



MATHS

BOOKS - PATHFINDER MATHS (BENGALI ENGLISH)

TRIGONOMETRIC FUNCTIONS

Question Bank

1. In $\triangle ABC$ which one of the following is equal to $ab \cos C + bc \cos A$?

A. a) a^2

B. b) b^2

C. c) c^2

D. d) $a^2 + b^2$

Answer: B



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2. In $\triangle ABC$ if $a=3$ cm $b=4$ cm and $c=5$ am then value of $\cos B$ is

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3. If in $\triangle ABC$ $\cos A/\cos B = a/b$ then $\triangle ABC$ is

- A. a) right angled
- B. b) equilateral
- C. c) isosceles
- D. d) none of these

Answer: C

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4. In $\triangle ABC$ $\sin^2 A + \sin^2 B = \sin^2 C$ then $\angle C =$

A. a) 30°

B. b) 60°

C. c) 90°

D. d) 120°

Answer: C



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5. If in $\triangle ABC$, $\angle A = 60^\circ$, $\angle B = 45^\circ$ and $a = 2\sqrt{3}$ units then the value of b is

A. a) $\sqrt{2}$ units

B. b) $2\sqrt{2}$ units

C. c) 2 units

D. d) $\frac{1}{\sqrt{2}}$ units

Answer: B

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6. If in $\triangle ABC$ if $a\cos A = b\cos B$ then the triangle will be

- A. a) isosceles
- B. b) equilateral
- C. c) right angled
- D. d) isosceles or right angled

Answer: D

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7. In $\triangle ABC$ if $\cos A = \sin B / \sin C$ then the triangle is

- A. a) equilateral
- B. b) right angled
- C. c) isosceles

D. d)none of these

Answer: B



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8. If in $\triangle ABC$ $a=2b$ and $\angle A = 3\angle B$ then $\angle A =$

A. a) 90°

B. b) 60°

C. c) 45°

D. d) 30°

Answer: A



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9. If in $\triangle ABC$, $3a^2 = b^2 + c^2$ then $\cot B + \cot C - \cot A =$

A. 1

B. 0

C. $a\frac{c}{4} \triangle$

D. $a\frac{b}{4} \triangle$

Answer: B

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10. $\cos A/2 = \sqrt{\frac{b+c}{2c}}$ then the correct option is

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

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

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

D. d) none of these

Answer: A

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11. The length of three sides of a triangle be 1cm,2cm and 3 cm then the value of smallest angle is

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

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

C. c) $\frac{\pi}{31}$

D. d) No triangle will be formed.

Answer: B



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12. In an isosceles triangle ABC, $\angle A = 120^\circ$, a:b=

A. a) 2:1

B. b) $(1: \sqrt{3})$

C. c) 1:2

D. d) $(\sqrt{3}:1)$

Answer: D



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

A. a) $\angle A = \frac{\pi}{2}$

B. b) $\angle B = \frac{\pi}{2}$

C. c) $\angle C = \frac{\pi}{2}$

D. d) $\angle A = \frac{\pi}{4}$

Answer: A



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14. If the ratio of the angles of a triangle be 1:2:3 and the circumradius be 10 cm then the length of the greatest side is

- A. a)5cm
- B. b) $5\sqrt{3}$ cm
- C. c) $10\sqrt{3}$ cm
- D. d)20cm

Answer: D



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15. If in $\triangle ABC$, $a=5$ cm $b=5\sqrt{3}$ and $\angle C = 30^\circ$ then $c=$

- A. a)5cm
- B. b) $5\sqrt{3}$
- C. c) $\frac{5}{\sqrt{3}}$
- D. d)none of these

Answer: A



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16. If in $\triangle ABC$, $\angle C = 90^\circ$ then $\tan A + \tan B =$

A. a) $a+b$

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

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

D. d) none of these

Answer: C



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17. If in $\triangle ABC$ $a=3\text{cm}$, $b=5\text{cm}$ and $c=7\text{cm}$ then the triangle is

A. a) acute angled

B. b) right angled

C. c) obtuse angled

D. d) right angled isosceles

Answer: C



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18. If the ratio of the length of the sides of a triangle be $1 : \sqrt{3} : 2$ then the ratio of the angle be

