MATHS

BOOKS - PATHFINDER MATHS (BENGALI ENGLISH)

SOLUTION OF TRIANGLE AND HEIGHT AND DISTANCE

Question Bank

1. In a triangle ABC, the sides are 6cm, 10 cm and 14 cm. Show that the triangle is obtuse-angled with the obtuse angle equal to 120°.

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2. Two sides of a triangle are $\sqrt{3}-1$ and $\sqrt{3}+1$units and their included angle is 60°.Find the other side.

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3. Solve the triangle if $B=30^\circ, C=60^\circ$, a =6 cm

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4. Find the ratio of the sides of a triangle whose interior angles are $30^\circ, 60^\circ, 90^\circ$.

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5. In a right -angled triangle, prove that r+2R=S.

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6. The ex-radii r_1, r_2, r_3 or ΔABC are in H.P. Show that its sides a,b,c are in A.P.

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7. If the sides of a triangle are in the ratio 5:8:11 and theta denotes the angle opposite to the largest side of the triangle, then find the value of $\tan^2\frac{\theta}{2}$.

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8. In a triangle of base a, the ratio of the other sides is $r(\ <1)$. Show that the attitude of the triangle is less than or equal to $\frac{ar}{1-r^2.}$

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9. Prove that he distance between the circum-centre and the ortho-centre of a triangle ABC is $R\sqrt{1-8\cos A\cos B\cos C.}$

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10. If $r_1 = r_2 + r_3 + r,$ prove that the triangle is right angled.

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11. If in a $\Delta ABC,$ the value of cotA, cotB, cotC are in A.P. show a^2, b^2, c^2 are in A.P.

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12. The angle of depression of a standing bus at stopped B from the top L of a vertical monument of height 400 metres is 60°. Find the distance of the bus from the foot of the monument.

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13. The shadow of a pole is 9m long when the angle of elevation of the sun is 30°. Find the length of the shadow when the angle of elevation of the sun is 60°.

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14. From the foot of a 60m high tower the angle of elevation of a minar is 60° and from the top, it is 30°. Find the height of the minar.

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15. From a point on the horizontal line through the foot of a chimney the angle of elevation of the top of the chimney is 30°. and the angle of elevation is 60° at a point on the same straight line 50 metres nearer to the chimney. What is the height of the chimney?

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16. A man stands at a point X on the bank of a river and looks at the top of a tower which is situated exactly opposite to him on the other bank. The angle of elevations is 45°. The man then walk 300 m at right angle to the bank and away from it, to the point Y. From Y he looks at the top of the lower and finds the angle of elevations as 30°. Calculate the height of the tower and the width of the river.

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17. The angular elevations of the top of a tower from two points in the same horizontal line with its foot and observed to be θ and ϕ respectively. Find the distance between the two points of observation, if the height of the tower is h.

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18. An observer on the top of a monument 500 m above the sea level, observes the angles of depression of the two boats to be 45° and 30° respectively. Find the distance between the boats if the boats are-

On the same side of the monument,

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19. An observer on the top of a monument 500 m above the sea level, observes the angles of depression of the two boats to be 45° and 30° respectively. Find the distance between the boats if the boats are-

On the opposite sides of the monument,

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20. A vertical pillar of height h cm stands on the plane ground. At a fixed point on the plane ground the height of the top of the pillar and that of a point x cm below the top subtend angles 60° and 30° respectively. Prove that $x = \frac{2h}{3}$.

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21. A post stands on the top of a pillar 40ft high. The elevations of the tops of the pillar and the post are respectively 30° and 45° to an observer standing on the horizontal line from the foot of the pillar. Find the lenght of the post and the distance of the observer from the pillar.

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22. A man, standing on the bank of a river observes that the angle of elevation of the top of a tree just on the opposite bank is60°But the angle off elevations is 30° from a point at a distance y metres from the bank. Show that the height of tree $h = \frac{\sqrt{3y}}{2}$.

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23. A man standing on the deck of a ship, which is 10m above the water level, observes the angle of elevation of the top of a hill as 60° and the angle of depression of the base of the hill as 30°. Calculate the distance of the hill from the ship and the height of the hill.

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24. A boy standing on the ground finds a bird flying at a distance of 100 m from him at an elevation of 30°. A girl standing on the root of 20m high building finds of angle of elevation of the same bird to 45°. The boy and the girl are on opposite sides of the bird. Find the distance of the bird from the girl, correct to nearest cm.

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25. From an aeroplane vertically above a straight road the angles of depression of two consecutive mile stones on the road are observed to be 45° and 30°. Find the height of the aeroplane above the road.

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26. A vertical post 15 ft high is broken at a certain height, and its upper part, not completely separated,

meets the ground at an angle of 30°. Find the height at which the post is broken

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27. From the top of a cliff, 150 metres high, the angles of depression of the top and bottom of a pillar are found to be 30° and 60° respectively, find the height of the pillar.

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28. To a person standing at the middle point of the horizontal straight line joining the feet of two vertical posts of the same height, the angle of elevation of the top of each post appears to be 30°. After walking 40metres towards one of them , the person observes that the angle of elevation of the top of the same post has changed to 60°. Find the distance between the two posts.

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29. From the top and bottom of a cliff the angles of depression and elevation of the top of a pillar 60ft high are observed to be 30° and 60° respectively. Find the height of the cliff.

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30. A 1.4m tall girl sports a balloon moving with the wind in a horizontal line at a height of 91.4m from the ground. The angle of elevation of the balloon from the eyes of the girl at that instant is 60° . After some time ,the angle of elevation reduces to 30°. Find the distance travelled by the balloon during that interval. Take $\sqrt{3}$=1.732.

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31. The angle of elevation of a jet plane from a point on the ground is 60°. After a flight of 15 seconds, the angle of elevations changed to 30° . If the jet plane is flying horizontally at a constant height of $1500\sqrt{3}$ metres, find the speed of the jet plane.

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32. A man standing in the midst of a field observes, a flying bird in his north at an angle of elevation of 30° and after 2.5 minutes he observes the bird in his south at an angle of elevation of 60°. If the bird flies in a straight line all along at a height of $60\sqrt{3}$ metres, what is its speed?

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33. A man on the top of a vertical observation tower observes a car moving at a uniform speed coming directly towards it. If it takes 12 minutes for the angle of depression to changed from 30° to 45° , how soon after this will the car reach the observation tower? Give your answer correct to the nearest second.

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34. Two vertical poles are 120 metres apart and the height of one is double that of the other. From the middle point of the joining their feet, an observer finds the angular elevations of their tops to be complementary . Find the heights of the poles.

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35. The angle of elevation of a cloud from a point 200 m above a lake is 30° and the angle of depression of its reflection in the lake is 45°. Find the height of the cloud from the lake.

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36. At the foot of a mountain, the elevation of its summit is 45°. After ascending 400 m towards the mountain up an incline of 30°, the elevation changed to 60°. Find the height of the mountain.

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37. A ladder leaning against a vertical wall is inclined at an angle α to the horizontal. On moving its foot 2m away from the wall, the ladder is now inclined at an angle β. Find the vertical distance moved by the ladder.

