. Find r.

A. 1/2
B. 2
C. 4
D. 6
E. 8



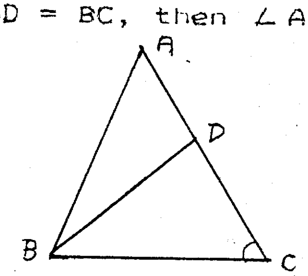
48. (88) In the figure, ABCD is a parallelogram. $AB \perp BD$, AB = 3 and BC = 5. AC =

A. 10
B. 12
C. $\sqrt{13}$
D. $\sqrt{26}$
E. $2\sqrt{13}$



49. (88) In the figure, if AB = AC and AD = BD = BC, then $\angle ACB$ =

A. 30°
B. 32°
C. 36°
D. 40°
E. 72°

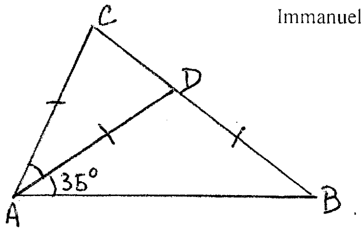


ANSWERS

1.E	2.D	3.C	4.B	5.E	6.C	7.A	8.D	9.C	10.D
11.D	12.E	13.C	14.E	15.E	16.C	17.B	18.A	19.B	20.A
21.C	22.D	23.C	24.E	25.D	26.B	27.B	28.C	29.D	30.A
31.D	32.D	33.C	34.A	35.B	36.B	37.E	38.B	39.C	40.C
41.D	42.C	43.B	44.B	45.E	46.B	47.B	48.E	49.E	

Plane Geometry.

1.



since $AD = DB$.

$\therefore \angle DBA = \angle DAB$
$= 35°$.

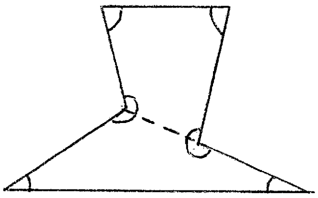
$\therefore \angle ADC = \angle DBA + \angle DAB$.
$= 35° + 35°$
$= 70°$

since $AC = AD$.

$\angle ACD = \angle ADC$.
$= 70°$

$\therefore \angle CAD = 180° - 70° - 70°$
$= 40°$. (E.)

2.



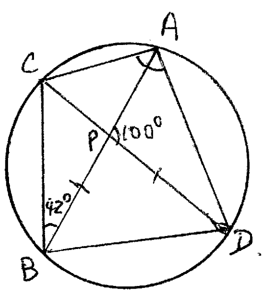
sum. of six angle.

sum of Δ + sum of $\square$ + 180°

$= 180° + 360° + 180°$

$= 720°$. (D.)

3.



since $BP = PD$.

$\therefore \angle PBD = \angle PDB$.

$\angle PBD + \angle PDB = 100°$

$\therefore \angle PDB = 50°$

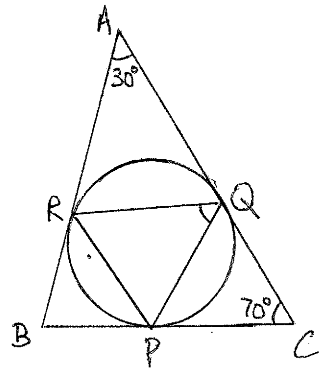
$\angle CDB - \angle CDA = 42°$.

$\therefore \angle BAD = 180° - 100° - 42°$
$= 38°$.

$\angle CAB = \angle CDB$
$= 50°$

$\angle CAD$
$= \angle BAD + \angle CAB$
$= 38° + 50°$
$= 88°$. (C.)

4



since. AR, AQ are tangents.

$\therefore AR = AQ$.

$\therefore \angle AQR = \angle ARQ$
$= \frac{180° - 30°}{2}$
$= 75°$.

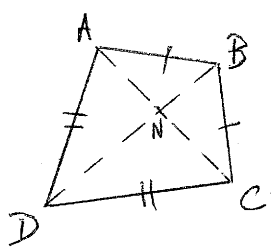
QC & PC are tangents.

$QC = PC$.

$\therefore \angle CQP = \frac{180° - 70°}{2}$
$= 55°$.

$\angle PQR = 180° - 75° - 55°$
$= 50°$. (B.)

5.



(1) In ΔABC.
$AB = BC$.
$\therefore \angle BAC = \angle BCA$.
In ΔACD.
$AD = CD$
$\angle DAC = \angle ACD$.

$\angle BAD$
$= \angle BAC + \angle DAC$
$= \angle BCA + \angle ACD$
$= \angle BCD$.

$\therefore$ (1) is true.

(2). the line segment is equidistant from the end points of the segment, the lines are perpendicular. $\therefore AC \perp BD$.

(3). $AB = BC$
$AD = CD$.
and BD is common.

$\therefore \Delta ABD \cong \Delta CBD$. (S.S.S.)

