MATHS

BOOKS - OBJECTIVE RD SHARMA ENGLISH

PROPERTIES OF TRIANGLES AND CIRCLES CONNECTED WITH THEM

Illustration

1. In any Δ ABC, $\sum$ a(sin B - sin C) =

A. 2s

B. $a^2 + b^2 + c^2$

C. 0

D. none of these

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2. In any Δ ABC, $\sum$ a sin (B -C) =

A. 2s

B. a+b+c

C. $a^2 + b^2 + c^2$

D. 0

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3. In any $\Delta ABC, \sum a^2(\sin^2 B - \sin^2 C) =$

A. 2s

B. $a^2 + b^2 + c^2$

C. 0

D. none of these

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4. In any $\Delta ABC, \sum (b-c)\cot$A/2`=

A. 0

B. 1

C. -1

D. none of these

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5. If in a triangle ABC, $\frac{\sin A}{\sin C}=\frac{\sin(A-B)}{\sin(B-C)}$, then

A. A.P

B. G.P.

C. H.P.

D. none of these

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6. In a ΔABC, if a =2, B = 60°and C =75°, then b=

A. $\sqrt{3}$

B. $\sqrt{6}$

C. $\sqrt{9}$

D. $1+\sqrt{2}$

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7. In a ΔABC, if $A = 45^\circ$ and $B = 75^\circ$, then $a + \sqrt{2}c =$

A. b

B. 2b

C. $\sqrt{2}b$

D. $\sqrt{3}b$

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8. If the angles of a triangle are in the ratio 2 : 3 : 7 ,then the sides are in the ratio

A. $\sqrt{2} : 2 : \sqrt{3} + 1$

B. $2 : \sqrt{2} : \sqrt{3} : 1$

C. $\sqrt{2} : \sqrt{3} + 1 : 2$

D. $2 : 3 : 7$

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9. If two angles of a ΔABC are 45 ° and 60°, then the ratio of the smallest and greatest sides are

A. $(\sqrt{3}-1)$: 1`

B. $\sqrt{3}:\sqrt{2}$

C. $1:\sqrt{3}$

D. $\sqrt{3}:1$

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10. If $\frac{\cos A}{a}=\frac{\cos B}{b}=\frac{\cos C}{c}$ and the side $a=2$, then find the area of the triangle

A. 1

B. 2

C. $\sqrt{3}/2$

D. $\sqrt{3}$

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11. The perimeter of a triangle ABC is six times the arithmetic mean of the sines of its angles. If the side a is 1, then find angle A

A. $\frac{\pi}{6}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{2}$

D. π

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12. If in a ΔABC, c = 3b and C - B = 90°, then tanB=

A. $2+\sqrt{3}$

B. $2-\sqrt{3}$

C. 3

D. $1/3$

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13. The side of a triangle are in the ratio $1:\sqrt{3}:2$, then the angles of the triangle are the ratio

A. $1:3:5$

B. $2:3:1$

C. $3:2:1$

D. $1:2:3$

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14. If $b + c = 3a$, then find the value of $\cot.\frac{B}{2}\cot.\frac{C}{2}$

A. 1

B. 2

C. $\sqrt{3}$

D. 3

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15. The angles of a triangle are in the ratio 3 : 5 : 10, the ratio of the smallest side to the greatest side is

A. $1 : \sin 10^{\circ}$

B. $1 : 2\sin 10^{\circ}$

C. $1:2\cos 10^{\circ}$

D. $1:2\cos 10^{\circ}$

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16. In any ΔABC, $2[bc\cos A+ca\cos B+ab\cos C]=$

A. $a^{2}+b^{2}+c^{2}$

B. abc

C. a+b+c

D. none of these

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17. If the sides of a triangle are a, b and $\sqrt{a^2 + ab + b^2}$, then find the greatest angle

A. 60°

B. 90°

C. 120°

D. none of these

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18. 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. $c^2 + 3c - 7 = 0$

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19. In a ΔABC, if(c+a+b) (a+b-c) =ab, then the measure of angle C is

A. $\frac{\pi}{3}$

B. $\frac{\pi}{6}$

C. $\frac{2\pi}{3}$

D. $\frac{\pi}{2}$

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20. In a triangle ABC, if the sides a,b,c, are roots of $x^3 - 11x^2 + 38x - 40 = 0$, then find the value of $\frac{\cos A}{a} + \frac{\cos B}{b} + \frac{\cos C}{c}$

A. $\frac{16}{9}$

B. $\frac{3}{4}$

C. $\frac{4}{3}$

D. $\frac{9}{16}$

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21. In a ΔABC,

$$\frac{b^2-c^2}{a\sec A}+\frac{c^2-a^2}{b\sec B}+\frac{a^2-b^2}{c\sec C}=$$

A. 1

B. 0

C. abc

D. none of these

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22. In a ΔABC, if a = 4, b = 5 , c = 6 then angle C is equal to

A. A

B. $\frac{1}{2}A$

C. 2A

D. 3A

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23. In a ΔABC, if $\Delta C = 60^\circ$, then

$$\frac{b}{c^2 - a^2} + \frac{a}{c^2 - b^2} =$$

A. a+b+c

B. $\frac{1}{a+b+c}$

C. abc

D. 0

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24. In a triangle ABC, $2ac\sin\left(\frac{1}{2}(A-B+C)\right)=$

A. $a^2+b^2-c^2$

B. $c^2+a^2-b^2$

C. $b^2-c^2-a^2$

D. $c^2-a^2-b^2$

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25. The angles A,B and C of a ΔABC are in A.PP. If AB=6, BC=7, then AC=

A. 5 units

B. 7 units

C. 8 units

D. none of these

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26. In a triangle ABC, $a(b\cos C - c\cos B)$ is :

A. a^2

B. $b^2 - c^2$

C. 0

D. none of these

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27. The straight roads intersect at an angle of 60º. A bus on one road is 2 km away from the intersection and a car on tire other road is 3 km away from the intersection. Then, the direct distance between the two vehicles, is

A. 1 km

B. $\sqrt{2}$ km

C. 4 km

D. $\sqrt{7}$ km

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28. In a $\Delta ABC, b\cos^2\left(\frac{C}{2}\right) + c\cos^2\left(\frac{B}{2}\right)$ is equal to

A. s

B. 2s

C. s/2

D. none of these

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29. In a $\Delta ABC, \sum (b+c)\cos A =$

A. a+b+c

B. a+b-c

C. a-b+c

D. none of these

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30. In a $\Delta ABC, a\left(\cos^2 B + \cos^2 C\right) + \cos A(c\cos C + b\cos B) =$

A. a

B. b

C. c

D. 0

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31. In a $\Delta ABC, b\cos^{2}{'}\frac{A}{2}+a\cos^{2}\frac{B}{2}=\frac{3}{2}c$, then a, c, b in (with usual notations)

A. a,b,c are in A.P.

B. a,c,b are in A.P.

C. a,b,c are in G.P.

D. none of these

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32. In any ΔABC, $\sum \frac{\cos A}{b \cos C + c \cos B}$ is equal to

A. $a^2 + b^2 + c^2$

B. $\frac{a^2 + b^2 + c^2}{abc}$

C. $\frac{a^2 + b^2 + c^2}{2abc}$

D. none of these

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33. In a ΔABC, if a=13,b =14, c =15, then $\sin\left(\frac{A}{2}\right) =$

A. $\frac{1}{\sqrt{5}}$

B. $\frac{2}{\sqrt{5}}$

C. $\frac{3}{\sqrt{5}}$

D. $\frac{4}{\sqrt{5}}$

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34. If in a ΔABC, Δ = (c + a - b) (a + b - c), then tan A is equal to

A. $\frac{2}{\sqrt{3}}$

B. $\frac{8}{15}$

C. $\frac{15}{16}$

D. none of these

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35. In a $\Delta ABC, 2a\frac{\sin^2 C}{2} + 2c\frac{\sin^2 A}{2} =$

A. 2(s-c)

B. 2(s-b)

C. 2(s-a)

D. s

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36. In a ΔABC, if $\frac{\tan A}{2} = \frac{5}{6}$ and $\frac{\tan B}{2} = \frac{20}{37}$ then $\frac{\tan C}{2} =$

A. $\frac{4}{5}$

B. $\frac{3}{5}$

C. $\frac{2}{5}$

D. none of these

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37. In a ΔABC, if a =2x, b =2y and $\angle C = 120^{\circ}$, then area of the triangle is

A. xy

B. $\sqrt{3}xy$

C. 3xy

D. 2xy

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38. Prove that $a^2 \sin 2B + b^2 \sin 2A = 4\Delta$

A. 2λ

B. λ

C. 4λ

D. none of these

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39. If $c^2 = a^2 + b^2$, then prove that $4s(s-a)(s-b)(s-c) = a^2b^2$

A. a^2b^2

B. c^2a^2

C. b^2c^2

D. s^4

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40. In any ΔABC, prove that $\Delta = \frac{a^2 - b^2}{2} \frac{\sin A \sin B}{\sin(A - B)}$.

A. 2Δ

B. 4Δ

C. Δ

D. 3Δ

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41. In ΔABC, $(a+b+c)\left(\tan\left(\frac{A}{2}\right)+\tan\left(\frac{B}{2}\right)\right)=$

A. $2c\frac{\cot C}{2}$

B. $2a\frac{\cot A}{2}$

C. $2b\frac{\cot B}{2}$

D. $\frac{\tan C}{2}$

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42. In $\triangle ABC$, $\frac{\tan A}{2}=\frac{5}{6}, \frac{\tan C}{2}=\frac{2}{5}$, then

A. $b^2=ac$

B. $2b=ac$

C. $2ac=b(a+c)$

D. a+b+c

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43. In a ΔABC, 2Δ(cot B + cot C)=

A. b^2

B. c^2

C. a^2

D. $2a^2$

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44. In a ΔABC,

$(c^2 + a^2 - b^2)\tan B + (a^2 + b^2 - c^2)\tan C =$

A. 4Δ

B. 8Δ

C. 6Δ

D. 12Δ

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45. In a ΔABC prove that $\cot A + \cot B + \cot C = \dfrac{a^2 + b^2 + c^2}{4\Delta}$

A. a+b+c

B. $a^{-1} + b^{-1} + c^{-1}$

C. $a^2 + b^2 + c^2$

D. none of these

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46. In any ΔABC, a cos A +b cos B + c cos C =

A. $\frac{\Delta^2}{abc}$

B. $\frac{4\Delta^2}{abc}$

C. $\frac{8\Delta^2}{abc}$

D. none of these

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47. A triangular park is enclosed on two sides by a fence and on the third side by a straight river bank. The two sides having fence are of same length x. The maximum area enclosed by the park is

A. $\frac{3}{2}x^2$

B. $\sqrt{\frac{x^3}{8}}$

C. $\frac{1}{2}x^2$

D. πx^2

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48. In any ΔABC, sin A + sin B + sin C =

A. $\frac{2s}{R}$

B. $\frac{s}{R}$

C. $\frac{3s}{R}$

D. none of these

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49. In a ΔABC

$$\frac{b\sin(C-A)}{c^2-a^2}+\frac{c\sin(A-B)}{a^2-b^2}=$$

A. $\frac{1}{2R}$

B. $\frac{1}{R}$

C. $\frac{2}{R}$

D. none of these

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50. If the radius of the circum-circle of an isosceles triangles ABC is equal to AB (= AC), then angle A is :

A. $\frac{\pi}{6}$

B. $\frac{\pi}{3}$

C. $\frac{2\pi}{3}$

D.