A. 1:3:5

B. 1:2:3

C. 2:3:1

D. 2:3:4

Answer: B



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19. In $\triangle ABC$ if $C = \frac{\pi}{2}$ then the greatest value of $\sin A \sin B$ is

A. 1

B. 2

C. $(1/2)$

D. none of these

Answer: C



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20. If in a triangle ABC , $(a-b+c)/a=b/(b+c-a)$ then $\angle C =$

A. a) 45°

B. b) 60°

C. c) 120°

D. d) none of these

Answer: B



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21. In $\triangle ABC$ if $c^2 = a^2 + b^2$ then $4s(s-a)(s-b)(s-c) =$

A. s^4

B. $c^2 a^2$

C. $a^2 b^2$

D. $b^2 c^2$

Answer: C



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22. If in $\triangle ABC$ $a=3\text{cm}$, $b=5\text{cm}$ and $\angle C = 120^\circ$ then $c =$

A. 5cm

B. 7cm

C. 4cm

D. 9cm

Answer: B



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23. If $2\cos A = \sin B / \sin C$ then show that the triangle is an isosceles triangle



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24. If $(\sin A)/3 = (\sin B)/3 = (\sin C)/4$ then prove that $\cos C = 1/9$



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25. The lengths of sides of $\triangle ABC$ are a units, b units and $\sqrt{a^2 + ab + b^2}$ units show that greatest angle of the triangle is 120°



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26. For any $\triangle ABC$ show that

$$c^2(\sin^2 B - \sin^2 A) + b^2(\sin^2 A - \sin^2 C) + a^2(\sin^2 C - \sin^2 B) = 0$$



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27. Prove that for a triangle ABC,

$$(a^2 - b^2 - c^2)\tan A + (a^2 - b^2 + c^2)\tan B = 0$$



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28. In any triangle ABC prove that $\sin 2A + \sin 2B + \sin 2C = \frac{abc}{2R^3}$



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29. If $(a+b+c)(b+c-a)=3bc$ then show that $\angle A = \frac{\pi}{3}$

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30. If the angles of the triangle ABC are in A.P. and $b:c = \sqrt{3} : \sqrt{2}$ then find the value of $\angle A$

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31. For $\triangle ABC$ prove that
 $(\sin A + \sin B)(\sin B + \sin C)(\sin C + \sin A) > \sin A \sin B \sin C$

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32. If in $\triangle ABC$, $\frac{2 \cos A}{a} + \frac{\cos B}{b} + \frac{2 \cos C}{c} = \frac{a}{bc} + \frac{b}{ca}$ then determine the angle A.

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33. If $\frac{\sin A}{\sin C} = \frac{\sin(A-B)}{\sin(B-C)}$ then show that a^2, b^2, c^2 are in arithmetic progression

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34. a, b, c are the lengths of sides of $\triangle ABC$ and $\frac{1}{a+c} + \frac{1}{b+c} = \frac{3}{a+b+c}$, show that $\angle C = 60^\circ$

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35. In $\triangle ABC$ show that $a = b \cos C + c \cos B$

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36. In $\triangle ABC$ if $\angle A = 60^\circ$ then show that $\frac{b+c}{a} = 2 \cos\left(\frac{B-C}{2}\right)$

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37. For any triangle ABC show that $a \sin(B-C) + b \sin(C-A) + c \sin(A-B) = 0$

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38. In $\triangle ABC$ $\angle C = 90^\circ$ then show that $\frac{a^2 + b^2}{a^2 - b^2} \sin(A - B) = 1$

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39. In $\triangle ABC$ if $a \cos^2\left(\frac{C}{2}\right) + c \cos^2\left(\frac{A}{2}\right) = 3\frac{b}{2}$ then show that a,b,c are in A.P

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40. In any triangle ABC show that $b^2 \sin 2C + c^2 \sin 2B = ab \frac{c}{R}$

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41. In any triangle ABC show that $\sin A + \sin B > \sin C$

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42. Prove that for any triangle ABC,

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

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43. For any triangle ABC prove that

$$(b - c) \cot\left(\frac{A}{2}\right) + (c - a) \cot\left(\frac{B}{2}\right) + (a - b) \cot\left(\frac{C}{2}\right) = 0$$

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44. for any $\triangle ABC$ show that

$$\frac{b^2 - c^2}{\cos B + \cos C} + \frac{c^2 - a^2}{\cos C + \cos A} + \frac{a^2 - b^2}{\cos A + \cos B} = 0$$

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45. if in a $\triangle ABC$, a^2, b^2, c^2 are in A.P. then show that $\cot A, \cot B$ and $\cot C$ are also in A.P

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46. In $\triangle ABC$ $\tan(A/2), \tan(B/2)$ and $\tan(C/2)$ are in A.P. then prove that $\cos A, \cos B, \cos C$ are in A.P.

