ATULYA

Mathematics

Case Study

Total 12 sets

CLASS - 10

The best collection of Case Study problems for CBSE class 10

The ATULYA

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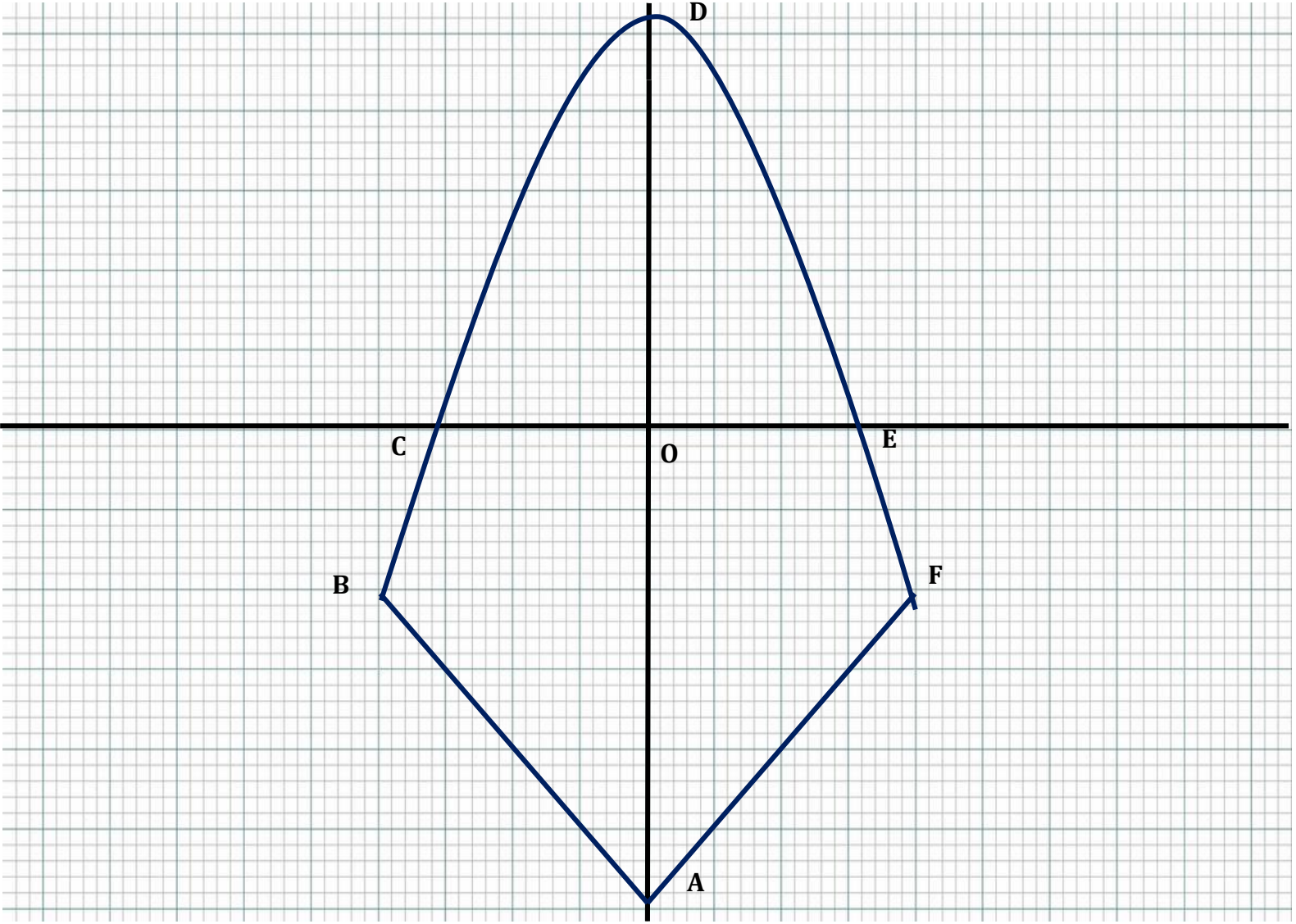
Case study based - 1

Charu is cycling in a park. He choose a path which is a closed curve, is partly parabolic. At the point where charu started, the path forms a right angle. Charu make a complete round on the path.



The graph shows the path of cycling. D is vertex of Parabolic curve which intersects X – axis at points C and E. Also ∠BAF is a Right angle.

(A) If BAF is an isosceles triangle than distance between points B and F is :-

(i) 6
(ii) 8
(iii) 10
(iv) 12

(B) At an specific time, Charu is standing at point R(-8,6) in the park. If there is a light pole in the park which is situated at origin in the graph. The angle of elevation of the top of the light pole is 60° from point R. Find the hight of the Light pole.

(i) 8

(ii) $12\sqrt{3}$

(iii) $10\sqrt{3}$

(iv) $14\sqrt{3}$

(C) Find the co-ordinates of the point P which divides line segment joining the points B and F in 3:5 .

(i) (2,-1)
(ii) (-2,1)
(iii) (1,2)
(iv) (-1,-2)

(D) From the graph , the equation for the parabolic Part of the path is :-

(i) $x^2-6x-9=0$

(ii) $x^2-9=0$

(iii) $x^2-6=0$

(iv) $x^2-6x+9=0$

(E) If the length of the track is 1 km. The boy is moving with Speed of 18 km/h. If he increases his speed by 6 km/h. Find the time saved by the boy in completing one round on the path.

(i) 50 sec
(ii) 20 sec
(iii) 45 sec
(iv) 15 sec

Case study based - 2

Boat and Stream

A boat is said to go downstream if it is moving along the Direction of the stream. The net speed of the boat in this case Is called Downstream speed.

A boat is said to go upstream if it is moving opposite to the Direction of the stream. The net speed of the boat in this case Is called Upstream speed.

If the speed of a boat is ‘x’ km/h in still water and the speed of the stream is ‘y’ km/h.

Than

The downstream speed = (x+y) km/h

The upstream speed = (x-y) km/h

BOAT →

STREAM →

Downstream

BOAT ←

STREAM →

Upstream

(A) If speed of boat increases by 3 km/h after every 5 minutes. If the initial speed of the boat is 30 km/h . Speed of the boat after 40 minutes:-

(i) 60 km/h
(ii) 64 km/h
(iii) 46 km/h
(iv) 51 km/h

(B) Boat charges consist of fixed charges and the remaining depending upon the time in minutes a person ride the boat. If a person take a ride for 8 minutes, he pays Rs. 130, and for 13 minutes, he pays Rs. 180. Find the fixed charges and the rate per minute.

(i) 100 and 20
(ii) 50 and 10
(iii) 40 and 8
(iv) 60 and 12

(C) A boat goes 12 km upstream and 40 km downstream in 8 hours. It can go 16 km upstream and 32 km downstream in the same time. Find the speed of the boat in still water and the speed of the stream.

(i) 10 km/h and 5 km/h
(ii) 8 km/h and 4 km/h
(iii) 6 km/h and 2 km/ h
(iv) 4 km/h and 1 km/h

(D) If the angle of elevation of a 50 m. high tower near river bank is 30° from the boat. Find the horizontal distance of the boat from bottom of the tower.

