



MATHS

BOOKS - DEEPTI MATHS (TELUGU ENGLISH)

PROPERTIES OF TRIANGLES

Solved Examples

1. In $\triangle ABC$, if $2R=r_1 - r$ then $\angle A =$

A. 30°

B. 45°

C. 60°

D. 90°

Answer: D



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2. In $\triangle ABC$, $\frac{b^2 - c^2}{a^2} \sin^2 A + \frac{c^2 + a^2}{b^2} \sin^2 B =$

A. $b^2 - a^2$

B. $a^2 + b^2$

C. $\frac{b^2 - a^2}{4R^2}$

D. $\frac{a^2 + b^2}{4R^2}$

Answer: C



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3. In $\triangle ABC$, if $\cot \frac{A}{2} : \cot \frac{B}{2} : \cot \frac{C}{2} = 1 : 4 : 15$, then the greatest angle of the triangle is

A. 60°

B. 90°

C. 120°

D. 135°

Answer: C



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4. Prove that
$$\frac{1 + \cos(A - B)\cos C}{1 + \cos(A - C)\cos B} = \frac{a^2 + b^2}{a^2 + c^2}$$

A. $a^2 + b^2$

B. $a^2 + c^2$

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

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

Answer: D



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5. In $\triangle ABC$, $\frac{a}{\cos A} = \frac{b}{\cos B} = \frac{c}{\cos C}$, if $b = 2$ then the area of the triangle is

A. $\sqrt{2}$

B. $\sqrt{3}$

C. 2

D. 3

Answer: B



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

A. 0

B. $1/2$

C. $1/\sqrt{2}$

D. 1

Answer: D



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7. If the sum of the squares of the sides of a triangle ABC is equal to twice the square of its circum diameter, then $\sin^2 A + \sin^2 B + \sin^2 C =$

A. 4

B. 3

C. 1

D. 2

Answer: D



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8. The roots of $x^2 - 2\sqrt{3}x + 2 = 0$ represent two sides of a triangle. IF the angle between them is $\pi/3$, then the perimeter of the triangle is

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

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

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

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

Answer: B



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9. The base of a triangle is 80 and one of the base angles is 60° . IF the sum of the lengths of the other two sides is 90, then the shortest side is

A. 15

B. 17

C. 19

D. 21

Answer: B

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10. In a triangle ABC, if $B = 30^\circ$ and $c = \sqrt{3}b$, then A can be equal to

A. 45°

B. 60°

C. 90°

D. 120°

Answer: C

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11. In a triangle ABC, if A,B, C are in A.P and $b:c = \sqrt{3} : \sqrt{2}$, then

A. $\sin(2C - A) = \sin(B/4)$

B. $\sin(A - C) = \sin(B/4)$

C. $\sin(A + C) = \cos 2R$

D. $\cos(A - C) = \sin(B/2)$

Answer: A

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12. In a $\triangle ABC$, $(a + b + c)(b + c - a) = \lambda bc$ if

A. $\lambda < 0$

B. $\lambda > 4$

C. $0 < \lambda < 4$

D. $\lambda > 6$

Answer: C

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13. In a $\triangle ABC$, if $a:b:c = 4:5:6$, then the ratio of the radius of the circumcircle to that of the incircle is

A. 7:5

B. 9:5

C. 12:7

D. 16:7

Answer: D



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14. A circle is inscribed in an equilateral triangle of side a , The area of the square inscribed in the circle, in sq. units is

A. $a^2/8$

B. $a^2/6$

C. $a^2/4$

D. $a^2/2$

Answer: B

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15. In a $\triangle ABC$, if p, q, r are the distances from the orthocentre to the vertices A, B, C respectively, then $a q r + b r p + c p q =$

A. $p q r$

B. $a b c$

C. $3r$

D. $3(p+q+r)$

Answer: B

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16. A regular polygon of nine sides, each of length 2 is inscribed in a circle.

The radius of the circle is

A. $\cos ec \frac{\pi}{9}$

B. $2 \cos ec \frac{\pi}{9}$

C. $\sec \frac{\pi}{9}$

D. $\cot \frac{\pi}{9}$

Answer: A



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17. IF an equilateral triangle and a regular hexagon have the same perimeter, then the ratio of their areas is

A. 1 : 4

B. 1 : 3

C. 2 : 3

D. 2:5

Answer: C



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Exercise 1 A

1. In $\triangle ABC$, if $a=5$, $b=6$, $\sin A = 5/6$, then $B=$

A. π

B. $\pi/2$

C. $\pi/3$

D. $\pi/4$

Answer: B



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2. In $\triangle ABC$, if $A = 75^\circ$, $B = 45^\circ$, $c = \sqrt{3}$, then $b =$

A. 2

B. $\sqrt{3}$

C. $2\sqrt{3}$

D. $\sqrt{2}$

Answer: D



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3. In $\triangle ABC$, if $a = \sqrt{3} + 1$, $b = 2$, $B = 45^\circ$, then $A =$

A. 30°

B. 60°

C. 75°

D. 45°

Answer: C



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4. In $\triangle ABC$, if $a = \sqrt{3} + 1$, $B = 30^\circ$, $C = 45^\circ$, then $c =$

A. 2

B. 3

C. 4

D. 1

Answer: A



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5. In $\triangle ABC$, if $A = 30^\circ$, $b = 8$, $a = 6$, $B = \sin^{-1} x$, then $x =$

A. $1/2$

B. $1/3$

C. $2/3$

D. 1

Answer: C



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6. In $\triangle ABC$, if $A=10$, $R=5$ then $A=$

A. π

B. $\pi/2$

C. $\pi/3$

D. $\pi/4$

Answer: B



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7. If $a = 2$, $b = 3$, $c = 4$ then find $\cos A$.

A. $\frac{7}{8}$

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

C. $\frac{6}{7}$

D. $\frac{5}{8}$

Answer: A



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8. In $\triangle ABC$, if $a = 4$, $b = 5$, $c = 60^\circ$, then $c =$

A. $2\sqrt{3}$

B. $\sqrt{21}$

C. 8

D. 14

Answer: B



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9. In $\triangle ABC$ if $b = 20$, $c = 21$ and $\sin A = 3/5$, then $a =$

A. 12

B. 13

C. 14

D. 15

Answer: B



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10. In $\triangle ABC$, if $a = 4$ cm, $b = 5$ cm, $c = 7$ cm, then $\cos \frac{A}{2} =$

A. $1/\sqrt{5}$

B. $1/\sqrt{2}$

C. $\sqrt{32/35}$

D. $2/3$

Answer: C

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11. In $\triangle ABC$, if $a=4$ cm, $b=7$ cm, $c=9$ cm, then $\tan \frac{A}{2} =$

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

B. $1/\sqrt{20}$

C. $\sqrt{20}$

D. $2/3$

Answer: B

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12. In $\triangle ABC$, if $a=13$ cm, $b=12$ cm, $c=5$ cm, then $\sin \frac{A}{2} =$

A. $1/\sqrt{5}$

B. $1/\sqrt{2}$

C. $\sqrt{32/35}$

D. $2/3$

Answer: B



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13. In $\triangle ABC$, if $a = 3$ cm, $b = 4$ cm, $c = 5$ cm, then $\cos \frac{C}{2} =$

A. $1/\sqrt{5}$

B. $1/\sqrt{2}$

C. $\sqrt{32/35}$

D. $2/3$

Answer: B



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14. In $\triangle ABC$, if $a = 13\text{cm}$, $b = 14\text{cm}$, $c = 15\text{cm}$, then $\tan \frac{C}{2} =$

A. $1/\sqrt{5}$

B. $1/\sqrt{2}$

C. $\sqrt{32/35}$

D. $2/3$

Answer: D



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15. In $\triangle ABC$, if $a = 7$, $b = 7\sqrt{3}$ and right angled at C, then $c =$

A. $2/\sqrt{3}$

B. $\sqrt{21}$

C. 8

D. 14

Answer: D



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16. If the angles of a triangle are in A.P, $a=2$, $c=4$ then $b=$

A. $2/\sqrt{3}$

B. $\sqrt{21}$

C. 8

D. 14

Answer: A



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17. The lengths of the two larger sides of a triangle are 10 and 9. If the angles are in A.P, then the length of the third side can be

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

B. $3\sqrt{3}$

C. 5

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

Answer: A



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

A. 2, $\sqrt{2}$

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

C. $\sqrt{2}, 4$

D. $2, 4\sqrt{3}$

Answer: A



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19. If two angles of a $\triangle ABC$ are 45° and 60° , then the ratio of the smallest and the greatest sides are

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

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

C. $1 : \sqrt{3}$

D. $\sqrt{3} : 1$

Answer: A



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20. In a triangle if the sum of two sides is x and their product is y such that $(x+z)(x-z)=y$ where z is the third side of the triangle then the triangle is

- A. equilateral
- B. right angled
- C. obtuse angled
- D. none

Answer: C



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21. IF 4,5 are two sides of a triangle and the included angle is 60° , then its area is

- A. 3
- B. 5

C. $5\sqrt{3}$

D. $3\sqrt{3}$

Answer: C



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22. IF 13,14,15 are the sides of the triangle , then the area of the triangle in sq. unit is

A. 84

B. 72

C. 56

D. 68

Answer: A



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23. In $\triangle ABC$, if $a = 2$, $B = 120^\circ$, $C = 30^\circ$, then the area of the triangle is

A. $2\sqrt{3}$

B. $\sqrt{3}$

C. $\sqrt{3}/2$

D. $4\sqrt{3}$

Answer: B



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24. In $\triangle ABC$, 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^2b^2

Answer: D



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25. In $\triangle ABC$, if $a = 4$, $b = 3$, $\angle A = 60^\circ$, 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. $c^2 + 3c - 7 = 0$

Answer: A



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26. In a triangle ABC , medians AD and BE are drawn. If $\angle D = 4$, $\angle DAB = \pi/6$, $\angle ABE = \pi/3$ then the area of $\triangle ABC$ is

A. $8/3$

B. $16/3$

C. $32/3\sqrt{3}$

D. $64/3$

Answer: C



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27. If two sides of a triangle are the roots of the equation $4x^2 - (2\sqrt{6})x + 1 = 0$ and the included angle is 60° , then the third side is

A. $\sqrt{3}$

B. $\sqrt{3}/2$

C. $1/\sqrt{3}$

D. $2/\sqrt{3}$

Answer: B



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28. The straight roads intersect at angle of 60° . A bus on one road is 2km. Away from the intersection and a car on the 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

Answer: D



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29. In $\triangle ABC$, if $a = 5$, $A = 30^\circ$, then the circumradius is

A. 4

B. 3

C. 6

D. 5

Answer: D



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30. If the length of each side of an equilateral triangle is 10 cm, then its circumradius is

A. $10\sqrt{3}$

B. $3\sqrt{10}$

C. $3/\sqrt{10}$

D. $10/\sqrt{3}$

Answer: D



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31. The diameter of the circumcircle of the triangle whose sides 61,60,11 is

A. 61

B. 60

C. 11

D. 50

Answer: A



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32. IF the sides of a triangle ABC are 6,8,10 unit , then the radius of its circumcentre is

- A. 4
- B. 3
- C. 6
- D. 5

Answer: D



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33. IF the perimeter of a triangle is 12 times the arithmetic mean of the sides of its angles then its circumference=

- A. 1
- B. 2
- C. 3

D. 6

Answer: B



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34. In $\triangle ABC$, if $b = c = R$ then $A =$

A. 30°

B. 60°

C. 90°

D. 120°

Answer: D



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35. IF the area of the triangle ABC is $a^2 - (b - c)^2$, then its circumradius

R=

A. $(a/6)\sin^2(A/2)$

B. $(a/16)\cos ec^2(A/2)$

C. $(b/16)\sin^2(B/2)$

D. $(c/16)\sin^2(C/2)$

Answer: B



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36. If $\Delta = a^2 - (b - c)^2$, is the area of the triangle ABC, then $\tan A =$

A. $\frac{1}{16}$

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

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

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

Answer: B



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37. IF the sides of a triangle are $7, 4\sqrt{3}, \sqrt{13}$ then its smallest angle is