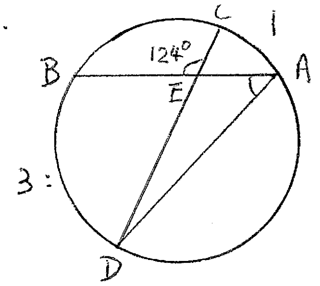
$\therefore \angle ABD = \angle CBD$.
$AB = BC$
& BN is common.

$\therefore \Delta ABN \cong \Delta CBN$ (S.A.S.)

$\therefore BD$ bisects AC.

$\therefore$ (1), (2) and (3) are true. (E.)

6.



since $\overset{\frown}{BD} : \overset{\frown}{AC} = 3:1$.

$\therefore \angle BAD = 3\angle ADC$.

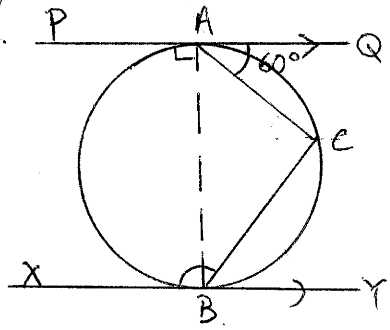
In ΔADE.

$180° = 124° + \angle BDA + \angle ADC$

$\angle BDA + \frac{1}{3}\angle BDA = 56°$

$\angle BDA = 42°$. (C)

7.



since PQ is a tangent.

$\therefore \angle ABC = \angle QAC$

$= 60°$

PQ // XY.

$\therefore \angle ABX = 90°$.

$\therefore \angle CBX = \angle ABC + \angle ABX$

$= 60° + 90°$

$= 150°$ (A.)

8. Let n be the side of polygon.

interior angle

$= 180° \times (n-2)$.

exterior angle of all polygon $= 360°$.

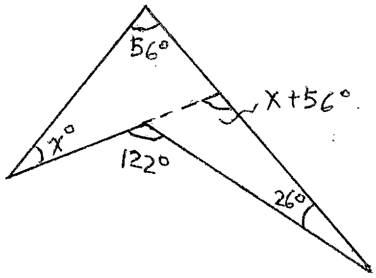
$\therefore 180°(n-2) - 360° = 360°$

$180°(n-2) = 720°$

$n - 2 = 4$

$\therefore n = 6$. (D.)

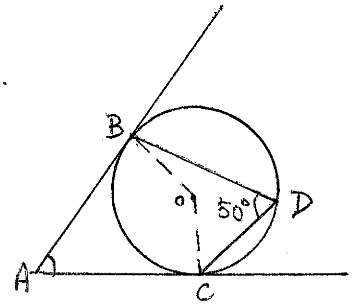
9.



$\therefore x + 56° + 26° = 122°$

$x = 40°$. (C.)

10.



Let O be centre.

$\angle BOC = 2\angle BDC$

$= 2(50°)$

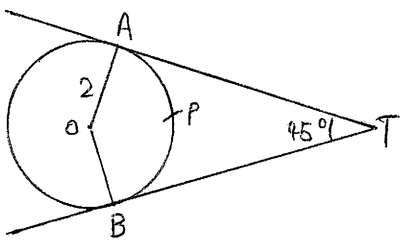
$= 100°$.

since $\angle BOC + \angle A = 180°$

$\therefore \angle A = 180° - 100°$

$= 80°$. (D.)

11.



$\angle AOB + \angle ATB = 180°$.

$\angle AOB + 45° = 180°$

$\angle AOB = 135° = \frac{3\pi}{4}$

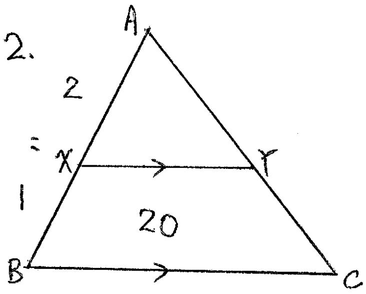
$\therefore$ the length of the arc APB.

$= r\theta^c$

$= 2 \cdot \left(\frac{3\pi}{4}\right)$

$= \frac{3}{2}\pi$. (D.)

12.



since XY // BC.

$\Delta AXY \sim \Delta ABC$.

$AX : XB = 2:1$

$\therefore AB : AX = 3:2$.

$\frac{\text{area of } \Delta ABC}{\text{area of } \Delta AXY} = \left(\frac{AB}{AX}\right)^2$

$= \left(\frac{3}{2}\right)^2$

$= 9/4$.

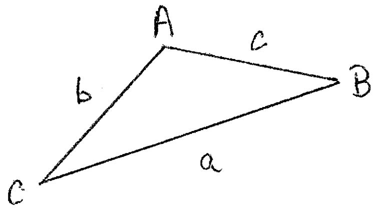
$\therefore$ area of $\Delta AXY = \frac{4}{9}$ area of ΔABC.

area of ABC − area of $\Delta AXY = 20$.