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51. In a $\Delta ABC, R^2$ (sin 2A+sin 2B+sin 2C)=

A. Δ

B. 3Δ

C. 4Δ

D. 2Δ

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52. The diameter of the circumcircle of a triangle with sides 5 cm, 6 cm and 7 cm, is

A. $\frac{3\sqrt{6}}{2}$ cm

B. $2\sqrt{6}$ cm

C. $\frac{35}{48}$ cm

D. none of these

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53. If Δ denotes the area of ΔABC, then $b^2 \sin 2C + c^2 \sin 2B$ is equal to

A. Δ

B. 2Δ

C. 3Δ

D. 4Δ

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54. If R denotes circum-radius of ΔABC, evaluate $\dfrac{b^2 - c^2}{2aR}$.

A. cos (B-C)

B. cos B-cosC

C. sin (B - C)

D. none of these

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55. If in $\Delta ABC, b^2 \sin 2C + c^2$ sin 2B = 2bc,then the triangle is

A. equilateral

B. isosceles with $\angle B = \angle C$

C. right angled at A

D. none of these

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56. If a ΔABC is right angled at B, then the diameter of the incircle of the triangle is

A. 2(c+ a - b)

B. c+a - 2b

C. c + a- b

D. none of these

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57. In a triangle a = 13 , b = 14, c = 15, r =

A. 4

B. 8

C. 2

D. 6

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58. In an equilateral triangle show that the in-radius and the circum-radius are connected by $r = \frac{R}{2}$.

A. r=4R

B. $r = \frac{R}{2}$

C. $r = \frac{R}{3}$

D. none of these

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59. In an equilateral triangle, the inradius, circumradius, and one of the exradii are in the ratio

A. $2:3:5$

B. $1 : 2 : 3$

C. $1 : 3 : 7$

D. $3 : 7 : 9$

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60. If in a triangle, $\left(1 - \frac{r_1}{r_2}\right)\left(1 - \frac{r_1}{r_3}\right) = 2$, then the triangle is

A. right angled

B. isosceles

C. equilateral

D. none of these

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61. If in a triangle $\frac{r}{r_1} = \frac{r_2}{r_3}$, then

A. $A = 90^\circ$

B. $B = 90^\circ$

C. C $= 90^\circ$

D. none of these

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62. In a triangle ABC, $r_1 + r = r_2 + r_3$. If the measure of angle A is 60º, then $\frac{s}{a} =$

A. $\frac{2}{3}$

B. 2

C. $\frac{4}{3}$

D. $\frac{3}{2}$

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63. In a triangle with sides a, b, c if $r1 > r2 > r3$ (which are the ex-radii), then

A. $a > b > c$

B. $a < b < c$

C. $a > b$ and $b < c$

D. $a < b$ and $b > c$

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64. If ΔABC is right angled at A,then $r_2 + r_3$=

A. $r_1 - r$

B. $r_1 + r$

C. $r - r_1$

D. R

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65. $r + r_3 + r_1 - r_2 =$

A. 4R cos A

B. 4R cos B

C. 4R cos C

D. 4R

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66. In a $\Delta ABC, r_1 + r_2 + r_3 - r$=

A. 4R cos A

B. 4R cos B

C. 4R cos C

D. 4R

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67. In a ΔABC,with usual notations, observe the two statements given below:

(I) $rr_1r_2r_3 = \Delta^2$ (II) $r_1r_2 + r_2r_3 + r_3r_1 = s^2$

Which one of the following is correct?

A. both I and II are true

B. I is true, II is false

C. I is false, II is true

D. both I and II are false

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68. Prove the questions

$$\frac{1}{r_1^2}+\frac{1}{r_2^2}+\frac{1}{r_3^2}+\frac{1}{r^2}=\frac{a^2+b^2+c^2}{\Delta^2}$$

A. 0

B. $\frac{a^2+b^2+c^2}{\Delta^2}$

C. $\frac{\Delta^2}{a^2+b^2+c^2}$

D. $\frac{a^2+b^2+c^2}{\Delta^2}$

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Section I - Solved Mcqs

1. In a ΔABC, $\frac{a+c}{a-c}\tan\left(\frac{B}{2}\right)$ is equal to

A. $\tan\left(\frac{B}{2}+C\right)$

B. $\tan\left(B+\frac{C}{2}\right)$

C. $\cot\left(\frac{B}{2}+C\right)$

D. none of these

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2. In a ΔABC ,which one of the following is true?

A. $(b+c)\frac{\cos A}{2}=a\sin\left(\frac{B+C}{2}\right)$

B. $(b+c)\cos\left(\frac{B+C}{2}\right)=a\frac{\sin A}{2}$

C. $(b-c)\cos\left(\frac{B-C}{2}\right)=a\frac{\cos A}{2}$

D. $(b-c)\frac{\cos A}{2}=a\sin\left(\frac{B-C}{2}\right)$

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3. In a $\Delta ABC, a\cos^2\left(\frac{B}{2}\right)+b\cos^2\left(\frac{A}{2}\right)$ is equal to

A. s

B. 2s

C. s/2

D. none of these

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4. One angle of an isosceles triangle is 120^0 and the radius of its incricel is $\sqrt{3}$. Then the area of the triangle in sq. units is $7+12\sqrt{3}$ (b) $12-7\sqrt{3}$ $12+7\sqrt{3}$ (d) 4π

A. $7+12\sqrt{3}$

B. $12 - 7\sqrt{3}$

C. $12 + 7\sqrt{3}$

D. 4π

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5. Internal bisector of $\angle A$ of ΔABC meets side BC to D. A line drawn through D perpendicular to AD intersects the side AC at E and side AB at. F. If a,b,c represent sides of ΔABC, then

A. AE is HM of b and c

B. $AD = \frac{2bc}{b+c} \frac{\cos A}{2}$

C. $EF = \frac{4b}{b+c} \frac{\sin A}{2}$

D. All of these

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6. In a triangle ABC with fixed base BC, the vertex A moves such that

$\cos B + \cos C = 4 \sin^2 A / 2$

If a, b and c denote the lengths of the sides of the triangle opposite to the angles A,B and C respectively, then

A. b+c=4a

B. b+c=2a

C. locus of point A is an ellipse

D. locus of point A is a pair of straight lines

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7. In a ΔABC, if $\tan. \frac{A}{2} = \frac{5}{6}, \tan. \frac{B}{2} = \frac{20}{37}$, then which of the following is/are correct ?

A. 2a=b+c

B. $a > b > c$

C. 2c=a+b

D. none of these

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8. In ΔABC ,if A:B:C =$3:5:4$,then $a+b+\sqrt{2}c=$

A. 2b

B. 2c

C. 3b

D. 3a

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9. If the lengths of the sides of a triangle are a - b , a + b and $\sqrt{3a^2 + b^2}$, $(a, b > , 0)$, then the largest angle of the triangle , is

A. $\frac{2\pi}{3}$

B. $\frac{3\pi}{4}$

C. $\frac{\pi}{2}$

D. $\frac{7\pi}{8}$

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10. If the angles of the triangle are in A.P. and $3a^2 = 2b^2$, then angle C ,is

A. $\frac{\pi}{6}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{4}$

D. $\frac{5\pi}{12}$

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11. In a ΔABC ,a =5 , b= 4 , and $\tan\left(\frac{C}{2}\right) = \sqrt{\frac{7}{9}}$, then c =

A. 6

B. 3

C. 2

D. none of these

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12. If in a $\triangle ABC$ sin A =$\frac{4}{5}$ and sin B =$\frac{12}{13}$, then sin C =

A. $\frac{33}{65}$

B. $\frac{56}{65}$

C. $\frac{33}{56}$

D. none of these

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13. If in a $\triangle ABC$, a = 6, b = 3 and cos (A -B) = $\frac{4}{5}$, then its area in square units, is

A. 8

B. 9

C. 6

D. none of these

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14. The perimeter of a triangle ABC is six times the arithmetic mean of the sines of its angles. If the side a is 1, then find angle A

A. $\frac{\pi}{6}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{2}$

D. π

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15. In a $\Delta ABC, a = 2b \text{ and } |A - B| = \frac{\pi}{3}$. Determine the $\angle C$.

A. $\frac{\pi}{4}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{6}$

D. none of these

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16. If in a $!ABC$, sin A, sin B and sin C 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.

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17. If in $\Delta ABC,$ the altitudes from the vertices A, B and C on opposite sides are in HP, then sin A sin B and sin C are in

A. H.P.

B. AGP

C. A.P.

D. G.P.

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18. In a triangle ABC cos A = $\frac{7}{8}$, cos B = $\frac{11}{16}$.then , cos C is equal to

A. $-\frac{1}{4}$

B. $-\frac{1}{2}$

C. 0

D. $\frac{1}{4}$

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19. If tan of the angles A , B , C are the solutions of the equations $\tan^3 x - 3k\tan^2 x - 3\tan x + k = 0$, then the triangle ABC is

A. isosceles

B. equilateral

C. acute angled

D. none of these

Answer: D

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20. If the angles of a triangle are in the ratio $4:1:1$, then the ratio of the longest side to the perimeter is (a)$\sqrt{3}:\left(2+\sqrt{3}\right)$ (b) $1:6$ (c)$1:2+\sqrt{3}$ (d) $2:3$

A. $\sqrt{3}:2+\sqrt{3}$

B. $1:6$

C. $1 : 2 + \sqrt{3}$

D. $2 : 3$

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21. In triangle ABC, let $\angle C = \pi / 2$. If r is the inradius and R is circumradius of the triangle, then $2(r + R)$ is equal to

A. a+b

B. b+c

C. c+a

D. a+b+c

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22. Let PQ and RS be tangents at the extremities of the diameter PR of a circle of radius r. If PS and RQ intersect at apoint X on the circumference of the circle, then 2r equals :

A. $\sqrt{PQ.\,RS}$

B. $\dfrac{PQ+RS}{2}$

C. $\dfrac{2PQ.\,RS}{PQ+RS}$

D. $\sqrt{\dfrac{PQ^2+RS^2}{2}}$

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23. If a , b , c denote the sides of a $!ABC$ such that the equation $x^2+\sqrt{2}x+1=0$ and $ax^2+bx+c=0$ have a common root , then C =

A. $\dfrac{\pi}{4}$

B. $\dfrac{\pi}{3}$

C. $\frac{\pi}{2}$

D. none of these

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24. If in a $\triangle ABC$,b = 12 units , c = 5 units and $\triangle$ = 30 sq. units , then the distance between vertex A and incentre of the triangle is equal to

A. 2 units

B. $2\sqrt{2}$ units

C. $\sqrt{2}$ units

D. none of these

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25. In a $!ABC$, 2r = r_1 and A=30 , then cos $\frac{B-C}{2}$ is equal to

A. $\frac{3\sqrt{3}}{2\sqrt{2}}$

B. $\frac{3\left(\sqrt{3}-1\right)}{2\sqrt{2}}$

C. $\frac{3\left(\sqrt{3}-1\right)}{2\sqrt{3}}$

D. none of these

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26. In a triangle ! ABC, a^2cos^2A=b^2+c^2 then

A. $0 < A < \frac{\pi}{4}$

B. $\frac{\pi}{4} < A < \frac{\pi}{2}$

C. $\frac{\pi}{2} < A < \pi$

D. $A = \frac{\pi}{2}$

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27. In a triangle ABC , the sides a , b , c are in G.P., then the maximum value of $\angle B$ is

A. 30°

B. 45°

C. 60°

D. 90°

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28. The area of a triangle is $\sqrt{3}$ sq. units and $\angle B$=60 If a^2, b^2, c^2 are in A.P., the length of side AC is

A. $2\sqrt{3}$ units

B. 2 units

C. 3 units

D. $3\sqrt{3}$ units

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29. If in a $\triangle ABC$, tan $\frac{A}{2}$ and tan $\frac{B}{2}$ are the roots of the equation $6x^2 - 5x + 1 = 0$, then

A. $a^2 + b^2 > c^2$

B. $a^2 - b^2 = c^2$

C. $a^2 + b^2 = c^2$

D. none of these

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30. In a $!ABC$ the length of the median AD to the side BC is 4 units. If $\angle A = 60^\circ$ and the area of the triangle is $2\sqrt{3}$ sq. units. The length of side BC, is

A. $2\sqrt{3}$

B. $4\sqrt{3}$

C. 6

D. 8

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31. Two sides of a tariangle are given by the roots of the equation $x^2 - 2\sqrt{3}x + 2 = 0$. The angle between the sides is $\frac{\pi}{3}$. Find the perimeter of Δ.