A. 30°

B. 45°

C. 90°

D. 120°

Answer: A



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38. In $\triangle ABC$, if $\cot \frac{A}{2} : \cot \frac{B}{2} : \cot \frac{C}{2} = 1 : 4 : 15$, then the greatest angle of the triangle is

A. $\pi / 3$

B. $\pi / 4$

C. $\pi / 6$

D. $2\pi / 3$

Answer: D



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39. IF $x^2 + x + 1, 2x + 1, x^2 - 1$ are the sides of a triangle then its largest angle is

A. $\pi / 3$

B. $\pi / 4$

C. $\pi / 6$

D. $2\pi / 3$

Answer: D

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40. If the sides of a triangle are in the ratio $x : y : \sqrt{x^2 + xy + y^2}$, then the greatest angle is

A. 90°

B. 120°

C. $\cos^{-1}\left(\frac{x+y}{x-y}\right)$

D. none

Answer: B

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

A. 60°

B. 150°

C. 120°

D. 90°

Answer: C

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42. The smallest angle of the triangle whose sides are $6 + \sqrt{12}$, $\sqrt{48}$, $\sqrt{24}$ is

A. $\pi/3$

B. $\pi/4$

C. $\pi/6$

D. $2\pi/3$

Answer: C

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43. IF the angles of a triangle are in the ratio 2 : 3 : 5, then the ratio of the greatest side to the least side is

A. $2 : \sqrt{10 - 2\sqrt{5}}$

B. $4 : \sqrt{10 - 2\sqrt{5}}$

C. $2 : \sqrt{10 + 2\sqrt{5}}$

D. $4 : \sqrt{10 + 2\sqrt{5}}$

Answer: B



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44. If the angles of a right angled triangle are in A.P then the sides are in the ratio

A. 1 : 3 : 2

B. 1 : 2 : 1

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

D. none

Answer: C



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45. IF the angles of a triangle are in the ratio $1 : 2 : 3$, the corresponding sides are in the ratio

A. $2 : 3 : 1$

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

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

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

Answer: D



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46. If the angles of a triangle are in the ratio 1 : 2 : 7, then the ratio of the longest side to the smallest side is

A. 1 : 7

B. 1 : 3

C. $\sqrt{5} + 1 : \sqrt{5} - 1$

D. $\sqrt{5} - 1 : \sqrt{5} + 1$

Answer: C



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

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

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

C. $1 : \cos 10^\circ$

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

Answer: D



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48. IF the angles of triangle are in the ratio $1 : 1 : 4$ then the ratio of the perimeter of the triangle to its largest side is

A. $3 : 2$

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

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

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

Answer: C



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49. In $\triangle ABC$, if $\sin^2 A + \sin^2 B = \sin^2 C$, then $C =$

A. 30°

B. 45°

C. 60°

D. 90°

Answer: D



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50. In $\triangle ABC$, $\sin A : \sin B : \sin C$ is

A. $a+b+c$

B. $a : b : c$

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

D. abc

Answer: B



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51. The sides of a right angled triangle are in A.P then they are in the ratio

A. 2 : 3 : 1

B. 2 : 3 : 5

C. 3 : 4 : 5

D. 3 : 1 : 2

Answer: C



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52. The circumcentre of a triangle lies within the triangle only when the triangle is

A. acute angled

B. right angled

C. isosceles

D. none of these

Answer: A



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53. In $\triangle ABC$, if $\cos^2 A + \cos^2 B + \cos^2 C = 1$, then the triangle is

A. equilateral

B. right angled

C. isosceles

D. none of these

Answer: B



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54. In $\triangle ABC$, if $\cos A + \cos B + \cos C = 3/2$, then the triangle is

- A. isosceles
- B. equilateral
- C. right angled
- D. none of these

Answer: B



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55. In $\triangle ABC$, if $\tan A + \tan B + \tan C = 3\sqrt{3}$, then the triangle is

- A. isosceles
- B. right angled
- C. equilateral

D. none

Answer: C

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56. In $\triangle ABC$, if $\tan B \tan C + \tan C \tan A + \tan A \tan B = \sqrt{3} \tan A \tan B \tan C$ then the triangle is

- A. isosceles
- B. equilateral
- C. right angled
- D. right angled isosceles

Answer: A

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57. In $\triangle ABC$, if $c(a + b)\cos B/2 = b(a + c)\cos C/2$, then the triangle is

- A. isosceles
- B. right angled
- C. equilateral
- D. none of these

Answer: A



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58. In $\triangle ABC$, if $a^2 + b^2 + c^2 = 8R^2$, then the triangle is

- A. right angled
- B. isosceles
- C. equilateral
- D. none of these

Answer: A



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59. In $\triangle ABC$, if $\sin^2 A + \sin^2 B + \sin^2 C = 9/4$, then the triangle is

- A. isosceles
- B. right angled
- C. equilateral
- D. none of these

Answer: C



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60. In $\triangle ABC$, if $\cos^2 A + \cos^2 B + \cos^2 C = 3/4$, then the triangle is

- A. right angled

B. equilateral

C. isosceles

D. none

Answer: B



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61. IF $\triangle ABC$, if $a \tan A + b \tan B = (a + b) \tan\left(\frac{A + B}{2}\right)$, then the triangle is

A. isosceles

B. right angled

C. equilateral

D. none

Answer: A



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62. IF ΔABC , if $\cot \frac{A}{2} = \frac{b+c}{a}$, then the triangle is

- A. isosceles
- B. equilateral
- C. right angled
- D. none

Answer: C

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

- A. right angled
- B. Isosceles right angled
- C. equilateral
- D. Scalene

Answer: C



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64. IF $\cos A = \frac{\sin B}{2\sin C}$, then $\triangle ABC$ is

- A. isosceles
- B. equilateral
- C. right angled
- D. none

Answer: A



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65. In a triangle ABC if $\sin A \sin B = ab/c^2$, then the triangle is

- A. equilateral

B. right angled

C. obtuse angled

D. none

Answer: B



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66. In $\triangle ABC$, if $\sin C = \frac{\sin A}{2 \cos B}$ then the triangle is

A. equilateral

B. right angled

C. isosceles

D. none

Answer: C



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67. In $\triangle ABC$, if $2 \cos B = a/c$, then the triangle is

- A. right angled
- B. equilateral
- C. isosceles
- D. none

Answer: C



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68. If $a \cos B = b \cos A$, then $\triangle ABC$ is

- A. isosceles
- B. equilateral
- C. right angled
- D. none

Answer: A



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69. In $\triangle ABC$ if $a^2 + b^2 + c^2 = ca + ab\sqrt{3}$ then the triangle is

A. equilateral

B. right angled isosceles

C. right angled with $A = 90^\circ$, $B = 60^\circ$, $C = 30^\circ$

D. None

Answer: C



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70. In $\triangle ABC$, if $\cos A \cos B + \sin A \sin B \sin C = 1$, then the triangle is

A. equilateral

B. right angled

C. isosceles

D. right angled isosceles

Answer: D



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71. In $\triangle ABC$, if $\cos A \cos B + \sin A \sin B \sin C = 1$, then $a : b : c =$

A. 1 : 1 : 1

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

C. 1 : 1 : 2

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

Answer: D



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72. In ΔABC , if $\sin A \cos B = 1/4$ and $3 \tan A = \tan B$, the triangle is right angled at

A. A

B. B

C. C

D. not right angled

Answer: C



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73. In a triangle ABC if $\cot A = (x^3 + x^2 + x)^{1/2}$, $\cot B = (x + x^{-1} + 1)^{1/2}$ and $\cot C = (x^{-3} + x^{-2} + x^{-1})^{-1/2}$ then the triangle is

A. isosceles

B. obtuse angled

C. right angled

D. none

Answer: C



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74. The radius of the circumcircle of an isosceles triangle PQR is equal to $PQ (= PR)$. Then the angle P is

A. $\pi/6$

B. $\pi/3$

C. $\pi/2$

D. $2\pi/3$

Answer: D



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75. The perimeter of a $\triangle ABC$ is 6 times the A.M. of the sines of its angles. If the side 'a' is 1, then the angle A is

A. $\pi/6$

B. $\pi/3$

C. $\pi/2$

D. π

Answer: A



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76. 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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77.

In

$\triangle ABC$, if $(\sin A + \sin B + \sin C)(\sin A + \sin B - \sin C) = 3 \sin A \sin B$

, then

A. $A = 60^\circ$

B. $B = 60^\circ$

C. $C = 60^\circ$

D. None

Answer: C



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78. In ΔABC , if $\sin A + \sin B + \sin C = 1 + \sqrt{2}$ and $\cos A + \cos B + \cos C = \sqrt{2}$ then the triangle is

- A. equilateral
- B. isosceles
- C. right angled
- D. right angled isosceles

Answer: D

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79. IF ABC is the triangle then one root of $x^2 - 2bx \cos A + b^2 - a^2 = 0$ is

- A. a
- B. b
- C. C

D. none

Answer: C

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80. In ΔABC $\sum \frac{\sin^2 A + \sin A + 1}{\sin A}$ is always greater than

A. 9

B. 3

C. 27

D. none

Answer: A

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81. In 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

Answer: C

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82. If A, B, C are angles of a acute angled triangle then the least value of $\tan A \tan B \tan C$ is

A. 1

B. 3

C. $\sqrt{3}$

D. $3\sqrt{3}$

Answer: D

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83. In a right angled ΔABC , $\sin^2 A + \sin^2 B + \sin^2 C =$

A. 0

B. 1

C. -1

D. 2

Answer: D

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84. IF twice the square of the radius of a circle is equal to half the sum of the squares of the sides of inscribed triangle ABC, then $\sin^2 A + \sin^2 B + \sin^2 C =$

A. 1

B. 2

C. 4

D. 8

Answer: A



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85. In a triangle ABC, if a is the arithmetic mean and b, c ($b \neq c$) are the two geometric means between any two positive real numbers then

$$\frac{\sin^3 B + \sin^3 C}{\sin A \sin b \sin C} =$$

A. 0

B. 1

C. 2

D. 4

Answer: C

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86. 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 value of $\frac{\sin(x + y)\sin(y + z)}{\sin x \sin z} =$

- A. 1
- B. 2
- C. 4
- D. None

Answer: C

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87. In $\triangle ABC$, if $B = 60^\circ$, $C = 45^\circ$ and D divides BC internally in the ratio 1:3 then $\frac{\sin\angle BAD}{\sin\angle CAD} =$

A. $1/\sqrt{6}$

B. $1/3$

C. $1/\sqrt{3}$

D. $\sqrt{2}/\sqrt{3}$

Answer: A



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88. If the area of an isosceles triangle is $\sqrt{2} + 1$ and vertical angle is 45° then the base of the triangle is

A. 1

B. 2

C. $\sqrt{2}$

D. $\sqrt{2} - 1$

Answer: B

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89. IF A, B, C are angles of a triangle, then the minimum value of

$$\tan^2 \frac{A}{2} + \tan^2 \frac{B}{2} + \tan^2 \frac{C}{2} \text{ is}$$

A. 0

B. 1

C. $1/2$

D. None

Answer: B

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90. In $\triangle ABC$, $\sum a(\sin B - \sin C) =$

A. 0

B. 1

C. 2

D. 3

Answer: A

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91. In $\triangle ABC$, $\sum a^2(\cos^2 B - \cos^2 C) =$

A. 0

B. 1

C. 2

D. 3

Answer: A

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92. In ΔABC , $\sum a \cdot \sin(B - C) =$

A. 0

B. 1

C. 2

D. 3

Answer: A



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93. In a triangle ABC, $C = 90^\circ$. Then $\frac{a^2 - b^2}{a^2 + b^2} =$

A. $\sin(A+B)$

B. $\sin(A-B)$

C. $\cos(A+B)$

D. $\cos(A-B)$

Answer: B



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94. In any ΔABC ,
$$\frac{(a + b + c)(b + c - a)(c + a - b)(a + b - c)}{4b^2c^2} =$$

A. $\cos^2 A$

B. $\cos^2 B$

C. $\sin^2 A$

D. $\sin^2 B$

Answer: C



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95. In ΔABC ,
$$\sum a^3 \sin(B - C) =$$

A. 0

B. 1

C. 2

D. 3

Answer: A



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96. In $\triangle ABC$, $\sum a^3 \sin(B - C) =$