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38. If the length of the sides of the triangle ABC satisfy, $2(bc^2 + ca^2 + ab^2) = b^2c + c^2a + a^2b + 3abc$, then triangle ABC is:

A. Right angled

B. Isosceles

C. Equilateral

D. none of these

Answer: C

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39. ABC is a right angled Δ in which $\angle B = 90^\circ$ and BC =a. If n points $L_1, L_2, L_3, \dots, L_n$ on AB are such that AB is divided into (n+1) equal parts and $L_1M_1, L_2M_2, \dots, L_nM_n$ are line segments parallel to BC and points $M_1, M_2, \dots, M_n$ are on AC, then the sum of the lengths of $L_1M_1, L_2M_2, \dots, L_nM_n$ is:

A. $\frac{a(n+1)}{2}$

B. $\frac{a(n-1)}{2}$

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

D. none of these

Answer: C

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40. The perimeter ΔABC is 3 times the arithmetic mean of the sine of its of its angles . If the side 'b'=1, then the angle B equal to :

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

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

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

D. none of these

Answer: C

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41. Let $A_0A_1A_2A_3A_4A_5$ be a regular hexagon inscribed in a circle of unit radius. Then the product of the lengths of the line segments A_0A_1, A_0A_2 and A_0A_4 is

A. 44259

B. $\sqrt[3]{3}$

C. 3

D. $\frac{\sqrt[3]{3}}{2}$

Answer: C

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42. If twice the square of the diameter of a circle is equal to half the sum of the square of the sides of inscribed ΔABC, then $\sin^2 A + \sin^2 B + + \sin^2 C$ is equal to:

A. 1

B. 2

C. 4

D. 8

Answer: C

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43. If in $\Delta ABC, \frac{1}{a+c}+\frac{1}{b+c}=\frac{3}{a+b+c}$, then angleC is equal to

A. 30°

B. 45°

C. 60°

D. 75°

Answer: C

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44. In a ΔABC, the point D divides BC in the ratio 1:2

Also AD is perpendicular to AB. Then the value of the

expression

$\tan B(1 + 2\tan A \tan c) - 2\tan C$ is:

A. 0

B. 1

C. -1

D. none of these

Answer: A

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45. In a triangle with sides a, b and c a semicircle touching the sides AC and CB is inscribed whose diameter lies on AB. Then , the radlus of the semicircle is:

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

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

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

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

Answer: D

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46. From the top of a tower , which is 240m high , if the angle of depression of a point on the ground is 30°. then the distance of the point from the foot of the tower is

A. $240 \times \sqrt{3}m$

B. $40 \times \sqrt{3}m$

C. $80 \times \sqrt{3}m$

D. $120 \times \sqrt{3}m$

Answer: A

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47. If the length of the shadow of a vertical pole on the horizontal grounds is $\sqrt{3}$ times its height, then the angle of elevation of the sun is

A. 15°

B. 30°

C. 45°

D. 60°

Answer: B

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48. The ratio of the length of a rod and its shadow is $\sqrt{3}:1:$. The angle of elevation of the sun is

A. 30°

B. 45°

C. 60°

D. 90°

Answer: C

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49. If the angles of elevation of a tower from two points distance a and b $(a > b)$ from its foot and in the same straight line from it are 30° and 60°, then the height of the towers

A. $\sqrt{a}b$

B. $\sqrt{a} + b$

C. $\sqrt{a} - b$

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

Answer: A

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50. The angle of depression of two boatsm as observes from the masthead of a ship, 50m high, are 45° and 30°, respectively. The distance between the boats, if they are on the same side of the masthead, is

A. $50m$

B. $50(\sqrt{3}+1)m$

C. $50(\sqrt{3}-1)m$

D. $50\left(1-\frac{1}{\sqrt{3}}\right)m$

Answer: C

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51. A tower subtends an angle of 30° at a point on the same level as its foot. At a second point h metres above the first, the depression of the foot of the tower is 60°. The height of the lower is

A. $\frac{h}{2}m$

B. $\sqrt{3}hm$

C. $\frac{h}{3}m$

D. $\frac{h}{\sqrt{3}}m$

Answer: C

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52. The shadow of a tower , when the angle of elevation of the sun is 45°, is found to be 10m longer than when it was 60°. The height of the tower is

A. 23.66m

B. 24.56m

C. 26.2m

D. none of these

Answer: A

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53. The angles of depression of the top and bottom of 8 m tall tower from a cliff are 30° and 45° respectively. Which of the following will be the height of the cliff?

A. $4(3+\sqrt{3})m$

B. $4(1+\sqrt{3})m$

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

D. none of these

Answer: A

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54. The angles of elevation of the bottom and the top of the tower fixed at the top of a 20m high building, from a point on the ground are 45° and 60° respectively. The height of the tower is

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

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

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

D. none of these

Answer: A

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55. A tower is $10\sqrt{3}$ metres high. If a point on the ground is 30m away from its foot, then the angle of elevation is

A. 45°

B. 30°

C. 60°

D. 75°

Answer: B

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56. The shadow of a vertical tower on level of ground increased by 10m when the attitude of the sun change from 45° to 30°. Find the height of the lower.

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

B. $5(\sqrt{3}-1)m$

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

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

Answer: C

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57. Two posts are just on the opposite side of a road. The heights of the posts are in the ratio $\sqrt{3}:1$. The angle of elevation of the top of the smaller post from the mid point of the road is 45°. What is the angle of depression of the point from the top of the other post?

A. 60°

B. 30°

C. 90°

D. 45°

Answer: A

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58. A man on the top of a vertical observation tower observes a car moving at a uniform speed coming directly towards it. If it takes 12 minutes for the angle of depression to change from 30° to 45°, how soon after this will the car reach the observation tower?

A. 15 min 32 sec

B. 16 min 32 sec

C. 17 min 32 sec

D. 18 min 32 sec

Answer: B

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59. Two men standing on either side of a tower 60m high observe the angle of elevation of the top of the tower is to be 45° and 60° respectively. Find the distance between two men.

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60. Two sides of a triangle are of lengths 2a and 2b and contain an angle of 120°. If the angle opposites the sides 2a is θ, then the value of $\tan\theta$ is equal to

A. $\dfrac{a\sqrt{3}}{2a+b}$

B. $\dfrac{a\sqrt{3}}{a+2b}$

C. $\dfrac{a\sqrt{3}}{2a-b}$

D. $\dfrac{a\sqrt{3}}{a-2b}$

Answer: B

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61. An isosceles triangle has two equal sides of length 'a' and angle between them is $\propto$. The area of the triangle is

A. $\dfrac{1}{2}a^2 \cos \propto$

B. $a^2 \cos \propto$

C. $\frac{1}{2}a^2 \sin \propto$

D. $a^2 \sin \propto$

Answer: C

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62. The height of a right circular cone is 40 cm and semi-vertical angle is 30°, the slant height of the cone is =?