A. $6 + \sqrt{3}$

B. $2\sqrt{3} + \sqrt{6}$

C. $2\sqrt{3}+\sqrt{10}$

D. none of these

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32. If in $\triangle ABC, \frac{c+a}{b}+\frac{c+b}{a}=\frac{c}{r}$ then

A. $\angle B=\frac{\pi}{2}$

B. $\angle C=\frac{\pi}{2}$

C. $\angle A=\frac{\pi}{2}$

D. none of these

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33. In a $!ABC$, there is a point D on the side BC such that $\frac{BD}{DC} = \frac{1}{3}$.If $\angle B = \frac{\pi}{3}, \angle C = \frac{\pi}{4}$ and $\sin\angle(CAD) = \lambda \sin\angle BAD$ then λ is equal to

A. $\frac{1}{\sqrt{6}}$

B. $\sqrt{6}$

C. $\frac{1}{\sqrt{3}}$

D. $\sqrt{3}$

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34. If G is the centroid of a ΔABC, then $GA^2 + GB^2 + GC^2$ is equal to

A. $a^2 + b^2 + c^2$

B. $\frac{a^2 + b^2 + c^2}{3}$

C. $\frac{a^2 + b^2 + c^2}{2}$

D. $\frac{(a+b+c)^2}{3}$

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35. In an equilateral triangle the ratio of circum-radius and in-radius is

A. $3:1$

B. $1:1$

C. $2:\sqrt{3}$

D. $2:1$

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36. In an equilateral triangle, the inradius, circumradius, and one of the exradii are in the ratio

A. $1:1:1$

B. $1:2:3$

C. $2:1:3$

D. $3:2:4$

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37. In a scalene triangle ABC , AD and CF are the altitudes drawn from A and C on the sides BC and AB repectively.If the area of the triangle ABC and BDF are 18sq.units and 2 sq. units respectively and DF = $2\sqrt{2}$, then R =

A. $\frac{9}{4}$

B. $\frac{9}{2}$

C. 9

D. none of these

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38. Sides of ΔABC are in A.P. If $a < \min\{b, c\}$, then cos A may be equal to

A. $\dfrac{3c - 4b}{2b}$

B. $\dfrac{3c - 4b}{2c}$

C. $\dfrac{4c - 3b}{2b}$

D. $\dfrac{4c - 3b}{2c}$

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39. If a right angled triangle ABC of maximum Δ area is inscribed in a circle of radius R , then

A. $\Delta = 2R^2$

B. $r = (\sqrt{2} - 1)R$

C. $\dfrac{1}{r_1} + \dfrac{1}{r_2} + \dfrac{1}{r_3} = \dfrac{\sqrt{2} - 1}{R}$

D. $s = (\sqrt{2}-1)R$

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40. In $\triangle ABC, \angle A = \frac{\pi}{2} b = 4, c = 3$,then the value of $\frac{R}{r}$ is equal to

A. $\frac{5}{2}$

B. $\frac{7}{2}$

C. $\frac{9}{2}$

D. $\frac{35}{24}$

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41. If in a $!ABC$,CD is the bisector of $\angle ACB,$ then CD =

A. $\frac{a+b}{2ab} \frac{\cos C}{2}$

B. $\frac{a+b}{ab}\frac{\cos C}{2}$

C. $\frac{2ab}{a+b}\frac{\cos C}{2}$

D. $\frac{b\sin A}{\sin\left(B+\frac{C}{2}\right)}$

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42. Let ABC be a triangle and O be its orthocentre .If R and R_1 are the circum-radii of triangle ABC and AOB , then

A. $R_1 > R$

B. $R_1 = R$

C. $R_1 < R$

D. none of these

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43. If the area(!) and an angle(θ) of a triangle are given , when the side opposite to the given angle is minimum , then the length of the remaining two sides are

A. $\sqrt{\frac{2!}{\sin\theta}}, \sqrt{\frac{3!}{\sin\theta}}$

B. $\sqrt{\frac{2!}{\sin\theta}}, \sqrt{\frac{2!}{\sin\theta}}$

C. $\sqrt{\frac{4!}{\sin\theta}}, \sqrt{\frac{4!}{\sin\theta}}$

D. $\sqrt{\frac{6!}{\sin\theta}}, \sqrt{\frac{6!}{\sin\theta}}$

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44. If the sides of a triangle are in A.P. and the greatest angle of the triangle exceeds the least by 90°, then sine of the third angle is

A. $\frac{\sqrt{5}}{4}$

B. $\frac{\sqrt{6}}{4}$

C. $\frac{\sqrt{7}}{4}$

D. none of these

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45. In the $!ABC$, the altitudes are in H.P., then

A. angles A,B,C are in A.P.

B. sides a,b,c are in A.P.

C. sinA,sinB,sinC are in A.P

D. none of these

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46. In a $\Delta ABC, \angle B = \dfrac{2\pi}{3}$ and cos A + cos c = λ. Then , the exhaustive set of value of λ is

A. $(1, 3/2]$

B. $(3/2, \sqrt{3})$

C. $(1/2, \sqrt{3}/2)$

D. none of these

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47. In $!ABC$, least value of $\frac{e^A}{A} + \frac{e^B}{B} + \frac{e^C}{C}$ is equal to

A. $\frac{9}{\pi} e^{\pi/3}$

B. $\frac{\pi}{3} e^{\pi/3}$

C. $\frac{\pi}{9} e^{\pi/3}$

D. none of these

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48. If circum-radius and in-radius of a triangle ABC be 10 and 3 units respectively , then a cot A +b cot B +c cot C is equal to

A. 13

B. 26

C. 39

D. none of these

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49. In $!ABC$, x , y , and z are the distance of incentre from angular points A , B ,and C respectively . If $\frac{xyz}{abc} = \frac{\lambda r}{s}$, then λ=

A. 1

B. 2

C. 3

D. none of these

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50. If Δ denote the area of any triangle with semi-perimeter , then

A. $\Delta < \frac{s^2}{2}$

B. $\Delta > \frac{s^2}{4}$

C. $\Delta < \frac{s^2}{4}$

D. $\Delta < s^2$

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51. In any $!ABC$, sin $\frac{A}{2}$ is

A. less than $\frac{b+c}{a}$

B. less than or equal to $\frac{a}{b+c}$

C. greater than $\frac{2a}{a+b+c}$

D. none of these

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52. In a $\triangle ABC, AB = 2, BC = 4, CA = 3$. If D is the mid-point of BC, then the correct statement(s) is/are

A. $\cos B \ne \frac{11}{16}$

B. $\cos C \ne \frac{7}{8}$

C. $AD \ne 2.4$

D. $AD^2 = 2.5$

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53. In a triangle, $a^2 + b^2 + c^2 = ca + ab\sqrt{3}$. Then the triangles is :

A. equilateral

B. right angled and isosceles

C. right angled and not isosceles

D. none of these

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54. In TriangleABC with fixed length of BC, the internal bisector of angle C meets the side $ABatD$ and the circumcircle at E. The maximum value of $CD \times DE$ is c^2 (b) $\frac{c^2}{2}$ (c) $\frac{c^2}{4}$ (d) none of these

A. $\frac{b^2}{4}$

B. $\frac{c^2}{4}$

C. $\frac{a^2}{4}$

D. none of these

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55. In triangle ABC, AD and BE are the medians drawn through the angular points A and B respectively. $\angle DAB = 2\angle ABE = 36^\circ$ and $AD = 6$ units then circumradius of the triangle is equal to

A. $(3 - \sqrt{5})\cos ecC$

B. $(3 + \sqrt{5})\cos ecC$

C. $2(3 - \sqrt{5})\cos ecC$

D. $2(3 + \sqrt{5})$cosecC

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56. If the median AM , angle bisector AD and altitude AH drawn from vertex A of a triangle ABC divide angle A into four equal (D lying between

H and M) , then

A. $A = \frac{\pi}{3}$

B. $A = \frac{\pi}{2}$

C. $\frac{AC}{AB} = \sqrt{2} + 1$

D. $\frac{AC}{AB} = \frac{1}{\sqrt{2} + 1}$

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57. Which of the following pieces of data does NOT uniquely determine an acute-angled triangle $ABC(R$ being the radius of the circumcircle)? (a) $a, \sin A, \sin B$ (b) $a, b, c(c)$a ,sinB ,R(d)a ,sinA ,R`

A. a,sinA,sinB

B. a,b,c

C. a,sinB,R

D. a,sinA,R

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58. If a chord AB of a circle subtends an angle $\theta(\neq \pi/3)$ at a point C on the circumference such that the triangle ABC has maximum area , then

A. $A=\frac{\pi}{3}+\frac{\theta}{2}, B=\frac{2\pi}{3}-\frac{3\theta}{2}$

B. $A=\frac{\pi}{4}+\frac{\theta}{2}, B=\frac{3\pi}{4}-\frac{3\theta}{2}$

C. $A=\frac{\pi}{6}+\theta, B=\frac{5\pi}{6}+2\theta)$

D. none of these

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59. In a triangle ABC, medians AD and BE are drawn. If $AD=4, \angle DAB=\frac{\pi}{6}$ and $\angle ABE=\frac{\pi}{3}$ then the area of the triangle ABC is :

A. $\frac{64}{3\sqrt{3}}$

B. $\frac{8}{3\sqrt{3}}$

C. $\frac{16}{3\sqrt{3}}$

D. $\frac{32}{3\sqrt{3}}$

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60. In a $\triangle ABC$ if sin A cos B = $\frac{1}{4}$ and 3 tan A = tan B , then the triangle is

A. right angled at A

B. right angled at B

C. right angled at C

D. not right angled

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61. In a $\triangle ABC$ if $r_1 = 36, r_2 = 18$ and $r_3 = 12$, then the area of the triangle , in square units, is

A. 216

B. 316

C. 326

D. none of these

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62. In a $\triangle ABC$ if r_1 = 36 ,$r_2 = 18$ and $r_3 = 12$, then the perimeter of the triangle , is

A. 36

B. 18

C. 72

D. none of these

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63. In a triangle ABC, AD, BE and CF are the altitudes and R is the circum radius, then the radius of the circel DEF is

A. $\frac{R}{2}$

B. 2R

C. R

D. none of these

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64. In a $!ABC$ if a = 7 , b = 8 and c = 9 , then the length of the line joining B to the mid-points of AC is