A. 0

B. abc

C. $3abc$

D. 1

Answer: C



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97. In a triangle ABC , $(a^2 - b^2 - c^2)\tan A + (a^2 - b^2 + c^2)\tan B$ is equal to

A. $(a^2 + b^2 + c^2)\tan C$

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

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

D. None

Answer: D



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98. In $\triangle ABC$, $\frac{\sin A(a - b \cos C)}{\sin C(c - b \cos A)} =$

A. -2

B. -1

C. 0

D. 1

Answer: D



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99. In $\triangle ABC$, $\frac{b - a \cos C}{c - a \cos B} =$

A. c

B. c/b

C. bc

D. $b-c$

Answer: B



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100. In $\triangle ABC$, $\frac{\cos C + \cos A}{c + a} + \frac{\cos B}{b} =$

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

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

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

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

Answer: B

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101. In a triangle ABC, $\frac{a(a + c - b)}{b(b + c - a)}$ is equal to

A. $\frac{1 - \cos A}{1 - \cos B}$

B. $\frac{1 + \cos A}{1 + \cos B}$

C. $\frac{\cos^2(A/2)}{\sin^2(B/2)}$

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

Answer: A

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102. In a ΔABC , $a(\cos^2 B + \cos^2 C) + \cos A(c \cos C + b \cos B) =$

A. a

B. b

C. c

D. a+b+c

Answer: A



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103. In ΔABC , $(b + c - a)\tan(A/2) =$

A. Δ

B. 2Δ

C. $2\Delta/s$

D. none

Answer: C



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104. In $\triangle ABC$, if $s = 2b$ then $\cot \frac{A}{2} \cot \frac{C}{2} =$

A. 2

B. 1

C. 3

D. $\sqrt{2}$

Answer: A



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

A. 1

B. 2

C. 3

D. 4

Answer: B



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106. In $\triangle ABC$, if a, b, c are in A.P, then $\cos\left(\frac{A-C}{2}\right) \operatorname{cosec}\left(\frac{B}{2}\right) =$

A. $1/2$

B. 2

C. $1/3$

D. 3

Answer: B



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107. In $\triangle ABC$, $a(b \cos C - c \cos B) =$

A. $b-c$

B. $b+c$

C. $b^2 - c^2$

D. $b^2 + c^2$

Answer: C



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108. In a triangle ABC, $\frac{\cos B + \cos C}{1 - \cos A} =$

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

B. $\frac{bc}{1-a}$

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

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

Answer: C



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109. In $\triangle ABC$, $b \cos(C + \theta) + c \cos(B - \theta) =$

A. $a \sin \theta$

B. $a \cos \theta$

C. $a \tan \theta$

D. $a \cot \theta$

Answer: B



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110. In $\triangle ABC$, $\frac{b - c}{b + c} \cot \frac{A}{2} + \frac{b + c}{b - c} \tan \frac{A}{2} =$

A. $2 \sin(B - C)$

B. $2 \cos ec(B - C)$

C. $2 \cos(B - C)$

D. $2 \cot(B - C)$

Answer: B



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

A. a

B. b

C. c

D. 0

Answer: D



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

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

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

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

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

Answer: A



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113. In $\triangle ABC$, $(a + b + c) \left(\tan \frac{A}{2} + \tan \frac{B}{2} \right) \tan \frac{C}{2} =$

A. c

B. $c/2$

C. $2c$

D. $3c$

Answer: C



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114. In ΔABC , $(a - b)^2 \cos^2 \frac{C}{2} + (a + b)^2 \sin^2 \frac{C}{2} =$

A. c

B. $c/2$

C. $2c$

D. c^2

Answer: D



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115. Two sides of a triangle are given by the roots of the equation $x^2 - 5x + 6 = 0$ and the angle between the sides is $\pi/2$. Then the perimeter of the triangle is

A. $5 + \sqrt{2}$

B. $5 + \sqrt{13}$

C. $5 + \sqrt{5}$

D. $5 + \sqrt{7}$

Answer: D

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116. In ΔABC , $\frac{bc \cos A + ca \cos B + ab \cos C}{\cot A + \cot B + \cot C} =$

A. Δ

B. 2Δ

C. $\frac{1}{2}\Delta$

D. Δ^2

Answer: B

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117. In ΔABC , $\frac{\cot(A/2) + \cot(B/2) + \cot(C/2)}{\cot A + \cot B + \cot C} =$

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

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

C. s

D. Δ

Answer: A



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

A. 1

B. 0

C. s

D. 2Δ

Answer: B



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119. In ΔABC , $a^2 \sin 2C + c^2 \sin 2A =$

A. Δ

B. 2Δ

C. 3Δ

D. 4Δ

Answer: D



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120. In ΔABC , $R^2(\sin 2A + \sin 2B + \sin 2C) =$

A. Δ

B. 2Δ

C. 3Δ

D. 4Δ

Answer: C

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121. In ΔABC , if A,B,C are in A.P then $\frac{a+c}{\sqrt{a^2-ac+c^2}} =$

A. $\cos\left(\frac{A-C}{2}\right)$

B. $\sin\left(\frac{A-C}{2}\right)$

C. $2 \cos\left(\frac{A-C}{2}\right)$

D. $2 \sin\left(\frac{A-C}{2}\right)$

Answer: C

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122. In ΔABC , if a, b, c are in A.P the greatest angle is A and least is C then $4(1 - \cos A)(1 - \cos C) =$

A. $\cos A + \cos C$

B. $\cos A - \cos C$

C. $\sin A + \sin C$

D. $\cos A - \sin C$

Answer: A



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123. In ΔABC , if $x = \tan\left(\frac{B - c}{2}\right) \tan \frac{A}{2}$, $y = \tan\left(\frac{C - A}{2}\right) \tan \frac{B}{2}$, $z = \tan\left(\frac{A - B}{2}\right) \tan \frac{C}{2}$, then $x + y + z$ (In terms of x, y, z only) is

A. xyz

B. $2xyz$

C. $-xyz$

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

Answer: C



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124. In $\triangle ABC$, if $\cos A + 2 \cos B + \cos C = 2$, then the sides of the triangle are in

A. H.P.

B. G.P.

C. A.P.

D. None

Answer: C



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125. In $\triangle ABC$, if $a \sin^2 \frac{C}{2} + c \sin^2 \frac{A}{2}$ in terms of s, a, b, c is

A. s

B. $(s-b)$

C. a/c

D. 0

Answer: B



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126. In $\triangle ABC$, if $c \cos^2 \frac{A}{2} + a \cos^2 \frac{C}{2}$ in terms of s is

A. s

B. $(s-b)$

C. a/c

D. 0

Answer: A



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127. In $\triangle ABC$, $(b - c)^2 + 4bc \sin^2(A/2) =$

A. a^2

B. b^2

C. c^2

D. None

Answer: A



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128. In $\triangle ABC$, if $b = (c + a)\cos \theta$, then $\sin \theta =$

A. $\frac{2\sqrt{bc}}{b+c} \cos \frac{A}{2}$

$$\text{B. } \frac{2\sqrt{ca}}{c+a} \cos \frac{B}{2}$$

$$\text{C. } \frac{2\sqrt{ab}}{a-b} \sin \frac{C}{2}$$

$$\text{D. } \frac{2\sqrt{bc}}{b-c} \sin \frac{A}{2}$$

Answer: B



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129. In $\triangle ABC$, if $c = (a - b)\sec \theta$, then $\tan \theta =$

$$\text{A. } \frac{2\sqrt{bc}}{b+c} \cos \frac{A}{2}$$

$$\text{B. } \frac{2\sqrt{ca}}{c+a} \cos \frac{B}{2}$$

$$\text{C. } \frac{2\sqrt{ab}}{a-b} \sin \frac{C}{2}$$

$$\text{D. } \frac{2\sqrt{bc}}{b-c} \sin \frac{A}{2}$$

Answer: C



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130. In $\triangle ABC$, if $c = (a + b)\sin \theta$ and $\cos \theta = \frac{k\sqrt{ab}}{a - b}$, then the value of k is

A. $2 \cos(C/2)$

B. $2 \cos(B/2)$

C. $2 \cos(A/2)$

D. None

Answer: A



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131. In $\triangle ABC$, if $a(b \cos C + c \cos B) = 2ka^2$, then $k =$

A. 0

B. 1

C. $1/2$

D. 2

Answer: C



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132. In $\triangle ABC$, if $\tan \theta = \frac{a+b}{a-b} \tan \frac{C}{2}$, then $c =$

A. $(a-b) \cos \frac{C}{2} \sec \theta$

B. $(a+b) \cos \frac{C}{2} \sec \theta$

C. $(a-b) \sin \frac{C}{2} \tan \theta$

D. $(a+b) \sin \frac{C}{2} \tan \theta$

Answer: A



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133. If $\tan \frac{C-A}{2} = k \cot \frac{B}{2}$ then find k .

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

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

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

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

Answer: A



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134. In $\triangle ABC$, if $\tan \frac{A}{2} = t \cot \left(\frac{B-C}{2} \right)$, then $t =$

A. $(c-a)(c+a)$

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

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

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

Answer: C



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135. If the area of a triangle satisfies the relation $\Delta = a^2 - (b - c)^2$, then

$\tan(A/2) =$

A. $1/4$

B. $1/3$

C. $1/2$

D. None

Answer: A



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136. In $\triangle ABC$, if a, b, c are in A.P, then $\tan \frac{A}{2} \tan \frac{C}{2} =$

A. $1/4$

B. $1/3$

C. 3

D. None

Answer: B



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137. In $\triangle ABC$, if $\tan \frac{A}{2}, \tan \frac{B}{2}, \tan \frac{C}{2}$ are in H.P, then a, b, c are in

A. H.P.

B. G.P.

C. A.P.

D. None

Answer: C



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138. In $\triangle ABC$, if $\frac{a}{c} = \frac{\sin(A - B)}{\sin(B - C)}$, then a^2, b^2, c^2 are in

A. A.P.

B. G.P.

C. H.P.

D. None

Answer: A



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139. In $\triangle ABC$, if $\cot \frac{A}{2}, \cot \frac{B}{2}, \cot \frac{C}{2}$ are in A.P. then a,b,c are in

A. A.P.

B. G.P.

C. H.P.

D. None

Answer: A



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140. In $\triangle ABC$, if $\sin^2 \frac{A}{2}, \sin^2 \frac{B}{2}, \sin^2 \frac{C}{2}$ are in H.P, then a,b,c in

A. A.P.

B. G.P.

C. H.P.

D. None

Answer: C



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141. In $\triangle ABC$, if $a \cos^2 \frac{C}{2} + c \cos^2 \frac{A}{2} = \frac{3b}{2}$ then a,b,c are in

A. A.P.

B. G.P.

C. H.P.

D. None

Answer: A



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

A. a,c,b 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



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143. If $\tan \frac{A}{2} = \frac{5}{6}$ and $\tan \frac{C}{2} = \frac{2}{5}$ then determine the relation between a, b,c

A. $b^2 = ac$

B. $2b = a + c$

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

D. $a + b = c$

Answer: B

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144. In $\triangle ABC$, if $3 \tan \frac{A}{2} \tan \frac{C}{2} = 1$ then a,b,c are in

A. A.P.

B. G.P.

C. H.P.

D. None

Answer: A

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145. In $\triangle ABC$, if $\tan A, \tan B, \tan C$ are in H.P., then a^2, b^2, c^2 are in

A. H.P.

B. G.P.

C. A.P.

D. None

Answer: C



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146. In $\triangle ABC$, if $\sin A : \sin C = \sin(A - B) : \sin(B - C)$, then a^2, b^2, c^2 are in

A. A.P.

B. G.P.

C. H.P.

D. None

Answer: A



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

A. A.P.

B. H.P.

C. G.P.

D. None

Answer: A



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148. In $\triangle ABC$, if $\frac{a+b}{1-ab}b, \frac{b+c}{1-bc}$ are in A.P then $a, 1/b, c$ are In

A. A.P.

B. G.P.

C. H.P.

D. None

Answer: C



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149. In $\triangle ABC$, if $C = A - B = 60^\circ$, then the value of $\frac{a-b}{c} =$