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63. 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 $\propto$. If R is the circum-radius of the triangle ABC, then the height of the tower is

A. $R\tan\propto$

B. $R\cot\propto$

C. $R\sin\propto$

D. $R\cos\propto$

Answer: C

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64. A round balloon of radius 10m subtends an angle of 60° at the eye of the observer while the angle of elevation of its centre is 30°. Which of the following is the height of the centre of the balloon?

A. $10\sqrt{3}$m

B. 30m

C. 20m

D. 40m

Answer: D

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65. The angle of elevation of a cloud from a point h metres above a lake is 45° and the angle of depression of its reflection in the lake is 60°. Which of the following is the height of the cloud?

A. $\left(\frac{\sqrt{3}+1}{\sqrt{3}-1}\right)hm$

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

C. $\sqrt{3}hm$

D. $\frac{h}{\sqrt{3}}m$

Answer: A

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66. In a triangle ABC , a (bcosC-ccosB) is equal to

A. a^2

B. $b^2 - c^2$

C. 0

D. none of these

Answer: B

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67. In a triangle tanA+tanB+tanC=6 and tanAtanB=2, then the values of tan A, tanB and tanC are respectively

A. 1,2,3

B. 2,1,4

C. 1,2,0

D. none of these

Answer: A

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68. If the data given to construct a triangle ABC are a=5, b=7, $\sin A = \frac{3}{4}$, then it is possible to construct

A. only one triangle

B. two triangles

C. infinitely many triangles

D. no triangle

Answer: D

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69. In a triangle ABC, if $\left(1+\frac{a}{b}+\frac{c}{b}\right)\left(1+\frac{b}{c}-\frac{a}{c}\right)=3,$ then the angle A is

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

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

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

D. none of these

Answer: A

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70. If in a triangle ABC, anglesA, B,C are in A.P, 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 of these

Answer: A

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71. In a triangle ABC, if A=$\frac{\pi}{4}$, and tanBtanC=k,then k must satisfy

A. $k^2 - 6k + 1 \leq 0$

B. $k^2 - 6k + 1 = 0$

C. $k^2 - 6k + 1 \geq 0$

D. $3 - 2\sqrt{2} < k < 3 + 2\sqrt{2}$

Answer: C

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72. Given b=2,c=$\sqrt{3}$and A= 30°, then in-radius of triangle ABC is

A. $\frac{\sqrt{3}-1}{2}$

B. $\frac{\sqrt{3}+1}{2}$

C. $\frac{\sqrt{3}-1}{4}$

D. none of these

Answer: A

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73. The sides of a triangle are 3x+4y,4x+3yand 5x+5y, where $x, y > 0$. The triangle is

A. right angled

B. equilateral

C. obtuse-angle

D. none of these

Answer: C

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74. If in a triangle ABC, B $=\frac{2\pi}{3}$, then cosA +cosC lies in

A. $\left[-\sqrt{3}, \sqrt{3}\right]$

B. $\left(-\sqrt{3}, \sqrt{3}\right]$

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

D. $\left[\frac{3}{2}, \sqrt{3}\right]$

Answer: C

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75. In a triangle ABC, sinA+sinB+sinC=1+$\sqrt{2}$ and cosA+cosB+cosC=$\sqrt{2}$. The triangle is

A. equllateral

B. isosceles only

C. right-angled only

D. right-angled isosceles

Answer: D

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76. If A+B+C+D=π, then the value of $\sum \cos A \cos C - \sum \sin A \sin C$is

A. -1

B. 1

C. 2

D. 0

Answer: D

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

A. 1

B. -1

C. 2

D. none of these

Answer: C

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78. In a triangle ABC, $\sqrt{a}+\sqrt{b}-\sqrt{c}$ is

A. always positive

B. always negative

C. positive only when c is smallest

D. none of these

Answer: A

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79. The area of the triangle inscribed in a circle of radius 4 and the ratio of its angles in the ratio 5:4:3 is

A. $4(3+\sqrt{3})$

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

C. $4(3-\sqrt{3})$

D. $4(\sqrt{3}-\sqrt{2})$

Answer: A

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80. The perimeter of a triangle ABC is 6 times the Arithmetic Mean of the sine of its angles. If side a is 1, then $\angle A$ is

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

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

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

D. π

Answer: A

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81. If in an obtuse angled triangle the obtuse angle is $\frac{3\pi}{4}$ and the other two angle are equal to two values of θsatisfying atantheta +bsectheta=c, when $|b| \leq \sqrt{(a^2 + c^2)}$, then$a^2 - c^2$ is equal to

A. ac

B. 2ac

C. a/c

D. none of these

Answer: B

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82. The radius of the circle passing through the centre of incircle of ΔABC and through the end points of BC is given by

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

B. $\left(\frac{a}{2}\right)\sec\left(\frac{A}{2}\right)$

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

D. $a\sec\left(\frac{A}{2}\right)$

Answer: B

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83. In a $\Delta ABC,\ b^2+c^2$=$1999a^2$, then $\dfrac{\cot B+\cot C}{\cot A}$ is equal to

A. $\dfrac{1}{999}$

B. 36161

C. 999

D. 1999

Answer: A

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84. In a ΔABC, tanAtanBtanC=9. For such tiangle , if $\tan^2 A + \tan^2 B + \tan^2 C = \lambda$, then

A. $9.\sqrt[3]{3} < \lambda < 27$

B. $\lambda \leq 27$

C. $\lambda < 9.\sqrt[3]{3}$

D. $\lambda \leq 27$

Answer: B

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85. If in a ΔABC, $r_1r_2 + r_2r_3 + r_3r_1$ is equal to (where r_1, r_2, r_3 are the exradii and 2s is the perimeter)

A. s^2

B. $2s^2$

C. $3s^2$

D. $4s^2$

Answer: A

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86. In a ΔABC, 2cosA=sinB/sinCand $2^{\tan^2 B}$ is a solution of equlation $x^2 - 9x + 8 = 0$, then DeltaABC is

A. equilateral

B. isosceles

C. scalene

D. right angled

Answer: A

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87. The area of the circle and the area of a regular polygon inscribed the circle of n sides and of perimeter equal to that of the circle are in the ratio of

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

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

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

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

Answer: A

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88. If there are only two linear function f and g which map [1.2] on [4,6] and in a ΔABC, c,=f(1)+g(1) and a is the maximum value of r^2, where r is the distance of a variable point on the curve $x^2 + y^2 - xy = 10$ from the origin, then sinA:sinC is

A. 1:2

B. 2:1

C. 1:1

D. none of these

Answer: C

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89. If A ,B,C,D are the angle of quadrilateral, then $\frac{\sum \tan A}{\sum \cot A}$ is equal to

A. $\prod \tan A$

B. $\prod \cot A$

C. $\sum \tan^2 A$

D. $\sum \cot^2 A$

Answer: A

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90. If Δ be the area of a triangle ABC and length of its two sides are 3 and 5. If c is the third side, then