A. 6

B. 7

C. 5

D. none of these

65. If the perimeter of a triangle and the diameter of an ex-circle are equal , then the triangle is

A. right angled isosceles

B. right angled

C. equilateral

D. isosceles

66. If D id the mid-point of the side BC of a triangle ABC and AD is perpendicular to AC , then

A. $b^2 = a^2 - c^2$

B. $a^2 + b^2 = 5c^2$

C. $3b^2 = a^2 - c^2$

D. $3a^2 = b^2 - 3c^2$

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67. ABC is a triangle. D is the middle point of BC. If AD is perpendicular to AC, The value of cos A cos C , is

A. $\left(3\frac{c^2 - a^2}{ac}\right.$

B. $\frac{a^2 - c^2}{2ac}$

C. $\left(2\frac{c^2 - a^2}{3ac}\right.$

D. none of these

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68. If the median of a triangle through A is perpendicular to AB, then

A. 2tanA+tanB=0

B. 2tanA-tanB=0

C. tanA-2tanB=0

D. tanA+2tanB=0

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69. In a $\triangle ABC$, if $r_1 = 2r_2 = 3r_3$, then a:b:c =

A. $3:4:5$

B. $5:3:4$

C. $5:4:3$

D. none of these

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70. In ΔABC, if $r_1 < r_2 < r_3$, then find the order of lengths of the sides

A. $a > b > c$

B. $a < b < c$

C. $a < c < b$

D. none of these

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71. In a $\triangle ABC$ if $r_1 = 8, r_2 = 12$ and $r_3 = 24,$ then a =

A. 16

B. 20

C. 12

D. none of these

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72. If I is the incentre of a ΔABC such that $\angle A = 60^\circ$, then AI =

A. r

B. $\frac{r}{2}$

C. 2r

D. none of these

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73. If I_1 is the centre of the escribed circle touching side BC of $!ABC$ in which $\angle A = 60^\circ$, then I_1 A =

A. r_1

B. $\frac{r_1}{2}$

C. $2r_1$

D. none of these

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74. In a $\triangle ABC$, if 2R + r =r_1 , then

A. $\angle A = \pi/2$

B. $\angle B = \pi/2$

C. $\angle C = \pi/2$

D. none of these

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75. The sides of a triangle are $\sin\alpha, \cos\alpha, \sqrt{1+\sin\alpha\cos\alpha}$ for some $0 < \alpha < \frac{\pi}{2}$ then the greatest angle of the triangle is :

A. 150°

B. 90°

C. 120°

D. 60°

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76. In a triangle ABC , if 3a = b + c , then cot $\frac{B}{2}$ cot $\frac{C}{2}$ =

A. 1

B. 2

C. 3

D. 4

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77. If $\sin^2.\dfrac{A}{2}, \sin^2.\dfrac{B}{2}$, and $\sin^2.\dfrac{C}{2}$ are in H.P., then prove that the sides of triangle are in H.P

A. A.P.

B. G.P.

C. H.P.

D. none of these

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78. In a $\triangle ABC$, if $\frac{1}{b+c}+\frac{1}{c+a}=\frac{3}{a+b+c}$, then $\angle C$=

A. 90°

B. 60°

C. 45°

D. 30°

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79. Observe the following statements: (I) In $!ABC, b\frac{\cos^2 C}{2}+os^2\frac{B}{2}=s$, (II) In $!ABC\frac{\cot A}{2}=\frac{b+c}{2} \Rightarrow B=90^\circ$

Which of the following is correct?

A. both I and II are true

B. I is true, II is false

C. I is false, II is true

D. both I and II are false

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80. In a triangle , if $r_1 = 2r_2 = 3r_3$, then $\frac{a}{b} + \frac{b}{c} + \frac{c}{a}$ is equal to

A. $\frac{75}{60}$

B. $\frac{155}{60}$

C. $\frac{176}{60}$

D. $\frac{191}{60}$

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81. Sides a , b , c of $!ABC$ are in A.P. and $\cos\theta_1 = \frac{a}{b+c}\cos\theta_2 = \frac{b}{a+c}, \cos\theta_3 = \frac{c}{a+b}$, then $\frac{\tan^2(\theta_1)}{2} + \frac{\tan^2(\theta_3)}{2}$=

A. $2/3$

B. 1

C. $\sqrt{5}/3$

D. none of these

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82. Consider a triangle ABC and let a, b and c denote the lengths of the sides opposite to vertices A, B and C, respectivelu. Suppose $a = 6, b = 10$ and the triangle is $15\sqrt{3}$. If $\angle ACB$ is obtus and if r denotes than radius of the incircle of the triangle, then the value of r^2 is ____

A. 2

B. 4

C. 3

D. 6

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83. If the angles A, B and C of a triangle are in an arithmetic progression and if a, b and c denote the lengths of the sides opposite to A, B and C respectively, then the value of the expression $\frac{a}{c}\sin 2C + \frac{c}{a}\sin 2A$ is

A. $\frac{1}{2}$

B. $\frac{\sqrt{3}}{2}$

C. 1

D. $\sqrt{3}$

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84. Let ABC be a triangle such that $\angle ACB = \frac{\pi}{6}$ and let a , b and c denote the lengths of the side opposite to A, B ,and C respectively. The value(s) of x for which $a = x^2 + x + 1, b = x^2 - 1,$ and $c = 2x + 1$ is(are) $-\left(2 + \sqrt{3}\right)$ (b) $1 + \sqrt{3}$ (c)$2 + \sqrt{3}$ (d) $4\sqrt{3}$

A. $-\left(2 + \sqrt{3}\right)$

B. $1 + \sqrt{3}$

C. $2 + \sqrt{3}$

D. $4\sqrt{3}$

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85. For a regular polygon, let r and R be the radii of the inscribed and the cirumscribed circles, respectively. A false statement among the following is

A. There is a regular polygon with $\frac{r}{R} = \frac{2}{3}$

B. There is a regular polygon with $\frac{r}{R}=\frac{\sqrt{3}}{2}$

C. There is a regular polygon with $\frac{r}{R}=\frac{1}{2}$

D. There is a regular polygon with $\frac{r}{R}=\frac{1}{\sqrt{2}}$

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86. Let PQR be a triangle of area with a=2,b=7/2,and c=5/2, where a, b and c are the lengths of the sides of the triangle opposite to the angles at P , Q and R respectively. Then (2sinP-sin2P)/(2sinP+sin2P) equals

A. $\frac{3}{4!}$

B. $\frac{45}{4!}$

C. $\left(\frac{3}{4!}\right)^2$

D. $\left(\frac{45}{4!}\right)^2$

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87. ABCD is a trapezium such that AB and CD are parallel and $BC \perp CD$.

If $\angle ADB = \theta$, $BC = p$ and $CD = q$, then AB is equal to

A. $\dfrac{(p^2 + q^2)\sin\theta}{p\cos\theta + q\sin\theta}$

B. $\dfrac{p^2 + q^2\cos\theta}{p\cos thet + q\sin\theta}$

C. $\dfrac{p^2 + q^2}{p^2\cos\theta + q^2\sin\theta}$

D. $\dfrac{(p^2 + q^2)\sin\theta}{(p\cos\theta + q\sin\theta)^2}$

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88. about to only mathematics

A. 16,18

B. 18,22

C. 22,24

D. 16,20

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89. In a triangle, the sum of two sides is x and the product of the same two sides is y. If $x^2 - c^2 = y,$ where c is the third side of the triangle, then the ratio of the in-radius to the circum-radius of the triangle is

A. $\dfrac{3y}{2x(x+c)}$

B. $\dfrac{3y}{2c(x+c)}$

C. $\dfrac{3y}{4x(x+c)}$

D. $\dfrac{3y}{4c(x+c)}$

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90. In $ABC,$ if $\dfrac{\sin A}{c\sin B} + \dfrac{\sin B}{c} + \dfrac{\sin C}{b} = \dfrac{c}{ab} + \dfrac{b}{ac} + \dfrac{a}{bc},$ then the value of angle A is (a)120^0 (b) 90^0 (c) 60^0 (d) 30^0

A. 120°

B. 90°

C. 60°

D. 30°

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91. In $\Delta ABC,$ if $2b = a + c$ and $A - C = 90^{\circ},$ then sin B equal

All symbols used have usual meaning in $\Delta ABC.]$

A. $\frac{\sqrt{7}}{5}$

B. $\frac{\sqrt{5}}{8}$

C. $\frac{\sqrt{7}}{4}$

D. $\frac{\sqrt{5}}{3}$

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92. In a $\Delta XYZ,$ let x,y,z be the lengths of sides opposite to the angles X, Y, Z respectively and $2x = x + y + z.$ If $\frac{s-x}{4} = \frac{s-y}{3} = \frac{s-z}{2}$ and area of incircle of the ΔXYZ is $\frac{8\pi}{3}$ then

A. $6\sqrt{6}$ sq. units

B. $3\sqrt{6}$ sq. units

C. $12\sqrt{6}$ sq. units

D. $6\sqrt{3}$ sq. units

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93. If s−x/4= s−y/3=s-z/2 and area of incircle of the triangle XYZ is 8(pi)/3 thenThe radius of the circumcircle of $\triangle XYZ$

A. $\frac{35}{\sqrt{6}}$

B. $\left(\frac{35}{2\sqrt{6}}\right.$

C. $\frac{35}{4\sqrt{6}}$

D. $\frac{35}{6\sqrt{6}}$

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94. If $r=\sqrt{\frac{8}{3}}$ and $R=\frac{35}{4\sqrt{6}}$ then the value of $\sin\frac{X}{2}\sin\frac{Y}{2}\sin\frac{Z}{2}$ =

A. $\frac{6}{35}$

B. $\frac{4}{35}$

C. $\frac{2}{35}$

D. $\frac{8}{35}$

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95. If x=5,y=6,z=7.The value of $\sin^2\left(\frac{X+Y}{2}\right)$, is

A. $\frac{3}{5}$

B. $\frac{4}{5}$

C. $\frac{2}{5}$

D. $\frac{1}{5}$

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SOLVED MCQ

1. P is a point on the altitude of !ABC such that $\angle CBP$= $\frac{B}{3}$,then A.P.is equal to

A. $2a\frac{\sin C}{3}$

B. $2b\frac{\sin A}{3}$

C. $2c\frac{\sin B}{3}$

D. $2c\frac{\sin C}{3}$

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2. If p , q , r are the legths of the internal bisectors of angles A ,B , C respectively of a $!ABC$, then area of ABC

A. $\frac{1}{a}+\frac{1}{b}-\frac{1}{c}$

B. $\frac{1}{a}+\frac{1}{c}-\frac{1}{b}$

C. $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}$

D. $\frac{1}{b}+\frac{1}{c}-\frac{1}{a}$

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Section II - Assertion Reason Type

1. Statement I: If in a triangle $ABC, \sin^2 A + \sin^2 B + \sin^2 C = 2,$ then one of the angles must be 90°.

Statement II: In any triangle ABC $\cos 2A + \cos 2B + \cos 2C = -1 - 4\cos A \cos B \cos C$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement- 2 is True.

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2. Statement-1: In any ΔABC if A is obtuse, then tanBtanC < 1

Statement-2: In any $!ABC$, we have

tan A + tan B + tan C = tan A tan B tan C

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement- 2 is True.

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3. Let a and b denote llie lengths of the legs of a right triangle with following properties:

(i) All three sides of the triangle are integers.

(ii) The perimeter of the triangle is numerically equal to its area.

(iii) a ltb.

Statement-1: The number of such triangle is 2

Statement-2: Maximum possible perimeter of the triangle is 30°.

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement- 2 is True.

