

PROPERTIES ASSIGNMENT

1. If the perpendicular AD divides the base of the triangle ABC such that BD , CD and AD are in the ratio 2, 3 and 6, then angle A is equal to
- (a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{6}$
2. In a triangle ABC , $\frac{2 \cos A}{a} + \frac{\cos B}{b} + \frac{2 \cos C}{c} = \frac{a}{bc} + \frac{b}{ca}$, then the value of angle A is
- (a) 45° (b) 30° (c) 90° (d) 60°
3. If the two angles on the base of a triangle are $\left(22\frac{1}{2}\right)^\circ$ and $\left(112\frac{1}{2}\right)^\circ$, then the ratio of the height of the triangle to the length of the base is
- (a) 1 : 2 (b) 2 : 1 (c) 2 : 3 (d) 1 : 1
4. If $\Delta = a^2 - (b - c)^2$, where Δ is the area of triangle ABC , then $\tan A$ is equal to
- (a) $\frac{15}{16}$ (b) $\frac{8}{15}$ (c) $\frac{8}{17}$ (d) $\frac{1}{2}$
5. The perimeter of a ΔABC is 6 times the arithmetic mean of the sines of its angles. If the side a is 1, then the angle A is
- (a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{2}$ (d) π
6. If $A_1 A_2 A_3 \dots A_n$ be a regular polygon of n sides and $\frac{1}{A_1 A_2} = \frac{1}{A_1 A_3} + \frac{1}{A_1 A_4}$, then
- (a) $n = 5$ (b) $n = 6$ (c) $n = 7$ (d) None of these
7. If an triangle PQR , $\sin P$, $\sin Q$, $\sin R$ are in A.P., then
- (a) The altitudes are in A.P. (b) The altitudes are in H.P.
(c) The medians are in G.P. (d) The medians are in A.P.
8. Points D , E are taken on the side BC of a triangle ABC such that $BD = DE = EC$. If $\angle BAD = x$, $\angle DAE = y$, $\angle EAC = z$, then the values of $\frac{\sin(x+y)\sin(y+z)}{\sin x \sin z} =$
- (a) 1 (b) 2 (c) 4 (d) None of these
9. In a ΔABC , $2 \cos\left(\frac{A-C}{2}\right) = \frac{a+c}{\sqrt{a^2+c^2-ac}}$, then
- (a) $B = \frac{\pi}{3}$ (b) $B = C$ (c) A, B, C are in A.P. (d) Both (a) and (c)
10. If P is the product of the sines of angles of a triangle, and q the product of their cosines, then the tangents of the angle are roots of the equation
- (a) $qx^3 - px^2 + (1+q)x - p = 0$ (b) $px^3 - qx^2 + (1+p)x - q = 0$
(c) $(1+q)x^3 - px^2 + qx - p = 0$ (d) None of these
11. If the radius of the circumcircle of an isosceles triangle PQR is equal to $PQ (= PR)$, then the angle P is
- (a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{2}$ (d) $\frac{2\pi}{3}$
12. If p_1, p_2, p_3 are respectively the perpendiculars from the vertices of a triangle to the opposite sides, then $p_1 \cdot p_2 \cdot p_3 =$
- (a) $\frac{a^2 b^2 c^2}{R^2}$ (b) $\frac{a^2 b^2 c^2}{4R^2}$ (c) $\frac{4a^2 b^2 c^2}{R^2}$ (d) $\frac{a^2 b^2 c^2}{8R^2}$
13. If r_1, r_2, r_3 are the radii of the escribed circles of a triangle ABC and if r is the radius of its incircle, then $r_1 r_2 r_3 - r(r_1 r_2 + r_2 r_3 + r_3 r_1)$ is equal to
- (a) 0 (b) 1 (c) 2 (d) 3
14. In a triangle, the line joining the circum centre to the incentre is parallel to BC , then $\cos B + \cos C =$
- (a) $\frac{3}{2}$ (b) 1 (c) $\frac{3}{4}$ (d) $\frac{1}{2}$
15. The sides of a triangle inscribed in a given circle subtend angles α, β, γ at the centre. The minimum value of the A.M. of $\cos\left(\alpha + \frac{\pi}{2}\right), \cos\left(\beta + \frac{\pi}{2}\right)$ and $\cos\left(\gamma + \frac{\pi}{2}\right)$ is equal to

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

16. In a right angled triangle the hypotenuse is $2\sqrt{2}$ times the length of perpendicular drawn from the opposite vertex on the hypotenuse, then the other two angles are

- (a) $\frac{\pi}{3}, \frac{\pi}{6}$ (b) $\frac{\pi}{4}, \frac{\pi}{4}$ (c) $\frac{\pi}{8}, \frac{3\pi}{8}$ (d) $\frac{\pi}{12}, \frac{5\pi}{12}$

