N.S.
March 2005

(Pages : 4)

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MATHEMATICS—Paper II

Total Score : 50

Time : 2 hours

Note.—(1) *Answer* **all** *questions.*

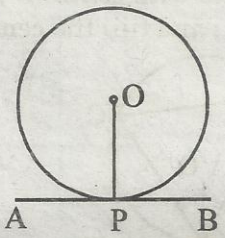
(2) *Calculations and figures required for finding out the answers should be given in the right-hand margin of each answer.*

SCORES

[For questions **1—5**, write answers in *one* word.]

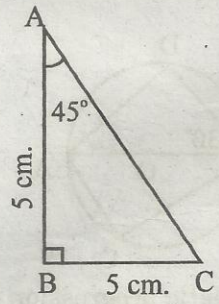
1. The first term of an arithmetic progression is k. The second term is $k + n$. Find the third term. ½

2. P is a point of the circle with centre O. If AB is perpendicular to OP what is the most suitable name for AB, in relation to the circle. ½



3. Find the central angle of an arc if the central angle of its complement is 60°. ½

4. From figure find the value of cos 45°. ½

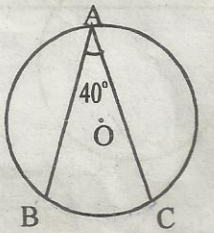


5. Find the sum of the natural numbers from 1 to $n - 2$. ½

[For question **6** onwards write detailed steps wherever necessary.]

6. In $\sin x = 0.8$, find the value of $\cos x$? 1

7. In the figure $\angle BAC = 40°$. Find the central angle of arc BAC. 1



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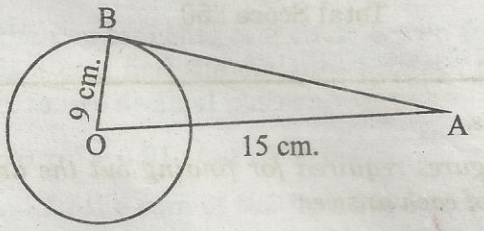
8. In the figure, O is the centre of the circle and AB is a tangent. OB = 9 cm., OA = 15 cm. Find the length of AB. 1

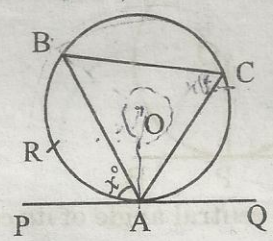


9. The seventh term of an arithmetic progression is 21 and the fifth term is 10. Then what is the sixth term ? 1

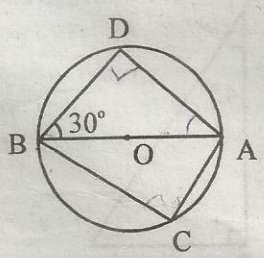
10. The mean weight of 10 students is 43 kg. When one more student was admitted, the new mean became 42 kg. Find the weight of the new student ? 1

11. If $a = l \sin u$ and $b = l \cos u$, prove that $a^2 + b^2 = l^2$. 1½

12. In the figure, PQ is a tangent of the circle with centre O ; AB is a chord. If $\angle PAB = x°$, find (i) $\angle ACB$; (ii) central angle of arc ARB ; and (iii) the central angle of arc BCA. 1½

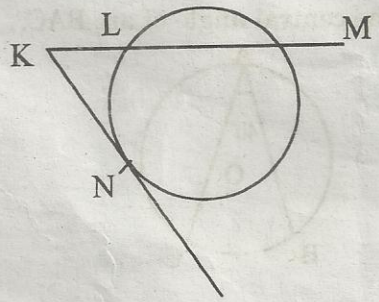


13. In the figure, O is the centre of the circle. $\angle DBA = 30°$. Then, find $\angle ADB$, $\angle ACB$ and $\angle DAB$. 1½



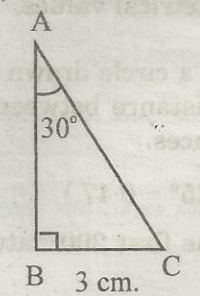
14. The common difference of an arithmetic progression is – 3. Its twentieth term is 36. Find the first three terms. 1½