A. $\Delta \leq \dfrac{(c^2 + 16c + 64)}{12\sqrt{3}}$

B. $\Delta = \dfrac{(c^2 + 16c + 64)}{8\sqrt{3}}$

C. $\Delta = \dfrac{(c^2 + 16c + 64)}{4\sqrt{3}}$

D. none of these

Answer: A

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91. Which of the following pieces of data does not uniquely determine acute angled ΔABC (R= circum radius)

A. a, sinA,sinB

B. a,b,c

C. a,sinB,R

D. a,sinA,R

Answer: D

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92. In a triangle ABC, (a+b+c)(b+c-a)=kbc if

A. $k < 0$

B. $k > 6$

C. $0 < k < 4$

D. $k > 4$

Answer: C

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93. If cosA/a=cosB/b=cosC/cand the side a=2, then area of triangle is

A. 1

B. 2

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

D. $\sqrt{3}$

Answer: D

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94. If λ be the perimeter of the ΔABC. then $b\cos^2\left(\frac{c}{2}\right)+c\cos^2\left(\frac{B}{2}\right)$ is equal to

A. λ

B. 2λ

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

D. none of these

Answer: C

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95. If the area of a triangle ABC is given by $\Delta = a^2 - (b-c)^2$ then $\tan\left(\frac{A}{2}\right)$ is equal to

A. -1

B. 0

C. 1/4

D. 1/2

Answer: C

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96. If in a ΔABC, cosA+2cosB+cosC=2,`then a,b,c are in

A. A.P.

B. G.P.

C. H.P.

D.

Answer: A

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97. If D is the mid point of side BC of a triangle ABCand AD is perpendicular to BC, then

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

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

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

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

Answer: B

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98. If f,g,h are the internal bisectors of a ΔABC` then

1/fcos(A/2)+1/gcos (B/2)+1/hcos(c/2) is equal to

A. 1/a+1/b-1/c

B. 1/a-1/b+1/c

C. 1/a+1/b+1/c

D. none of these

Answer: C

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99. If a,b,c,d be the sides of a quadrilateral and g(x)=f[f{f(x)}], where $f(x)=\frac{1}{1-x}$ then $\frac{d^2}{a^2+b^2+c^2}$ is equal to

A. $> g(3)$

B. $< g(3)$

C. $> g(2)$

D. $< g(4)$

Answer: B

Watch Video Solution

100. In aΔABC, $\frac{\sin A}{\sin C}=\frac{\sin(A-B)}{\sin(B-C)}$ then

A. cotA,cotB,cotC, in A.P.

B. sin2A,sin2B,sin2C in A.P.

C. cos2A,cos2B,cos2C in A.P.

D. asinA,bsinB,csinC in A.P.

Answer: C

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101. Let a,b,c be the sides of triangle whose perimeter is p and area is A, then

A. $p^3 \leq 27(b+c-a)(c+a-b)(a+b-c)$

B. $p^2 \leq 3(a^2+b^2+c^2)$

C. $a^2+b^2+c^2 \geq 4\sqrt{3}A$

D. $p^4 \leq 25 < A$

Answer: B::C

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102. If in a ΔABC, CD is the angle bisector of the $\angle ABC$, then CD is equal to

A. $\left(\frac{a+b}{2ab}\right)\cos\left(\frac{c}{2}\right)$

B. $\left(\frac{a+b}{ab}\right)\cos\left(\frac{c}{2}\right)$

C. $\left(\frac{2ab}{a+b}\right)\cos\left(\frac{c}{2}\right)$

D. $\frac{b\sin A}{\sin(B)}$

Answer: C

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103. If A, A_1, A_2, A_3 are the areas of the inscribed and escribed circles of a ΔABC, then

A. `sqrtA_1+sqrtA_2+sqrtA_3=sqrtpi(r_1+r_2+r_3)

B. $\frac{1}{\sqrt{A_1}}+\frac{1}{\sqrt{A_2}}+\frac{1}{\sqrt{A_3}}=\frac{1}{\sqrt{A}}$

C. $\frac{1}{\sqrt{A_1}}+\frac{1}{\sqrt{A_2}}+\frac{1}{\sqrt{A_3}}=\frac{s^2}{\sqrt{\pi r_1 r_2 r_3}}$

D. $\sqrt{A_1}+\sqrt{A_2}+\sqrt{A_3}=\sqrt{\pi}(4R+r)$

Answer: A::B::C::D

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104. If A+B $=\frac{\pi}{3}$ and cosA+cosB=1, then which of the following is/are true

A. $\cos(a-b)=\frac{1}{3}$

B. $|\cos A-\cos B|=\sqrt{\frac{2}{3}}$

C. $\cos(A-B)=-\frac{1}{3}$

D. $|\cos A-\cos B|=\frac{1}{2\sqrt{3}}$

Answer: B::C

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105. When any two sides and one of the opposite acute are given, under certain additional condition two triangle are possible. The case when two triangle are possible is called the ambiguous case.

In fact when any two sides and the angle opposite to one of them are given either no triangle is possible or only one triangle is possible or two triangle are possible.

In the ambiguous case, let a, b, and angleA are given and c_1,c_2 are two values of the third side c.

Two different triangle are possible when

A. $b \sin A < a$

B. $b \sin A < a$ and $b > a$

C. $b \sin A < a$ and $b < a$

D. $b \sin A < a$ and $a = b$

Answer: B

Watch Video Solution

106. When any two sides and one of the opposite acute are given, under certain additional condition two triangle are possible. The case when two triangle are possible is called the ambiguous case.

In fact when any two sides and the angle opposite to one of them are given either no triangle is possible or only one triangle is possible or two triangle are possible.

In the ambiguous case, let a, b, and angleA are given and c_1,c_2 are two values of the third side c

The difference between two values of c is

A. $2\sqrt{(a^2 - b^2)}$

B. $\sqrt{(a^2 - b^2)}$

C. $2\sqrt{(a^2 - b^2 \sin^2 A)}$

D. $\sqrt{(a^2 - b^2 \sin^2 A)}$

Answer: C

Watch Video Solution

107. If p_1, p_2, p_3 are altitudes of a triangle ABC from the vertices A,B,C respectively and Δ is the area of the triangle and s is semi perimeter of the triangle.

If $\frac{1}{p_1} + \frac{1}{p_2} + \frac{1}{p_3} = \frac{1}{2}$, then the least value of $p_1 p_2 p_3$ is

A. 8

B. 27

C. 125

D. 216

Answer: D

Watch Video Solution

108. If p_1, p_2, p_3 are altitudes of a triangle ABC from the vertices A,B,C respectively and Δ is the area of the triangle and s is semi perimeter of the triangle

The value of $\frac{\cos A}{p_1} + \frac{\cos B}{p_2} + \frac{\cos C}{p_3}$ is

A. 1/r

B. 1/R

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

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

Answer: B

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109. Match List - I with List-II

List - I	List - II
(1) Circular plate is expanded by heat from radius 5 cm to 5.06 cm. Approximate increase in area is	(P) 4
(2) If an edge of a cube increases by 1%, then percentage increase in volume is	(Q) 0.6π
(3) If the rate of decrease of $\frac{x^2}{2}-2x+5$ is twice the rate of decrease of x, then x is equal to (rate of decreases is non-zero)	(R) 3
(4) Rate of increase in area of equilateral triangle of side 15 cm, when each side is increasing at the rate of 0.1 cm/s, is	(S) $\frac{3\sqrt{3}}{4}$

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111. In a Δ, (a+b+c)(b+c-a)=λbc, when$\lambda \in I$, then greatest value of λ is

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112. In a ΔABC then line joining the circumcentre to the incentre is parallel to BC, then valueof cosB+cosC is

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113. If in a ΔABC, a=5, b=4 and cos(A-B)=31/32, then the third side c is equal to

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114. In ΔABC, if BC is unity, $\sin\left(\frac{A}{2}\right)=x_1, \sin\left(\frac{B}{2}\right)=x_2$, $\cos\left(\frac{A}{2}\right)=x_3, \cos\left(\frac{B}{2}\right)=x_4$ with $\left(\frac{x_1}{x_2}\right)^{2007}-\left(\frac{x_3}{x_4}\right)^{2007}=0$, then the length of ACis ....