17. In a triangle ABC , $a=4, b=3, \angle A=60^\circ$. Then c is the root of the equation

- (a) $c^2 - 3c - 7 = 0$ (b) $c^2 + 3c + 7 = 0$ (c) $c^2 - 3c + 7 = 0$ (d) $c^2 + 3c - 7 = 0$

18. In a triangle ABC , angle A is greater than angle B . If the measure of angles A and B satisfy the equation $3 \sin x - 4 \sin^3 x - k = 0, 0 < k < 1$, then the measure of angle C is

- (a) $\frac{\pi}{3}$ (b) $\frac{\pi}{2}$ (c) $\frac{2\pi}{3}$ (d) $\frac{5\pi}{6}$

19. In a $\triangle ABC$ a, b, A are given and b_1, b_2 are two values of the third side b such that $b_2 = 2b_1$. Then $\sin A =$

- (a) $\sqrt{\frac{9a^2 - c^2}{8a^2}}$ (b) $\sqrt{\frac{9a^2 - c^2}{8c^2}}$ (c) $\sqrt{\frac{9a^2 + c^2}{8a^2}}$ (d) None of these

20. There exists a triangle ABC satisfying

- (a) $\tan A + \tan B + \tan C = 0$ (b) $\frac{\sin A}{2} = \frac{\sin B}{3} = \frac{\sin C}{7}$
 (c) $(a+b)^2 = c^2 + ab$ and $\sqrt{2}(\sin A + \cos A) = \sqrt{3}$ (d) $\sin A + \sin B = \frac{\sqrt{3}+1}{4}, \cos A \cos B = \frac{\sqrt{3}}{2} = \sin A \sin B$

21. In the ambiguous case, given a, b and A . Then the difference between the two values of c is

- (a) $2\sqrt{a^2 - b^2}$ (b) $\sqrt{a^2 - b^2 \sin^2 A}$ (c) $2\sqrt{a^2 - b^2 \sin^2 A}$ (d) $\sqrt{a^2 - b^2}$

22. The sides of a triangle are in A.P. and its area is $\frac{3}{5} \times$ (Area of an equilateral triangle of the same perimeter). Then the ratio of the sides is

- (a) 1 : 2 : 3 (b) 3 : 5 : 7 (c) 1 : 3 : 5 (d) None of these

23. There exists a triangle ABC satisfying the conditions

- (a) $b \sin A = a, A < \frac{\pi}{2}$ or $b \sin A < a, A < \frac{\pi}{2}, b < a$ (b) $b \sin A > a, A > \frac{\pi}{2}$
 (c) $b \sin A > a, A < \frac{\pi}{2}$ (d) None of these

24. In a $\triangle ABC$, if $\angle C = 30^\circ, a = 47 \text{ cm}$ and $b = 94 \text{ cm}$, then the triangle is

- (a) Right angled (b) Right angled isosceles (c) Isosceles (d) Obtuse angled

25. In a triangle ABC , if $a \sin A = b \sin B$, then the nature of the triangle

- (a) $a > b$ (b) $a < b$ (c) $a = b$ (d) $a + b = c$

26. If the sides of a triangle be 6, 10 and 14 then the triangle is

- (a) Obtuse angled (b) Acute angled (c) Right angled (d) Equilateral

27. If in a triangle ABC , a, b, c and angle A is given and $c \sin A < a < c$, then

- (a) $b_1 + b_2 = 2c \cos A$ (b) $b_1 + b_2 = c \cos A$ (c) $b_1 + b_2 = 3c \cos A$ (d) $b_1 + b_2 = 4c \sin A$

28. In a triangle ABC if $\frac{\cos A}{a} = \frac{\cos B}{b} = \frac{\cos C}{c}$, then the triangle is

- (a) Right angled (b) Obtuse angled (c) Equilateral (d) Isosceles

29. If $\cot \frac{A}{2} = \frac{b+c}{2}$, then the $\triangle ABC$ is

- (a) Isosceles (b) Equilateral (c) Right angled (d) None of these

30. In any $\triangle ABC$ if $a \cos B = b \cos A$, then the triangle is

- (a) Equilateral Triangle (b) Isosceles Triangle
 (c) Scalene Triangle (d) Right angled Triangle

31. If one side of a triangle is twice the other side and the angles opposite to these sides differ by 60° , then the triangle is