(i) 50

(ii) $50\sqrt{3}$

(iii) $\frac{50}{\sqrt{3}}$

(iv) 100

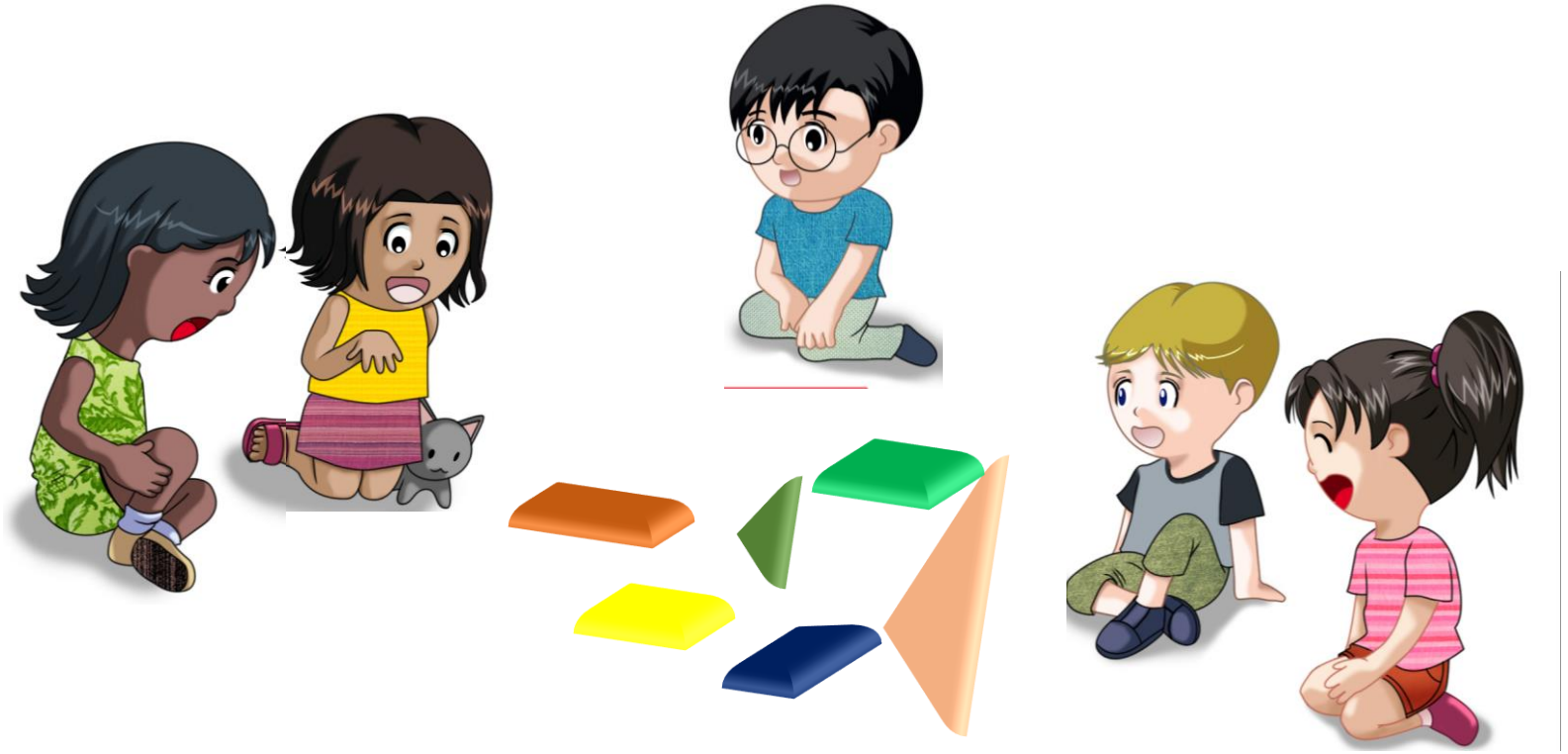
(E) A family of 3 members is riding the boat. If man's age is 3 times the age of his son. The son is 12 years younger than his mother. if woman's age is 21. Find the age of the man.

(i) 33
(ii) 27
(iii) 24
(iv) 36

Case study based - 3

Children with geometrical pieces

Children are playing with some pieces of cardboard. They have arranged the pieces in a pattern.



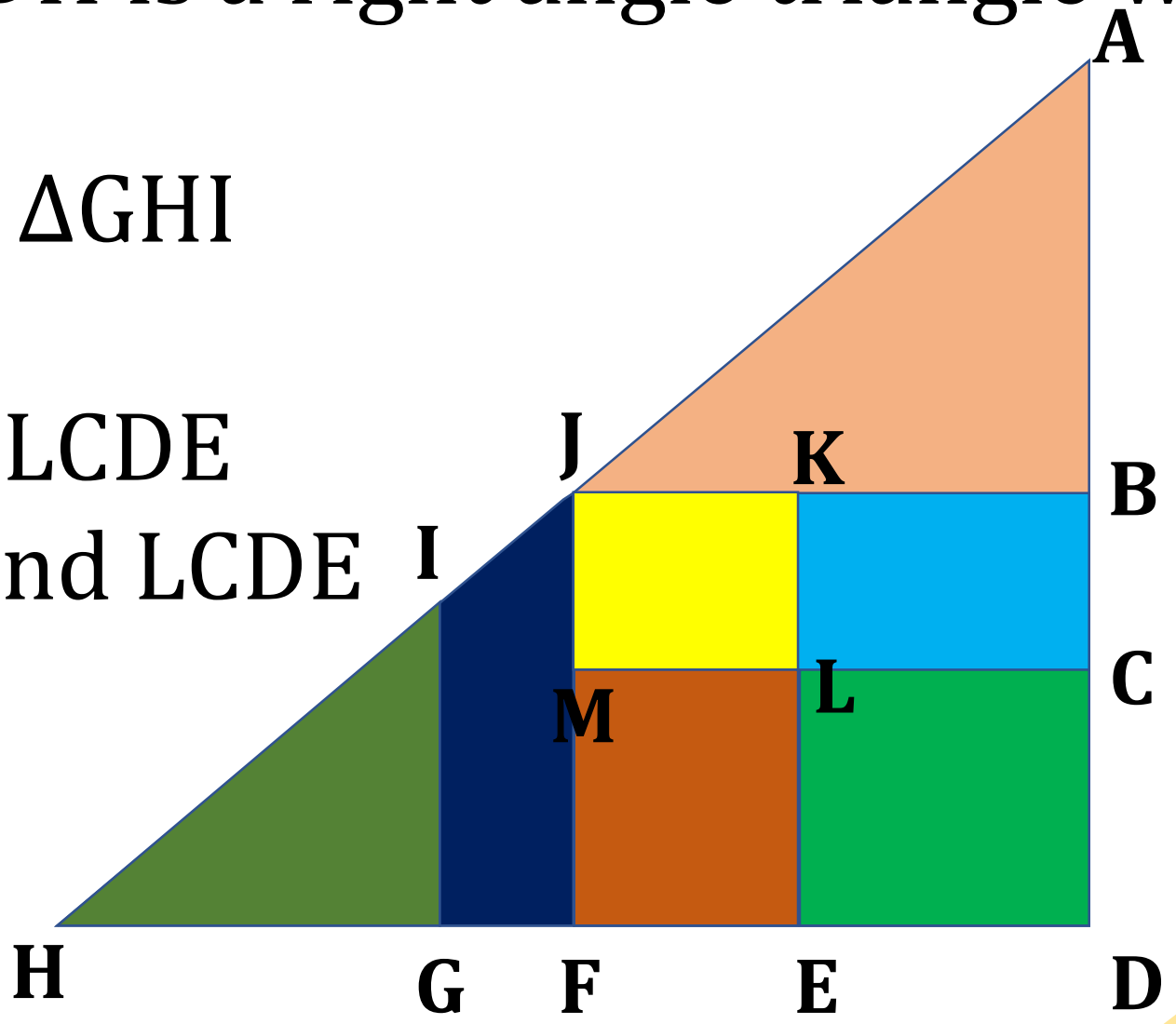
In the given figure ΔADH is a right angle triangle which Contains:-

(I) Triangle ΔABJ and ΔGHI

(II) Quadrilateral GFJI

(III) Square JKLM and LCDE

(IV) Rectangle MLEF and LCDE



(A) From point H, Naman walks 24 m east to reach at point F. From point F, Naman walks 6 m. towards north and reaches at point M. From point M, he walks 5 m. east to L, Then 4 m. to K, then walks to west and finally reaches at J. What is the straight-line distance between position when he started and his position now?

(i) 26 m
(ii) 36 m
(iii) 24 m
(iv) 48 m

(B) Consider the following three claims about a triangle ABJ with side lengths m, n and r.

Claim 1: ABJ is a right triangle provided $n^2-m^2=r^2$.

Claim 2: Triangle with side lengths $m+2$, $n+2$ and $r+2$ is a right-angle triangle.

Claim 3: Triangle with side lengths $2m$, $2n$ and $2r$ is a right-angle triangle.

Which of these is correct?

(i) Claim 1 would be correct if $n>m$, $n>r$ and Claim 2 would be correct if ABJ is a right triangle.

(ii) Claim 1 would be correct if $r>m$, $r>n$ and Claim 2 would be correct if ABJ is a right triangle.

(iii) Claim 1 would be correct if $n>m$, $n>r$ and Claim 3 would be correct if ABJ is a right triangle.

(iv) Claim 1 would be correct if $r>m$, $r>n$ and Claim 3 would be correct if ABJ is a right triangle.

