MATHS

BOOKS - CALCUTTA BOOK HOUSE

MATHS (BENGALI ENGLISH)

THEOREMS ON CONCURRENCE

Examples Select The Correct Answer Mcq

1. (i) The circumcentre of the triangle ABC is O, If $\angle BOC = 80^\circ$, then $\angle BAC =$

A. 40°

B. 160°

C. 130°

D. 110°

Answer:

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2. (ii) Orthocentre of the triangle ABC is O, If $\angle BAC = 40^\circ$, then $\angle BOC =$

A. 80°

B. 140°

C. 110°

D. 40°

Answer:

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3. (iii) Incentre of the triangle ABC is O, If $\angle BAC = 40^\circ$, then $\angle BOC =$

A. 80°

B. 110°

C. 140°

D. 40°

Answer:

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4. (iv) The centroid of the ΔABC is G, If the area of the ΔGBC be 12 Sq. cm, the area of the ΔABC is

A. 24 Sq. cm

B. 6 Sq. cm

C. 36 Sq. cm

D. None of these

Answer:

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5. (v) If the circum-radius of the right-angled triangle ABC be 5 cm, then the length of its hypotenuse will be-

A. 2.5 cm

B. 10 cm

C. 5 cm

D. None of these

Answer:

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Examples Short Answer Type Questions

1. (i) The sides of a triangle are 6 cm, 8 cm and 10 cm, find the position of the circum-centre of the triangle.

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2. (ii) AD is median of the equilateral ΔABC and G is its centroid. The side of the triangle is $3\sqrt{3}$ cm, then find the length of AG.

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3. Which of the following pairs of linear equations has unique solution, no solution or infinitely many solutions. In case there is unique solution, find it by using cross-multiplication method $x-3y-3=0, 3x-9y-2=0$

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4. (iv) In the isosceles triangle ABC, $\angle ABC = \angle ACB$ and median $AD = \frac{1}{2}BC$. If AB= $\sqrt{2}$ cm, then find the length of the circum-radius of the ΔABC.

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Examples Long Answer Type Questions

1. In a cricket match, a batswoman hits a boundary 6 times out of 30 balls she plays. Find the probability that she did not hit a boundary.

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2. Two medians BE and CF of ΔABC intersect at G. Prove that area of the quadrilateral

$AFGE = \frac{1}{3}\Delta ABC.$

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3. Which of the following pairs of linear equations has unique solution, no solution or infinitely many solutions

$3x - 5y = 20, 6x - 10y = 40$

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4. The bisector of the interior angles $\angle B$ and $\angle C$ of the ΔABC, meet at H. Prove that $\angle BHC = 90^\circ + \frac{1}{2}\angle BAC$.

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5. Prove that if the three medians of a triangle be equal , then it is an equilateral triangle.

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6. Which term of the AP: 121, 117,113, ..., is its first negative term?

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7. Which of the following are quadratic equations? (i) $\left(x+\frac{1}{x}\right)^2=3\left(x+\frac{1}{x}\right)$ (ii) $x^2-3x=0$

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8. Find the sum of the following APs: 2, 7, 12,..... to 10 terms.

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9. Find the sum of given below: 34 + 32 + 30 + ... + 10

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Exercise Select The Correct Answer Mcq

1. (i) G is the centroid of the equilateral ABC. If $AB = 10$ cm, then the length of AG is

A. $5\sqrt{3}$ cm

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

C. $10\sqrt{3}$ cm

D. $\frac{10\sqrt{3}}{3}$ cm

Answer: D

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2. (ii) AD is median of the ΔABC and the centroid of ΔABC is O. If $AO = 10$ cm, then the length of OD is

A. 2.4 cm

B. 5 cm

C. 7.5 cm

D. 20 cm

Answer: B

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3. (iii) O is the incentre of the ΔABC and $\angle BOC = 116^\circ$. Then $\angle BAC =$

A. 52°

B. 55°

C. 60°

D. 75°

Answer: A

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4. (iv) AD is a median of the ΔABC and G is its centroid. Then $AD : AG =$

A. $2:3$

B. $3:4$

C. $3:2$

D. $3:5$

Answer: C

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5. (v) The point of intersection of the bisectors of the angles of any triangle is called-

A. circum-centre

B. incentre

C. centroid

D. orthocentre

Answer: B

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6. (vi) The point of intersection of the three medians of any triangle is called-

A. circum-centre

B. incentre

C. centroid

D. orthocentre

Answer: C

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7. (vii) Circum-radius of any right-angled triangle is