$\therefore \frac{5}{9}$ area of $\Delta ABC = 20$

area of $\Delta ABC = 36$. (E.)

13.



(1) $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$.

since $a > b > c$

$\sin A > \sin B > \sin C$.

$\therefore A > B > C$.

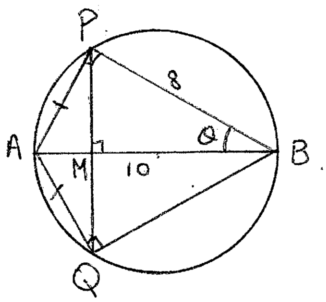
(2). $b + c > a$ is true.
sum of any two sides is greater than the other side.

(3). If $\angle A > 90^\circ$

$\angle B + \angle C < \angle A$.

$\therefore$ (1) & (2) only (C.)

14.



since AB is a diameter

$\therefore \angle APB = \angle AQB = 90^\circ$

$AP = AQ$.

$\therefore AB \perp PQ$

In $\triangle ABP$.

$AP^2 = AB^2 - BP^2$

$AP = \sqrt{10^2 - 8^2}$

$AP = 6$

$\sin\alpha = \frac{6}{10} = \frac{3}{5}$.

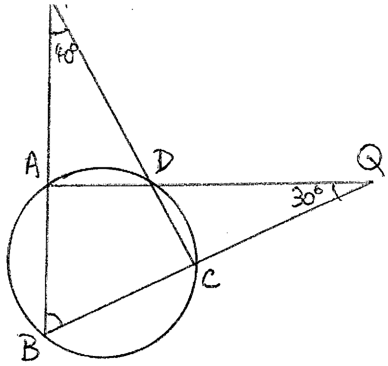
$\frac{PM}{PB} = \sin\alpha$

$PM = 8(\frac{3}{5}) = \frac{24}{5}$.

$PQ = 2PM$.

$= \frac{48}{5} = 9.6$ (E)

15.



$\angle B + \angle P = \angle C$.

$\angle B + 40^\circ = \angle C$.

$\angle C + 30^\circ = \angle D$.

$\angle B + 70^\circ = \angle D$.

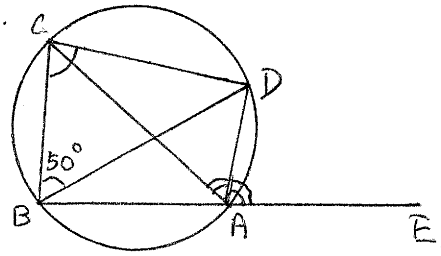
since ABCD is cyclic quad.

$\therefore \angle B + \angle D = 180^\circ$

$\therefore \angle B + 70^\circ = 180^\circ - \angle B$

$\angle B = 55^\circ$. (E.)

16.



$\angle CBD = \angle CAD$ (equal arc)

$\angle CAD = 50^\circ$.

since DA bisects $\angle CAE$.

$\therefore \angle DAE = \angle CAD = 50^\circ$.

ABCD is ~~a~~ cyclic quad.

$\therefore \angle BCD = \angle DAE$

$= 50^\circ$. (C.)

17. exterior angles $= 360^\circ$

$\therefore x^\circ + 2x^\circ + 3x^\circ + 4x^\circ + 5x^\circ = 360^\circ$

$15x = 360$

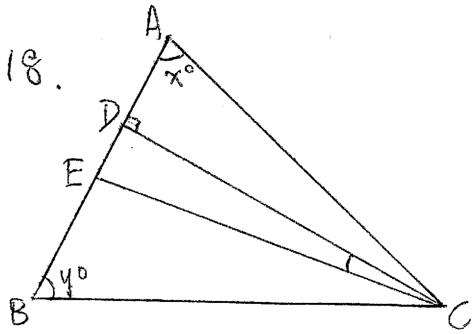
$x = 24$.

the smallest interior angle $= 180^\circ -$ the largest exterior angle.

$= 180^\circ - 5(24^\circ)$

$= 60^\circ$. (B.)

18.



$\angle ACB = 180^\circ - x^\circ - y^\circ$.

CE bisects $\angle ACB$.

$\therefore \angle ACE = \frac{1}{2}\angle ACB$.

$= \frac{1}{2}(180^\circ - x^\circ - y^\circ)$.

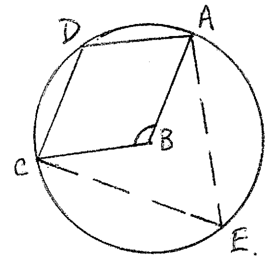
$\angle ACD = 90^\circ - x^\circ$.

$\therefore \angle DCE = \angle ACE - \angle ACD$.

$= 90^\circ - \frac{1}{2}x^\circ - \frac{1}{2}y^\circ \quad 90^\circ + x^\circ$

$= \frac{1}{2}(x^\circ - y^\circ)$ (A.)