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4. Statement-1: If the measures of two angles of a triangle are 45° and 60°, then the ratio of the smallest and the greatest sides are $(\sqrt{3}-1):1$

Statement-2: The greatest side of a triangle is opposite to its greatest angle.

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement- 2 is True.

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5. Statement-1: In a $!ABC$,

$$(a+b+c)\left(\frac{\tan A}{2}+\frac{\tan B}{2}\right)=2c\frac{\cot C}{2}$$

Statement-2: In a $!ABC$, a = b cos C + c cos B

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement- 2 is True.

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6. Statement-1: In a $!ABC$, if

$2a^2 + 4b^2 + c^2 = 4ab + 2ac$, then $\cos A = \frac{1}{4}$

Statement-2: In a ΔABC if $\cos A = \frac{1}{4}$, then

$(a+b+c)(b+c-a) = \frac{5}{2}bc$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement- 2 is True.

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7. Statement-1: If the lengths of two sides of a triangle are roots of the equation $x^2 - 12x + 35$=0 and the angle opposite to third side is obtuse, then the square of the length of the third side is greater than 74.

Statement- 2: In a $!ABC, \cos C = \frac{a^2 + b^2 - c^2}{2ab}$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement- 2 is True.

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8. Statement I In a triangle ABC if $\tan A : \tan B : \tan C = 1 : 2 : 3$, then $A = 45^\circ$

Statement II If $p : q : r = 1 : 2 : 3$, then $p = 1$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement- 2 is True.

Watch Video Solution

9. Statement-1: In any $!ABC$, if a : b : c = 4 : 5 : 6, then R:r=16:17.

Statement-2: In any $!ABC$, $\frac{R}{r} = \frac{abc}{4s}$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement- 2 is True.

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10. Statement I In any triangle ABC

$a\cos A + b\cos B + c\cos C \leq s.$

Statement II In any triangle ABC

$\sin\left(\frac{A}{2}\right)\sin\left(\frac{B}{2}\right)\sin\left(\frac{C}{2}\right) \leq \frac{1}{8}$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement- 2 is True.

Watch Video Solution

11. Statement-1: In $!ABC, r_1 + r_2 + r_3 - r = 4R$

Statement-2: In $!ABC, r_1r_2 + r_2r_3 + r_3r_1 = !^2$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement- 2 is True.

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12. Statement- 1: If the sines of the angles of a triangle are in A.P., then the altitudes ef the triangle are also in A.P.

Statement-2: Twice the area of a triangle is equal to the product of the lengths of a side and the altitude on it.

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement- 2 is True.

Answer: D

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13. In $!ABC$ it is given that a:b:c = cos A:cos B:cos C

Statement-1: $!ABC$ is equilateral.

Statement-2: cosA

$$= \frac{b^2 + c^2 - a^2}{2bc}, \cos B = \frac{c^2 + a^2 - b^2}{2ac}, \cos C = \frac{a^2 + b^2 - c^2}{2ab}$$

A. Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement- 2 is True.

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Exercise

1. If $b=\sqrt{3}, c=1$ and $\angle A=30^{\circ}$, then the measure of $\angle B$ is

A. 60°

B. 135°

C. 90°

D. 120°

Answer: D

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2. Find the area of the triangle ABC in which $a=1,\ b=2\ and\ \angle c=60^{0}$.

A. 4sq.units

B. $\frac{1}{2}$ sq.units

C. $\frac{\sqrt{3}}{2}$ sq. units

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

Answer: C

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3. In a triangle ABC,vertex angles A,B,C and side BC are given .The area of $\triangle ABC$ is

A. $\frac{s(s-a)(s-b)(s-c)}{2}$

B. $\frac{b^2 \sin C \sin A}{\sin B}$

C. ab sin C

D. $\frac{1}{2} \frac{a^2 \sin B \sin C}{\sin A}$

Answer: D

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4. The area of the circle and the area of a regular polygon of n sides and the perimeter of polygon equal to that of the circle are in the ratio of $\tan\left(\frac{\pi}{n}\right):\frac{\pi}{n}$ (b) $\cos\left(\frac{\pi}{n}\right):\frac{\pi}{n}$ $\frac{\sin\pi}{n}:\frac{\pi}{n}$ (d) $\cot\left(\frac{\pi}{n}\right):\frac{\pi}{n}$

A. $\tan\left(\frac{\pi}{n}\right):\frac{\pi}{n}$

B. $\cos\left(\frac{\pi}{n}\right):\frac{\pi}{n}$

C. $\sin\left(\frac{\pi}{n}\right):\frac{\pi}{n}$

D. $\cot\left(\frac{\pi}{n}\right):\frac{\pi}{n}$

Answer: A

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5. If $\cot\frac{A}{2}=\frac{b+c}{a}$, then ΔABC is

A. isosceles

B. equliteral

C. right angled

D. none of these

Answer: C

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6. In $\triangle ABC, \frac{\tan A}{2} = \frac{5}{6}, \frac{\tan C}{2} = \frac{2}{5}$, then

A. a,b,c are in A.P

B. a,b,c are in A.P

C. b,a,c are in A.P

D. a,b,c are in G.P

Answer: B

Watch Video Solution

7. In a triange, the line joining the circumcentre to the incentre is parallel to BC, then $\cos B + \cos C$ is equal to

A. $3/2$

B. 1

C. $3/4$

D. $1/2$

Answer: B

Watch Video Solution

8. In a triangle ABC,r=

A. $(s-a)\frac{\tan B}{2}$

B. $(s-b)\frac{\tan B}{2}$

C. $(s-b)\frac{\tan C}{2}$

D. $(s-a)\frac{\tan C}{2}$

Answer: B

Watch Video Solution

9. The exradii $r_1, r_2, \text{ and } r_3 \text{ of } \Delta ABC$ are in H.P. show that its sides a, b, and c are in A.P.

A. inH.P.

B. in A.P.

C. in G.P.

D. none of these

Answer: B

Watch Video Solution

10. In any triangle ABC, prove that: $a^3 \cos(B - C) + b^3 \cos(C - A) + c^3 \cos(A - B) = 3abc$

A. 3abc

B. 3(a+b+c)

C. abc(a+b+c)

D. 0

Answer: A

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11. If $c^2 = a^2 + b^2, 2s = a + b + c$, then $4s(s - a)(s - b)(s - c) =$

A. s^4

B. b^2c^2

C. c^2a^2

D. a^2, b^2

Answer: D

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12. The sides of a triangle are 13,14,15, then the radius of its in-circle is

A. $67/8$

B. $65/4$

C. 4

D. 24

Answer: C

Watch Video Solution

13. If a $\cos A = b \cos B,$ then the triangle is

A. equliteral

B. right angled

C. isosceles

D. isosceles or right angled

Answer: D

Watch Video Solution

14. The in-radius of the triangle whose sides are 3,5,6,is

A. $\sqrt{8/7}$

B. $\sqrt{8}$

C. $\sqrt{7}$

D. $\sqrt{7/8}$

Answer: A

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15. In an equliateral triangle of side $2\sqrt{3}$ cm. The find circum-radius.

A. 1cm

B. $\sqrt{3}$ cm

C. 2cm

D. $2\sqrt{3}$ cm

Answer: C

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16. If the angle opf a triangle are in the ratio $1:2:3$, then show that the sides opposite to the respective angle are in the ratio $1:\sqrt{3}:2$.

A. $2:3:1$

B. $\sqrt{3}:2:1$

C. $2:\sqrt{3}:1$

D. $1:\sqrt{3}:2$

Answer: D

Watch Video Solution

17. In any ΔABC, $\prod\left(\frac{\sin^2 A+\sin A+1}{\sin A}\right)$ is always greater than

A. 9

B. 3

C. 27

D. none of these

Answer: A

Watch Video Solution

18. In any ΔABC, $\prod\left(\frac{\sin^2 A+\sin A+1}{\sin A}\right)$ is always greater than

A. 9

B. 3

C. 27

D. none of these

Answer: A

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19. In a right angled triangle ABC $\sin^{2}A+\sin^{2}B+\sin^{2}C=$

A. 0

B. 1

C. -1

D. none of these

Answer: D

Watch Video Solution

20. In any ΔABC, is $2\cos B = \frac{a}{2}$, then the triangle is

A. right angled

B. equilateral

C. isosceles

D. none of these

Answer: C

Watch Video Solution

21. If in a $\triangle ABC$,a sin A=b sin B, then the triangle, is

A. right angled

B. equilateral

C. isosceles

D. none of these

Answer: A

Watch Video Solution

22. In any ΔABC, If $\cot\frac{A}{2}, \cot\frac{B}{2}, \cot\frac{C}{2}$ are in AP, then a, b, c are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: A

Watch Video Solution

23. In any $\triangle ABC$ b^(2)sin2C+c^(2)sin2B=

A. !

B. $2!$

C. $3!$

D. $4!$

Answer: D

Watch Video Solution

24. If in a triangle ABC, $\frac{\cos A}{a}=\frac{\cos B}{b}=\frac{\cos C}{c}$,then the triangle is

A. right angled

B. obtuse angled

C. equilateral

D. isosceles

Answer: C

Watch Video Solution

25. If in a triangle ABC, $\triangle = a^2 - (b-c)^2$, then tanA is equal to

A. $\frac{15}{16}$

B. $\frac{8}{15}$

C. $\frac{8}{17}$

D. $\frac{1}{2}$

Answer: B

Watch Video Solution

26. If the angles A,B,C of a triangle are in A.P. and sides a,b,c, are in G.P., then prove that a^2, b^2, c^2 are in A.P.

A. A.P.

B. H.P.

C. G.P.

D. none of these

Answer: A

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27. In a triangle, the lengths of the two larger sides are 10 and 9, respectively. If the angles are in A.P, then the length of the third side can be (a) $5-\sqrt{6}$ (b) $3\sqrt{3}$ (c) 5 (d) $5+\sqrt{6}$

A. $5 \pm \sqrt{6}$

B. $3\sqrt{3}$

C. 5

D. $\sqrt{5} \pm 6$

Answer: A

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28. There exist a triangle ABC satisfying

A. $b\sin A = a, A < \frac{\pi}{2}$

B. $b\sin A > a, A > \frac{\pi}{2}$

C. $b\sin A > a, A < \frac{\pi}{2}$

D. $b\sin A > a, A > \frac{\pi}{2}, b > a$

Answer: A

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29. In a triangle, the length of two larger sides are 24 and 22 respectively.