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115. If any ΔABC, if sinA,sinB,sinC are in A.P. and the maximum value of $\tan\left(\frac{B}{2}\right)=\lambda$, then $\frac{1}{\lambda^2}$is -

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116. In $\triangle ABC$ (b+c)/11=(c+a)/12=(a+b)/13 then prove that (cosA)/7=(cosB)/19=(cosC)/25

Watch Video Solution

117. In $\triangle ABC$ if cosAcosB +sinAsinB sinC=1 then prove that$a : b : c = 1 : 1 : \sqrt{2}$

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118. If in a triangle ABC, AD, BE and CF are the attitude and R is the circum-radius then find the radius of circle circumscribing the triangle DEF.

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119. If x,y,z are the perpendiculars from the vertices of a triangle ABC on the opposite sides a,b,c respectively, then show that $\frac{bx}{c}+\frac{cy}{a}+\frac{az}{b}=\frac{a^2+b^2+c^2}{2R}$

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120. In a ΔABC prove that: $a^3\cos(B-C)+b^3\cos(C-A)+c^3\cos(A-B)=3abc$

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121. In $\triangle ABC$, D is the mid point of side BC. If AD is perpendicular to AC. then prove that $\cos A \cos C$

$$= \frac{2(c^2 - a^2)}{3ca}$$

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122. For a ΔABc, it is given that cosA +cosB+cosC=3/2. prove that the Δ is equilateral.

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123. If any ΔABC, show that :

$$\frac{\sin^2 A + \sin A + 1}{\sin A} \geq 3$$

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124. In a ΔABC, if $\cot A + \cos B + \cot C =$ sqrt3 $. prove t\hat{t} he$Delta`is equilateral.

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125. Perpendiculars are drawn from the anglesA, B,C,of an acute angles Δ on the opposite sodes and products to meet the circumscribing circle. If these produced parts be $\propto$, β, γrespectively, show that $\frac{a}{\propto} + \frac{b}{\beta} + \frac{c}{\gamma} = 2(\tan A + \tan B + \tan C$

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126. ABCD is a trapezium such that AB,DC.are parallel and BC is perpendicular to them. If $\angle ADB = \theta, BC = p$ and $CD = q$, show that AB= $\dfrac{(p^2 + q^2)\sin\theta}{p\cos\theta + q\sin\theta}$

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127. For any triangle ABC, $\dfrac{(a+b+c)(b+c-a)(c+a-b)(a+b-c)}{4b^2c^2}$ is equal to

A. cos^2A

B. sin^2A

C. cosAcosBcosC

D. none of these

Answer: B

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128. In ΔABC, if $a=5, b=4$ and $\cos(A-B)=\frac{31}{32}$,then the perimeter of triangle is

A. 15

B. 14

C. 13

D. none of these

Answer: A

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129. If in triangle ABC,cot(A/2)=(b+c)/a, then the triangleABC is

A. isosceles

B. equilateral

C. right-angled

D. none of these

Answer: C

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130. In a triangleABC, $\tan\left(\frac{A}{2}\right)=\frac{5}{6}, \tan\left(\frac{C}{2}\right)=\frac{2}{5}.$

Then which of the following is correct?

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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131. In a triangle ABC , $c^2 = a^2 + b^2$,2s=a+b+c. Then 4s(s-a)(s-b)(s-c)is equal to

A. 5^4

B. b^2c^2

C. c^2a^2

D. a^2b^2

Answer: D

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132. In a triangle ABC, $a\cos A = b\cos B$. Then the triangle is

A. equilateral

B. scalene

C. isosceles

D. none of these

Answer: C

Watch Video Solution

133. Sides of a triangle ABC are in A.P. If $a < \min\{b, c\}$,then cosA may be equal to

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

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

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

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

Answer: D

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134. Angles A, Band C of a triangle ABC are in A.P.If b/c= $\frac{\sqrt{3}}{\sqrt{2}}$, then angle A is

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

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

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

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

Answer: C

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135. In a triangleABC, bccotA+cacotB+c abcotC is equal to ?

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136. In a triangle ABC, (acosA+bcosB+ccc cosC)/(a+b+c) is equal to

A. R/r

B. R/(2r)

C. r/R

D. (2r)/R

Answer: C

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137. In a triangle ABC, $\angle B = \frac{\pi}{3}$ and $\angle C = \frac{\pi}{4}$. Let D divide side BC internally in the ratio 1:3.

Then $\frac{\sin(\angle BAD)}{\sin(\angle CAD)}$ is

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

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

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

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

Answer: A

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138. If in a triangle ABC, $\frac{2\cos A}{a} + \frac{\cos B}{b} + \frac{2\cos C}{c} = \frac{a}{bc} + \frac{b}{ac}$, then angle A is

A. 90°

B. 45°

C. 135°

D. none of these

Answer: A

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139. If the bisector of angle A of triangle ABC makes an angle θ with BC, then $\sin\theta$ is

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

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

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

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

Answer: A

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140. If P is a point on the altitude AD of the triangle ABC such that $\angle CBP = \frac{B}{3}$, then APis

A. $2a \sin\left(\frac{C}{3}\right)$

B. $2b \sin\left(\frac{C}{3}\right)$

C. $2c \sin\left(\frac{B}{3}\right)$

D. $2c \sin\left(\frac{C}{3}\right)$

Answer: C

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141. For a regular of n sides, sides are a , and circum radius is R and in-radius =r, then r+R is

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

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

C. $\frac{a}{4}\cot\left(\frac{\pi}{2n}\right)$

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

Answer: D

Watch Video Solution

142. If p_1, p_2, p_3 are altitudes of a triangle ABC from the vertices A,B,C respectively and Δ is the area of the triangle and s is semi perimeter of the triangle.