19.



$\angle AEC = \frac{1}{2}\angle ABC$.

$\angle AEC + \angle ADC = 180^\circ$.

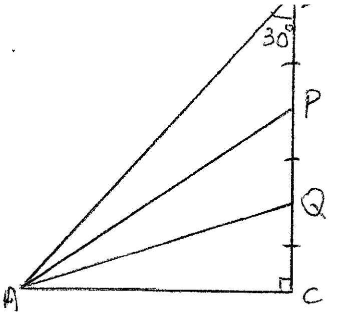
since ABCD is a rhombus.

$\angle ADC = \angle ABC$.

$\therefore \frac{1}{2}\angle ABC + \angle ABC = 180^\circ$

$\angle ABC = 120^\circ$. (B.)

20.



Let $QC = x$.

$\therefore BC = 3x$.

$\tan 60^\circ = \dfrac{3x}{AC}$

$\sqrt{3} = \dfrac{3x}{AC}$

$\dfrac{x}{AC} = \dfrac{\sqrt{3}}{3}$

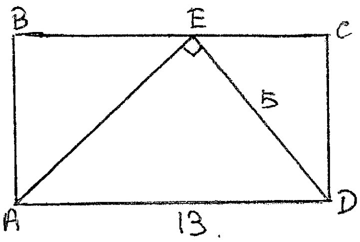
In $\triangle ACQ$

$\tan \angle QAC = \dfrac{x}{AC}$

$= \sqrt{3}/3$

$\angle QAC = 30^\circ$. (A.)

21.



$AE^2 = AD^2 - DE^2$

$AE = \sqrt{13^2 - 5^2}$

$AE = 12$

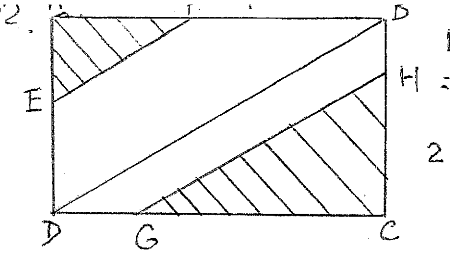
area of ABCD

$= 2 \cdot$ area of $\triangle ADE$

$= 2 \cdot [\frac{1}{2}(5)(12)]$

$= 60$. (C.)

22.



In $\triangle ABD$ & $\triangle AEF$.

$EF \parallel BD$.

$\therefore \triangle ABD \sim \triangle AEF$.

$\dfrac{AF}{AB} = \dfrac{1}{2}$.

$\dfrac{\text{area of } \triangle AEF}{\text{area of } \triangle ABD} = \left(\dfrac{1}{2}\right)^2$

$= \dfrac{1}{4}$.

since $GH \parallel BD$.

$\therefore \triangle CBD \sim \triangle CHG$.

$\therefore \dfrac{CH}{CB} = \dfrac{2}{3}$.

$\dfrac{\text{area of } \triangle CGH}{\text{area of } \triangle CBD} = \left(\dfrac{2}{3}\right)^2$

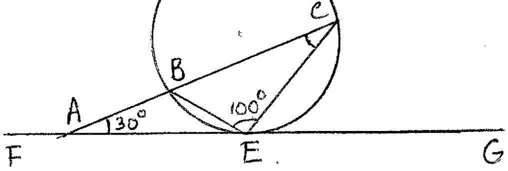
$= \dfrac{4}{9}$.

$\therefore$ the fraction of shaded area

$= \frac{1}{2}\left(\frac{1}{4}\right) + \frac{1}{2}\left(\frac{4}{9}\right)$

$= \dfrac{25}{72}$. (D.)

23.



Since GF is a tangent.

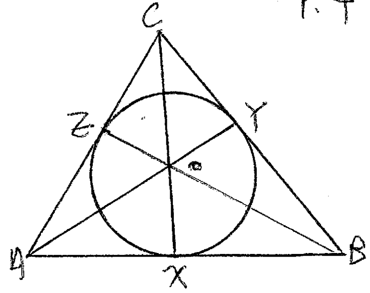
$\angle AEB = \angle ACE$.

$\therefore 2\angle ACE + 30^\circ + 100^\circ = 180^\circ$

$2\angle ACE = 50^\circ$

$\angle ACE = 25^\circ$. (C.)

24.



(I) since AB & AC are tangent $\therefore$ OA bisects $\angle BAC$.

(II) $\angle OXA = \angle OZA = 90^\circ$.

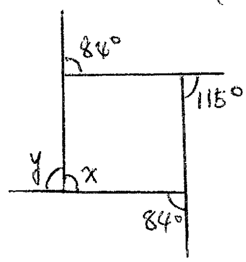
$\therefore \angle OXA + \angle OZA = 180^\circ$.

$\therefore$ A, X, O & Z are concyclic.

(III) AB & AC are tangent.

$\therefore AX = AZ$. (E.)

25.