15. In the figure, the chord ML is extended. The tangent at N meets this extended chord at K. Prove that $KL \times KM = KN^2$. 2



SCORES

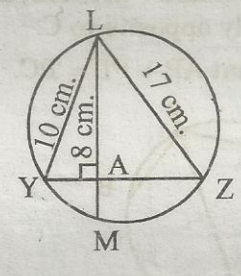
16. In the right-angled triangle ABC, $\angle A = 30°$ and BC = 3 cm. Find the other two sides. 2



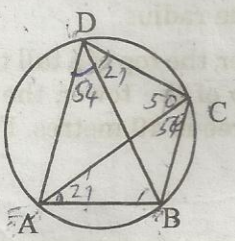
17. The angles of a quadrilateral are in the ratio 1 : 2 : 5 : 4. Show that it is a cyclic quadrilateral. 2

18. How many numbers are there between 200 and 400 which give remainder 2 when divided by 7 ? 2

19. In the figure, the chords LM and YZ intersect at right angles at A. LY = 10 cm. ; LZ = 17 cm. ; LA = 8 cm. Find LA × AM. 2



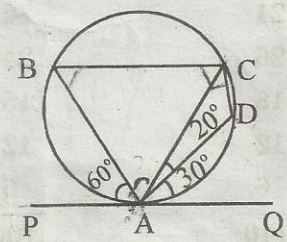
20. In the cyclic quadrilateral ABCD, $\angle ADB = 54°$, $\angle ACD = 50°$, $\angle BDC = 27°$. Find $\angle DBA$, $\angle BCA$ and $\angle DAB$. 2½



$\angle ADB = 54°$
$\angle ACB = 54°$ ie; $\angle BCA = 54°$
$\angle ACD = 50°$ $\angle BCD =$
$\angle ABD = 50°$

21. Various steps used to find out the angles of quadrilateral ABCD from the figure are given below. Write down the appropriate reasons for each. 2½

(a) $\angle BAC = 70°$.
(b) $\angle BAD = 90°$.
(c) $\angle BCD = 90°$.
(d) $\angle ABC = 50°$.
(e) $\angle ADC = 130°$.



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SCORES

22. If $\cos x = \frac{5}{7}$, find all the other trigonometrical values. 2½

23. The angle between the two tangents of a circle drawn from external point is 50°. If the radius of the circle is 3 cm., find the distance between the centre of the circle and the external point correct to two decimal places. 3

(sin 25° = 0·42 ; cos 25° = 0·91 ; tan 25° = 0·47.)

24. To the problem of finding the sum of the first 200 natural numbers, a student gave the answer as follows : 3

$1 + 2 + 3 + \ldots . + 200 = 100 \times 201 = 20100.$

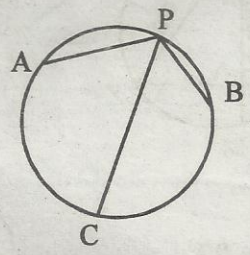
(a) Explain the process of getting this answer.

(b) Using this method, find the value of

$5 + 10 + 15 + \ldots . + 1000.$

25. In the figure, the central angles of the smaller arcs AB, BC and CA are all equal to 120°. P is the point on the circle diametrically opposite to C. 3

For the chords AP, PB and PC prove that AP + PB = PC.



26. In the right-angled triangle ABC, AB = 7 cm., AC = 6 cm. ∠A = 90°. Draw the ΔABC and construct its incircle. Then measure the radius. 3

27. When viewed from the bottom of a tower, the top of a tall tree was seen at angle of elevation of 65°. But when viewed from the top of the tower, the angle of elevation was 25°. The distance between the tower and the tree is 40 metres. Find the heights of the tower and the tree ? 3

(tan 65° = 2.14 ; tan 25° = 0.47)

28. The ages of men and women working in a factory are given in the table below. Find the mean age of the workers. 4

Age	*No. of women*	*No. of men*
20—25	12	8
25—30	17	13
30—35	21	22
35—40	26	24
40—45	16	15
45—50	12	12
50—55	6	6
Total	110	100