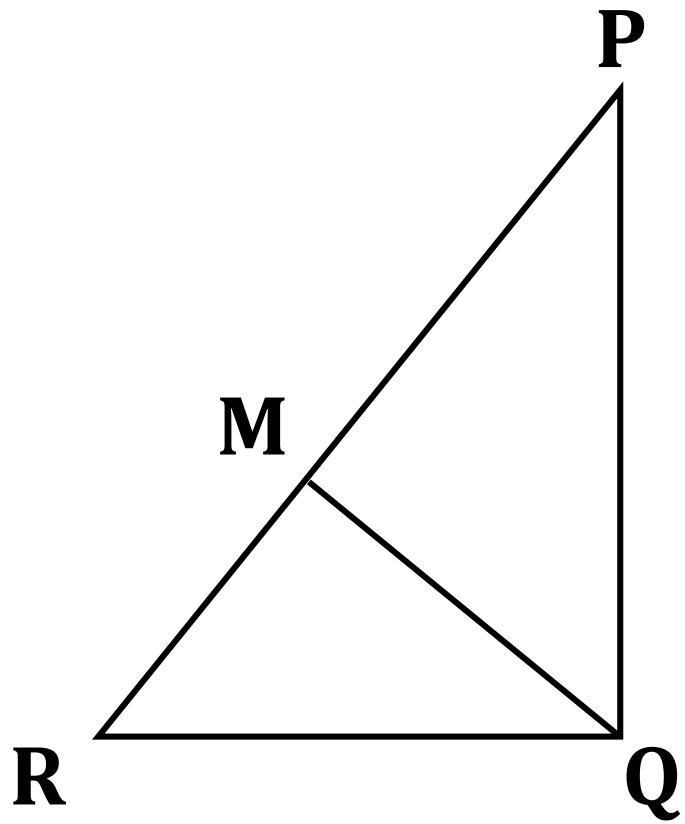
(C) Observe the right triangle PQR, right angled at Q as shown below. If $QM \perp PR$, then which of the following is NOT correct?

(i) $\Delta PMQ \sim \Delta PQR$

(ii) $QR^2 = RM \cdot PR$

(iii) $PR^2 = PQ \cdot RQ$

(iv) $\Delta PMQ \sim \Delta QMR$



(D) If $\angle ABJ = 90°$, B and J are mid points of sides AD and AH respectively. If BJ ∥ DH than which of the following is false ?

(i) $\Delta ABJ \sim \Delta ADH$

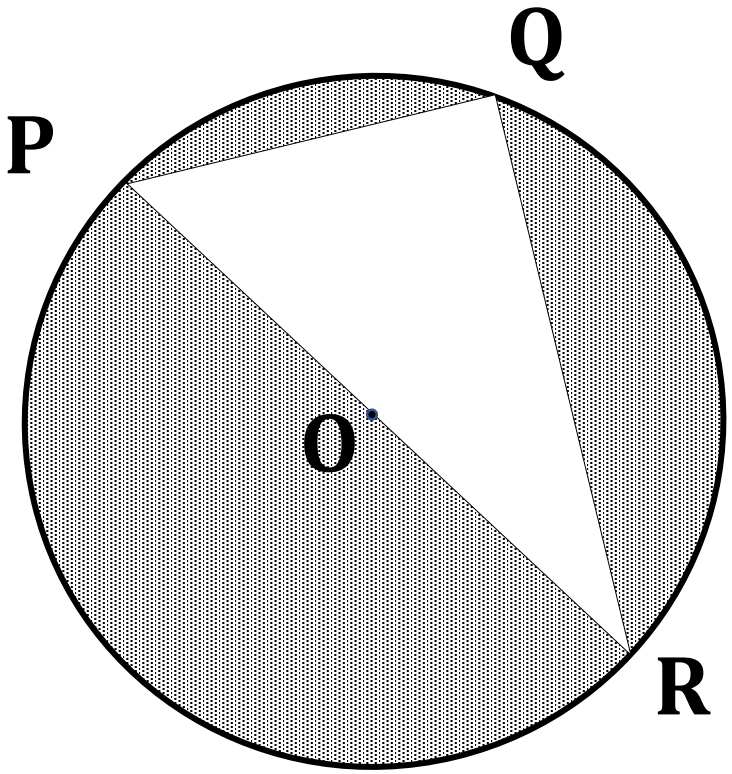
(ii) $2BJ = DH$

(iii) $AJ^2 - JB^2 = AB^2$

(iv) $\frac{AB}{BD} = \frac{AJ}{AH}$

(E) If PR = 14 cm is diameter and PQ = 8 cm and QR = 10 cm are chords of the circle. Area of the shaded region is :-

(i) 256 cm^2
(ii) 228 cm^2
(iii) 114 cm^2
(iv) 107 cm^2

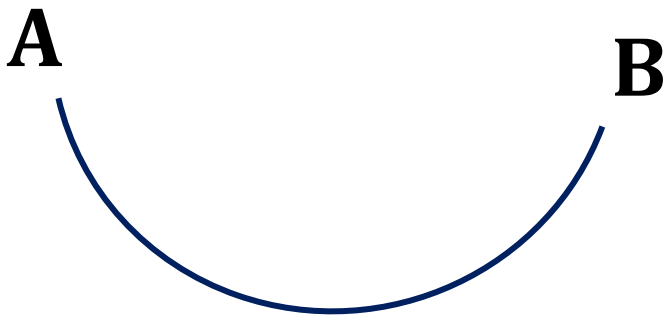


Case study based - 4

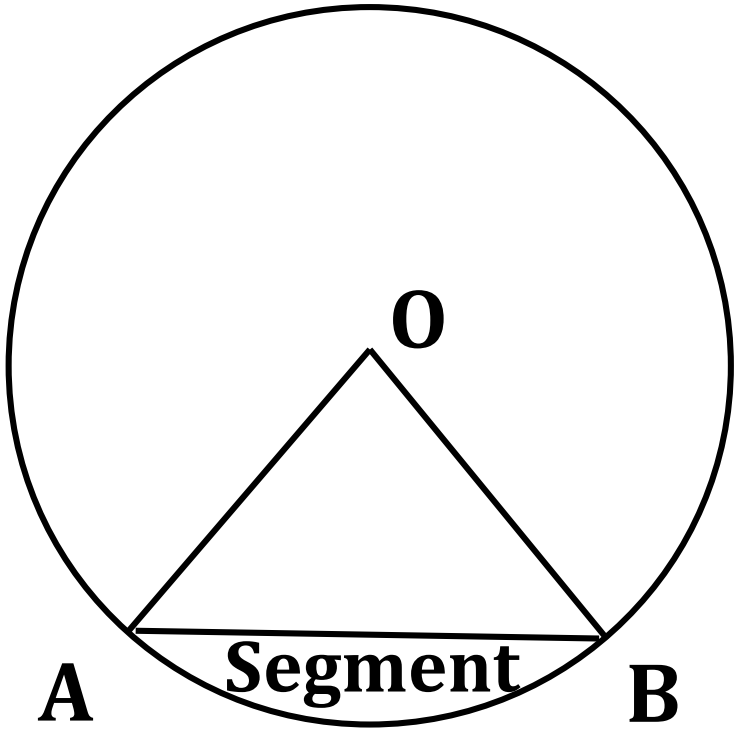
Application of arc of a circle : A parachute is in the shape of an arc of a circle

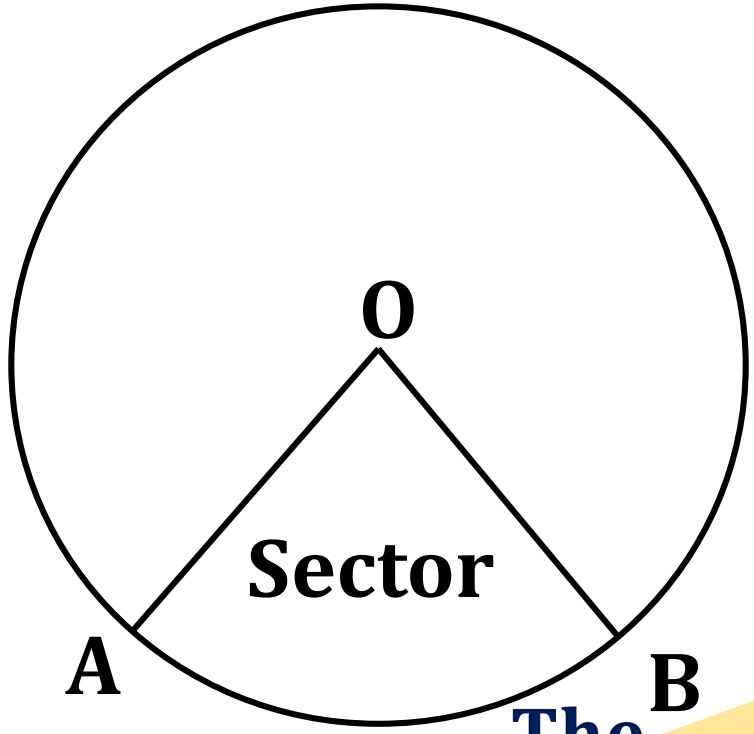
Arc of a Circle :- The arc of a circle is defined as the part or segment of the circumference of a circle. If the length of the arc is exactly half of a circle, it is known as a semicircular arc. An arc is named based on its endpoints.