Since exterior angles $= 360^\circ$.

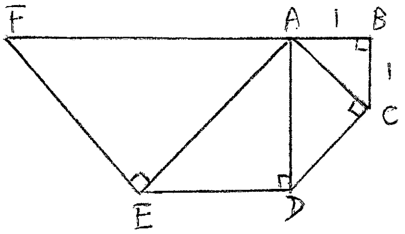
$\therefore 84^\circ + 115^\circ + 84^\circ + y = 360^\circ$

$y = 77^\circ$

$\therefore x = 180^\circ - 77^\circ$

$= 103^\circ$. (D.)

26.



$AC = \sqrt{1^2+1^2}$

$= \sqrt{2}$

$AD = \sqrt{\sqrt{2}^2 + \sqrt{2}^2}$

$= 2.$

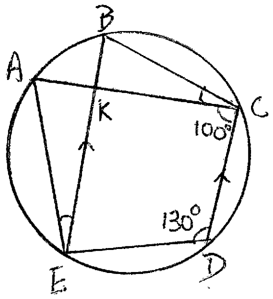
$AE = \sqrt{2^2+2^2}$

$= 2\sqrt{2}.$

$AF = \sqrt{(2\sqrt{2})^2 + (2\sqrt{2})^2}$

$= 4$ (B.)

27.



since $BE \parallel CD$.

$\therefore \angle BED + \angle CDE = 180°$

$\angle BED = 180° - 130°$

$= 50°.$

$\angle BCA = AEB.$

since ABCD are concyclic.

$\therefore \angle BCA + 50° + 100° = 180°$

$\angle BCA = 30°$ (B.)

28, Let the smallest interior angle be x.

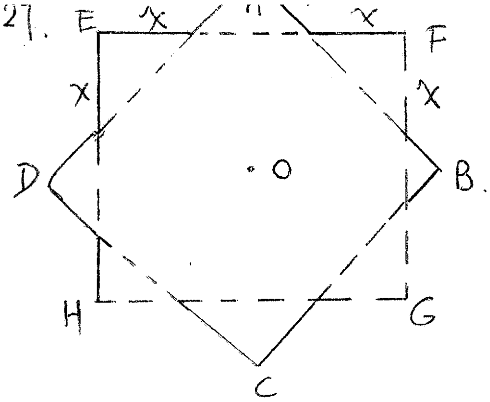
$x, x+10°, x+20°, x+30°, x+40°.$

$\therefore \frac{5}{2}(x + x + 40°) = 540°$

$2x + 40° = 216°$

$x = 88°$ (C)

27.



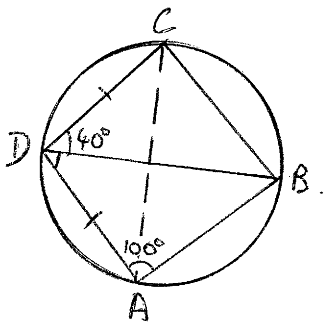
$2x + \sqrt{x^2+x^2} = 1.$

$2x + \sqrt{2}x = 1$

$x(2+\sqrt{2}) = 1.$

$x = \frac{1}{2+\sqrt{2}}.$ (D.)

30.



$\angle BAC = \angle BDC = 40°.$

$\therefore \angle CAD = \angle DAB - \angle BAC$

$= 100° - 40°$

$= 60°.$

since $AD = CD$

$\therefore \angle DCA = \angle CAD = 60°.$

$\therefore \angle ADC = 180° - 2 \times 60°$

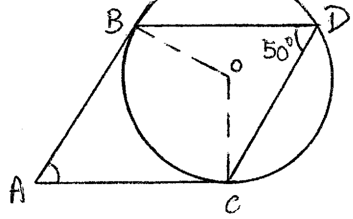
$= 60°.$

$\angle ADB = \angle ADC - \angle BDC$

$= 60° - 40°$

$= 20°.$ (A.)

31.



P.5.

O is the centre.

$\therefore \angle BOC = 2\angle BDC$

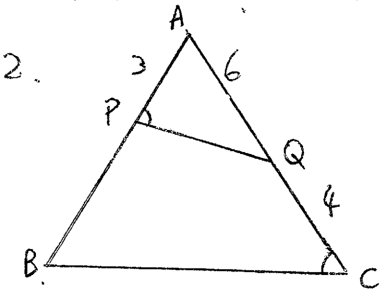
$= 2(50°)$

$= 100°$

$\angle A + \angle BOC = 180°$

$\therefore \angle A = 80°$ (D.)

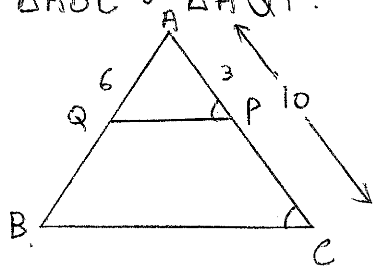
32.



since $\angle P = \angle C$.