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- (a) Equilateral (b) Isosceles (c) Right angled (d) None of these
32. The sides of a triangle are $3x + 4y, 4x + 3y$ and $5x + 5y$ units where $x > 0, y > 0$. The triangle is
 (a) Right angled (b) Equilateral (c) Obtuse angled (d) None of these
33. If $A = 60^\circ, a = 5, b = 4\sqrt{3}$ in $\triangle ABC$, then $B =$
 (a) 30° (b) 60° (c) 90° (d) None of these
34. If $A = 30^\circ, a = 7, b = 8$ in $\triangle ABC$, then B has
 (a) One solution (b) Two solutions (c) No solution (d) None of these
35. If one angle of a triangle is 30° and the lengths of the sides adjacent to it are 40 and $40\sqrt{3}$, the triangle is
 (a) Right angled (b) Isosceles (c) Both (a) and (b) (d) None of these
36. If in $\triangle ABC$, $a = 5; b = 4; A = \frac{\pi}{2} + B$, then the value of C
 (a) Cannot be evaluated (b) Is equal to $\tan^{-1} \frac{1}{9}$ (c) Is equal to $\tan^{-1} \frac{1}{40}$ (d) Is equal to $2 \tan^{-1} \frac{1}{9}$
37. We are given b, c and $\sin B$ such that B is acute and $b < c \sin B$. Then
 (a) No triangle is possible (b) One triangle is possible
 (c) Two triangles are possible (d) A right angled triangle is possible
38. Which is true in the following
 (a) $a \cos A + b \cos B + c \cos C = R \sin A \sin B \sin C$ (b) $a \cos A + b \cos B + c \cos C = 2R \sin A \sin B \sin C$
 (c) $a \cos A + b \cos B + c \cos C = 4R \sin A \sin B \sin C$ (d) $a \cos A + b \cos B + c \cos C = 8R \sin A \sin B \sin C$
39. In $\triangle ABC$, $a \cos A + b \cos B + c \cos C =$
 (a) $4R \sin A \sin B \sin C$ (b) $3R \sin A \sin B \sin C$ (c) $\sin A \sin B \sin C$ (d) $4R \cos A \cos B \cos C$
40. The in-radius of the triangle whose sides are 3, 5, 6 is
 (a) $\sqrt{\frac{8}{7}}$ (b) $\sqrt{8}$ (c) $\sqrt{7}$ (d) $\sqrt{\frac{7}{8}}$
41. In an equilateral triangle of side $2\sqrt{3}$ cm, the circum-radius is
 (a) 1 cm (b) $\sqrt{3}$ cm (c) 2 cm (d) $2\sqrt{3}$ cm
42. If the lengths of the sides of a triangle are 3, 4 and 5 units, then R the circum-radius is
 (a) 2.0 (b) 2.5 (c) 3.0 (d) 3.5
43. In a triangle ABC , $a : b : c = 4 : 5 : 6$. The ratio of the radius of the circumcircle to that of the incircle is
 (a) $\frac{16}{9}$ (b) $\frac{16}{7}$ (c) $\frac{11}{7}$ (d) $\frac{7}{16}$
44. If R is the radius of the circumcircle of the $\triangle ABC$ and Δ is its area, then
 (a) $R = \frac{a+b+c}{\Delta}$ (b) $R = \frac{a+b+c}{4\Delta}$ (c) $R = \frac{abc}{4\Delta}$ (d) $R = \frac{abc}{\Delta}$
45. A circle is inscribed in an equilateral triangle of side a . The area of any square inscribed in this circle is
 (a) $\frac{a^2}{12}$ (b) $\frac{a^2}{6}$ (c) $\frac{a^2}{3}$ (d) $2a^2$
46. The diameter of the circum-circle whose sides are 61, 60, 11
 (a) 60 (b) 61 (c) 62 (d) 63
47. In an equilateral triangle, circum-radius : in-radius : ex-radius i.e., $R : r : r_1 =$
 (a) 1 : 1 : 1 (b) 1 : 2 : 3 (c) 2 : 1 : 3 (d) 3 : 2 : 4
48. In a $\triangle ABC$, I is the in-centre. The ratio $IA : IB : IC$ is equal to
 (a) $\sin \frac{A}{2} : \sin \frac{B}{2} : \sin \frac{C}{2}$ (b) $\cos \frac{A}{2} : \cos \frac{B}{2} : \cos \frac{C}{2}$ (c) $\operatorname{cosec} \frac{A}{2} : \operatorname{cosec} \frac{B}{2} : \operatorname{cosec} \frac{C}{2}$ (d) $\sec \frac{A}{2} : \sec \frac{B}{2} : \sec \frac{C}{2}$
49. In a triangle ABC if $r_1 = 2r_2 = 3r_3$, then
 (a) $2a = b + c$ (b) $a + c = 2b$ (c) $a + b - 2c = 0$ (d) None of these
50. If in a triangle R and r are the circumradius and in-radius respectively, then the H.M. of the ex-radii of the triangle is
 (a) $3r$ (b) $2R$ (c) $R + r$ (d) None of these