Chord of a circle :- A straight line that could be drawn by connecting the two ends of the arc is known as a chord of a circle.



Arc of a circle





(A) Which of these is equivalent to π?

(i) $\frac{Circumference}{Radius}$

(ii) Circumference X Diameter

(iii) $\frac{Circumference}{Diameter}$

(iv) Circumference X Radius

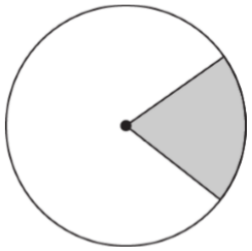
(B) If the length of the belts of parachute is 7 m. And make an angle of 45° at the point of joining. than length of parachute is :-

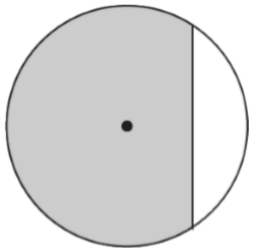
(i) 22 m.
(ii) 11 m.
(iii) 15 m.
(iv) 5.5 m.

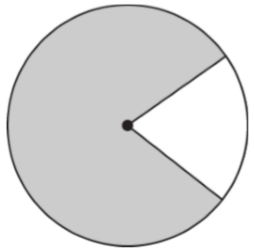
(C) Consider the statements below.
Statement 1: All circles are similar.
Statement 2: All squares are similar.
Statement 3: All right triangles are congruent.
Statement 4: All equilateral triangles are congruent.
Which statement is/are correct?

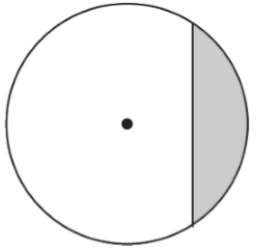
(i) Statement 1 and Statement 3
(ii) Statement 2 and Statement 4
(iii) Statement 1 and Statement 2
(iv) Statement 3 and Statement 4

(D) Which of the following options represents the shaded region as the major sector and unshaded region as the minor sector?

(i) 

(ii) 

(ii) 

(iv) 

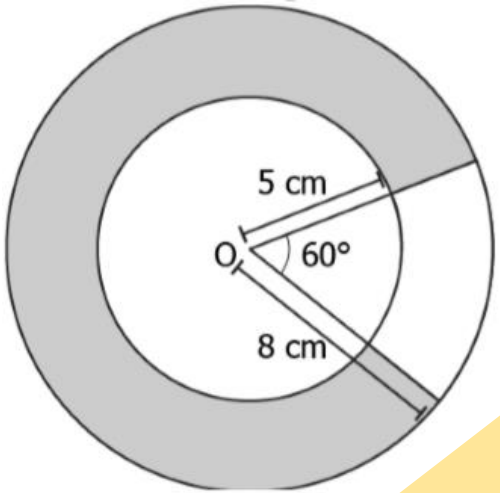
(E) Two concentric circles of radius 8 cm and 5 cm are shown below, and a sector forms an angle of 60° at the centre O. What is the area of the shaded region?

(i) $38\pi \text{ cm}^2$

(ii) $\frac{77\pi}{2} \text{ cm}^2$

(iii) $\frac{11\pi}{2} \text{ cm}^2$

(iv) $\frac{195\pi}{6} \text{ cm}^2$



Case study based - 5

A visit to a shopping mall

In a shopping mall there are three stores :-

(i) Shoe store

(ii) Clothes store

(iii) Fruits corner

Each store has it's own price list.

In shoe store the price list is as below :-

Types of shoes	Price (Rs.)
Casual	500
Formal	350
Sports	750

In clothes store the price list is as below :-

Types of Clothes	Price (Rs.)
T-Shirt	300
Trouser	600
Blazer	2000

In Fruits corner the price list is as below :-

Fruits	Price (Rs.)
Apple	70
Orange	40
Guava	30

(A) Satvik purchased x trousers and y kg. oranges for Rs. 1400. Mahi purchased x pair of sport shoes and y kg apple for Rs. 1850. Which of these equations relates between x and y ?

(i) $600x+40y=1850$ and $750x+70y=1400$
(ii) $600x+40y=1400$ and $750x+70y=1850$
(iii) $750x+40y=1400$ and $600x+70y=1850$
(iv) $600x+70y=1400$ and $750x+40y=1850$

(B) Manan gave a note of ₹2,000 for a pair of casual shoes. She was returned 11 notes in denominations of ₹200 and ₹100. Which pair of equations can be used to find the number of ₹200 notes, x, and the number of ₹100 notes y? How many notes of ₹100 did she get?

(i) $x+y=11 \quad and \ 200x+100y=1500$; 7

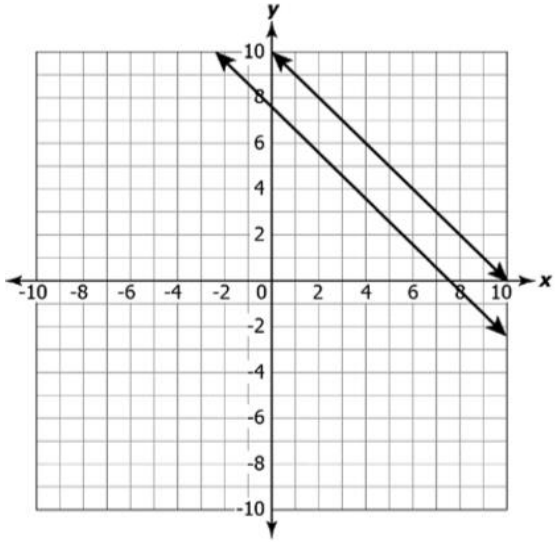
(ii) $x+y=11 \quad and \ 200x+100y=2000$; 8

(iii) $x=y+11 \quad and \ 200x+100y=1500$; 6

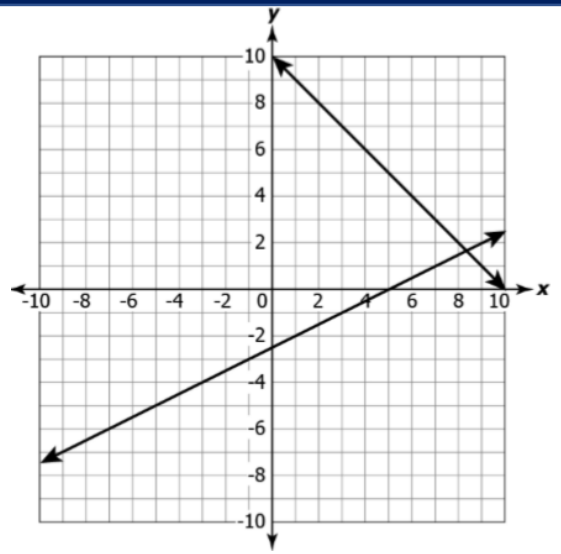
(iv) $x+y=11 \quad and \ 100x+200y=2000$; 9

(c) Which of these linear equations have a unique solution?

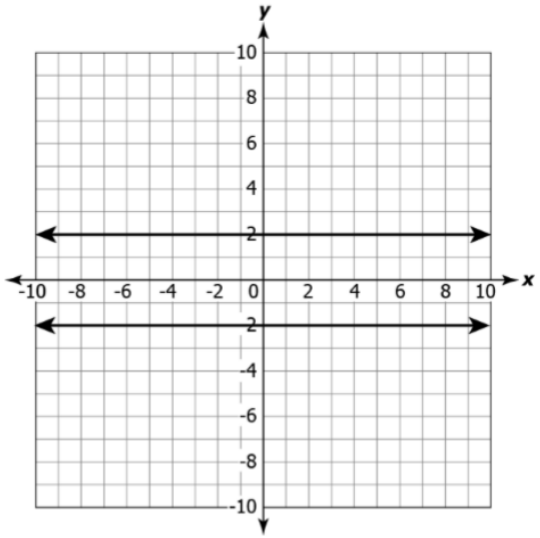
(i)