$\angle A$ is common.

$\therefore \triangle ABC \sim \triangle AQP.$



$\therefore \frac{AB}{AQ} = \frac{AC}{AP}$

$\frac{AB}{6} = \frac{10}{3}$

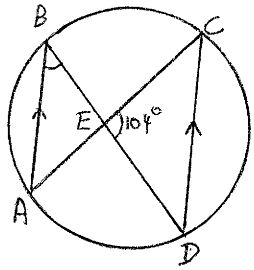
$AB = 20.$

$\therefore PB = AB - AP$

$= 20 - 3$

$= 17.$ (D)

33.



Let $\angle ABD = x$.

$\angle ACD = \angle ABD$ (equal arc.)
$= x$

since. $AB \parallel CD$

$\angle BAC = \angle ACD = x$.

$\angle CDB = \angle BAC = x$.

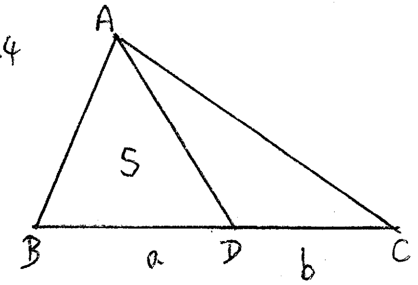
In ΔCDE.

$\angle ACD + \angle CDB + \angle CED = 180^\circ$

$2x + 104^\circ = 180^\circ$

$x = 38^\circ$ (C.)

34



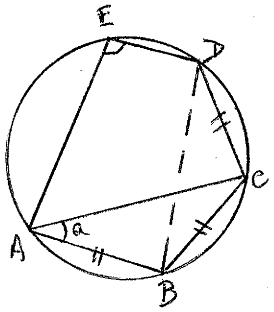
$$\frac{\text{area of } \Delta ABC}{\text{area of } \Delta ABD} = \frac{\frac{1}{2}(AB)(BC)\sin B}{\frac{1}{2}(AB)(BD)\sin B}$$

$$\frac{\text{area of } \Delta ABC}{S} = \frac{a+b}{a}$$

$$\text{area of } \Delta ABC = \left(\frac{a+b}{a}\right) S.$$

(A.)

35.



$\angle BDC = \angle BAC = a$.
(equal arc.)

since $AB = BC$.

$\angle BCA = \angle BAC = a$,

$\because BC = CD$.

$\therefore \angle CBD = \angle BDC = a$.

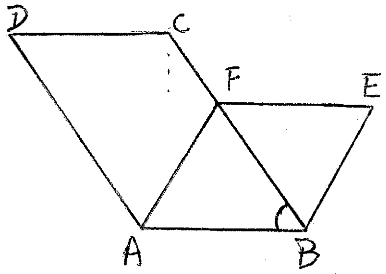
$\therefore \angle ACD = 180^\circ - \angle BCA - \angle CBD - \angle BDC$.

$= 180^\circ - 3a$.

since. $\angle AED + \angle ACD = 180^\circ$

$\therefore \angle AED = 180^\circ - (180^\circ - 3a)$
$= 3a$. (B.)

36.



area of $ABCD = (AB)(BC)\sin\angle CBA$

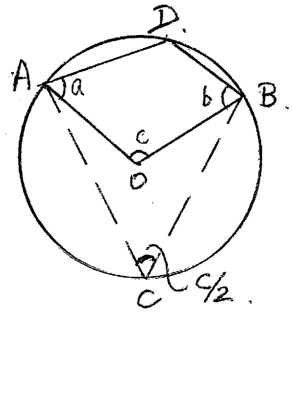
area of $ABEF = 2 \cdot$ area of ΔABF

$= 2 \cdot \left(\frac{1}{2}(AB)(BF)\sin\angle CBA\right)$

$= (AB)(BF)\sin\angle CBA$.

$$\therefore \frac{\text{area of } ABCD}{\text{area of } ABEF} = \frac{(AB)(BC)\sin\angle CBA}{(AB)(BF)\sin\angle CBA} = \frac{BC}{BF}. \quad \text{(B.)}$$

37.



$\angle ACB = \frac{1}{2}\angle AOB$.
$= \frac{c}{2}$.

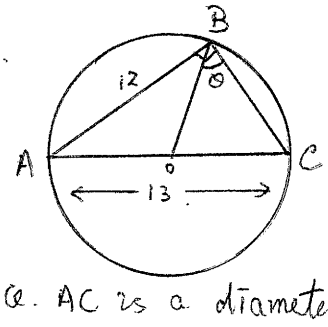
$\angle D = 180^\circ - \angle ACB$
$= 180^\circ - \frac{c}{2}$.

In OABD.

$a + b + c + \left(180^\circ - \frac{c}{2}\right) = 360^\circ$

$a + b = 360^\circ - 180^\circ - \frac{c}{2}$
$= 180^\circ - \frac{c}{2}$ (E.)