A. $1/\sqrt{3}$

B. 2

C. 3

D. 4

Answer: A



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150. In $\triangle ABC$, if $A = 60^\circ$ then $\frac{b}{c+a} + \frac{c}{a+b} =$

A. 1

B. 2

C. 3

D. 4

Answer: A



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151. If $C = 60^\circ$, then show that $\frac{a}{b+c} + \frac{b}{c+a} = 1$

A. 2

B. 4

C. 3

D. 1

Answer: D



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152. In $\triangle ABC$, if $C = 60^\circ$ then $\frac{1}{a+b} + \frac{1}{a+c} =$

A. $a+b+c$

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

C. abc

D. 0

Answer: B



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153. In $\triangle ABC$, if $C = 60^\circ$ 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

Answer: D



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

A. $\pi/2$

B. $\pi/4$

C. $2\pi/3$

D. $\pi/3$

Answer: D



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155. In $\triangle ABC$, if $B = 90^\circ$ then $\tan \frac{A}{2} =$

A. $\sqrt{\frac{b-c}{b+c}}$

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

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

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

Answer: A



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156. In $\triangle ABC$, if $C = 90^\circ$ then $\frac{a^2 + b^2}{a^2 - b^2} \sin(A - B) =$

A. 1

B. 2

C. 3

D. 4

Answer: A



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

A. 90°

B. 60°

C. 45°

D. 30°

Answer: B



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158. In $\triangle ABC$, if $(a + b + c)(a + b - c) = 3ab$, then $C =$

A. 60°

B. 30°

C. 90°

D. None

Answer: A



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159. In $\triangle ABC$ if $A = 60^\circ$, then the value of

$$\left(1 + \frac{a}{c} + \frac{b}{c}\right)\left(1 + \frac{c}{b} - \frac{a}{b}\right) =$$

A. 3

B. 2

C. 1

D. None

Answer: A



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160. In ΔABC , $\frac{\cos A}{c \sin B} + \frac{\cos B}{a \sin C} + \frac{\cos C}{b \sin A} =$

A. s

B. R

C. $1/R$

D. $1/\Delta$

Answer: C



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161. In ΔABC , if $\frac{\sin A}{4} = \frac{\sin B}{5} = \frac{\sin C}{6}$ then the value of $\cos A + \cos B + \cos C =$

A. $23/15$

B. $23/16$

C. $23/14$

D. None

Answer: B

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162. In $\triangle ABC$, if $a:b:c = 3:4:5$, then $\sin A : \sin B : \sin C =$

A. $3:4:5$

B. $9:16:25$

C. $9:8:7$

D. $7:9:8$

Answer: A

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163. In a $\triangle ABC$, if $a : b : c = 7 : 8 : 9$, then find $\cos A : \cos B : \cos C$.

A. 7 : 9 : 11

B. 14 : 11 : 6

C. 7 : 19 : 25

D. 8 : 6 : 5

Answer: B



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164. In $\triangle ABC$ if $b + c : c + a : a + b = 11 : 12 : 13$, then $\cos A : \cos B : \cos C =$

A. 7 : 9 : 11

B. 14 : 11 : 6

C. 7 : 19 : 25

D. 8 : 6 : 5

Answer: C



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165. In $\triangle ABC$, if $\cos A = 17/22$, $\cos C = 1/14$, then $a : b : c =$

A. 7 : 9 : 11

B. 14 : 11 : 6

C. 7 : 19 : 25

D. 8 : 6 : 5

Answer: A



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166. In $\triangle ABC$, if $\cot \frac{A}{2} : \cot \frac{B}{2} : \cot \frac{C}{2} = 3 : 7 : 9$, then $a : b : c =$

A. 7: 9: 11

B. 14: 11: 6

C. 7: 19: 25

D. 8: 6: 5

Answer: D

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167. In ΔABC , if $\tan A : \tan B : \tan C = 1 : 2 : 3$, then $\sin A : \sin B : \sin C =$

A. $\sqrt{5} : 3 : 2\sqrt{2}$

B. $3 : 2\sqrt{2} : \sqrt{5}$

C. $\sqrt{5} : 2\sqrt{2} : 3$

D. None

Answer: C

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168. In a triangle ABC, $\frac{s-a}{11} = \frac{s-b}{12} = \frac{s-c}{13}$, then $\tan^2(A/2) =$

A. $143/432$

B. $13/33$

C. $11/39$

D. $12/37$

Answer: B

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169. In a triangle ABC, if $\cot \frac{A}{2} \cot \frac{B}{2} = c$, $\cot \frac{B}{2} \cot \frac{C}{2} = a$ and $\cot \frac{C}{2} \cot \frac{A}{2} = b$, then $\frac{1}{s-a} + \frac{1}{s-b} + \frac{1}{s-c} =$

A. -1

B. 0

C. 1

D. 2

Answer: D



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170. In $\triangle ABC$, $B = 45^\circ$, $C = 120^\circ$, $a = 40\text{cm}$, the length of the perpendicular from A on BC produced is

A. $40(\sqrt{3} + 1)$

B. $20(\sqrt{3} + 1)$

C. $40(3 + \sqrt{3})$

D. $20(3 + \sqrt{3})$

Answer: D



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171. If H is the orthocentre of ΔABC , then AH=

- A. $\cos A$
- B. $R \cos A$
- C. $2 R \cos A$
- D. None

Answer: C



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172. IF H is the orthocentre of ΔABC and if AH=x, BH=y, CH=z, then

$$\frac{a}{x} + \frac{b}{y} + \frac{c}{z} =$$

A. $\frac{a}{x} \frac{b}{y} \frac{c}{z}$

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

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

D. abc

Answer: A



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173. In ΔABC , if $\frac{2 \cos A}{a} + \frac{\cos B}{b} + \frac{2 \cos C}{c} = \frac{a}{bc} + \frac{b}{ca}$, then $A =$

A. 45°

B. 60°

C. 30°

D. 90°

Answer: D



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174. If α, β, γ are the lengths of altitudes of ΔABC , then

$$\alpha^{-2} + \beta^{-2} + \gamma^{-2} =$$

A. Δ

B. $\cot A + \cot B + \cot C$

C. $\frac{\cot A + \cot B + \cot C}{\Delta}$

D. $\frac{\Delta}{\cot A + \cot B + \cot C}$

Answer: C



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175. If α, β, γ , are lengths of the altitudes of a triangle ABC with area Δ ,

then $\frac{\Delta^2}{R^2} \left(\frac{1}{\alpha^2} + \frac{1}{\beta^2} + \frac{1}{\gamma^2} \right) =$

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

B. $\cos^2 A + \cos^2 B + \cos^2 C$

C. $\tan^2 A + \tan^2 B + \tan^2 C$

D. $\cot^2 A + \cot^2 B + \cot^2 C$

Answer: A



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176. If α, β, γ are the lengths of the altitudes of ΔABC , then

$$\frac{\cos A}{\alpha} + \frac{\cos B}{\beta} + \frac{\cos C}{\gamma} =$$

A. Δ

B. $1/\Delta$

C. R

D. $1/R$

Answer: D



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177. If α, β, γ are the lengths of the altitudes of ΔABC , then

$$\frac{1}{\alpha} + \frac{1}{\beta} - \frac{1}{\gamma} - \frac{2ab}{(a+b+c)\Delta} \cos^2 \frac{C}{2} =$$

A. 0

B. 1

C. $2s$

D. Δ

Answer: A



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Exercise 1 B

1. If the sides of the triangle are 13,14,15 then the radius of the incircle is

A. $65/8$

B. $65/4$

C. 4

D. 24

Answer: C



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2. In $\triangle ABC$, if $r : R : r_1 = 2 : 5 : 12$, then $A =$

A. 45°

B. 60°

C. 30°

D. 90°

Answer: D



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3. In $\triangle ABC$, if $a = 26$, $b = 30$, $\cos C = 63/65$ then $r =$

A. 3

B. 4

C. 5

D. 2

Answer: A



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4. In $\triangle ABC$, if $a = 30, b = 24, c = 18$ then $r =$

A. 15

B. 18

C. 36

D. 6

Answer: D



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5. In $\triangle ABC$, if $a = 13, b = 14, c = 15$, then $r_1 =$

A. $21/2$

B. 14

C. $65/8$

D. 4

Answer: A



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6. In $\triangle ABC$, if $a = 26b = 30 \cos C = 63/65$, then the value of r_1 is

A. $65/4$

B. $4/65$

C. 48

D. 16

Answer: D



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7. In $\triangle ABC$, if $a = 13, b = 14, c = 15$ then $r_2 =$

A. $21/2$

B. 14

C. $65/8$

D. 12

Answer: D



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8. In $\triangle ABC$, if $a = 26, b = 30 \cos C = 63/65$, then the value of r_2 is

A. $65/4$

B. $4/65$

C. 48

D. 16

Answer: C

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9. In $\triangle ABC$, if $a = 30, b = 24, c = 18$, then $r_3 =$

A. 15

B. 18

C. 36

D. 12

Answer: D

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10. In $\triangle ABC$, if $r_1 = 36, r_2 = 18, r_3 = 12$, then $R =$

A. 15

B. 18

C. 24

D. 30

Answer: A



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

A. 10

B. 12

C. 16

D. 20

Answer: B



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12. IF in a triangle ABC, $r_1 = 2$, $r_2 = 3$ and $r_3 = 6$ then a=

A. 1

B. 2

C. 3

D. 4

Answer: C



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13. In $\triangle ABC$, if $r_1 = 36$, $r_2 = 18$, $r_3 = 12$, then b=

A. 15

B. 18

C. 24

D. 30

Answer: C

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14. In $\triangle ABC$, if $r_1 = 3, r_2 = 10, r_3 = 15$ then $c =$

A. 5

B. 12

C. 13

D. $13/2$

Answer: C

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15. In a triangle ABC , $\frac{s-a}{\Delta} = \frac{1}{8}, \frac{s-b}{\Delta} = \frac{1}{12}, \frac{s-c}{\Delta} = \frac{1}{24}$ then $b =$

A. 16

B. 20

C. 24

D. 28

Answer: A



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16. IF 2,4,6,12 are in radius and exradii of triangle , then its area is

A. 6 sq. unit

B. 24 sq.unit

C. 30 sq.unit

D. 12 sq.unit

Answer: B



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17. In an equilateral triangle $r : R : r_1$ is

A. $1 : 1 : 1$

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

C. $1 : 2 : 3$

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

Answer: C



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18. In the area of ΔABC is 96 sq.cm and its perimeter is 16 cm, then its is radius is

A. 10 cm

B. 11 cm

C. 12 cm

D. 13 cm

Answer: C



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19. If the perimeter of a triangle is 12 unit and its in radius is 1 unit, then its area is

A. 6 sq. unit

B. 24 sq.unit

C. 30 sq.unit

D. 12 sq.unit

Answer: A



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20. IF the area of a triangle is 6 sq.unit and its in radius 2 unit then its perimeter is

- A. 1
- B. 2
- C. 3
- D. 6

Answer: D



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21. The perimeter of a triangle right angled at C is 70, and the in-radius is 6, then $|a - b| =$

- A. 1
- B. 2
- C. 8

D. 9

Answer: A



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22. In $\triangle ABC$, if $\Delta = 8 \text{ sq. unit}$, $s = 1.5 \text{ unit}$ then its inradius is

A. $14/3$

B. $21/4$

C. $13/2$

D. $16/3$

Answer: D



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23. In $\triangle ABC$, if $a = 26$, $b = 30$, $\cos C = 63/65$ then $r_1 : r_2 : r_3 =$

A. 4: 12: 1

B. 3: 4: 12

C. 1: 4: 12

D. 4: 12: 3

Answer: A



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24. In $\triangle ABC$, if $a = 30b = 24c = 18$, then the ratio $\frac{1}{r_1} : \frac{1}{r_2} : \frac{1}{r_3} =$

A. 1: 2: 3

B. 2: 1: 3

C. 3: 2: 1

D. 1: 3: 2

Answer: A



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25. In ΔABC , $r =$

A. $(s-a) \tan(B/2)$

B. $(s-b) \tan(B/2)$

C. $(s-b) \tan(C/2)$

D. $(s-a) \tan(C/2)$

Answer: B



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26. In ΔABC , $r_1 r_2 r_3 =$