If $\frac{1}{p_1} + \frac{1}{p_2} + \frac{1}{p_3} = \frac{1}{2}$, then the least value of $p_1 p_2 p_3$ is

A. 8

B. 27

C. 125

D. 216

Answer: D

Watch Video Solution

143. In a triangle if the sum of two sides is x and this product is $y(\geq 2\sqrt{x})$ such that $x^2 - z^2 = y,$ where z is the third side, then in-radius of the triangle is

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

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

C. $\frac{y\sqrt{3}}{2(x+z)}$

D. $\frac{z\sqrt{3}}{(x+y)}$

Answer: C

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144. If $P_1P_2P_3$are altitude of a triangle which circumscribes a circle of diameter $\frac{16}{3}$ unit. then the least value of $P_1 + P_2 + P_3$ is

A. 12

B. 24

C. 22

D. none of these

Answer: B

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145. A nine-side regular polygon with side length 2, is inscribed in a circle. The radius of the circle is

A. $\sec\left(\frac{\pi}{9}\right)$

B. $\sin\left(\frac{\pi}{9}\right)$

C. $\cos ec\left(\frac{\pi}{9}\right)$

D. $\tan\left(\frac{\pi}{9}\right)$

Answer: C

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146. A circle is inscribed in an equilateral triangle of side length a. The area of any square inscribed in the circle is

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

B. $\frac{a^2}{6}$

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

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

Answer: B

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147. In a triangle ABC, $\angle C = \frac{\pi}{2}$. If r is the in-radius and R is the circum-radius of the triangle ABC, then 2(r+R) is equal to

A. a+b-c/2

B. b+c

C. c+a

D. a+b+c

Answer: A

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148. In an ambiguous case of solving a triangle when $a = \sqrt{5}, b = 2, \angle A = \frac{\pi}{6}$ and the two possible value of third side are c_1 and c_2 then

A. $|c_1 - c_2| = 2\sqrt{6}$

B. $|c_1 - c_2| = 4\sqrt{6}$

C. $|c_1 - c_2| = 4$

D. $|c_1 - c_2| = 6$

Answer: C

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149. In an equilateral triangle , $R : r : r_2$ is equal to

A. 1:1:1

B. 1:2:3

C. 3:2:1

D. 3:2:4

Answer: C

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150. In a ΔABC, angles A,B,C are in A.P. Then $\lim_{A \to C} \frac{\sqrt{3 - 4\sin A \sin C}}{|A - C|}$ is

A. 1

B. 2

C. 3

D. 4

Answer: A

Watch Video Solution

151. If a,b,c,d,be the sides of a quadrilateral and g(x)=f[f{f(x)}], where f(x)=1/(1-x), $\frac{d^2}{a^2+b^2+c^2}$ is equal to

A. $> g(3)$

B. $< g(3)$

C. $> g(2)$

D. $< g(4)$

Answer: B

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152. In ΔABC, let $A = \frac{\pi}{3}$, b=40, c=30, AD is a median, them the value of AD is

A. $6\sqrt{13}$

B. $4\sqrt{5}$

C. $3\sqrt{34}$

D. $5\sqrt{37}$

Answer: D

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153. In a ΔABC, sides a,b,c are in A.P. and $\frac{2}{1!9!}+\frac{2}{3!7!}+\frac{1}{5!5!}=\frac{8^a}{2b}!$, then the maximum value of tanA tanB is equal to

A. 44228

B. 44256

C. 44287

D. 1/3

Answer: B

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154. In an isosceles triangle ABC, AB=AC. If vertical angle A is 20°, then $a^3 + b^3$ is equal to

A. $3a^2b$

B. $3b^2c$

C. $3c^2a$

D. abc

Answer: C

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155. If f,g, h are the internal bisectors of a ΔABC, then $\frac{1}{f}\cos\left(\frac{A}{2}\right)+\frac{1}{g}\cos\left(\frac{B}{2}\right)+\frac{1}{h}\cos\left(\frac{C}{2}\right)$ is equal to

A. 1/a+1/b-1/c

B. 1/a-1/b+1/c

C. 1/a+1/b+1/c

D. none of these

Answer: C

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156. Let $A_0A_1A_2A_3A_4A_5$ be a regular hexagon inscribed in a circle of unit radius. Then the product of the lengths of the line segments A_0A_1, A_0A_2 and A_0A_4 is

A. 44289

B. $3\sqrt{3}$

C.

D. (3sqrt(3))/2

Answer: C

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157. 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. equilateral

B. isosceles

C. right angled

D. obtuse angled

Answer: C

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158. If the sine of the angles of ΔABCsatisfy the equation$c^3x^3 - c^2(a+b+c)x^2 + Ix + m = 0$ (where a, b c are the sides of ΔABC), then ΔABC is

A. always right angled for any I,m

B. right angled only when

$$I = c(ab + bc + ca) = c\sum ab, m = -abc$$

C. right angled only when

$$I = \frac{c\sum ab}{4}, m = -\frac{abc}{8}$$

D. never right angled

Answer: B

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159. In a triangle ABC, $r^2 + r_1^2 + r_2^2 + r_3^2 + a^2 + b^2 + c^2$ is equal to (where r is inradius and r_1, r_2, r_3 are exradil a,b,c are the sides of ΔABC)

A. $2R^2$

B. $4R^2$

C. $8R^2$

D. $16R^2$

Answer: D

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

A. right angled

B. isosceles

C. equilateral

D. none of these

Answer: A

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161. If I is the incenter of ΔABC, then the ratio IA:IB:IC is equal to

A. $\cos ec\left(\frac{A}{2}\right):\cos ec\left(\frac{B}{2}\right):\cos ec\left(\frac{C}{2}\right)$

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

C. $\sec\left(\frac{A}{2}\right):\sec\left(\frac{B}{2}\right):\sec\left(\frac{C}{2}\right)$

D. none of the above

Answer: A

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162. If in a $\Delta ABC, a^2\cos^2 A=b^2+c^2,$ then

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

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

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

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

Answer: C

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163. In any ΔABC, $\prod \frac{\sin^2 A + \sin A + 1}{\sin A}$ is always greater than

A. 9

B. 3

C. 27

D. none of these

Answer: C

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164. In any triangle ABC, $\sum \frac{\sin^2 A + \sin A + 1}{\sin A}$ is always greater than

A. 9

B. 3

C. 27

D. none of these

Answer: A

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165. In ΔABC, the value of $\frac{(r_1 + r_2)(r_2 + r_3)(r_3 + r_1)}{R(s)^2}$ is

A. 3

B. 4

C. 2

D. 1

Answer: B

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166. If in a triangle $\frac{s-a}{11}=\frac{s-b}{12}=\frac{s-c}{13}$, then $\tan^2\left(\frac{A}{2}\right)$

A. 44317

B. 19/34

C. 13/33

D. none of these

Answer: C

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167. If in a triangle ABC, $\angle B = 60^\circ$, then

A. $(a-b)^2 = c^2 - ab$

B. $(a-b)^2 = b^2 - ab$

C. $(c-a)^2 = b^2 - ac$

D. $a^2 + b^2 + c^2 = ac$

Answer: C

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168. Given an isosceles triangle with equal sides of length b,base angle $\alpha < \frac{\pi}{4}$and R, r the radii and o, I the centres of the circumcricle and incircle, respectively. Then