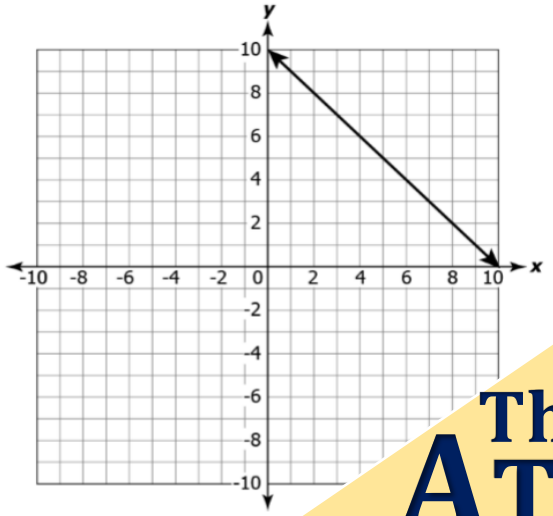
(ii)



(iii)



(iv)



(D) Nobita bought 5 kg. fruits in which there are oranges and guavas. He paid Rs. 160. Than the weight of oranges and guavas respectively :-

(i) 2 kg and 3 kg
(ii) 4 kg and 1 kg
(iii) 3 kg and 2 kg
(iv) 1 kg and 4 kg

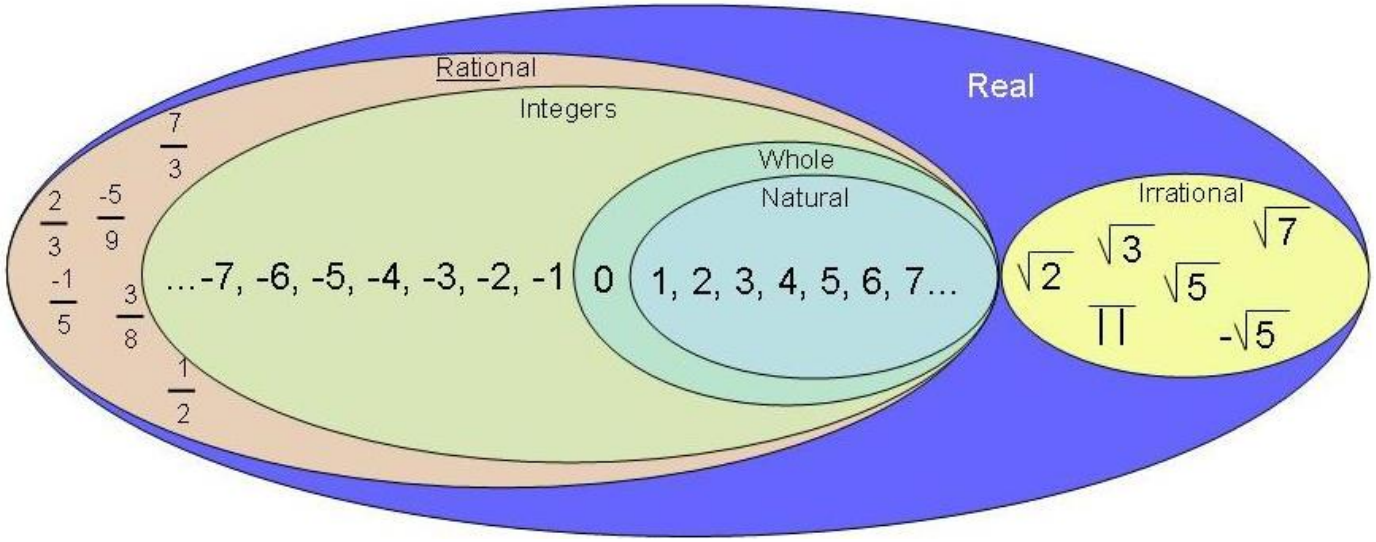
(E) In Diwali sale there is a discount of 25% in clothes store and 20% in shoe store. How much money Shinchan saved if he bought 1 blazer and 4 pair of formal shoes ?

(i) Rs. 750
(ii) Rs. 840
(iii) Rs. 780
(iv) Rs. 800

Case study based - 6

Number System :-

Real numbers are simply the combination of rational and irrational numbers, in the number system. In general, all the arithmetic operations can be performed on these numbers and they can be represented in the number line



HCF :-

- The largest common factor of all the given numbers is known as the highest common factor of the numbers.
- The highest number that can be divided exactly into two or more numbers without any remainders.
- It is also known as the greatest common divisor (GCD)
- The most easy way to find the hcf of two or more given numbers is to create a factor tree.

LCM :-

- LCM of any two numbers is the value which is evenly divisible by the two given numbers.
- It is also called the Least Common Divisor (LCD).
- LCM is also used to add or subtract any two fractions when the denominators of the fractions are different.

Product of the numbers = HCF X LCM

(A) Which of the following is an irrational number?

(i) $\frac{\sqrt{2}}{\sqrt{8}}$

(ii) $\frac{\sqrt{3}}{3\sqrt{5}}$

(iii) $\frac{\sqrt{5}}{\sqrt{20}}$

(iv) $\frac{\sqrt{63}}{\sqrt{7}}$

(B) The decimal expansion of the rational number $\frac{14587}{1250}$ will terminate after:

(i) one decimal place
(ii) two decimal places
(iii) three decimal places
(iv) four decimal places

(C) A worker needs to pack 350 kg of rice and 150 kg of wheat in bags such that each bag weighs the same. Each bag should either contain rice or wheat. Which option shows the correct steps to find the greatest amount of rice/wheat the worker can pack in each bag?

(i) Step 1: $350=2(150)+50$
Step 2: $150=3(50)+0$
Step 3: Greatest amount: 50 kg

(ii) Step 1: $350=2(150)+50$
Step 2: $150=2(50)+0$
Step 3: Greatest amount: 50 kg

(iii) Step 1: $350=2(150)+50$
Step 2: $150=3(50)+0$
Step 3: Greatest amount: 150 kg

(iv) Step 1: $350=2(150)+50$
Step 2: $150=2(50)+0$
Step 3: Greatest amount: 150 kg

(D) For some integer q, every odd integer is of the form

(i) q

(ii) $q + 1$

(iii) $2q$

(iv) $2q + 1$

(E) Three bulbs red, green and yellow flash at intervals of 80 seconds, 90 seconds and 110 seconds. All three flash together at 8:00 am. At what time will the three bulbs flash altogether again?

(i) 9:00 am
(ii) 9:12 am
(iii) 10:00 am
(iv) 10:12 am

(F) An integer is always a :-

(i) Natural Number
(ii) Irrational number
(iii) Rational Number
(iv) Whole Number

(G) The product of a non-zero rational and an irrational number is :-

(i) always irrational

(ii) always rational

(iii) rational or irrational

(iv) one

Case study based - 7

Runs scored by players :-

In an IPL season there were some players who participated. The table shows the runs scored by players.

Runs	15 - 25	25 - 35	35 - 45	45 - 55	55 - 65	65 - 75	75 - 85
Players	6	11	7	4	4	2	1

(A) Find the sum of lower limit and upper limit of modal class ?

(i) 30
(ii) 40
(iii) 50
(iv) 60

(B) Find the mean runs scored by players ?

(i) 38
(ii) 39.71
(iii) 40
(iv) 41.62

Runs	Players		
15 - 25	6		
25 - 35	11		
35 - 45	7		
45 - 55	4		
55 - 65	4		
65 - 75	2		
75 - 85	1		

(C) How many players scored 45+ in the IPL ?

(i) 7
(ii) 9
(iii) 11
(iv) 18

(D) In the formula Mode = $l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \times h$, what is f_0 ?

(i) frequency of the class succeeding the modal class
(ii) frequency of the class preceding the modal class
(iii) frequency of the modal class
(iv) lower limit of the modal class

(E) Which of the following is correct ?

(i) 2 Median = Mode + 3 Mean

(ii) Median = 3 Mode + 2 Mean

(iii) 3 Median = 2 Mode + Mean

(iv) 3 Median = Mode + 2 Mean

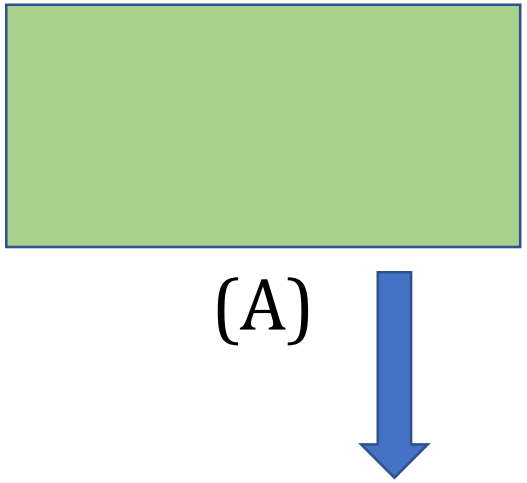
Case study based - 8

Packaging Box

A company manufactures boxes for gift packaging. A group of employees of this company prepares cuboidal shaped boxes. For this they follow the given process.

