MATHS

BOOKS - CALCUTTA BOOK HOUSE MATHS (BENGALI ENGLISH)

THEOREMS ON TRANSVERSAL AND MID-POINTS

Example 1

1. An isosceles triangle has perimeter 30 cm and each of the equal sides is 12 cm. Find the area of the triangle.

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2. The floor of a rectangular hall has a perimeter 250 m. If the cost of painting the four walls at the rate of Rs.10 perm^2 is Rs.15000, find the height of the hall.

A. 5 cm

B. 6 cm

C. 7 cm

D. 12 cm

Answer:

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3. A traffic signal board, indicating 'SCHOOL AHEAD', is an equilateral triangle with side a. Find the area of the signal board, using

Heron's formula.If its perimeter is 180 cm, what will be the area of the signal board?

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4. Find all the common zeroes of the polynomials $x^3 + 5x^2 - 9x - 45$and $x^3 + 8x^2 + 15x$

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Example 2

1. Find p (0), p (1) and p (2) for the polynomials

$p(y) = y^2 - y + 1$

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2. Find the remainder when

$x^3 + 3x^2 + 3x + 1$ is divided by $x + 1$

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3. Find p (1), p (2) and p (3) for the polynomial

$p(x) = (x - 1)(x + 1)$

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4. Find p (0), p (1) and p (2) for the polynomials

$p(t) = 2 + 1 + 2t^2 - t^3$

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5. A bag contains 3 red balls and 5 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is not red?

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6. A box contains 5 red marbles, 8 white marbles and 4 green marbles. One marble is taken out of the box at random. What is the

probability that the marble taken out will be not green?

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Example 3

1. Find the remainder when $x^3 + 3x^2 + 3x + 1$ is divided by $x - \frac{1}{2}$

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Example 4

1. Prove that the quadrilateral obtained by successively joining the mid -points of a parallelogram is also a parallelogram.

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Example 5

1. Prove that the quadrilateral formed by joining the mid-points of the sides of a square

is also a square.

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Example 6

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

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Example 7

1. A piggy bank contains hundred 50 p coins, fifty ₹ 1 coins, twenty ₹ 2 coins and ten ₹ 5 coins. If it is equally likely that one of the coins will fall out when the bank is turned upside down, what is the probability that the coin will be a 50 p coin?

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Example 8

1. A die is thrown once. Find the probability of getting a number lying between 2 and 6.

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Example 9

1. One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting a king of red colour.

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Example 10

1. Gopi buys a fish from a shop for his aquarium. The shopkeeper takes out one fish at random from a tank containing 5 male fish and 8 female fish. What is the probability that the fish taken out is a male fish?

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Example 11

1. A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8 and these are equally likely outcomes. What is the probability that it will point at 8?

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Example 12

1. A die is thrown once. Find the probability of getting a prime number.

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Mcq

1. D and E are the mid-points of AB and AC of the equilateral ΔABC. If DE + AB = 15 cm, then, DE =

A. 4 cm

B. 5 cm

C. 6 cm

D. 8 cm

Answer: b

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2. E is the mid-point of the side BC of the parallelogram ABCD. DE and extended AB intersects each other at F. If AB = 4 cm, then AF =

A. 4 cm

B. 8 cm

C. 10 cm

D. 6 cm

Answer: B

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3. The mid-points of the sides AB, BC and CA of the equilateral ΔABC are D, E and F

respectively, AE intersects DF at O. If $\angle OBD = 15^\circ$, then $\angle AOB =$

A. 45°

B. 105°

C. 120°

D. 135°

Answer: d

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4. In $\Delta ABC, \angle B = \angle C$. If AB = 8 cm and if the line segment through D, the mid-point of AB and parallel to BC intersects AC at E, then CE =

A. 4 cm

B. 6 cm

C. 8 cm

D. 10 cm

Answer: a

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5. In the isosceles right-angled $\Delta ABC, \angle A = 90^\circ$. $AD \perp BC$ and the line segment through D and parallel to BA intersects AC at a point E. If DE = 2 cm, then BC =

A. 4 cm

B. $4\sqrt{2}$ cm

C. $2\sqrt{2}$ cm

D. 2 cm

Answer: b

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6. In the trapezium ABCD, AB = 10 cm and DC = 8 cm. The line segment through C and parallel to DA intersects AB at E. Then BE =