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

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48. In any triangle ABC if $\cos A = \sin B - \cos C$ then show that any angle of the triangle is a right angle.

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49. In any triangle ABC prove that $a^2 \cot A + b^2 \cot B + c^2 \cot C = \frac{abc}{R}$

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50. in any triangle ABC prove that

$$\frac{b-c}{a} \cos^2\left(\frac{A}{2}\right) + \frac{c-a}{b} \cos^2\left(\frac{B}{2}\right) + (a-b)\left(\frac{1}{c}\right) \cos^2\left(\frac{C}{2}\right) = 0$$

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51. In $\triangle ABC$ if the angles A, B and C be in A.P. then show that

$$2 \cos\left(\frac{A-C}{2}\right) = \frac{a+c}{\sqrt{a^2-ac+c^2}}$$

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52. In $\triangle ABC$ if $\cos A \cos B + \sin A \sin B \sin C = 1$ then prove that $a:b:c = 1:1:\sqrt{2}$

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53. In $\triangle ABC$ $(b+c)/11=(c+a)/12=(a+b)/13$ then prove that $(\cos A)/7=(\cos B)/19=(\cos C)/25$

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54. In $\triangle ABC$ if $\frac{a^2 + b^2}{a^2 - b^2} = \frac{\sin(A + B)}{\sin(A - B)}$ then prove that it is either a right angled or an isosceles triangle.

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55. In $\triangle ABC$ if $\frac{a}{b+c} = \tan\left(\frac{A}{2}\right)$ then show that $A + C = \frac{\pi}{2}$

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56. if the lengths of sides of a triangle be $1-2x$, $(x^2 - x + 1)$ and $(x^2 - 1)$ then show that the greatest angle of the triangle is 120°

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57. If in $\triangle ABC$, $\sin^4 A + \sin^4 B + \sin^4 C = \sin^2 B \sin^2 C + 2 \sin^2 C \sin^2 A + 2 \sin^2 A \sin^2 B$ then show that $\angle A$ is either 30° or 150°

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58. For any triangle ABC prove that $a \cos A + b \cos B + c \cos C = 2a \sin B \sin C$

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59. If in $\triangle ABC$, $b^2 = a(c + a)$ and $c^2 = (a + b)b$ then prove that $\cos A \cos B \cos C = -1/8$

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60. If in $\triangle ABC$ $\cos A + \cos B + \cos C = 3/2$ then prove that triangle is equilateral

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61. If $8R^2 = a^2 + b^2 + c^2$ then show that the triangle is right angled

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62. If in a $\triangle ABC$, $a \tan A + b \tan B = (a+b) \tan((A+B)/2)$ then prove that it is an isosceles triangle

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63. 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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64. Perpendicular drawn from the vertices A,B,C upon opposite sides of

$\triangle ABC$ passes through a fixed point O. if $\overline{OA} = x$, $\overline{OB} = y$ and $\overline{OC} = z$ then prove that $\frac{a}{x} + \frac{b}{y} + \frac{c}{z} = \frac{abc}{xyz}$

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65. In $\triangle ABC$ if

$$\cot A + \cot B + \cot C = \sqrt{3(\cot A \cot B + \cot B \cot C + \cot A \cot C)}$$

then prove that the triangle is an equilateral triangle

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66. The sides of a triangle are in A.P. and the greatest angle exceeds the least by 90° prove that the sides are proportional to $\sqrt{7} + 1$, $\sqrt{7}$ and $\sqrt{7} - 1$



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67. The sides of a triangle are three consecutive natural numbers and its largest angle is twice the smallest one determine the sides of the triangle



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68. If S ,O and G represents circumcentre orthocentre and centroid respectively in a triangle then show that $OG:GS=2:1$



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