38.



since. AC is a diameter.

$\therefore \angle ABC = 90^\circ$.

$\therefore BC = \sqrt{AC^2 - AB^2}$
$= \sqrt{13^2 - 12^2}$
$= 5$.

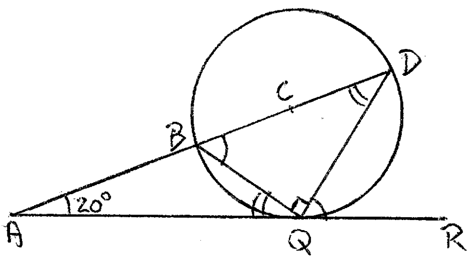
$OB = OC =$ radius $= \frac{13}{2}$.

$\therefore$ By cosine rule,

$OC^2 = OB^2 + BC^2 - 2(OB)(BC)\cos\theta$

$$\cos\theta = \frac{(6.5)^2 + (5)^2 - (6.5)^2}{2(5)(6.5)} = \frac{5}{13}. \quad \text{(B)}$$

39.



since BD is a diameter,

$\angle BQD = 90°$

$\angle DBQ = \angle DQR$

$\angle BDQ = \angle BQA$

$\angle DBQ = 20° + \angle BQA$

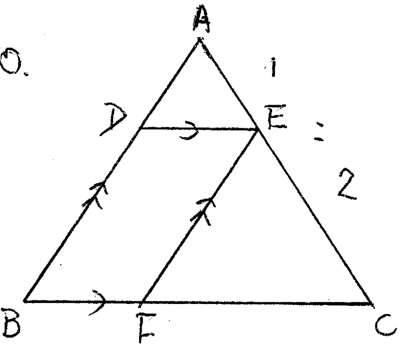
$\angle DBQ + \angle BDQ = 90°$

$\angle DBQ + \angle DBQ - 20° = 90°$

$\therefore \angle DBQ = 55°$

$\angle DQR = 55°$ (C.)

40.



since DE // BF.

$\therefore \triangle ADE \sim \triangle ABC \sim \triangle EFC$

$\therefore \dfrac{\text{area of } \triangle ADE}{\text{area of } \triangle ABC} = \left(\dfrac{AE}{AC}\right)^2$

$= \left(\dfrac{1}{3}\right)^2$

area of $\triangle ADE = \dfrac{1}{9}$ area of $\triangle ABC$.

$\dfrac{\text{area of } \triangle EFC}{\text{area of } \triangle ABC} = \left(\dfrac{CE}{AC}\right)^2$

$= \left(\dfrac{2}{3}\right)^2$

area of $\triangle EFC = \dfrac{4}{9}$ area of $\triangle ABC$.

area of BFED.

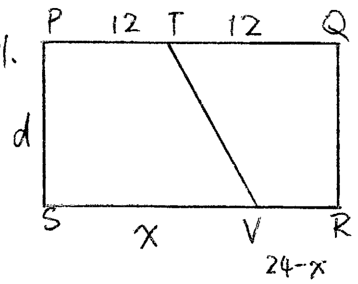
$=$ area of $\triangle ABC$ − area of $\triangle ADE$ − area of $\triangle EFC$.

$= \dfrac{4}{9}$ area. of BFED

$\therefore$ area of $\triangle ADE$: area of BFED

$= 1 : 4$. (C.)

41.



Let SV be x.

area of PTVS $= \dfrac{(12+x)d}{2}$.

area of TQRV $= \dfrac{[(24-x)+12]d}{2}$.

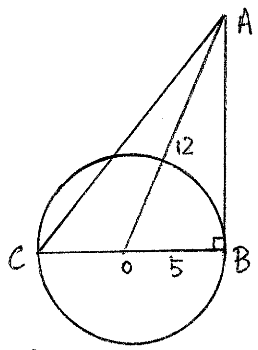
$\therefore \dfrac{(12+x)\frac{d}{2}}{(36-x)\cdot\frac{d}{2}} = 2$.

$12 + x = 72 - 2x$

$3x = 60$

$x = 20$. (D.)

42.



since AB is a tangent.

$\therefore \angle CBA = 90°$.

$\therefore AB^2 = OA^2 - OB^2$

$AB = \sqrt{12^2 - 5^2}$

$= \sqrt{119}$

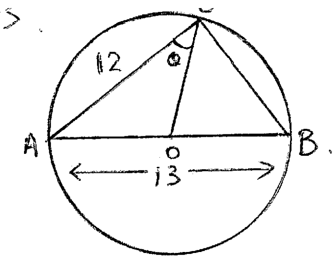
$OC = OB = 5$.

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

$= \sqrt{119 + 10^2}$

$= \sqrt{219}$ (C.)

43.



since AB is a diameter,

$\therefore \angle ACB = 90°$

$BC = \sqrt{AB^2 - C^2}$

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

$= 5$.