A. $4R$

B. $r \cdot s$

C. $r \cdot s^2$

D. R

Answer: C

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27. In ΔABC , $\frac{\sqrt{r r_1 r_2 r_3}}{2Rr(\sin A + \sin B + \sin C)} =$

A. 1

B. $1/3$

C. $1/4$

D. $1/2$

Answer: D

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28. In ΔABC , $r(r_1 + r_2 + r_3) =$

A. $ab + bc + ca - s^2$

B. $ab - bc + ca - s^2$

C. $ab + bc - ca - s^2$

D. $ab + bc + ca + s^2$

Answer: A

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29. In $\triangle ABC$, $a(rr_1 + r_2r_3) =$

A. $\frac{ca - r_3r_1}{r_2}$

B. $\frac{r_3r + r_1r_2}{ab}$

C. $\frac{r_3^2}{4R - r_1 - r_2}$

D. abc

Answer: D

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30. In $\triangle ABC$, $\frac{1}{r_1} + \frac{1}{r_2} + \frac{1}{r_3} =$

A. Δ/s

B. $1/r$

C. $2/r$

D. $3/r$

Answer: B



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31. In any triangle ABC , $r_1r_2 + r_2r_3 + r_3r_1 =$

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

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

C. $\frac{2\Delta}{r}$

D. Δ^2

Answer: A



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32. In ΔABC , $(r_1 - r)(r_2 - r)(r_3 - r) =$

A. $4Rr^2$

B. $4Rr^2$

C. R

D. 0

Answer: B



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33. In ΔABC , $(r_1 + r_2)(r_2 + r_3)(r_3 + r_1) =$

A. $4Rs^2$

B. $4Rr^2$

C. R

D. 0

Answer: A

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34. In ΔABC , $\frac{1}{r_1^2} + \frac{1}{r_2^2} + \frac{1}{r_3^2} + \frac{1}{r^2} =$

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

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

C. $\frac{1}{2Rr}$

D. R

Answer: B

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35. In $\triangle ABC$, $\frac{\Delta^2}{a^2 + b^2 + c^2} \left\{ \frac{1}{r_1^2} + \frac{1}{r_2^2} + \frac{1}{r_3^2} + \frac{1}{r^2} \right\} =$

- A. 1
- B. 0
- C. s
- D. Δ

Answer: A



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36. In $\triangle ABC$, $\left(\frac{1}{r} - \frac{1}{r_1} \right) \left(\frac{1}{r} - \frac{1}{r_2} \right) \left(\frac{1}{r} - \frac{1}{r_3} \right) =$

- A. $\frac{abc}{\Delta^3}$
- B. 0
- C. $4Rr^2$

D. $1/r$

Answer: A



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

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

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

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

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

Answer: D



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38. In $\triangle ABC$, $r + r_2 + r_3 - r_1 =$

A. $4R \cos A$

B. $4R \cos B$

C. $4R \cos C$

D. $4R$

Answer: D

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39. In $\triangle ABC$, $r + r_2 + r_3 - r_1 =$

A. $4R \cos A$

B. $4R \cos B$

C. $4R \cos C$

D. $4R$

Answer: A

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40. In ΔABC , $r + r_2 + r_3 - r_1 =$

A. $4R \cos A$

B. $4R \cos B$

C. $4R \cos C$

D. $4R$

Answer: B



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41. IF in a ΔABC , $r_3 = r_1 + r_2 + r$, then $\angle A + \angle B =$

A. 120°

B. 100°

C. 90°

D. 80°

Answer: C



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42. In $\triangle ABC$, $r_1^2 + r_2^2 + r_3^2 + r^2 =$

A. $16R^2 - (a^2 + b^2 + c^2)$

B. $16R^2 - (a^2 + b^2 - c^2)$

C. $16R^2 - (a^2 - b^2 + c^2)$

D. $16R^2 - (a^2 - b^2 - c^2)$

Answer: A



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43. In $\triangle ABC$, $\frac{ab - r_1 r_2}{r_3} =$

A. $\frac{ca - r_3r_1}{r_2}$

B. $\frac{r_3r + r_1r_2}{ab}$

C. $\frac{r_3^2}{4R - r_1 - r_2}$

D. abc

Answer: A



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44. In $\triangle ABC$, $\frac{r_1r + r_2r_3}{bc} =$

A. $\frac{ca - r_3r_1}{r_2}$

B. $\frac{r_3r + r_1r_2}{ab}$

C. $\frac{r_3^2}{4R - r_1 - r_2}$

D. abc

Answer: B



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45. In $\triangle ABC$, $r_3 + \frac{r_1 r_2}{r_1 + r_2} =$

A. $\frac{ca - r_3 r_1}{r_2}$

B. $\frac{r_3 r + r_1 r_2}{ab}$

C. $\frac{r_3^2}{4R - r_1 - r_2}$

D. abc

Answer: C



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46. In $\triangle ABC$, $\sqrt{\left[\frac{rr_1}{r_2 r_3}\right]} =$

A. Δ

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

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

D. $\sin \frac{B}{2}$

Answer: B



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47. In ΔABC , $(r_3 + r_1) \sqrt{\left[\frac{rr_2}{r_3r_1} \right]} =$

A. a

B. b

C. c

D. 0

Answer: B



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48. In ΔABC , $r_1 r_2 \sqrt{\left[\frac{4R - r_1 - r_2}{r_1 + r_2} \right]}$

A. $(r_2 + r_3)\sec^2 \frac{A}{2}$

B. $r_1 r_2 r_3$

C. Δ

D. s

Answer: C

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49. In ΔABC , $\frac{r_2(r_3 + r_1)}{\sqrt{r_1 r_2 + r_2 r_3 + r_3 r_1}} =$

A. s^2

B. b

C. c

D. 0

Answer: B

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50. In ΔABC , $\frac{b-c}{r_1} + \frac{c-a}{r_2} + \frac{a-b}{r_3} =$

A. s^2

B. b

C. c

D. 0

Answer: D



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51. In ΔABC , $\frac{r_1 - r}{a} + \frac{r_2 - r}{b} =$

A. a/r_3

B. b/r_3

C. c/r_3

D. 0

Answer: C



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52. In $\triangle ABC$, $\frac{r_1 - r}{a} + \frac{r_2 - r}{b} + \frac{r_3 - r}{c} =$

A. $\frac{r_1 + r_2 + r_3}{3}$

B. $r_1 + r_2 + r_3$

C. $\frac{r_1 + r_2 + r_3}{2}$

D. $\frac{r_1 + r_2 + r_3}{s}$

Answer: D



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53. In $\triangle ABC$ prove that $\frac{r_1}{bc} + \frac{r_2}{ca} + \frac{r_3}{ab} = \frac{1}{r} - \frac{1}{2R}$.

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

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

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

D. $1 - \frac{r}{2R}$

Answer: A

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54. In $\triangle ABC$, $rr_1 \cot \frac{A}{2} =$

A. Δ

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

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

D. $\sin \frac{B}{2}$

Answer: A

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55. In $\triangle ABC$, $r_2 r_3 \tan \frac{A}{2} =$

A. a

B. b

C. c

D. Δ

Answer: D



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56. In $\triangle ABC$, $(r_1 + r_2) \tan \frac{C}{2} =$

A. a

B. b

C. c

D. 0

Answer: C

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57. In $\triangle ABC$ $(r_3 - r) \cot \frac{C}{2} =$

A. a

B. b

C. c

D. 0

Answer: C

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58. In $\triangle ABC$, $r \left(\cot \frac{B}{2} + \cot \frac{C}{2} \right) =$

A. a

B. b

C. c

D. 0

Answer: A



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59. In $\triangle ABC$, $r \left(\cot \frac{A}{2} + \cot \frac{B}{2} + \cot \frac{C}{2} \right) =$

A. s

B. $2s$

C. $s/2$

D. $4s$

Answer: A



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60. In $\triangle ABC$, $r_1 \cot \frac{A}{2} + r_2 \cot \frac{B}{2} + r_3 \cot \frac{C}{2} =$

A. s

B. $2S$

C. $3S$

D. $4s$

Answer: C



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61. In $\triangle ABC$, $r \left(r_1 \cot \frac{A}{2} + r_2 \cot \frac{B}{2} + r_3 \cot \frac{C}{2} \right) =$

A. $3s$

B. 3Δ

C. $3/\Delta$

D. $2/\Delta$

Answer: B



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62. In ΔABC , $(r_1 + r_2)\sec^2 \frac{C}{2} =$

A. $(r_2 + r_3)\sec^2 \frac{A}{2}$

B. $r_1 r_2 r_3$

C. Δ

D. s

Answer: A



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63. In a triangle ABC, $\frac{r_1 + r_2}{1 + \cos C} =$

A. $2ab/c\Delta$

B. $(a + b)/c\Delta$

C. $abc/2\Delta$

D. abc/Δ^2

Answer: C



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64. In ΔABC , $r^3 \cot^2 \frac{A}{2} \cdot \cot^2 \frac{B}{2} \cdot \cot^2 \frac{C}{2} =$

A. $(r_2 + r_3)\sec^2 \frac{A}{2}$

B. $r_1 r_2 r_3$

C. Δ

D. s

Answer: B



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65. In $\triangle ABC$, $4Rr \cos \frac{A}{2} \cos \frac{B}{2} \cos \frac{C}{2} =$

A. $(r_2 + r_3) \sec^2 \frac{A}{2}$

B. $r_1 r_2 r_3$

C. Δ

D. s

Answer: C



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66. In $\triangle ABC$, $r^2 \cot \frac{A}{2} \cdot \cot \frac{B}{2} \cdot \cot \frac{C}{2} =$

A. $(r_2 + r_3) \sec^2 \frac{A}{2}$

B. $r_1 r_2 r_3$

C. Δ

D. s

Answer: C



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67. In $\triangle ABC$, $a \cot A + b \cot B + c \cot C =$

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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68. In $\triangle ABC$, $a \cot A + b \cot B + c \cot C =$

A. $2(R + r)$

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

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

D. $1 - \frac{r}{2R}$

Answer: A

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

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

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

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

D. $1 - \frac{r}{2R}$

Answer: C

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70. In ΔABC , $\sin^2 \frac{A}{2} + \sin^2 \frac{B}{2} + \sin^2 \frac{C}{2} =$

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

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

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

D. $1 - \frac{r}{2R}$

Answer: D



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71. The length of the sides of the extriangle of an equilateral triangle in terms of circumradius is

A. $\sqrt{3}R$

B. $2\sqrt{3}R$

C. $\sqrt{2}R$

D. $2\sqrt{2}R$

Answer: B



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72. The distance between orthocentre and circumcentre of an equilateral triangle is

A. 1

B. 0

C. s

D. 2Δ

Answer: B



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73. The distance between orthocentre and circumcentre of an equilateral triangle is

A. 0

B. 1

C. $2s$

D. 2Δ

Answer: A



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74. If ΔABC is an equilateral triangle, then the ratio of the area of the triangle in the area of its pedal triangle is

A. 1:2

B. 2:3

C. 4:1

D. 5 : 4

Answer: C



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75. The ratio of circum radii of a triangle to its pedal triangle is

A. 1 : 2

B. 2 : 1

C. 3 : 4

D. 3 : 5

Answer: B



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76. IF $\triangle ABC$, is an equilateral triangle, then ratio of the sides of the triangle to its ex-centre triangle is

- A. 1:2
- B. 2:1
- C. 4:3
- D. 5:3

Answer: A



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77. 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

Answer: B



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

A. $b+c$

B. $a+b$

C. $a+b+c$

D. $c+a$

Answer: B



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79. The perimeter of a triangle is 16 cm. One of the sides is of length 6 cm. if the area of the triangle is 12 sq cm, then the triangle is

A. right angled

B. Isosceles

C. equilateral

D. Scalene

Answer: B



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80. In $\triangle ABC$, if $C = 90^\circ$ then $rr_3 =$

A. $r_1 r_2$

B. $r_1 - r$

C. $a + b$

D. 2

Answer: A



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81. In $\triangle ABC$, if $C = 90^\circ$ then $2(r + R) =$

A. $r_1 r_2$

B. $r_1 - r$

C. $a + b$

D. 2

Answer: C



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82. In $\triangle Abc$, if $A = 90^\circ$ then $r_2 + r_3 =$