If the angles are in A.P. then the third side is

A. $12 + 2\sqrt{13}$

B. $12 - \sqrt{13}$

C. $2\sqrt{13} + 2$

D. $2\sqrt{13} - 2$

Answer: A

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30. If in a triangle $ABC, a\cos^2\left(\frac{C}{2}\right) + c\cos^2\left(\frac{A}{2}\right) = \frac{3b}{2}$, then the sides $a, b, andc$ are in A.P. b. are in G.P. c. are in H.P. d. satisfy $a + b = \cdot$

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: A

Watch Video Solution

31. If twice the square of the diameter of the circle is equal to half the sum of the squares of the sides of incribed triangle ABC,then $\sin^2 A + \sin^2 B + \sin^2 C$ is equal to

A. 1

B. 2

C. 4

D. 8

Answer: C

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32. In triangle ABC, angle A is greater than angle B. If the measure of angles A and B satisfy the equation $3\sin x - 4\sin^3 x - k = 0$. Find the value of angle C (A) $\frac{\pi}{3}$ (B) $\frac{\pi}{2}$ (C) $\frac{2\pi}{3}$ (D) $\frac{5\pi}{6}$

A. $\pi/3$

B. $\pi/2$

C. $2\pi/3$

D. $5\pi/6$

Answer: C

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33. $\frac{2\cos A}{a}+\frac{\cos B}{b}+\frac{2\cos C}{c}=\frac{a}{ac}+\frac{b}{ca}$, then the values of the angle A is

A. $\pi/3$

B. $\pi/4$

C. $\pi/2$

D. $\pi/6$

Answer: C

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34. If $A>0, B>0$ and $A+B=\frac{\pi}{6}$, then the minimum value of $\tan A+\tan B$, is

A. $1/3$

B. 1

C. ∞

D. $1/\sqrt{3}$

Answer: A

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35. If $\cos(\theta-\alpha), \cos\theta, \cos(\theta+\alpha)$ are in H.P.,then $\cos\theta\sec(\alpha/2)$ is equal to

A. -1

B. $\pm\sqrt{2}$

C. ± 2

D. ± 3

Answer: B

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36. If $\sin\beta$ is the GM between $\sin\alpha$ and $\cos\alpha, then \cos 2\beta =$

A. $2\sin^2\left(\frac{\pi}{4}-\alpha\right)$

B. $2\cos^2\left(\frac{\pi}{4}-\alpha\right)$

C. $2\cos^2\left(\frac{3\pi}{4}+2\alpha\right)$

D. $2\sin^2\left(\frac{\pi}{4}+\alpha\right)$

Answer: A

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37. If $\sin A=\sin^2 B$ and $2\cos^2 A=3\cos^2 B$ then the triangle ABC is

A. right angled

B. obtuse angled

C. isosceles

D. equilateral

Answer: B

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38. If in a triangle ABC ,

(sinA+sinB+sinC)(sinA+sinB-sinC)=3sinAsinB` then

A. $A = 60^\circ$

B. $B = 60^\circ$

C. $C = 60^\circ$

D. none of these

Answer: C

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39. In a $\Delta ABC, \sin A + \sin B + \sin C = 1 + \sqrt{2}$ and $\cos A + \cos B + \cos C = \sqrt{2}$ if the triangle is

A. equilateral

B. isosceles

C. right angled

D. right angled isosceles

Answer: D

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40. Point D,E are taken on the side BC of an acute angled triangle ABC,, such that $BD = DE = EC$. If $\angle BAD = x, \angle DAE = y$ and $\angle EAC = z$ then the value of $\frac{\sin(x+y)\sin(y+z)}{\sin x \sin z}$ is ______

A. 1

B. 2

C. 4

D. none of these

Answer: C

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41. In a triangle ABC , if 3a = b + c , then cot $\frac{B}{2}$ cot $\frac{C}{2}$ =

A. 1

B. $\sqrt{3}$

C. 2

D. none of these

Answer: C

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42. If A+ B+ C=π, n $\in$ Z,then tan nA+ tan +nB +tan nC is equal to

A. 0

B. 1

C. tan nA tan nB tan nC

D. none of these

Answer: C

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43. If A,B,C are angles of a triangle ,then the minimum value of $\tan^2\left(\frac{A}{2}\right)+\tan^2\left(\frac{B}{2}\right)+\tan^2\left(\frac{C}{2}\right)$, is

A. 0

B. 1

C. $1/2$

D. none of these

Answer: B

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44. If in a triangle ABC, $\cos A + \cos B + \cos C = \frac{3}{2}$, prove that the triangle is equilateral.

A. isosceles

B. right angled

C. equilaterial

D. none of these

Answer: C

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45. If in a ΔABC , $\cos a \cos B \pm \sin A \sin B \sin C = 1$, then show that $a : b : c = 1 : 1 : \sqrt{2}$.

A. isosceles

B. right angled

C. isosceles right angles

D. equilateral

Answer: C

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46. If in a triangle ABC , $\frac{b+c}{11}=\frac{c+a}{12}=\frac{a+b}{13}$ then cosA is equal to

A. $\frac{1}{5}$

B. $\frac{5}{7}$

C. $\frac{19}{35}$

D. none of these

Answer: A

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47. If p_1, p_2, p_3 are altitudes of a triangle ABC from the vertices A,B,C and $\triangle$ the area of the triangle, then $p_1^{-2} + p_2^{-2} + p_3^{-2}$ is equal to

A. $\dfrac{a+b+c}{\Delta}$

B. $\dfrac{a^2+b^2+c^2}{4\Delta^2}$

C. $\dfrac{a^2+b^2+c^2}{\Delta^2}$

D. none of these

Answer: B

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48. If p_1, p_2, p_3 are altitudes of a triangle ABC from the vertices A,B,C and ! the area of the triangle, then $p_1 . p_2, p_3$ is equal to

A. abc

B. 8R

C. $a^2b^2c^2$

D. $\dfrac{a^2 \cdot b^2 \cdot c^2}{8R^3}$

Answer: D

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49. P_1, P_2, P_3 are altitudes of a triangle ABC from the vertices A, B, C and Δ is the area of the triangle,

The value of $P_1^{-1} + P_2^{-1} + P_3^{-1}$ is equal to-

A. `(s-a)/Δ

B. `(s-b)/Δ

C. `(s-c)/Δ

D. `s/Δ

Answer: C

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50. If median of the ΔABC through A is perpendicular to BC, then which one of the following is correct ?

A. tanA+tanB=0

B. 2tanA+tanB=0

C. tanA+2tanB=0

D. none of these

Answer: C

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51. If in a triangle ABC, $\frac{\sin A}{\sin C} = \frac{\sin(A-B)}{\sin(B-C)}$, then

A. a,b,c are in A.P

B. a^2, b^2, c^2 are in A.P

C. a,b,c are in H.P

D. a^2, b^2, c^2 are in H.P

Answer: B

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52. If in a $!ABC, a\tan A + b\tan B = (a+b)\tan\left(\frac{A+B}{2}\right)$, then

A. A = B

B. A = -B

C. A = 2B

D. B = 2A

Answer: A

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53. If in a triangle $ABC, \cos A = \frac{\sin B}{2\sin C}$ then the triangle ABC, is

A. equilateral

B. isosceles

C. right angled

D. none of these

Answer: B

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54. If in a triangle ABC, $\frac{a^2 - b^2}{a^2 + b^2} = \frac{\sin(A - B)}{\sin(A + B)}$ the triangle is

A. right angled or isosceles

B. right angled and isosceles

C. equilaterial

D. none of these

Answer: A

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55. If in a triangle ABC, b + c = 3a, then tan $\left(\frac{B}{2}\right)\tan\left(\frac{C}{2}\right)$ is equal to

A. 1/2

B. 1/3

C. 1/4

D. 1/5

Answer: A

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56. Let ABC be a triangle such that $\angle A = 45^\circ, \angle B = 75^\circ$, then $a + c\sqrt{2}$ is equal to

A. 0

B. b

C. 2b

D. $-b$

Answer: C

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57. If in a ΔABC , $\cos A + 2\cos B + \cos C = 2$, then a,b, c are in

A. A.P.

B. H.P.

C. G.P

D. none of these

Answer: A

Watch Video Solution

58. If the altitudes of a triangle are in A.P,then the sides of the triangle are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: C

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59. In any triangle ABC ,the distance of the orthocentre from the vertices A, B,C are in the ratio

A. sin A : sin B : sin C

B. cos A : cos B : cos C

C. tan A : tan B: tan C

D. none of these

Answer: B

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60. If R is the radius of circumscribing circle of a regular polygon of n-sides,then R =

A. $\frac{a}{2}\sin\left(\frac{\pi}{n}\right)$

B. $\frac{a}{2}\cos\left(\frac{\pi}{n}\right)$

C. $\frac{a}{2}\cos ec\left(\frac{\pi}{n}\right)$

D. $\frac{a}{2}\cos ec\left(\frac{\pi}{n}\right)$

Answer: C

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61. If r is the radius of inscribed circle of a regular polygon of n-sides ,then r is equal to

A. $\frac{a}{2}\cot\left(\frac{\pi}{2n}\right)$

B. $\frac{a}{2}\cot\left(\frac{\pi}{n}\right)$

C. $\frac{a}{2}\tan\left(\frac{\pi}{n}\right)$

D. $\frac{a}{2}\cos\left(\frac{\pi}{n}\right)$

Answer: B

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62. The area of a regular polygon of n sides is (where r is inradius, R is circumradius, and a is side of the triangle (a) $\frac{nR^2}{2}\sin\left(\frac{2\pi}{n}\right)$ (b) $nr^2\tan\left(\frac{\pi}{n}\right)$ (c) $\frac{na^2}{4}\frac{\cot\pi}{n}$ (d) $nR^2\tan\left(\frac{\pi}{n}\right)$

A. $\frac{nR^2}{2}\sin\left(\frac{2\pi}{n}\right)$

B. $nr^2\tan\left(\frac{2\pi}{2n}\right)$

C. $\frac{nr^2}{2}\sin\left(\frac{2\pi}{n}\right)$

D. $nR^2\tan\left(\frac{\pi}{n}\right)$

Answer: A

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63. If r, r_1, r_2, r_3 have their usual meanings , the value of $\frac{1}{r_1}+\frac{1}{r_2}+\frac{1}{r_3}$, is

A. 1

B. 0

C. $\frac{1}{r}$

D. none of these

Answer: C

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64. If p_1, p_2, p_3 are respectively the perpendicular from the vertices of a triangle to the opposite sides, then find the value of $p_1p_2p_3$.

A. $\dfrac{a^2b^2c^2}{R^2}$

B. $\dfrac{a^2b^2c^2}{4R^2}$

C. $\dfrac{4a^2b^2c^3}{R^2}$

D. $\dfrac{a^2b^2c^2}{8R^2}$

Answer: D

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65. If p_1, p_2, p_3 are respectively the perpendiculars from the vertices of a triangle to the opposite sides , then $\dfrac{\cos A}{p_1} + \dfrac{\cos B}{p_2} + \dfrac{\cos C}{p_3}$ is equal to

A. $1/r$

B. $1/R$

C. $1/!$

D. none of these

Answer: B

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66. If in $\Delta ABC, 8R^2 = a^2 + b^2 + c^2$, then the triangle ABC is

A. right angled

B. isosceles

C. equilaterial

D. none of these

Answer: A

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67. If A_1, A_2, A_3 denote respectively the areas of an inscribed polygon of 2n sides , inscribed polygon of n sides and circumscribed poylgon of n sides ,then A_1, A_2, A_3 are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

Watch Video Solution

68. If the angles of a triangle are in A.P.with common difference equal $1/3$ of the least angle ,the sides are in the ratio

A. $\sqrt{2}: 2\sqrt{3}: \sqrt{6} + \sqrt{2}$

B. $2\sqrt{2}: \sqrt{3}: \sqrt{6} - \sqrt{2}$

C. $2\sqrt{2}: 2\sqrt{3}: \sqrt{6} - \sqrt{2}$

D. $2\sqrt{2}: 2\sqrt{3}: \sqrt{6} + \sqrt{2}$

Answer: D

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69. In a triangle ABC, A = 8, b = 10 and c = 12. What is the angle C equal to ?