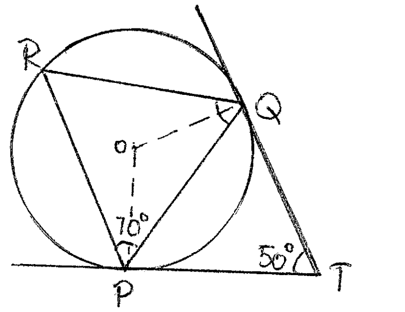
since $OA = OC$.

$\therefore \angle OAC = \angle ACO = \theta$.

$\therefore \sin\theta = \dfrac{BC}{AB}$.

$= \dfrac{5}{13}$. (B.)

44.



since. QT & PT are tangents,

$\angle QOP + \angle QTP = 180°$

$\angle QOP = 180° - 50°$

$= 130°$.

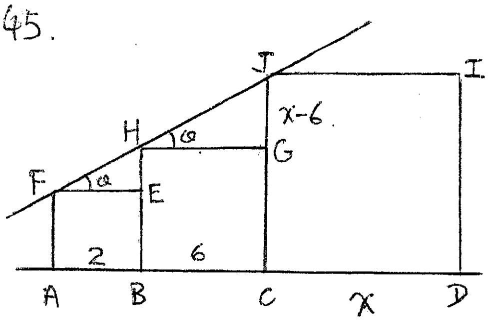
$\angle PRQ = \frac{1}{2}\angle QOP$

$= 65°$.

$\therefore \angle RQP = 180° - 70° - 65°$

$= 45°$. (B.)

45.



Let CD be x.

In ΔEFH.

$$\tan\theta = \frac{6-2}{2} = 2.$$

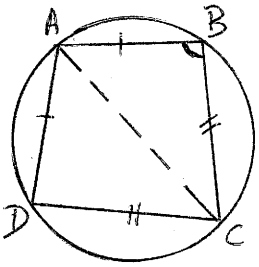
In ΔGHJ.

$$\tan\theta = \frac{x-6}{6}.$$

$$\therefore \frac{x-6}{6} = 2.$$

$$x = 18 \quad (E.)$$

46.



$AB = AD$.

$CD = BC$.

and AC is common.

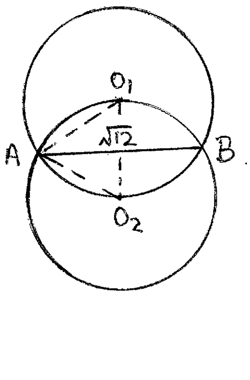
$\therefore \Delta ACD \cong \Delta ACB$

$\therefore \angle ABC = \angle ADC$.

$\therefore \angle ABC + \angle ADC = 180°$

$\therefore \angle ABC = 90°$. (B.)

47.



In ΔO_1O_2A.

$O_1A = O_2A = O_1O_2 = r$.

$\therefore \angle O_1AO_2 = 60°$

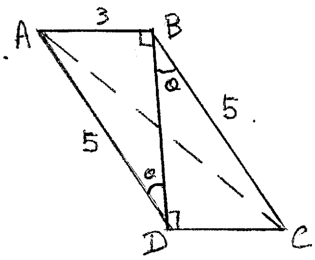
$\angle O_2AB = \frac{60°}{2} = 30°$.

$$\therefore \cos 30° = \frac{\sqrt{12}/2}{r}$$

$$r = \frac{\sqrt{12}}{2} \Big/ \frac{\sqrt{3}}{2}$$

$$= 2. \quad (B.)$$

48.



$$\sin\theta = \frac{3}{5}.$$

In ΔABC.

$$AC^2 = AB^2 + BC^2 - 2(AB)(BC)\cos(90°+\theta)$$

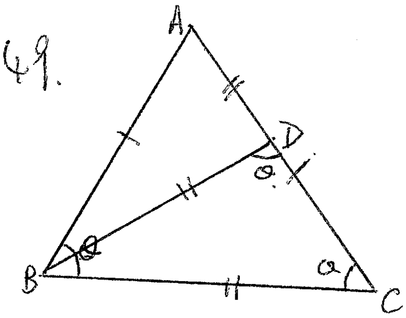
$$AC^2 = 3^2 + 5^2 - 2(3)(5)(-\sin\theta)$$

$$AC^2 = 9 + 25 + 30\left(\frac{3}{5}\right)$$

$$AC = \sqrt{52}$$

$$= 2\sqrt{13}. \quad (E.)$$

49.



Let $\angle ACB = \theta$

Since. $AB = AC$ &

$BC = BD$

$\therefore \angle BDC = \angle ABC = \angle ACB = \theta$.

$\therefore \angle A = 180° - 2\theta$.

$\angle ABD = \angle A = 180° - 2\theta$.

$\because (AD = BD)$.

$\therefore \angle A + \angle ABD = \angle BDC$

$2(180° - 2\theta) = \theta$.

$360° = 5\theta$

$\theta = 72°$ (E.)