1.Take a rectangular cardboard.
2.Cut a square of same size at each corner.
3.Fold the remaining part and fix with the help of gum and paper.
4.The box is ready.

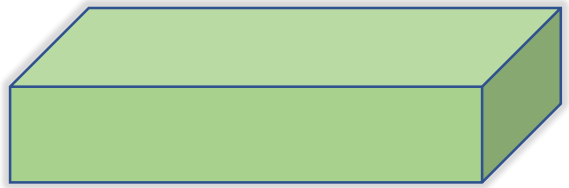
Length and breadth of cardboard are 61 cm and 46 cm respectively. The squares at each corner of the rectangle are of side 8 cm.



(A)

Boxes are covered with cuboidal lid of same size.

(B)



(C)

(A) Abhinav purchased 6 juice glasses of cylindrical shape to gift his friend. The hight of the glass is 12 cm and diameter is 7 cm. If these glasses packed in the gift box than find the remaining volume in the box.

(i) 8224 cm^3
(ii) 6448 cm^3
(iii) 8028 cm^3
(iv) 6884 cm^3

(B) Find the area of gift wrapping paper to wrap the box .

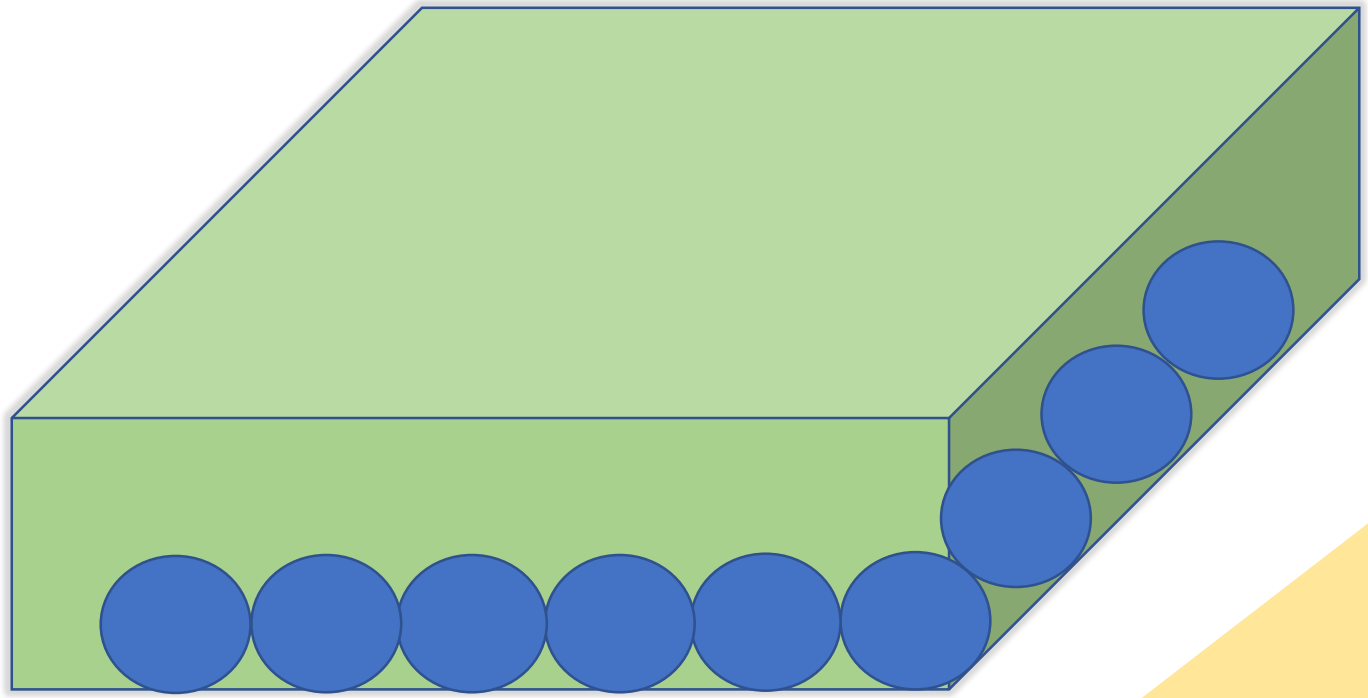
(i) $3600\ cm^2$
(ii) $3900\ cm^2$
(iii) $2250\ cm^2$
(iv) $2500\ cm^2$

(C) Find the perimeter of the figure B.

(i) 225 cm
(ii) 220 cm
(iii) 214 cm
(iv) 250 cm

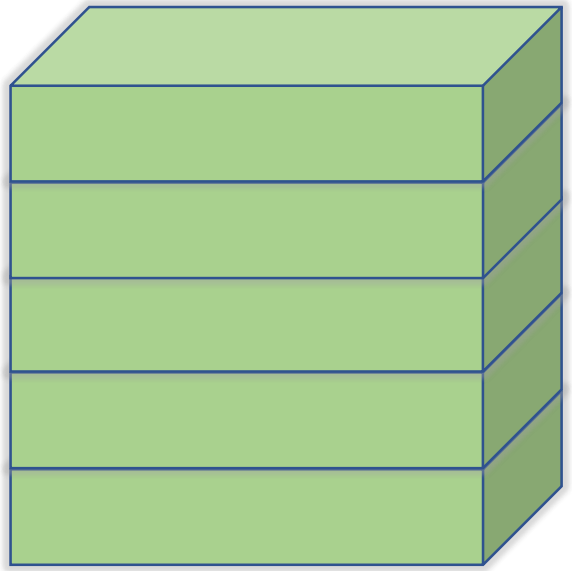
(D) Some balls of radius 3.5 cm packed in the box. Find the maximum number of balls which can packed in the box.

(i) 18
(ii) 24
(iii) 28
(iv) 30



(E) If 5 such boxes are kept one above other then find the total surface area of the shape.

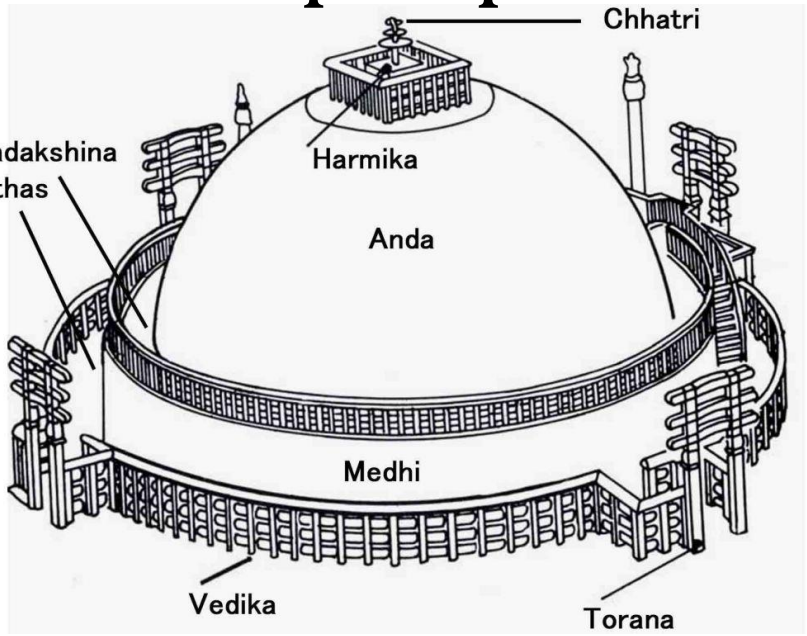
(i) 8700 cm^2
(ii) 8650 cm^2
(iii) 9000 cm^2
(iv) 9500 cm^2



Case study based - 9

Stupa of Sanchi

The stupa of sanchi is a great example of architecture in india. Its base part is cylindrical in shape. The dome of this stupa called anda, is hemispherical in shape. It also contains a cubical shaped part called Harmika at the top.



(A) Find the lateral surface area of the Harmika, if the side of this part is 8 m.

(i) $128\ m^2$
(ii) $256\ m^2$
(iii) $512\ m^2$
(iv) $384\ m^2$

(B) The diameter and hight of the cylindrical base part are 42 m. and 12 m respectively. If the volume of a brick is 0.01 m^3 . Find the number of bricks used in the cylindrical base.

(i) 16,63,400
(ii) 166320
(iii) 16,63,200
(iv) 17,20,180

(C) The diameter of the anda is 42 m. Find the volume of the anda.