A. $A/2$

B. 2A

C. 3A

D. none of these

Answer: B

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70. If the sides a, b, c of a triangle ABC are the roots of the equation $x^3 - 13x^2 + 54x - 72 = 0$, then the value of $\frac{\cos A}{a} + \frac{\cos B}{b} + \frac{\cos C}{c}$ is equal to :

A. $\frac{169}{144}$

B. $\frac{61}{72}$

C. $\frac{61}{144}$

D. $\frac{169}{72}$

Answer: C

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71. The area of a ΔABC is $b^2 - (c-a)^2$. Then ,tan B =

A. $\frac{4}{3}$

B. $\frac{3}{4}$

C. 8/15

D. none of these

Answer: C

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72. If in a triangle ABC, $\frac{\sin A}{\sin C} = \frac{\sin(A-B)}{\sin(B-C)}$, then

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: A

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73. If in a triangle ABC, $3\sin A = 6\sin B = 2\sqrt{3}\sin C$, then the angle A is

A. 0°

B. 30°

C. 60°

D. 90°

Answer: D

Watch Video Solution

74. The sides of a triangle are in A.P. and its area is $\frac{3}{5}$ th of an equilateral triangle of the same perimeter. Find the greatest angle of the triangle

A. $1:2:3$

B. $3:5:7$

C. $1:3:5$

D. none of these

Answer: B

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75. In a triangle $\sin^4 A + \sin^4 B + \sin^4 C = \sin^2 B \sin^2 C + 2\sin^2 C \sin^2 A + 2\sin^2 A \sin^2 B$, then its angle A is equal to-

A. $\frac{\pi}{6}, \frac{5\pi}{6}$

B. $\frac{\pi}{3}, \frac{5\pi}{6}$

C. $\frac{5\pi}{6}, \frac{2\pi}{3}$

D. none of these

Answer: A

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76. In any triangle ABC , $\frac{\tan\left(\frac{A}{2}\right)-\tan\left(\frac{B}{2}\right)}{\tan\left(\frac{A}{2}\right)+\tan\left(\frac{B}{2}\right)}$ is equal to

A. $\frac{a-b}{a+b}$

B. $\frac{a-b}{c}$

C. $\frac{a-b}{a+b+c}$

D. $\frac{c}{a+b}$

Answer: B

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77. If the sides a,b and c of a ABC are in A.P.,then

$\left(\tan\left(\frac{A}{2}\right)+\tan\left(\frac{C}{2}\right)\right):\cot\left(\frac{B}{2}\right)$, is

A. $3:2$

B. $1:2$

C. $3:4$

D. none of these

Answer: D

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78. If the sides of the triangle are the roots of the equation $x^3 - 2x^2 - x - 16$=0, then the product of the in-radius and circum-radius of the triangle ,is

A. 3

B. 6

C. 4

D. 2

Answer: C

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79. If AD, BE and CF are the medians of a ΔABC, then evaluate $(AD^2 + BE^2 + CF^2) : (BC^2 + CA^2 + AB^2)$.

A. $4 : 3$

B. $3 : 2$

C. $3 : 4$

D. $2 : 3$

Answer: C

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80. If a ΔABC is right angled at B, then the diameter of the incircle of the triangle is

A. $\frac{\pi}{4}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{2}$

D. none of these

Answer: C

Watch Video Solution

81. If a^2, b^2, c^2 are in A.P.,then which of the following is also in A.P.?

A. sin A , sin B, sin C

B. tan A , tan B, tan C

C. cot A , cot B , cot C

D. none of these

Answer: C

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82. If in a $\Delta ABC, \sin^3 A + \sin^3 B + \sin^3 C$

$= 3\sin A . \sin B . \sin C,$ then find the valueof determinant

$$\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}.$$

A. 0

B. $(a+b+c)^3$

C. (a+b+c)(ab+bc+ca)

D. none of these

Answer: A

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83. If the ex-radii of a triangle are in H.P.,then the corresponding sides are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: A

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84. If I is the incentre of a $!ABC$, then $IA:IB:IC$ is equal to

A. $\cos ec\frac{A}{2}:\cos ec\frac{B}{2}:\cos ec\frac{C}{2}$

B. $\frac{\sin A}{2}:\frac{\sin B}{2}:\frac{\sin C}{2}$

C. $\frac{\sec A}{2}:\frac{\sec B}{2}:\frac{\sec C}{2}$

D. none of these

Answer: A

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85. In a $\triangle ABC$, the HM of the ex-radii is equal to

A. 3r

B. 2R

C. R + r

D. none of these

Answer: A

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86. In a ΔABC if $r_1 : r_2 : r_3 = 2 : 4 : 6,$ then $a : b : c$=

A. $3 : 5 : 7$

B. $1 : 2 : 3$

C. $5 : 8 : 7$

D. none of these

Answer: D

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87. If in a $!ABC, \angle A = \pi/3$ and AD is a median , then

A. $2AD^2 = b^2 + c^2 + bc$

B. $4AD^2 = b^2 + c^2 + bc$

C. $6AD^2 = b^2 + c^2 + bc$

D. none of these

Answer: B

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88. In a $\triangle ABC \frac{\cos^2 A}{2} + \frac{\cos^2 B}{2} + \frac{\cos^2 C}{2} =$

A. $2 - \frac{r}{R}$

B. $2 - \frac{r}{2R}$

C. $2 + \frac{r}{2R}$

D. none of these

Answer: C

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89. The base of a triangle is 80cm and one of the base angles is 60°.If the sum of the lenghts of the other two sides is 90cm,then the length of the shortest side is

A. 15cm

B. 19cm

C. 21cm

D. 17cm

Answer: D

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90. In a ΔABC if $r_1 = 16, r_2 = 48$ and $r_3 = 24$, then its in-radius ,is

A. 7

B. 8

C. 6

D. none of these

Answer: B

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91. In a $\triangle ABC$ if a =26, b= 30 and cos C =$\frac{63}{65}$, then r_2 =

A. 84

B. 45

C. 48

D. 24

Answer: C

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92. In a triangle ABC if sides a = 13, b =14 and c = 15, then reciprocals of r_1, r_2, r_3 are in the ratio

A. $6:7:8$

B. $6:7:8$

C. $8:7:6$

D. none of these

Answer: C

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93. In a ABC , ifsin $A and \sin B$ are the roots of the equation $c^2x^2 - c(a+b)x + ab = 0$, then find $\sin c$

A. 1/3

B. $\frac{1}{2}$

C. 1

D. 0

Answer: C

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94. If a , b , c denote the sides of a $!ABC$ such that the equation $x^2 + \sqrt{2}x + 1 = 0$ and $ax^2 + bx + c = 0$ have a common root , then C =

A. 30°

B. 45°

C. 90°

D. 60°

Answer: B

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95. In a ΔABC if $b+c=2a$ and $\angle A=60^\circ$ then ΔABC is

A. equilateral

B. right angled

C. isosceles

D. scalene

Answer: A

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96. In a ΔABC, if $b=20, c=21$ and $\sin A=\frac{3}{5}$, then the value of a is

A. 12

B. 13

C. 14

D. 15

Answer: B

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97. Let A, B and C are the angles of a plain triangle and $\tan\left(\frac{A}{2}\right)=\frac{1}{3}, \tan\left(\frac{B}{2}\right)=\frac{2}{3}$ .then $\tan\left(\frac{C}{2}\right)$ is equal to

A. $7/9$

B. $2/9$

C. $1/3$

D. $2/3$

Answer: A

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Chapter Test

1. If the sides of a triangle are in the ratio $3:7:8$, then find $R:r$

A. $2:7$

B. $7:2$

C. $3:7$

D. $7:3$

Answer: B

Watch Video Solution

2. The area of a regular polygon of n sides is (where r is inradius, R is circumradius, and a is side of the triangle (a) $\frac{nR^2}{2}\sin\left(\frac{2\pi}{n}\right)$ (b) $nr^2\tan\left(\frac{\pi}{n}\right)$ (c) $\frac{na^2}{4}\frac{\cot\pi}{n}$ (d) $nR^2\tan\left(\frac{\pi}{n}\right)$

A. $\frac{1}{2}R^2\sin\left(\frac{2\pi}{n}\right)$

B. $\frac{n}{2}R^2\sin\left(\frac{\pi}{n}\right)$

C. $\frac{n}{2}R\sin\left(\frac{2\pi}{n}\right)$

D. $\frac{nR^2}{2}\sin\left(\frac{2\pi}{n}\right)$

Answer: D

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3. If the angles of a triangle are 30° and 45°, and the included side is $(\sqrt{3}+1)$ cm, then

A. $\frac{1}{\sqrt{3}-1}$

B. $\sqrt{3}+1$

C. $\dfrac{1}{\sqrt{3}+1}$

D. none of these

Answer: A

Watch Video Solution

4. In a $\Delta ABC, \angle B = \dfrac{\pi}{3}$ and $\angle C = \dfrac{\pi}{4}$ let D divide BC internally in the ratio $1:3$, then $\dfrac{\sin(\angle BAD)}{\sin(\angle CAD)}$ is equal to :

A. $\dfrac{1}{\sqrt{6}}$

B. $\dfrac{1}{3}$

C. $\dfrac{1}{\sqrt{3}}$

D. $\sqrt{\left(\dfrac{2}{3}\right)}$

Answer: A

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5. If A is the area and $2s$ is the sum of the sides of a triangle, then $A \leq \frac{s^2}{4}$ (b) $A \leq \frac{s^2}{3\sqrt{3}}$ $2R \sin A \sin B \sin C$ (d) $none of these$

A. $A \leq \frac{s^2}{3\sqrt{3}}$

B. $A \leq \frac{s^2}{2}$

C. $A > \frac{s^2}{\sqrt{3}}$

D. none of these

Answer: A

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6. If in a triangle ABC, right angled at B, s-a=3, s-c=2, then the values of a and c are respectively

A. 2,3

B. 3,4

C. 4,3

D. 6,8

Answer: B

Watch Video Solution

7. If the sides of a triangle are a, b and $\sqrt{a^2+ab+b^2}$, then find the greatest angle

A. 60°

B. 90°

C. 120°

D. 135°

Answer: C

Watch Video Solution

8. In a $\Delta ABC \sum (b+c)\frac{\tan A}{2}\tan\left(\frac{B-C}{2}\right) =$

A. a

B. b

C. c

D. 0

Answer: D

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9. In $\triangle ABC, \angle A = \frac{\pi}{3}$ and $b:c = 2:3, \tan\theta = \frac{\sqrt{3}}{5}, 0 < \theta < \frac{\pi}{2}$ then

A. $B = 60^\circ + 0$

B. $C = 60^\circ + \theta$

C. $C = 60^\circ - \theta$

D. $C = 60^\circ - \theta$

Answer: B

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10. In a ΔABC, AD is the altitude from A. Given $b > c, \angle C = 23^\circ$ and $AD = \dfrac{abc}{(b^2 - c^2)}$, find $\angle B$.

A. 53°

B. 113°

C. 87°

D. none of these

Answer: B

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11. If the angles A, B, C (in that order) of triangle ABC are in arithmetic progression, and $L = \lim_{A \to C} \frac{\sqrt{3 - 4\sin A \sin C}}{|A - C|}$ then find the value of $100L^2$.