A. $r_1 r_2$

B. $r_1 - r$

C. $a + b$

D. 2

Answer: B



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83. In $\triangle ABC$, if $A = 90^\circ$ then $\left(1 - \frac{r_1}{r_2}\right)\left(1 - \frac{r_1}{r_3}\right) =$

A. 1

B. 2

C. 3

D. 4

Answer: B



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84. In $\triangle ABC$, $\frac{r_1}{(s-b)(s-c)} =$

A. abc/Δ^3

B. 0

C. $4Rr^2$

D. $1/r$

Answer: D

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85. In ΔABC , $\sum (r + r_1)\tan\left(\frac{B - C}{2}\right) =$

A. $\frac{abc}{\Delta^3}$

B. 0

C. $4Rr^2$

D. $1/r$

Answer: B

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86. In $\triangle ABC$, if $\left(1 - \frac{r_1}{r_2}\right)\left(1 - \frac{r_1}{r_3}\right) = 2$ then the triangle is

- A. isosceles
- B. equilateral
- C. right angled
- D. none

Answer: C

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87. In $\triangle ABC$, if $(r_1 - r_2)(r_3 - r_2) = 2r_1r_3$, then triangle is

- A. equilateral
- B. right angled
- C. isosceles

D. none

Answer: B



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88. In $\triangle ABC$, if a, b, c are in A.P, then r_1, r_2, r_3 are in

A. A.P.

B. G.P.

C. H.P.

D. None

Answer: C



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89. In $\triangle ABC$, if r_1, r_2, r_3 are in H.P, then a, b, c are in

A. A.P.

B. G.P.

C. H.P.

D. None

Answer: A



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90. In $\triangle ABC$, if $(a - b)(s - c) = (b - c)(s - a)$ then r_1, r_2, r_3 are in

A. A.P.

B. G.P.

C. H.P.

D. None

Answer: B

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91. In $\triangle ABC$, if $r = 1$, $R = 4$, $\Delta = 8$, then $ab+bc+ca=$

A. 73

B. 81

C. 84

D. 78

Answer: C

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92. In $\triangle ABC$, if r_1, r_2, r_3 are in H.P., then $r_2/r_1=$

A. 1

B. 2

C. 3

D. 4

Answer: C



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93. In $\triangle ABC$, if $r_1 = r_2 = r_3$ then the triangle is

A. equilateral

B. right angled

C. isosceles

D. none

Answer: A



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94. In $\triangle ABC$, if $r r_1 = r_2 r_3$, then the triangle is

A. isosceles

B. equilateral

C. right angled

D. none

Answer: C



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95. In $\triangle ABC$ the roots of the equation

$$x^3 - (r + 4R)x^2 + s^2x - s^2r = 0 \text{ are}$$

A. r, r_1, r_2

B. r, r_2, r_3

C. r, r_1, r_3

D. r_1, r_2, r_3

Answer: D

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96. In $\triangle ABC$, if $r_1 < r_2 < r_3$ then

A. $a < b < c$

B. $a > b > c$

C. $b < a < c$

D. $a < c < b$

Answer: A

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

A. 4 : 3 : 5

B. 3 : 4 : 5

C. 5 : 3 : 4

D. 3 : 5 : 4

Answer: A



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98. In $\triangle ABC$, if $4r = 3R$ then $\cos A + \cos B + \cos C =$

A. $1/4$

B. $3/4$

C. $5/4$

D. $7/4$

Answer: D



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99. In ΔABC is H is the orthocentre of ΔABC and $x= AH, y=BH, z=CH$,
then $x+y+z=$

A. $r+R$

B. $2(r + R)$

C. $\frac{1}{2}(r + R)$

D. $2(r - R)$

Answer: B



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100. If the line joining the circumcentre 'O' and the incentre I is parallel to BC, then $\cos B + \cos C =$

A. $3/2$

B. 1

C. $3/4$

D. 2

Answer: B



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101. In $\triangle ABC$, if $2R + r = r_1$ then the triangle is

A. isosceles

B. equilateral

C. right angled

D. none

Answer: C



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102. If A , A_1 , A_2 , A_3 are the areas of incircle and ex-circle of a triangle respectively then prove that $\frac{1}{\sqrt{A_1}} + \frac{1}{\sqrt{A_2}} + \frac{1}{\sqrt{A_3}} = \frac{1}{\sqrt{A}}$

A. $2/\sqrt{A}$

B. $3/\sqrt{A}$

C. $1/\sqrt{A}$

D. None

Answer: C



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103. The ratio of the area of the incircle to the area of $\triangle ABC$ is

A. $\frac{\pi}{\sin A \sin B \sin C}$

B. $\frac{\pi}{\cot(A/2)\cot(B/2)\cot(C/2)}$

C. $\frac{\pi}{\cot(A/2)\tan(B/2)\tan(C/2)}$

D. None

Answer: B



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104. If p_1, p_2, p_3 are altitudes of a ΔABC then show that

$$\frac{1}{p_1} + \frac{1}{p_2} + \frac{1}{p_3} = \frac{1}{r}$$

A. $1/r$

B. $1/r_1$

C. $1/r_2$

D. $1/r_3$

Answer: A



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105. IF p_1, p_2, p_3 are the lengths of the altitudes of a triangle from the vertices A,B,C then $1/p_1 + 1/p_2 + 1/p_3 =$

A. $\frac{2ab \cos^2 C / 2}{\Delta(a + b + c)}$

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

C. $\frac{\cot A + \cot B + \cot C}{\Delta}$

D. $2R$

Answer: C



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106. IF p_1, p_2, p_3 are the lengths of the altitudes of a triangle from the vertices A,B,C then $1/p_1 + 1/p_2 + 1/p_3 =$

A. $\frac{2ab \cos^2 C / 2}{\Delta(a + b + c)}$

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

C. $\frac{\cot A + \cot B + \cot C}{\Delta}$

D. 2R

Answer: A



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107. IF p_1, p_2, p_3 are the lengths of the altitudes of a triangle from the vertices A,B,C then $\frac{\cos A}{p_1} + \frac{\cos B}{p_2} + \frac{\cos C}{p_3} =$

A. $\frac{2ab \cos^2 C / 2}{\Delta(a + b + c)}$

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

C. $\frac{\cot A + \cot B + \cot C}{\Delta}$

D. 2R

Answer: B



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108. IF p_1, p_2, p_3 are the lengths of the altitudes from the vertices of ΔABC to the opposite sides, then $\frac{a \cot A}{p_1} + \frac{b \cot B}{p_2} + \frac{c \cot C}{p_3} =$

A. $1/r$

B. $1/R$

C. $1/r_3$

D. 2

Answer: D



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109. IF p_1, p_2, p_3 are the lengths of the altitudes from the vertices of ΔABC to the opposite sides, then $p_1 p_2 p_3 =$

A. $1/r$

B. $1/R$

C. $1/r_3$

D. $8\sqrt[3]{abc}$

Answer: D



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110. If in a triangle ABC, the altitudes from the A,B,C on opposite sides are in H.P. then $\sin A, \sin B, \sin C$ are in

A. G.P.

B. A.P.

C. Arithmetic- Geometric Progression

D. H.P.

Answer: B



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111. If $\triangle ABC, A'B'C'$ are such that $B = B', A + A' = 180^\circ$, then $aa' =$

A. $aa' + 1$

B. $bb' + cc'$

C. $aa' + cc'$

D. None

Answer: B



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Exercise 1 C

1. From the top a mast of 180 mt high, the angle of depression of an object is 60° . The distance of the object from the ship is

A. $180\sqrt{3}$

B. $60\sqrt{3}$

C. 60

D. $60/\sqrt{3}$

Answer: B



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2. From the top of a building h meters, the angle of depression of an object on the ground is α . the distance(in meter) of the object from the foot of the building is

A. $h \cot \alpha$

B. $h \tan \alpha$

C. $h \cos \alpha$

D. $h \sin \alpha$

Answer: A



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3. If a flag staff of 6 mt high placed on the top of a tower throws a shadow of $2\sqrt{3}$ mt along the ground then the angle that the Sun makes with the ground is

A. 45°

B. 30°

C. 75°

D. 60°

Answer: D



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4. The shadow of the tower standing on a level ground is found to be 60 metres longer when the sun's altitude is 30° than when it is 45° . The height of the tower is

A. 60 m

B. 30 m

C. $60\sqrt{3}m$

D. $30(\sqrt{3} + 1)m$

Answer: D



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5. The sum of angles of elevation of the top of a tower from two points distance a and b from the base and in the same straight line with it is 90° . Then the height of the tower is :

A. a^2b

B. ab^2

C. \sqrt{ab}

D. ab

Answer: C



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6. AB is a vertical pole with B at the ground level and A at the top. A man finds that the angle of elevation of the point A from a certain point C on the ground is 60° . He moves away from the pole along the line BC to a point D such that $CD = 7$ m. From D, the angle of elevation of the point A is 45° . Find the height of the pole.

A. $\frac{7\sqrt{3}}{2}(\sqrt{3} + 1)m$

B. $\frac{7\sqrt{3}}{2}(\sqrt{3} - 1)m$

C. $\frac{7\sqrt{3}}{21} \frac{1}{\sqrt{3} + 1}m$

D. $\frac{7\sqrt{3}}{21} \frac{1}{\sqrt{3} - 1}m$

Answer: A



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7. A person walking along a straight road towards a hill observes at two points distances $\sqrt{3}$ km. The angle of elevation of the hill to be 30° and 60° . The height of the hill is

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

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

C. $\frac{\sqrt{3} + 1}{2} km$

D. $\sqrt{3} km$

Answer: A



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8. The angle of elevation of an object from a point P on the level ground is α . Moving d metres on the ground towards the object, the angle of elevation is found to be β . Then the height (in metres) of the object is

A. $d \tan \alpha$

B. $d \cot \beta$

C. $\frac{d}{\cot \alpha + \cot \beta}$

D. $\frac{d}{\cot \alpha - \cot \beta}$

Answer: D



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9. The angle of elevation of the top of a tower from a point on the same level as the foot of the tower is 15° . On moving 100 metres towards the tower, the angle of elevation increases to 30° . The height of the tower is

A. 50

B. 100

C. 150

D. 200

Answer: A

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10. From a point on the level ground, the angle of elevation of the top of a pole is 30° . On moving 20 metres nearer, the angle of elevation is 45° .

Then the height of the pole, in metres, is

A. $10(\sqrt{3} - 1)$

B. $10(\sqrt{3} + 1)$

C. 15

D. 20

Answer: B

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11. The elevation of an object on a hill is observed from a certain point in the horizontal plane through its base, to be 30° . After walking 120 metres

towards it on level ground the elevation is found to be 60° . Then the height of the object (in metres) is

A. 120

B. $60\sqrt{3}$

C. $120\sqrt{3}$

D. 60

Answer: B



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12. A tower, of x metres high, has a flagstaff at its top. The tower and the flagstaff subtend equal angles at a point distant y metres from the foot of the tower. Then the length of the flagstaff in metres in

A. $\frac{y(x^2 - y^2)}{(x^2 + y^2)}$

B. $\frac{x(y^2 + x^2)}{(y^2 - x^2)}$

C. $\frac{x(x^2 + y^2)}{(x^2 - y^2)}$

D. $\frac{x(x^2 - y^2)}{(x^2 + y^2)}$

Answer: B



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13. A flag staff of length 'd' stands on tower of height h. If at a point on the ground the angle of elevation of the tower and top of the flag staff be α, β then h=

A. $\frac{d \cot \beta}{\cot \alpha - \cot \beta}$

B. $\frac{d \tan \beta}{\cot \alpha - \cot \beta}$

C. $\frac{d \cot \beta}{\cot \alpha - \cot \beta}$

D. None

Answer: A



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14. The angles of elevation of a tower from two points which are at distances h_1 and h_2 from the foot of the tower on the same side are complementary. The height of the tower is

A. $\sqrt{h_1 h_2}$

B. $h_1 h_2$

C. h_1 / h_2

D. $\sqrt{h_1 / h_2}$

Answer: A



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15. A flag staff on the top of the tower 80 mt of height subtends an angle $\tan^{-1}(1/9)$ at a point on the ground 100 mt from the foot of the tower.