(i) $19568\ m^3$
(ii) $17545\ m^3$
(iii) $18406\ m^3$
(iv) $19404\ m^3$

(D) A priest is watching chhatri at the top of the stupa. If the hight of the chhatri from the ground level is 60 m. and the angle of elevation of the chhatri from the priest is 30°. Find the distance of the priest from the base of the stupa.

(i) $60\sqrt{3}$

(ii) $20\sqrt{3}$

(iii) $40\sqrt{3}$

(iv) $\frac{60}{\sqrt{3}}$

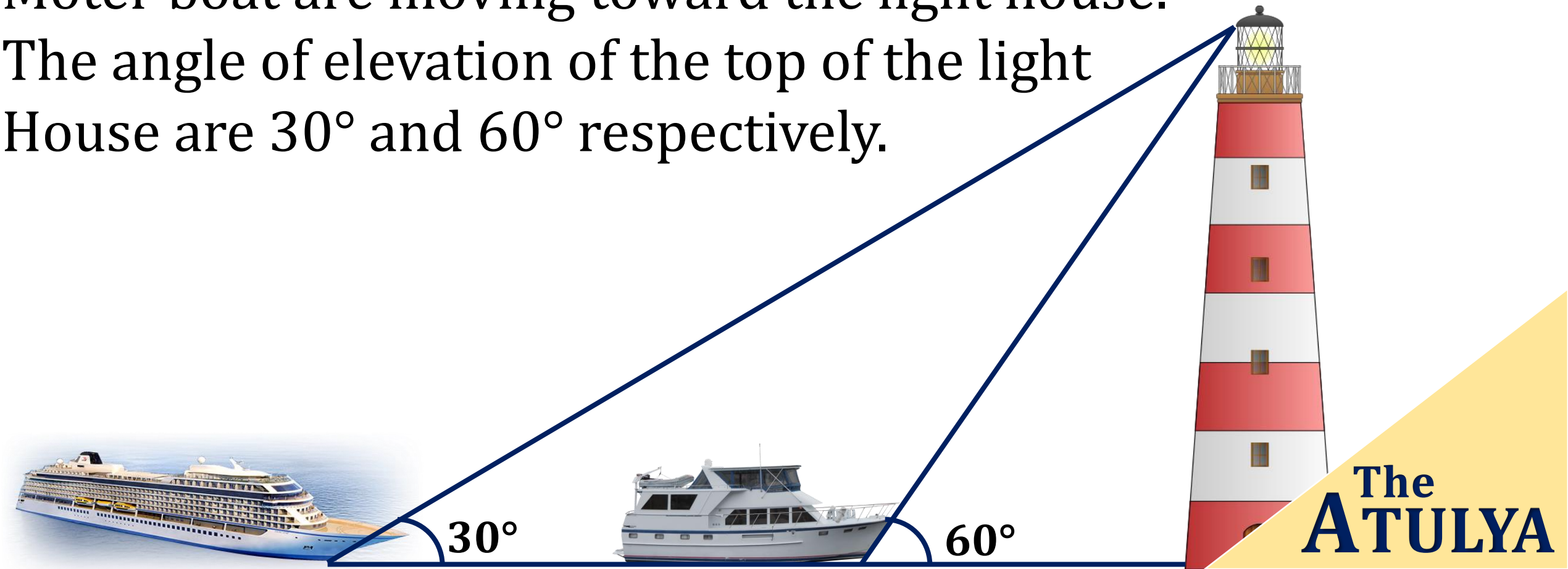
(E) The radius of pradakshina patha is 25 m. A boy walks 7 rounds on this path. Find the distance covered by the boy.

(i) 1200 m.
(ii) 1100 m.
(iii) 1000 m.
(iv) 1500 m.

Case study based - 10

Ship and Light house

There is a light house near seashore. A ship and a Moter boat are moving toward the light house. The angle of elevation of the top of the light House are 30° and 60° respectively.



(A) What is the distance between the two ships, if the hight of the light house is 42m.

(i) $\frac{42}{\sqrt{3}}$

(ii) $42\sqrt{3}$

(iii) $\frac{28}{\sqrt{3}}$

(iv) $28\sqrt{3}$

(B) If the hight of the light house is $50\sqrt{3}$ m. find the time taken by ship to reach the base of light house if its speed is 150 meter/minute

(i) 2 minute
(ii) 30 seconds
(iii) 1 minute
(iv) 45 seconds

(C) At a time in the day, the ratio of the length of the light house and its shadow is 1:1. find the angle of depression of the sun.

(i) 30°
(ii) 45°
(iii) 60°
(iv) 0°

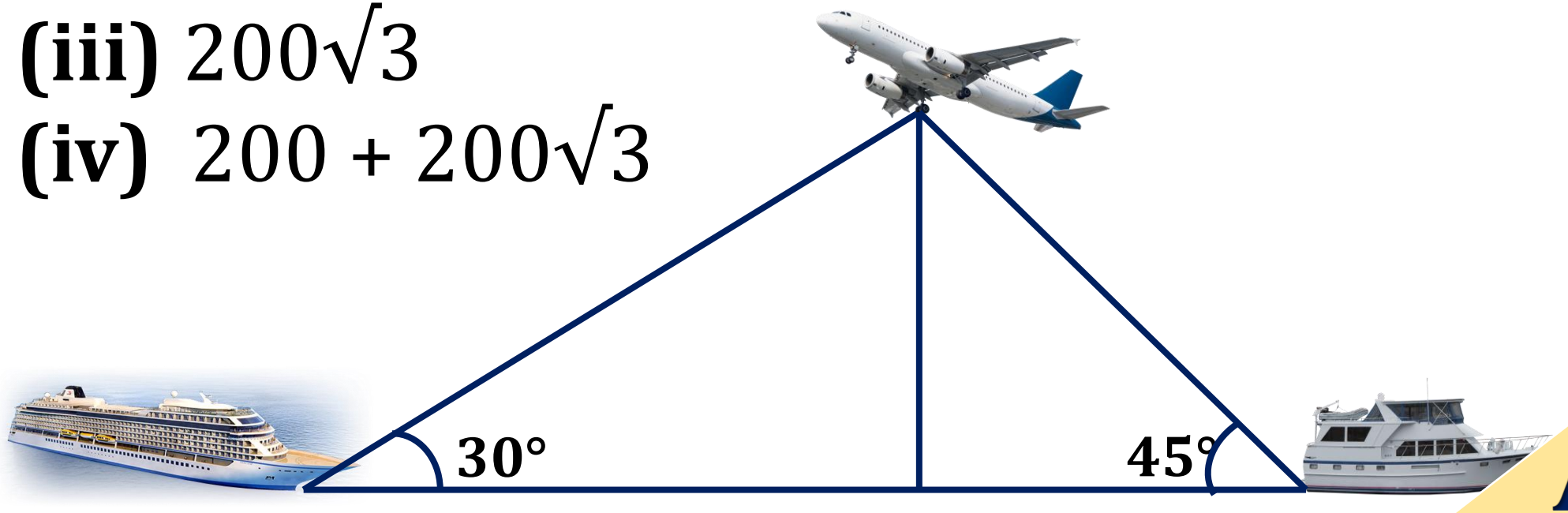
(D) An aeroplane is flying at a hight of 100 m. Find the distance between the ship and the boat from the given figure.

(i) $100\sqrt{3}$

(ii) $100 + 100\sqrt{3}$

(iii) $200\sqrt{3}$

(iv) $200 + 200\sqrt{3}$



(E) If the distance between the ship and the boat is 100m. The speeds of the boat and the ship are 60m/sec and 80m/sec respectively. Find the time in which the ship catch the boat.

(i) 8 sec
(ii) 5 sec
(iii) 6 sec
(iv) 10 sec

Case study based - 11

Probability of an event

Probability is a measure of the likelihood of an event to occur. Probability can range from 0 to 1. where 0 means the event to be an impossible one and 1 indicates a certain event. The sum of probabilities of all the events is 1. In other words probability is the ratio of number of favorable outcomes to number of total outcomes.

$$P(E) = \frac{\text{Number of favourable outcomes}}{\text{Number of all possible outcomes}}$$

(A) The probability of an impossible event is :-

(i) Positive
(ii) Zero
(iii) Negative
(iv) None of the above

(B) 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?

(i) $\frac{8}{13}$

(ii) $\frac{5}{13}$

(iii) 1

(iv) $\frac{13}{5}$

(C) Which of the following cannot be the probability of an event?

(i) $\frac{2}{3}$

(ii) **-1.5**

(iii) **15%**

(iv) **0.7**

(D) One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting a face card.