A. 100

B. 2

C. 3

D. 4

Answer: A

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12. If the radius of the incircle of a triangle withits sides 5k, 6k and 5k is 6, then k is equal to

A. 3

B. 4

C. 5

D. 6

Answer: B

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13. Two sides of a triangle are $2\sqrt{2}$ and $2\sqrt{3}cm$ and the angle opposite to the shorter side of the two is $\frac{\pi}{4}$. The largest possible length of the third side is

A. $(\sqrt{6}+\sqrt{2})cm$

B. $(\sqrt{6}+\sqrt{2})cm$

C. $(\sqrt{6}-\sqrt{2})cm$

D. none of these

Answer: A

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14. In a $\triangle ABC, a = 13cm, b = 12$ and $c = 5cm$ The distance of A from BC is

A. $\frac{144}{13}$

B. $\frac{65}{12}$

C. $\frac{60}{13}$

D. $\frac{25}{13}$

Answer: C

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15. In a $\triangle ABC, B = \frac{\pi}{8}, C = \frac{5\pi}{8}$. The altitude from A to the side BC, is

A. $\frac{a}{2}$

B. 2a

C. $\frac{1}{2}(b + c)$

D. b+c

Answer: A

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16. In $\Delta ABC, A=\frac{2\pi}{3}, b-c=3\sqrt{3}cm$ and area of $\Delta ABC=\frac{9\sqrt{3}}{2}cm^2$, then BC =

A. $6\sqrt{3}$

B. 9cm

C. 18cm

D. 12cm

Answer: B

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17. In ΔABC if $a=(b-c)\sec\theta$ then $\dfrac{2\sqrt{bc}}{b-c}\sin\left(\dfrac{A}{2}\right)=$

A. $\cos\theta$

B. $\cot\theta$

C. $\tan\theta$

D. $\sin\theta$

Answer: C

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18. In a ΔABC, $(a+b+c)(b+c-a)=\lambda bc$. (where symbols have their usual meaning)& $\lambda\in I$, then greatest value of λ is

A. $\lambda<0$

B. $\lambda>4$

C. $\lambda>0$

D. $0<\lambda<4$

Answer: D

Watch Video Solution

19. If in ΔABC, a=2b and A=3B, then A is equal to

A. 90°

B. 60°

C. 30°

D. 45°

Answer: A

Watch Video Solution

20. Let the angles $A, BandC$ of triangle ABC be in $A\dot{P}\cdot$ and let $b:c$ be $\sqrt{3}:\sqrt{2}$. Find angle $A\cdot$

A. 75°

B. 45°

C. 60°

D. 15°

Answer: A

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21. In a triangle ABC, AD, BE and CF are the altitudes and R is the circum radius, then the radius of the circel DEF is

A. $\frac{R}{2}$

B. 2R

C. R

D. $\frac{3}{2}R$

Answer: A

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22. If in a $\triangle ABC = \frac{a}{\cos A} = \frac{b}{\cos B}$, then

A. 2 sin A sin B sin C=1

B. $\sin^2 A + \sin^2 B = \sin^2 C$

C. 2 sin A cos B=sin C

D. none of these

Answer: C

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23. In a $\triangle ABC, \frac{s}{R} =$

A. sin A+sin B+ sin C

B. cos A +cos B+ cos C

C. 2

D. none of these

Answer: A

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24. If in a $\triangle ABC, A = \frac{\pi}{3}$ and AD is the median, then

A. $2AD^2 = b^2 + c^2 + bc$

B. $4AD^2 = b^2 + c^2 + bc$

C. $6AD^2 = b^2 + c^2 + bc$

D. none of these

Answer: B

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25. Prove that

$a(b^2+c^2)\cos A+b(c^2+a^2)\cos B+c(a^2+b^2)\cos C=3abc$

A. $3abc^2$

B. $3a^2bc$

C. 3abc

D. $3ab^2C$

Answer: C

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26. The angle of a right-angled triangle are in AP. Then , find the ratio of the in-radius and the perimeter.

A. $(2-\sqrt{3}):2\sqrt{3}$

B. $1:8\sqrt{3}(2+\sqrt{3})$

C. $(2+\sqrt{3}):4\sqrt{3}$

D. none of these

Answer: A

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27. Find the sum of the radii of the circles, which are respectively inscribed and circumscribed about the a regular polygon of n sides.

A. $\frac{a}{4}\cot\frac{\pi}{2\pi}$

B. $a\cot\frac{\pi}{n}$

C. $\frac{a}{2}\cot\frac{\pi}{2\pi}$

D. $a\cot\frac{\pi}{2\pi}$

Answer: D

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28. If $0 < x < \frac{\pi}{2}$ then

A. $\frac{\pi}{3}$

B. $\frac{\pi}{2}$

C. x

D. $\frac{\pi}{2} - x$

Answer: B

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29. 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. obtuse angled

C. equilateral

D. none of these

Answer: B

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30. The perimeter of a triangle is 16 cm. One ofthe sides is of length 6 cm. If the area of thetriangle is 12 sq. cm, then the triangle is

A. right angled

B. isoscles

C. equilateral

D. scalene

Answer: B

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31. In a $\triangle ABC, \quad \text{if} \quad \frac{a}{b^2 - c^2} + \frac{c}{b^2 - a^2} = 0, \quad \text{then} \quad \angle B =$

A. $\frac{\pi}{2}$

B. $\frac{\pi}{4}$

C. $\frac{2\pi}{3}$

D. $\frac{\pi}{3}$

Answer: D

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32. In a $\triangle ABC, a^2 \sin 2C + c^2 \sin 2A =$

A. Δ

B. 2Δ

C. 3Δ

D. 4Δ

Answer: D

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33. Prove that $\dfrac{\cos C + \cos A}{c+a} + \dfrac{\cos B}{b} = \dfrac{1}{b}$

A. $\dfrac{1}{a}$

B. $\dfrac{1}{b}$

C. $\dfrac{1}{c}$

D. $\dfrac{c+a}{b}$

Answer: B

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34. If the sides of triangle a, b, c be in A.P. then $\tan.\dfrac{A}{2} + \tan.\dfrac{C}{2}$ is :

A. $1/4$

B. $1/3$

C. 3

D. 4

Answer: B

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35. In a triangle ABC, cos A+cos B+cos C=

A. $1+\frac{r}{R}$

B. $1-\frac{r}{R}$

C. $1-\frac{R}{r}$

D. $1+\frac{R}{r}$

Answer: A

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36. if $A+B+C=\pi$, and $\cos A=\cos B\cos C$, show that $2\cot B\cot C=1$.

A. 2

B. 3

C. $1/2$

D. 5

Answer: C

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37. Prove that $a(b^2+c^2)\cos A+b(c^2+a^2)\cos B+c(a^2+b^2)\cos C=3abc$

A. abc

B. 2abc

C. 3abc

D. 4abc

Answer: C

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38. The sides of a triangle are $x^2 + x + 1, 2x + 1, and x^2 - 1$. Prove that the greatest angle is 120^0.

A. 120°

B. 60°

C. 40°

D. 30°

Answer: A

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39. In a $\triangle ABC, \quad \text{if } C = 60^\circ, \quad \text{then } \frac{a}{b+c} + \frac{b}{c+a} =$

A. 2

B. 1

C. 4

D. none of these

Answer: B

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40. In a $\triangle ABC$, if a,c,b are in A.P. then the value of $\frac{a \cos B - b \cos A}{a - b}$, is

A. 3

B. 2

C. 1

D. none of these

Answer: B

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41. If a ΔABC is right angled at B, then the diameter of the incircle of the triangle is

A. c+a-b

B. 2(c+a-b)

C. c+a-2b

D. c+a+2b

Answer: A

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42. The angle of a right-angled triangle are in AP. Then , find the ratio of the in-radius and the perimeter.

A. $(2+\sqrt{3}), 2\sqrt{3}$

B. $(2+\sqrt{3}), \sqrt{3}$

C. $(2-\sqrt{3}) : 2\sqrt{3}$

D. $(2-\sqrt{3}) : 4\sqrt{3}$

Answer: C

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43. The angle of a triangle are in the ratio 1 : 2 : 7, prove that the ratio of the greatest side to the least side is $(\sqrt{5}+1) : (\sqrt{5}-1)$.

A. $(\sqrt{5}+1) : (\sqrt{5}-1)$

B. $(\sqrt{5}-1) : (\sqrt{5}+1)$

C. $(\sqrt{5}+2) : (\sqrt{5}-2)$

D. $(\sqrt{5}-2) : (\sqrt{5}+2)$

Answer: B

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44. In ΔABC, let $a=5, b=4$ and $\cos\left(A-B=\frac{31}{32}\right)$, then which of the following statement (s) is (are) correct ?

[Note All symbols used have usuall meaning in a triangle]

A. $1/4$

B. $1/8$

C. $1/6$

D. $1/2$

Answer: B

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45. In a $\triangle\ ABC$if $\text{c}=(a+b)\sin\theta$ and $\cos\theta=\frac{k\sqrt{a}b}{a+b}$, then $k=$

A. $2\cos\frac{C}{2}$

B. $2\cos\frac{B}{2}$

C. $2\cos\frac{A}{2}$

D. $\cos\frac{C}{2}$

Answer: A

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46. In $\triangle ABC$, if $\frac{s-a}{\Delta}=\frac{1}{8}, \frac{s-b}{\Delta}=\frac{1}{12}$ and $\frac{s-c}{\Delta}=\frac{1}{24}$, then $b=$

A. 16

B. 20

C. 24

D. 28

Answer: A

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47. In a triangle ABC if $2a = \sqrt{3}b + c$, then possible relation is

A. $c^2 = a^2 + b^2 - ab$

B. $a^2 = b^2 + c^2$

C. $b^2 = a^2 + c^2 - \sqrt{3}ac$

D. none of these

Answer: B

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48. If in a triangle $ABC, a\cos^2\left(\frac{C}{2}\right) + c\cos^2\left(\frac{A}{2}\right) = \frac{3b}{2}$, then the sides $a, b, andc$ are in A.P. b. are in G.P. c. are in H.P. d. satisfy $a + b = \cdot$

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: A

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49. The sides of a right angled triangle are in A.P., then they are in the ratio :

A. $3:4:5$

B. $4:5:6$

C. $3:4:6$

D. none of these

Answer: A

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50. In a triangle ABC, $B = 90^\circ$ then the value of $\tan\left(\frac{A}{2}\right) =$

A. $\sqrt{\frac{b+c}{b-c}}$

B. $\sqrt{\frac{b-c}{b+c}}$

C. $\sqrt{\frac{a+c}{a-c}}$

D. $\sqrt{\frac{a-c}{a+c}}$

Answer: B

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51. In a $\triangle\ ABC$, if $B = 90^\circ$, then the value of $\tan\frac{A}{2}$ in terms of the sides, is

A. xyz

B. x^2yz

C. $x^2y^2z^2$

D. none of these

Answer: D

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52. In a ΔABC ,a =5 , b= 4 , and $\tan\left(\frac{C}{2}\right)=\sqrt{\frac{7}{9}}$, then c =

A. $\sqrt{6}$

B. $\sqrt{5}$

C. 6

D. 5

Answer: C

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53. In a $\triangle ABC,\ \text{ if } C=60^\circ,\ \text{ then } \frac{a}{b+c}+\frac{b}{c+a}=$

A. 2

B. 4

C. 3

D. 1

Answer: D

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54. If p_1, p_2, p_3 are altitudes of a triangle ABC from the vertices A,B,C and $\triangle$ the area of the triangle, then $p_1^{-2} + p_2^{-2} + p_3^{-2}$ is equal to

A. $\frac{\cot A + \cos B + \cot C}{\Delta}$

B. $\frac{\Delta}{\cot A + \cos B + \cot C}$

C. $\Delta(\cot A + \cos B + \cot C)$

D. none of these

Answer: A

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55. Show that $\frac{r_1}{bc} + \frac{r_2}{ca} + \frac{r_3}{ab} = 2R - r$

A. $\frac{1}{2R} - \frac{1}{r}$

B. 2R-r

C. r-2R

D. $\frac{1}{r} - \frac{1}{2R}$

Answer: D

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