The height of the flag staff is

A. 19 mt

B. 20 mt

C. 21 mt

D. 22 mt

Answer: B



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16. The angles of elevation of a cliff at a point A on the ground and at a point B, 100 mt vertically at A are α and β respectively. The height of the cliff in mt is

A. $\frac{100 \tan \beta}{\cot \beta - \cot \alpha}$

B. $\frac{100 \cot \beta}{\cot \beta - \cot \alpha}$

C. $\frac{100 \tan \beta}{\cot \alpha + \cot \beta}$

D. $\frac{100 \cot \beta}{\cot \alpha + \cot \beta}$

Answer: B



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17. The top of a hill observed from the top and bottom of a building of height h is at angle of elevation p and q respectively. The height of the hill is

A. $\frac{h \cot p}{\cot p - \cot q}$

B. $\frac{h \cot q}{\cot p - \cot q}$

C. $\frac{h \cot p}{\cot p + \cot q}$

D. $\frac{h \cot q}{\cot p + \cot q}$

Answer: A



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18. A flag staff of 5 mts high stands on a building of 25 mt high. At an observer at a height of 30 mt the flag staff and the building subtend equal angles. The distance of the observer from the top of the flag staff is

A. $5\sqrt{3}$

B. $5\sqrt{2}$

C. $5\sqrt{6}$

D. $\frac{5\sqrt{3}}{\sqrt{2}}$

Answer: D



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19. From the top of a building 60 m high the angle of elevation of the top of a tower is found to be angle of depression of the foot of the tower. The height of the tower in meter is

A. 100

B. 90

C. 120

D. 105

Answer: C



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20. The horizontal distance between two towers is 60m and the angular depression of the top of the first as seen from the second, which is 150 m high is 30° . The height of the first tower is

A. $(150 + 20\sqrt{3})m$

B. $(150 + 15\sqrt{3})m$

C. $(150 - 20\sqrt{5})m$

D. $(150 - 20\sqrt{3})m$

Answer: D



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21. From the top of a cliff 60 mt high, the angles of depression of top and bottom of a tower are 30° , 60° . The height of the tower is

A. 40 mt

B. 50 mt

C. 60 mt

D. 30 mt

Answer: A



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22. From the top of the hill h metres high the angles of depression of the top and the bottom of a pillar are α and β respectively. The height (in metres) of the pillar is

A. $\frac{h(\tan \beta - \tan \alpha)}{\tan \beta}$

B. $\frac{h(\tan \alpha - \tan \beta)}{\tan \alpha}$

C. $\frac{h(\tan \beta + \tan \alpha)}{\tan \beta}$

D. $\frac{h(\tan \beta + \tan \alpha)}{\tan \alpha}$

Answer: A



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23. These are two towers on a horizontal line. From the mid point of the line joining their feet, the tops of the towers appear at angles of elevation of 60° and 30° respectively. The first tower has a height of 100 m. The height of the second tower is

A. $\frac{100}{\sqrt{3}}m$

B. $\frac{100}{5}m$

C. $(\sqrt{2})100m$

D. $\frac{100}{3}m$

Answer: D



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24. The angles of elevation of the tops of two vertical towers as seen from the middle point of the line joining the foot of the towers are 60° , 30° respectively. The ratio of the heights of the towers is

A. 2 : 1

B. $\sqrt{3}$: 1

C. 3 : 2

D. 3 : 1

Answer: D



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25. P is a point on the segment joining the feet to vertical poles of heights a and b, The angles of elevation of the tops of the poles from P are 45° each. Then the square of the distance between the tops of the poles is:

A. $\frac{a^2 + b^2}{2}$

B. $a^2 + b^2$

C. $2(a^2 + b^2)$

D. $4(a^2 + b^2)$

Answer: C



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26. A tower subtends angles α , 2α , 3α respectively at points A, B and C all lying on a horizontal line through the foot of the tower, Then $\frac{AB}{BC} =$

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

B. $1 + 2 \cos 2\alpha$

C. $2 + \cos 2\alpha$

D. $\frac{\sin 2\alpha}{\sin \alpha}$

Answer: B



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27. The angle of elevation of a cloud from a point h mt above the surface of a lake is θ and the angle of depression of its reflection in the lake is φ .

The height of the cloud is

A. $\frac{h \sin(\varphi + \theta)}{\sin(\varphi - \theta)}$

B. $\frac{h \sin(\varphi - \theta)}{\sin(\varphi + \theta)}$

C. $\frac{h \sin(\theta + \varphi)}{\sin(\theta - \varphi)}$

D. $\frac{h \sin(\theta - \varphi)}{\sin(\theta + \varphi)}$

Answer: A



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28. The angle of elevation of a stationary cloud from a point 2500 mt above a lake is 15° and the angle of depression of its reflection in the lake is 45° . The height of the cloud is

A. $2500 / \sqrt{3}mt$

B. $2500mt$

C. $2500\sqrt{3}mt$

D. None

Answer: C



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29. The angle of elevation of the top of the tower observed from each of the three points A,B,C on the ground, forming a triangle is the same angle α . If R is the circumradius of the $\triangle ABC$, then the height of the tower is

A. $R \sin \alpha$

B. $R \cos \alpha$

C. $R \cot \alpha$

D. $R \tan \alpha$

Answer: D



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30. A person standing on the bank of a river observes that the angle of elevation of the top of the tree on the opposite bank of the river is 60° and when he retires 40 meters away from the tree the angle of elevation becomes 30° . The breadth of the river is

- A. 20 m
- B. 60 m
- C. 40 m
- D. 30 m

Answer: A



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31. ABC is a triangular park with $AB=AC=100$ meters. A clock tower is situated at the mid point of BC. The angles of elevation of the tower at A and B are $\cot^{-1}(3.2)$ and $\operatorname{cosec}^{-1}(2.6)$ respectively. The height of the tower is

A. 100 mt

B. 50 mt

C. 25 mt

D. $50\sqrt{3}$ mt

Answer: C



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32. An aeroplane flying with uniform speed horizontally one kilometer above the ground is observed at an elevation of 60° . After 10s if the elevation is observed to be 30° , then the speed of the aeroplane (in km/h) is

A. $240/\sqrt{3}$

B. $200\sqrt{3}$

C. $240\sqrt{3}$

D. $120/\sqrt{3}$

Answer: C



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33. The upper $3/4^{th}$ portion of a vertical pole subtends an angle $\tan^{-1}(3/5)$ at a point in the horizontal plane through its foot and at a distance 40 m from the foot . Given that the vertical pole is at a height less than 100m from the ground ,find its height .

A. 20m

B. 40m

C. 60m

D. 80m

Answer: A



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34. A vertical pole subtends an angle $\tan^{-1}\left(\frac{1}{2}\right)$ at a point P on the ground. IF the angles subtended by the upper half and the lower half of the pole at P are respectively α and β , then $(\tan \alpha, \tan \beta) =$

A. $\left(\frac{1}{4}, \frac{1}{5}\right)$

B. $\left(\frac{1}{5}, \frac{2}{9}\right)$

C. $\left(\frac{2}{9}, \frac{1}{4}\right)$

D. $\left(\frac{1}{4}, \frac{2}{9}\right)$

Answer: C



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35. The angle of elevation of a stationary cloud from a point 2500 m above a lake is 15° and from the same point the angle of depression of its reflection in the lake is 45° . The height (in meters) of the cloud above the lake, given that $\cot 15^\circ = 2 + \sqrt{3}$, is

A. 2500

B. $2500\sqrt{2}$

C. $2500\sqrt{3}$

D. 5000

Answer: C



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36. A lamp post is situated at the middle point M of the side AC of a triangular plot ABC with $BC = 8$ m and $AB = 9$ m. The lamp post subtends an angle 15° at the point B. The height of the lamp post is

A. $2 - \sqrt{3}$

B. $\sqrt{3} - 2$

C. $7(2 - \sqrt{3})$

D. $7(\sqrt{3} - 2)$

Answer: C



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37. A tree stands vertically on the slant of the hills. From a point A on the ground 35 meters down the hill from the base of the tree, the angle of elevation of the top of the tree is 60° . If the angle of elevation of the foot of the tree A is 15° , then the height of the tree.

A. $5\sqrt{2}$

B. $7\sqrt{2}$

C. $25\sqrt{2}$

D. $35\sqrt{2}$

Answer: D



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38. An object is placed at a distance of 10 cm from a convex mirror of focal length 15 cm. Find the position and nature of the image.

A. $3\sqrt{2}$

B. $7\sqrt{2}$

C. $25\sqrt{2}$

D. $35\sqrt{2}$

Answer: A



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39. Two ships leave a port at the same time . One goes 24km per hour in the direction $N45^\circ E$ and other travels 32km per hour in the direction

$S75^\circ E$. then the distance between the ships at the end of 3 hours

A. 7488

B. $\sqrt{7488}$

C. 5184

D. $\sqrt{5184}$

Answer: B



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40. Two trees A and B are on the same side of a river. From a point C in the river the distances of the trees A and B are 250 m and 300 m respectively. IF the angle C is 45° , the distance the trees is

A. 215.5

B. 225.5

C. 215

Answer: A[Watch Video Solution](#)

41. The angle of elevation of the top point P of the vertical tower PQ of height h from a point A is 45° and from a point B is 60° , where B is a point at a distance 30 meters from the point A measured along the line AB which makes an angle 30° with AQ. Then the height of the tower is.

A. $5(\sqrt{3} + 1)$

B. $10(\sqrt{3} + 1)$

C. $15(\sqrt{3} + 1)$

D. $20(\sqrt{3} + 1)$

Answer: C[Watch Video Solution](#)

42. AB is a vertical pole with B at the ground level and A at the top. A man finds that the angle of elevation of the point A from a certain point C on the ground is 60° . He moves away from the pole along the line BC to a point D such that $CD = 7$ m. From D, the angle of elevation of the point A is 45° . Find the height of the pole.

A. $7(3 + \sqrt{3})$

B. $\frac{7}{2}(3 + \sqrt{3})$

C. $\frac{7}{3}(3 + \sqrt{3})$

D. $\frac{7}{4}(3 + \sqrt{3})$

Answer: B



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43. A person observes the top of a tower from a point A on the ground. the elevation of the tower from this point is 60° . He moves 60 m in the direction perpendicular to the line joining A and base of the tower. The

angle of elevation of the tower from this point is 45° . Then the height of the tower (in meters) is _____

A. $60\frac{\sqrt{3}}{2}$

B. $60\sqrt{2}$

C. $60\sqrt{3}$

D. $60\frac{\sqrt{2}}{3}$

Answer: A



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44. A bird is sitting on the top of a vertical pole 20 m high and its elevation from a point O on the ground is 45° . It flies off horizontally straight away from the point O. After one second, the elevation of the bird from O is reduced to 30° . Then the speed (in m/s) of the bird is

A. $20\sqrt{2}$

B. $20(\sqrt{3} - 1)$

C. $40(\sqrt{2} - 1)$

D. $40(\sqrt{3} - \sqrt{2})$

Answer: B



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45. 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. $\frac{p^2 + q^2}{p^2 \cos \theta + q^2 \sin \theta}$

B. $\frac{(p^2 + q^2) \sin \theta}{(p \cos \theta + q \sin \theta)^2}$

C. $\frac{(p^2 + q^2) \sin \theta}{p \cos \theta + q \sin \theta}$

D. $\frac{p^2 + q^2 \cos \theta}{p \cos \theta + q \sin \theta}$

Answer: C



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Exercise 2 Special Type Questions Set 1

1. Which of the following statements is true

I : If $(a + b + c)(a + b - c) = ab$ then $\angle C = 60^\circ$

II If $\sin^2 A + \sin^2 B + \sin C = 2$ in a $\triangle ABC$ then it is right angled

A. only I is true

B. only II is true

C. both I, II are true

D. neither I nor II is true

Answer: B



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2. I: In a $\triangle ABC$, if $a=3, b=4, \angle A = 30^\circ$ the number of possible triangles is

2

II. In a $\triangle ABC$,
$$\frac{(a + b)\cos C + (b + c)\cos A + (c + a)\cos B}{\sin A + \sin B + \sin C} = R$$

A. only I is true

B. only II is true

C. both I, II are true

D. neither I nor II is true

Answer: A

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3. I: In a ΔABC , if $a = R \tan A$ then $b^2 + c^2 = bc + a^2$