A. half of its hypotenuse

B. one-third of its hypotenuse

C. two-third of its hypotenuse

D. twice of its hypotenuse

Answer: A

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8. (viii) The length of the side of a triangle are 8 cm, 15 cm and 17 cm. Then length of its circum-radius is

A. 4 cm

B. 7.5 cm

C. 8.5 cm

D. 20 cm

Answer: C

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9. (ix) Circum-centre, incentre, centroid and orthocentre will be the same of

A. an isosceles triangle

B. an equilateral triangle

C. a right-angled triangle

D. a right-angled isosceles triangle

Answer: B

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10. (x) I is the incentre of the $\Delta ABC, \angle BAC = 44^\circ$, then $\angle BIC =$

A. 134°

B. 110°

C. 112°

D. 68°

Answer: C

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11. (xi) O is the orthocentre of the ΔABC If $\angle BAC = 55^\circ$, then $\angle BOC =$

A. 125°

B. 135°

C. 145°

D. None of these

Answer: A

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Exercise Short Answer Type Questions

1. (i) The length of the circum-radius of the right-angled ΔABC is 4 cm. Find its length of hypotenuse.

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2. (ii) How many points of triangle are equidistant from its sides and what it its name?

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3. (iii) In the right-angled triangle ABC, $\angle ABC = 90^\circ$ and $AB = 5cm$ and $BC = 12cm$, then find its length of circum-radius.

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4. (iv) In $\Delta ABC, \angle ABC = 90^\circ$ and if $AB = 6cm$ and $BC = 8cm$, then find circum-radius of ΔABC.

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5. (v) ΔABC is equilateral and AD is a median of it. If G be the centroid of ΔABC and $GD = 10cm$. find the length of GB.

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6. (vi) ΔABC is an equilateral triangle of sides 6 cm. If G be its centroid, find the length of AG.

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7. Find the sum of the following A.P. 1,3,5,7,.....,199

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8. (viii) O is the orthocentre of ΔABC. If $\angle BOC = 4\angle BAC$, then find $\angle BOC$ and $\angle BAC$.

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9. (ix) AD, BE and CF are the three medians of ΔABC and intersect at G. The area of the ΔABC is 36 Sq. cm. Find (a) the area of ΔAGB and (b) the area of the quadrilateral BDGF.

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10. (x) DEF is the pedal triangle of the equilateral ΔABC. Find $\angle BED$.

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Exercise Long Answer Type Questions

1. Find the value of k for which the given value is a solution of the given equation $7x^2 + kx - 3 = 0$ at $x = \frac{2}{3}$

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2. Determine the nature of the roots of following quadratic equations : (i) $2x^2 - 3x + 5 = 0$ (ii) $2x^2 - 6x + 3 = 0$

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3. Some students planned a picnic. The budget for food was Rs. 480. But eight of these failed to go and thus the cost of food for each member increased by Rs. 10. How many students attended the picnic ?

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4. Find the value of k for which the given value is a solution of the given equation $x^2 + 3ax + k = 0$ at $x = -a$

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5. A piece of cloth costs Rs. 35. If the piece were 4 m longer and each metre costs Re. one less, the cost would remain unchanged. How long is the piece ?

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6. Two medians BE and CF of ΔABC intersect at G. Prove that area of the quadrilateral $AFGE = \frac{1}{3}\Delta ABC.$

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7. I is the incentre of ΔABC, Produced AI bisects BC at D. Prove that ΔABC is isosceles.

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8. Find the values of k for which the roots are real and equal in the following equations : $5x^2 - 4x + 2 + k\left(4x^2 - 2x - 1\right) = 0$

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9. I is the incentre of the ΔABC. The perpendicular drawn from I to BC intersects BC at. P. Prove that $AB - AC = BP - CP$.

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10. Find the values of k for which the roots are real and equal in the following equations : $kx^2 + 4x + 1 = 0$

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11. E is the mid-point of AD, a median of the ΔABC. The extended BE intersects AC at F. prove that $AF = \frac{1}{3}AC$.

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12. Write the first five terms of the following sequence whose nth term are: $a_n = 3n + 2$

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13. In $\Delta ABC, \angle B \leq \angle C$. If the interior bisector of $\angle BAC$ be AP and $AQ \perp BC$. then prove that $\angle PAQ = \frac{1}{2}(\angle B - \angle C)$

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14. P is a point on the median AD of the ΔABC. Prove that area of ΔAPB = area of ΔAPC.

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15. Find the next five terms of each of the following sequences given by :

$a_1 = a_2 = 2, a_n = a_{n-1} - 3, n > 2$

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16. Write the first five terms of the following sequence whose nth term are: $a_n = \frac{n-2}{3}$

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17. A bag contains 3 red balls, 5 black balls and 4 white balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is white?

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