(i) $\frac{3}{13}$

(ii) $\frac{4}{13}$

(iii) $\frac{12}{26}$

(iv) $\frac{5}{13}$

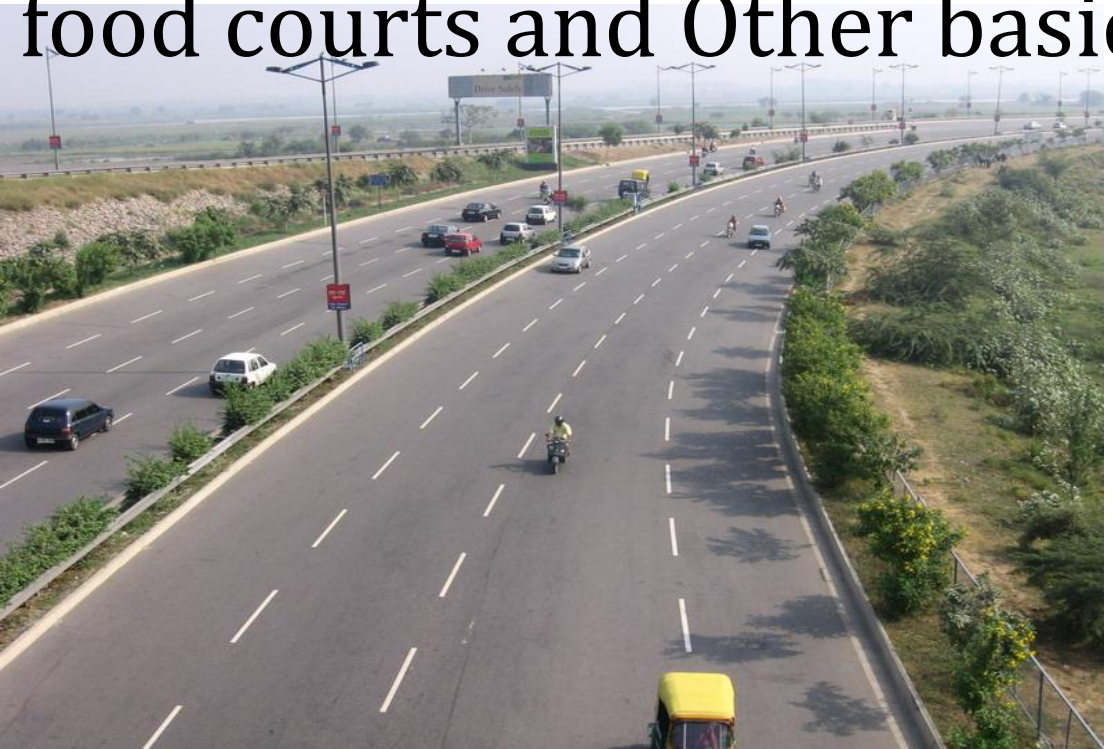
(E) If P(E) = 0.05, what is the probability of 'not E'?

(i) 0.15
(ii) 1
(iii) 0.5
(iv) 0.95

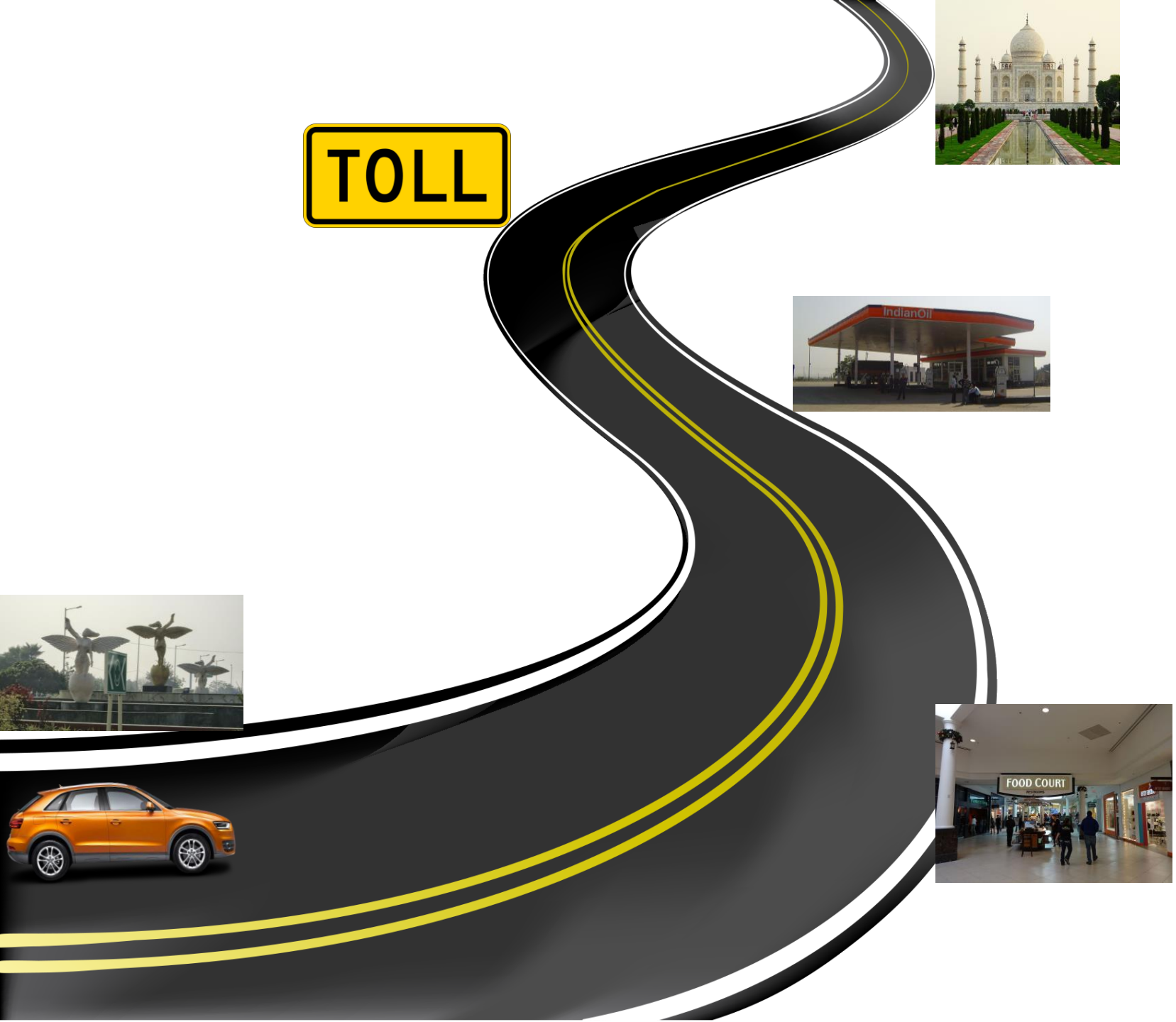
Case study based - 12

Yamuna Expressway

Yamuna expressway or Taj express way is 165 km long Expressway, connecting Greater Noida with Agra. It is india's One of the longest six lane expressways. It has filling stations, food courts and Other basic facilities.



The given table shows the distance of each stop from Greater Noida.



Stops	Distance (km)
Food Court	50
Filling Station	110
Toll Plaza	150

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(A) A car charges consist of a fixed charge together with the charge for the distance covered. A person paid Rs. 1000 as the charge to food court. Another person paid Rs. 1600 as the charge to filling station. Find the fixed charge.

(i) 10
(ii) 50
(iii) 100
(iv) 500

(B) In the food court Neha ordered 2 burgers and a cup of coffee and paid Rs. 190. Navneet ordered 1 burger and 2 cups of coffee and paid Rs. 170. Find the amount paid by Jeevitha if she bought 2 burgers only.

(i) 150
(ii) 140
(iii) 120
(iv) 100

(C) Kaustubh travels to his home which is 150 km distance. partly by a bus and a bike. he takes 3 hours if he travels 90 km by bus and the remaining by bike. If he travels 90 km by bike and the remaining by bus, he takes 10 minutes less. Find the speed of the bike and the bus respectively.

(i) 30 km/h, 60 km/h
(ii) 45 km/h, 60 km/h
(iii) 60 km/h, 30 km/h
(iv) 60 km/h, 45 km/h

(D) Ajay travels from food court to toll plaza in 2 hours. Find the time taken by him to travel a distance of 200 km.

(i) 4 Hrs
(ii) 3 Hrs
(iii) 5 Hrs
(iv) 3.5 Hrs

(E) Which of the following ratios represent infinitely many solutions :-

(i) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

(ii) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

(iii) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

(iv) None of the above

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For more CASE STUDY problems

Channel Link :- https://www.youtube.com/c/ATULYAMATHS


Yes, We Can