II: In a ΔABC if $\sin A + \sin B + \sin C$ is maximum then triangle is equilateral

A. only I is true

B. only II is true

C. both I, II are true

D. neither I nor II is true

Answer: C



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4. I: In a ΔABC , if $4s(s-a)(s-b)(s-c) = a^2b^2$ then it is right angled triangle

II: In a ΔABC , $\sin A + \sin B + \sin C$ is maximum then triangle is equilateral

A. only I is true

B. only II is true

C. both I, II are true

D. neither I nor II is true

Answer: C



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5. In $\triangle ABC$, if $(a - b)(s - c) = (b - c)(s - a)$ then r_1, r_2, r_3 are in

- A. only I is true
- B. only II is true
- C. both I, II are true
- D. neither I nor II is true

Answer: A



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6. In $\triangle ABC$, if $rr_1 = r_2r_3$, then the triangle is

- A. only I is true
- B. only II is true
- C. both I, II are true
- D. neither I nor II is true

Answer: D



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7. In a ΔABC , if $r_1 = s$ then the triangle is equilateral

II: In a ΔABC , $r = (s - b)\cot(C/2)$

A. only I is true

B. only II is true

C. both I, II are true

D. neither I nor II is true

Answer: D



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8. In ΔABC , the correct formulæ among the following are

Statement - I : $r = 4R \sin \frac{A}{2} \sin \frac{B}{2} \sin \frac{C}{2}$

Statement -II : $r_1 = (s - a)\tan \frac{A}{2}$

Statement-III : $r_3 = \frac{\Delta}{s - c}$

A. only I, II

B. only II, III

C. only I, III

D. I, II, III

Answer: C



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9. In $\triangle ABC$, with usual notation observe the two statements given below

Statement -I : $r_1 r_2 r_3 = \Delta^2$

Statement -II : $r_1 r_2 + r_2 r_3 + r_3 r_1 = s^2$

Which of the following statement 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

Answer: A



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10. Observe the following statements:

I) In ΔABC , $b \cos^2 \frac{C}{2} + c \cos^2 \frac{B}{2} = sl$. In

II) In ΔABC , $\cot \frac{A}{2} = \frac{b+c}{2} \Rightarrow B = 90^\circ$

Which of the following 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

Answer: B



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Exercise 2 Special Type Questions Set 2

1. The ascending order of $\alpha = \cot \frac{A}{2} \cot \frac{C}{2}$ when $s = 4b$, $\beta = \cot \frac{B}{2} \cot \frac{C}{2}$ when $s=3a$, $\gamma = \cos \frac{A-C}{2} \cos ec \frac{B}{2}$ When a, b, c are in A.P. is

A. α, β, γ

B. β, α, γ

C. γ, α, β

D. α, γ, β

Answer: B



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2. In a $\triangle ABC$, $A > C$ and $A - C = 90^\circ$ and $a + b = 2c$ and if $\alpha = \sin \frac{B}{2}$, $\beta = \cos \frac{B}{2}$, $\gamma = \tan \frac{B}{2}$ then ascending order of α, β, γ is

A. α, β, γ

B. β, α, γ

C. γ, α, β

D. α, γ, β

Answer: B



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3. IF $(a + b)^2 = c^2 + ab$ in a $\triangle ABC$ and if $\sqrt{2}(\sin A + \cos A) = \sqrt{3}$ then ascending order of angles A,B,C is

A. A,B,C

B. A,C,B

C. B,A,C

D. C,B,A

Answer: B



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4. If $a = 30, b = 18, c = 24$ then the descending order of r_1, r_2, r_3 is

A. r_1, r_3, r_2

B. r_3, r_2, r_1

C. r_2, r_3, r_1

D. r_1, r_2, r_3

Answer: A



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5. In $\triangle ABC$, if $r_1 = 3, r_2 = 10, r_3 = 15$, then $c =$

A. a,b,c

B. b,c,a

C. c,a,b

D. c,b,a

Answer: D



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Exercise 2 Special Type Questions Set 3

1. Match the following

I. In ΔABC , $(a-b)^2 \cos^2 \frac{C}{2} + (a+b)^2 \sin^2 \frac{C}{2} =$ a) c^2

II. In ΔABC , $\frac{b^2 - c^2}{a^2} \sin^2 A + \frac{c^2 - a^2}{b^2} \sin^2 B =$ b) $\frac{1}{b}$

III. In ΔABC , $\frac{bc \cos A + ca \cos B + ab \cos C}{\cot A + \cot B + \cot C} =$ c) 2Δ

IV. In ΔABC , $\frac{\cos C + \cos A}{c+a} + \frac{\cos B}{b} =$ d) $\frac{b^2 - a^2}{4R^2}$

A. a,b,c,d

B. a,d,c,b

C. d,a,b,c

D. a,c,d,b

Answer: B



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2. Match the following

I. In ΔABC , $a^2 \sin 2C + c^2 \sin 2A$

a) 4Δ

II. In ΔABC , $R^2 (\sin 2A + \sin 2B + \sin 2C)$

b) 2Δ

III. In ΔABC , $a \sin^2 \frac{C}{2} + c \sin^2 \frac{A}{2} =$

c) s

IV. In ΔABC , $c \cos^2 \frac{A}{2} + a \cos^2 \frac{C}{2} =$

d) $s - b$

A. a,b,d,c

B. c,d,a,b

C. d,a,b,c

D. a,c,d,b

Answer: A



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3. Match the following

I. In ΔABC , $\sum a^2 \sin(B - C)$

II. In ΔABC , $\sum a^3 \cos(B - C)$

III. In ΔABC , $r r_1 r_2 r_3$

IV. In ΔABC , $\frac{1}{r_1} + \frac{1}{r_2} + \frac{1}{r_3}$

a) Δ^2

b) 0

c) $1/r$

d) $3abc$

e) 2Δ

A. b,d,a,c

B. c,b,e,d

C. d,a,b,e

D. e,c,d,a

Answer: A



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4. Match the following

- | | |
|--|--------------------|
| I. In $\triangle ABC$, if $a = 5$, $A = 30^\circ$ then | a) $A = 120^\circ$ |
| II. In $\triangle ABC$, if $a = 8$, $b = 15$, $c = 17$ then | b) $r = R$ |
| III. In $\triangle ABC$, if $b = c = R$ then | c) $R = 17/2$ |
| IV. In an equilateral triangle | d) $R = 5$ |
| | e) $r = R/2$ |

A. e,b,d,c

B. b,a,c,d

C. a,d,b,a

D. d,c,a,c

Answer: D



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5. Match the following

- | | |
|---|--------------------------------|
| I. In ΔABC , if $\cot \frac{A}{2}, \cot \frac{B}{2}, \cot \frac{C}{2}$ are in A.P. then | a) r_1, r_2, r_3 are in A.P. |
| II. In ΔABC , if $\frac{a}{c} = \frac{\sin(A-B)}{\sin(B-C)}$ then | b) a, b, c are in A.P. |
| III. In ΔABC , if a, b, c are in A.P. then | c) a^2, b^2, c^2 are in A.P. |
| IV. In ΔABC , if $(a-b)(s-c) = (b-c)(s-a)$ then | d) r_1, r_2, r_3 are in G.P. |
| | e) r_1, r_2, r_3 are in H.P. |

A. d,e,a,b

B. b,c,a,e

C. a,b,d,c

D. c,d,b,e

Answer: B



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6. Match the following

- | | |
|--|---------------------------------------|
| I. In ΔABC , if $r_1 = r_2 = r_3$ then the triangle is | a) right angled triangle |
| II. In ΔABC , if $rr_1 = r_2r_3$ then the triangle is | b) equilateral triangle |
| III. In ΔABC , $a \cos B = b \cos A$ | c) right angled or isosceles triangle |
| IV. In ΔABC , $a \cos A = b \cos B$ | d) scalene triangle |
| | e) isosceles triangle |

A. a,b,d,e

B. c,d,b,a

C. b,a,e,c

D. d,e,c,b

Answer: C



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7. Match the following

I. In ΔABC , $(r_1 - r)(r_2 - r)(r_3 - r)$

a) $4R$

II. In ΔABC , $(r_1 + r_2)(r_2 + r_3)(r_3 + r_1)$

b) $4R r^2$

III. In ΔABC , $r_1 + r_2 + r_3 - r$

c) $4R s^2$

IV. In ΔABC , $r + r_3 + r_1 - r_2$

d) $4R \cos A$

e) $4R \cos B$

A. a,b,c,d

B. c,a,e,d

C. b,a,c,d

D. b,c,a,e

Answer: D



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Exercise 2 Special Type Questions Set 4

1. A: In a $\triangle ABC$, if the sides a, b, c are in A.P. then

$$a \cos^2 \frac{C}{2} + c \cos^2 \frac{A}{2} = 3b$$

R: In a $\triangle ABC$, if A, B, C are in A.P. then $B = \pi/3$

- A. A is true, R is true and R is correct explanation of A
- B. A is true, R is true and R is not correct explanation of A
- C. A is true, R is false
- D. A is false, R is true

Answer: D



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2. A: In a ΔABC , $r_1 r_2 r_3 = s^2$

R: In an equilateral triangle, $r : R : r_1 = 1 : 4 : 5$

A. A is true, R is true and R is correct explanation of A

B. A is true, R is true and R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: D



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3. A: In a ΔABC $(a + b + c)(b + c - a) = Abc$ if $0 < \lambda < 4$

R: In a ΔABC , $-1 \leq \cos A \leq 1$

A. A is true, R is true and R is correct explanation of A

B. A is true, R is true and R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: C



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4. A: In a ΔABC , if $r_1 = 2r_2 = 3r_3$ then $a : b = 5 : 4$.

R: In a ΔABC , if $xr_1 = yr_2 = zr_3 = (x + y + z)r$ then $a : b : c = y + z : z + x : x + y$

A. A is true, R is true and R is correct explanation of A

B. A is true, R is true and R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: A



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5. A: There is no triangle ABC for $A = \tan^{-1} 2$, $B = \tan^{-1} 3$

R: IF $x > 0$, $y > 0$ and $xy > 1$ then

$$\tan^{-1} x + \tan^{-1} y = \pi + \tan^{-1} \left(\frac{x + y}{1 - xy} \right)$$

- A. A is true, R is true and R is correct explanation of A
- B. A is true, R is true and R is not correct explanation of A
- C. A is true, R is false
- D. A is false, R is true

Answer: D



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6. A: In a $\triangle ABC$, if A,B,C are in A.P. and triangle is equilateral $\cos A + 2 \cos B + \cos C = 2$

R: In a $\triangle ABC$, if A,B,C are in A.P. and $\cos A + \cos B + \cos C = 2$ then the triangle is isosceles.

- A. A is true, R is true and R is correct explanation of A

B. A is true, R is true and R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: C

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7. A: In ΔABC , if r_1, r_2, r_3 are in H.P. then $r_2/r = 1/3$

R: In ΔABC , $\frac{1}{r_1} + \frac{1}{r_2} + \frac{1}{r_3} = \frac{2}{r}$

A. A is true, R is true and R is correct explanation of A

B. A is true, R is true and R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: D

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8. A: In a ΔABC , $\left(1 - \frac{r_1}{r_2}\right)\left(1 - \frac{r_1}{r_2}\right) = 2$ then the triangle is right angled.

R: In a ΔABC , $r_1r_2 + r_2r_3 + r_3r_1 = 2r^2$

A. A is true, R is true and R is correct explanation of A

B. A is true, R is true and R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: C

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9. A: IF In a ΔABC , $c \cos^2 \frac{A}{2} + a \cos^2 \frac{C}{2} = \frac{3b}{2}$ then a,b,c are In A.P.

R: In a ΔABC , $a \cos C + c \cos A = b$

A. A is true, R is true and R is correct explanation of A

B. A is true, R is true and R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: A



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10. A: In a ΔABC , $\Delta = a^2 - (b - c)^2$ then $\tan \frac{A}{2} = \frac{1}{2}$

R: In a ΔABC , $\tan \frac{A}{2} = \frac{\Delta}{(s - b)(s - c)}$

A. A is true, R is true and R is correct explanation of A

B. A is true, R is true and R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: D



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