A. 1 cm

B. 2 cm

C. 3 cm

D. 4 cm

Answer: b

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7. If the mid-points of AB, BC and CA of the ΔABC are D, E and F respectively, P and Q are also the mid-points of DE and EF respectively. Then PQ =

A. 2 BC

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

C. $\frac{1}{4}BC$

D. 4 BC

Answer: c

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8. ABC is an equilateral triangle. D and E are the mid-points of AB and AC. Then $\angle ADE =$

A. 30°

B. 45°

C. 60°

D. 75°

Answer: c

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9. In ΔABC, BE and CF are two medians . If BC = x cm, then EF =

A. 2x cm

B. 3x cm

C. $\frac{x}{3}cm$

D. $\frac{x}{2}cm$

Answer: d

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10. If each of sides of the square ABCD be a cm, then the length of each of the sides of the square, formed by joining the mid-points of the sides of ABCD is

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

B. 2a cm

C. $a\sqrt{2}$ cm

D. $\frac{a\sqrt{2}}{2}cm$

Answer: d

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Short Answer

1. The length of each of the sides of the equilateral triangle ABC is 6 cm. P and Q are

the mid-points of AB and AC respectively. Find the length of PQ and the measurement of $\angle APQ$.

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2. D, E and F are the mid-points of AB, BC and CA of the equilateral ΔABC. Prove that ΔDEF is also an equilateral triangle.

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3. D and E are the mid-points of the sides PR and QR of the ΔPQR. If $\angle EDR = 75^\circ$ and $\angle DRE = 35^\circ$, then find $\angle PQR$.

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4. In ΔABC, $\angle ABC = 90^\circ$, AB = 16 cm and BC = 12 cm. If P is the mid-point of AC, find the length of BP.

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5. If the mid points of the sides AB and AC of a triangle ABC are $(3, 5)$ a n d $(-3, -3)$ then the length of the side BC in cm is

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6. One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting a spade.

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7. The cost of a notebook is twice the cost of a pen. Write a linear equation in two variables to represent this statement.

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8. 12 defective pens are accidentally mixed with 132 good ones. It is not possible to just look at a pen and tell whether or not it is defective. One pen is taken out at random from this lot.

Determine the probability that the pen taken out is a good one.

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9. In the trapezium ABCD, AD || BC. X and Y are the mid-points of AB and DC. If XY = 10 cm, then find the sum of the length of its parallel sides.

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10. Five cards – the ten, jack, queen, king and ace of diamonds, are well shuffled with their face downwards. One card is then picked up at random. What is the probability that the card is the queen?

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Long Answer

1. Prove that the quadrilateral formed by joining the mid-points of the sides of a rectangle is a rhombus, but not a square.

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2. Five cards – the ten, jack, queen, king and ace of diamonds, are well shuffled with their face downwards. One card is then picked up at random.If the queen is drawn and put aside,

what is the probability that the second card picked up is a queen?

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3. The medians BE and CF of the ΔABC intersect each other at G and the line segment EF intersects AG at O. Prove that OA = 3.OG.

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4. ABCD is a trapezium in which AB || DC and E is the mid-point of AD. If F be a point on BC such that EF || DC, then prove that $EF = \frac{1}{2}(AB + DC)$.

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

$2x + y = 5, 3x + 2y = 8$

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6. If E, F and G are the mid-points of the sides AB, BC and CA of the ΔABC respectively, then prove that the centres of gravity of ΔABC and ΔEFG are the same point.

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7. Prove that if two medians of any triangle be equal, then it is an isosceles triangle.

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8. In the trapezium ABCD, AB || DC. The diagonals AC and BD of it intersects each other at O. Prove that $\Delta AOD = \Delta BOC$.

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9. D, E and F are the mid-points of the sides AB, AC and BC of the ΔABC. Prove that DE and AF bisects each other.

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10. E is the mid-point of the median AD of the ΔABC. Extended BE intersects AC at F. Prove that $AF = \frac{1}{3}AC$.

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11. D and E are the mid-points of AB and AC respectively of the ΔABC. AP is the median of BC. AP intersects DE at Q. Prove that DQ = QE and AQ = QP.

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12. Show that the straight lines joining the mid - points of the opposite sides of a quadrilateral bisect each other .

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13. Prove that the quadrilateral formed by joining the mid-points successively of any quadrilateral is also a parallelogram.

Also, prove that the perimeter of that

parallelogram is equal to the sum of that quadrilateral's diagonals.

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14. If the point (3, 4) lies on the equation $3y = ax + 7$, find the value of a.

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