A. $R = \frac{1}{2} b \cos ec\alpha$

B. $\Delta 2b^2 \sin 2\alpha$

C. $r = \frac{b \sin 2\alpha}{2(1 + \cos \propto)}$

D. $OI \left| \frac{b \cos\left(\frac{3\alpha}{2}\right)}{2 \sin \alpha \cos\left(\frac{\alpha}{2}\right)} \right|$

Answer: A::C::D

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169. In ΔABC, $A = 15^\circ$, $b = 10\sqrt{2}cm$ the value of 'a' for which these will be a unique triangle meeting these requirement is

A. $10\sqrt{2}cm$

B. 15cm

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

D. $5(\sqrt{3}-1)cm$

Answer: A::D

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170. In $\Delta ABC, a=5, b=4, A=\left(\frac{\pi}{2}\right)+B,$ thenC

A. cannot be evaluated

B. $\tan^{-1}\left(\frac{9}{40}\right)$

C. $\tan^{-1}\left(\frac{1}{40}\right)$

D. $2\tan^{-1}\left(\frac{1}{9}\right)$

Answer: B

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171. If tanA, tanB are the roots of the quadratic $abx^2 - c^2x + ab = 0$, where a,b,c are the sides of a triangle. then

A. $\tan A = \frac{a}{b}$

B. $\tan B = \frac{b}{a}$

C. cos C=0

D. $\tan A + \tan B = \dfrac{c^2}{ab}$

Answer: A::B::C::D

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172. There exist a triangle ABC satisfying

A. tanA+tanB+tanC=0

B. sinA/2=sinB/3=sinC/7

C. $(a+b)^2 = c^2 + ab$ and $\sqrt{2}(\sin A + \cos A) = \sqrt{3}$

D. $\sin A + \sin B = \frac{(\sqrt{3}+1)}{2}$

$$\cos A \cos B = \frac{\sqrt{3}}{4} = \sin A \sin B$$

Answer: C::D

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173. In a ΔABC, $\tan C < 0$. Then

A. $\tan A \tan B < 1$

B. $\tan A \tan B > 1$

C. $\tan A + \tan B + \tan C < 0$

D. $\tan A + \tan B + \tan C > 0$

Answer: A::C

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174. If the since of the angles A and B of a triangle ABCsatisfy the equation $c^2x^2 - c(a+b)x + ab = 0$, then the triangle

A. is acute angled

B. is right angled

C. is obtuse angled

D. satisfies$(\sin A + \cos A) = \frac{(a+b)}{c}$

Answer: B::D

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175. In a ΔABC tanA and tanB satisfy the equation $\sqrt{3}x^2 - 4x + \sqrt{3} < 0$, then

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

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

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

D. none of these

Answer: A::B

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176. For a triangle ABC, which of the following is true?

A. cosA/a=cosB/b=cosC/c

B. $\frac{\cos A}{a} + \frac{\cos B}{b} + \frac{\cos C}{c} = \frac{a^2 + b^2 + c^2}{2abc}$

C. $\frac{\sin A}{a} + \frac{\sin B}{b} + \frac{\sin C}{c} = \frac{3}{2R}$

D. $\frac{\sin 2A}{a^2} = \frac{\sin 2B}{b^2} = \frac{\sin 2C}{c^2}$

Answer: B::C

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177. ABCD be a cycle quadrilateral inscribed in a circle of radius R. The sides of a quadrilateral which can be inscribed in a circle are 6,6,8and 8cm.Then radius of circumcircle is

A. 5/2cm

B. 24/7cm

C. 11/7cm

D. none of these

Answer: D

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178. A quadrilateral ABCD is such that one circle can be inscribed in it and another circle circumscribed about it, then $\tan^2\left(\frac{A}{2}\right)$ is equal to

A. bc/ad

B. ab/cd

C. ad-bc/ad+bc

D. a+c/b+d

Answer: A

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179. ABCD be a cyclic quadrilateral inscribed in a circle of radius R. In previous problem the radius of the latter circle is

A. $\dfrac{\sqrt{(abcd)}}{(a+b+c+d)}$

B. $\dfrac{\sqrt{2abcd}}{(a+b+c+d)}$

C. $\dfrac{2\sqrt{(2abcd)}}{(a+b+c+d)}$

D. $\dfrac{2\sqrt{(a+c)(b+d)}}{a+b+c+d}$

Answer: C

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180. When any two sides and one of the opposite acute are given, under certain additional condition two triangle are possible. The case when two triangle are possible is called the ambiguous case.

In fact when any two sides and the angle opposite to one of them are given either no triangle is possible or only one triangle is possible or two triangle are possible.

In the ambiguous case, let a, b, and angleA are given and c_1,c_2 are two values of the third side c.

Two different triangle are possible when

A. $b \sin A < a$

B. $b \sin A < a \text{ and } b > a$

C. $b \sin A < a \text{ and } b < a$

D. $b \sin A < a \text{ and } a = b$

Answer: B

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181. When any two sides and one of the opposite acute are given, under certain additional condition two triangle are possible. The case when two triangle are possible is called the ambiguous case.

In fact when any two sides and the angle opposite to one of them are given either no triangle is possible or only one triangle is possible or two triangle are possible.

In the ambiguous case, let a, b, and angleA are given and c_1,c_2 are two values of the third side c

The difference between two values of c is

A. $2\sqrt{(a^2-b^2)}$

B. $\sqrt{(a^2 - b^2)}$

C. $2\sqrt{(a^2 - b^2 \sin^2 A)}$

D. $\sqrt{(a^2 - b^2 \sin^2 A)}$

Answer: C

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182. When any two sides and one of the opposite acute are given, under certain additional condition two triangle are possible. The case when two triangle are possible is called the ambiguous case.

In fact when any two sides and the angle opposite to one of them are given either no triangle is possible or only one triangle is possible or two triangle are possible.

In the ambiguous case, let a, b, and angleA are given and c_1,c_2 are two values of the third side c

The difference between two values of c is

A. 4acosA

B. $4a^2 \cos A$

C. $4a \cos^2 A$

D. $4a^2 \cos^2 A$

Answer: D

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183. Match List - I with List-II

List - I	List - II
(1) Circular plate is expanded by heat from radius 5 cm to 5.06 cm. Approximate increase in area is	(P) 4
(2) If an edge of a cube increases by 1%, then percentage increase in volume is	(Q) 0.6π
(3) If the rate of decrease of $\frac{x^2}{2}-2x+5$ is twice the rate of decrease of x, then x is equal to (rate of decreases is non-zero)	(R) 3
(4) Rate of increase in area of equilateral triangle of side 15 cm, when each side is increasing at the rate of 0.1 cm/s, is	(S) $\frac{3\sqrt{3}}{4}$

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184. Match List - I with List-II

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(4) Rate of increase in area of equilateral triangle of side 15 cm, when each side is increasing at the rate of 0.1 cm/s, is	(S) $\frac{3\sqrt{3}}{4}$

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185. In a triangle ABC, right angled at A. The radius of the inscribed circle is 2cm. Radius of the circle touching the side BC and also sides AB and AC produced is 15cm. The length of the side BC measured in cm is a, then 9a/13 is........

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186. If in a ΔABC, BC =5, CA=4, AB=3 and D, E are the point on BC such that BD=DE=EC, then 8tan $(\angle CAE)$ must be

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187. Three circle touch one another externally. The tangents at their points of contact meet at a point whose distance from the point of contant is 4. If the ratio of the product of the radii to the sum of the radii of the circle is λ, then $\frac{\lambda}{2}$ is ....

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188. If the radius of the circumcircle of a triangle is 12 and that of the incircle is 4. The sum of radii of the escribed circle is λ, then $\frac{\lambda}{13}$ is

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189. In a ΔABC, the maximum value of $4\left(\frac{\sum a\cos^2\left(\frac{A}{2}\right)}{a+b+c}\right)$ must be

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190. The sides of a cyclic quadrilateral are in A.P., the shortest is 6 and the difference of the longest and the shortest is also 6. The square of the area of the quadrilateral is ....

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191. In ΔABC, $\frac{r}{r_1} = \frac{1}{2}$, then the value of $\tan\left(\frac{A}{2}\right)\left(\tan\left(\frac{B}{2}\right) + \tan\left(\frac{C}{2}\right)\right)$ must be

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192. In a triangle ABC, the incircle touches the sides BC, CA and AB at D,E,F respectively. If radius of incircle is 4 unit and BD,CE and AF be consecutive natural numbers. The sum of the cubes of the length of the sides is λ, then $\frac{\lambda}{2079}$ is ....

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193. In triangle ABC, a=5,b=4,c=3. G is the centroid of triangle. If R_1 be the circumradius of triangle GAB, then the value of $\frac{325}{R_1^2}$ must be

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194. In the adjacent figure 'P' is any arbitrary interior point of the triangle ABC. H_a, H_b and H_c are the length of altitudes draw from vertices A,B and C respectively. If x_a, x_b and x_c represent the distance of 'P' from sides BC, CA and AB respectively, then the minimum value of $\left(\frac{H_a}{x_a}+\frac{H_b}{x_b}+\frac{H_c}{x_c}\right)$ must be

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195. Prove that asin(B-C)+bsin(C-A)+csin(A-B)=0.

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196. Prove that $1 - \tan\left(\frac{A}{2}\right)\tan\left(\frac{B}{2}\right) = \frac{2c}{a+b+c}$.

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197. Prove that acosA+bcosB+ccosC=2asinBsinC.

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198. prove that cosA +cosB+cosC=1+r/R.

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199. The sides of a triangle are $x^2+3x+3,\ 2x+3,\ x^2+2x$. Find the greatest angle of the triangle.

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200. If P_1, P_2, P_3 be the altitudes of a triangle from the vertices A,B,C Respectively and Δ be the area the triangle, then prove that $\frac{1}{P_1^2} + \frac{1}{P_2^2} + \frac{1}{P_3^3} = \frac{\cot A + \cot B + \cot C}{\Delta}$.

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201. If in $\triangle ABC, a^4 + b^4 + c^4 = 2c^2(a^2 + b^2)$ then find $\angle C$

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202. Let h_1, h_2, h_3 be the altitudes of the ΔABC and let the inradius be r. Then show that $\frac{h_1 + r}{h_1 - r} + \frac{h_2 + r}{h_2 - r} + \frac{h_3 + r}{h_3 - r} \geq 6$.

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203. For any triangle ABC, find the value of

$$\frac{bc\cos^2\left(\frac{A}{2}\right)+ca\cos^2\left(\frac{B}{2}\right)+ab\cos^2\left(\frac{C}{2}\right)}{a+b+c}.$$

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204. If in a ΔABC,

$\sin^3 A+\sin^3 B+\sin^3 C=3\sin A.\sin B.\sin C$,

then find the value of determinant, $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$

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205. AD is a median of the ΔABC.If AE and AFare medians of the triangles ABD respectively, and AD= $m_1, AE = m_2 AF = m_3,$ then find the value of $\frac{a^2}{8}$.

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206. In a triangle ΔXYZ, let a,b and c be the lengths of the sides opposite to the angles X,Y and Z, respectively. If $2(a^2 - b^2) = c^2$ and $\lambda = \frac{\sin(X - Y)}{\sin Z,}$ then possible values of n for which $\cos(n\pi\lambda) = 0$ is (are)

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207. In a triangle ΔXYZ, let a, b, and c be the length of the sides opposites to the angles X,Y and Z, respectively.If $1 + \cos 2X - 2\cos 2Y = 2\sin X \sin Y$, then possible value(s) of a/b is (are)

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208. If the angles of elevation of the top of a water from three collinear points, B and C, on a line leading to the foot of the tower, are 30°, 45° and 60° respectively, then the ratio, AB:BC,is:

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

B. $1 : \sqrt{3}$

C. 2:3

D. $\sqrt{3} : 1$

Answer:

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209. If in a triangle $\Delta ABC, a^2 \cos^2 A - b^2 - c^2 = 0$, then

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

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

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

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

Answer: B

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210. In a triangle ABC,$\angle C = 90^\circ$, r and R are the inradius and circumradius of the triangle ABC respectively, then 2(r+R) is equal to

A. b+c

B. c+a

C. a+b

D. a+b+c

Answer: C

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211. A bird is sitting on the top of a vertical pole 20 m high and its elevations 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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212. In a ΔABC, tanA and tanB are the roots of $pq(x^2+1)=r^2x$. Then ΔABC is

A. a right angled triangle

B. an acute angled triangle

C. an obtuse angled triangle

D. an equilateral triangle

Answer: A

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213. In a ΔABC, a,b,c are the sides of the triangle opposite to the angles A,B,C respectively. Then the value of $a^3 \sin(B-C) + b^3 \sin(C-A) + c^3 \sin(A-B)$ is equal to

A. 0

B. 1

C. 3

D. 2

Answer: A

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214. Let PQR be a triangle of area Δ with $a=2, b=\frac{7}{2}$ and $c=\frac{5}{2}$, where a,b and c are the lengths of the sides of the triangle opposite to the angles at P,Q and R respectively. Then $\left(\frac{2\sin P-\sin 2P}{2\sin P+\sin 2P}\right)$ equals

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

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

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

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

Answer: C

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215. Let p,q,r be the sides opposite to the angles P,Q,R respectively in a triangle PQR. Then $2pr\sin\left(\frac{P-Q+R}{2}\right)$ equal

A. $p^2+q^2+r^2$

B. $p^2+r^2-q^2$

C. $q^2+r^2-p^2$

D. $p^2+q^2-r^2$

Answer: B

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216. Let p,q,r be the altitudes of a triangle with area s and perimeter 2t. Then the value of $1/p+1/q+1/r$ is

A. s/t

B. t/s

C. $s/(2t)$

D. $(2s)/t$

Answer: B

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217. If in a triangle ABC, sinA, sinB,sinC are in A.P., then

A. the altitudes are in A.P.

B. the altitudes are in H.P.

C. the angles are in A.P.

D. the angles are in H.P

Answer: B

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