සියලු හිමිකම් ඇවිරිණි / முழுப் பதிப்புரிமையுடையது / All Rights Reserved]

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
இலங்கை பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka

32 | E | I

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2021(2022)
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2021 (2022)
General Certificate of Education (Ord. Level) Examination, 2021 (2022)

ගණිතය	I
கணிதம்	I
Mathematics	**I**

පැය දෙකයි
இரண்டு மணித்தியாலம்
Two hours

Index Number: .....

Certified Correct

.....
Signature of Invigilator

Important:

- This question paper consists of **8** pages.
- Write your **Index Number** correctly in the appropriate places on **this page** and on **page three**.
- Answer **all** questions **on this question paper itself**.
- Use the space provided under each question for working and writing the answer.
- Indicate the **relevant steps** and the **correct units** when answering the questions.
- Marks are awarded as follows:
  In Part A
  2 marks for each question
  In Part B
  10 marks for each question
- Blank papers can be obtained for scratch work.

For Marking Examiners' Use Only		
Part	**Question Numbers**	**Marks**
A	1 – 25	
B	1	
	2	
	3	
	4	
	5	
Total		

..... First Examiner	..... Code Number
..... Second Examiner	..... Code Number
..... Arithmetic Checker	..... Code Number
..... Chief Examiner	..... Code Number

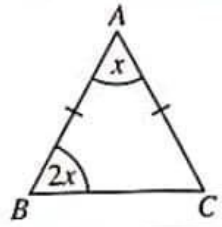
[see page two

Part A

Answer all questions on this question paper itself.

1. When an item is imported, customs duty of 22% is charged on its import value. What is the value of an item of import value 8000 rupees, after customs duty is paid?

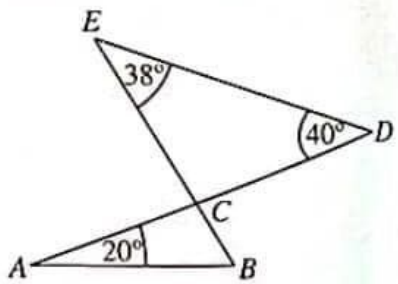
2. Find the value of x, based on the information in the figure.



3. Factorize: $9x^2 - 4$

4. The arc length of a sector of a circle of radius 7 cm is 11 cm. What fraction of the circle is the sector?

5. Find the magnitude of $A\hat{B}C$, based on the information in the figure.



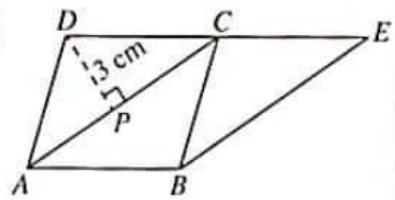
6. Simplify: $6x^4y^2 \div 3x^2y$

7. Fill in the blanks in the statement given below using suitable numbers.

A right prism with a uniform triangular cross-section has ..... triangular faces and ..... rectangular faces.

[see page three

8. $ABCD$ is a parallelogram. DC has been produced to E such that $AC \parallel BE$. If $BE = 6$ cm and $DP = 3$ cm, find the area of the trapezium $ABED$.



9. Find the least common multiple:

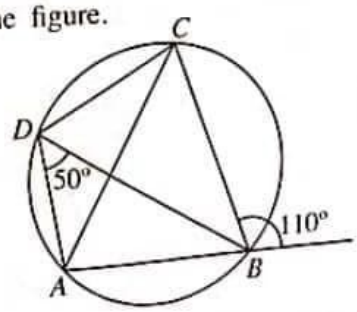
$4x^2y$, $6xy$, $3y^2$

10. A person who deposits 6000 rupees in a bank for 2 years at an annual interest rate of 5% compounded annually, receives 300 rupees as interest for the first year. How much interest does he receive for the second year?

11. The first quartile of a collection of data arranged in ascending order is in the 4^{th} position. In which position is the median of this collection of data?

12. Find the minimum area of a sheet of paper that can be used to completely cover the curved surface of a solid right circular cylinder of radius 7 cm and height 5 cm.
(Take the value of π as $\frac{22}{7}$.)

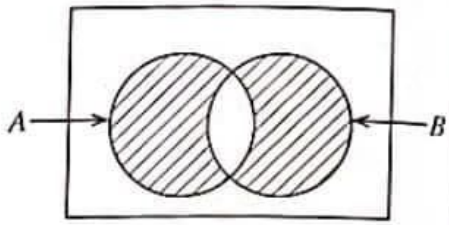
13. Find the magnitude of $B\hat{A}C$, based on the information in the figure.



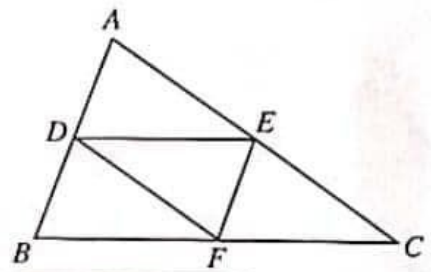
[see page four

14. Solve: $\frac{1}{x}-\frac{3}{4x}=\frac{3}{8}$

15. If $n(A)=10$, $n(B)=5$ and $n(A\cap B)=3$, how many elements are there in the shaded region of the Venn diagram?



16. In the triangle ABC in the given figure, D, E and F are respectively the midpoints of the sides AB, AC and BC. If $AB=4$ cm, $AC=5$ cm and the perimeter of the triangle DEF is 7 cm, find the length of BC.

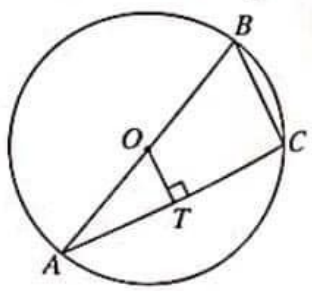


17. For the statements given below, mark a '✓' in front of each of the correct statements and a '×' in front of each of the incorrect statements.

$3<\sqrt{14}<4$	
$\sqrt{35}<5.5$	
$\sqrt{3}+\sqrt{15}<6$	

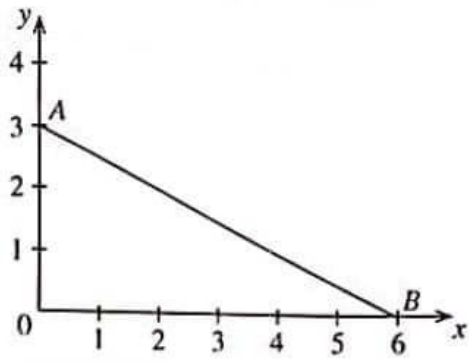
18. Anil takes 32 minutes to walk, at a uniform speed, from his home to school which is 2.4 km away. How many minutes will it take him to walk a distance of 3 km at the same uniform speed?

19. The centre of the given circle is O and its radius is 5 cm. If $TC=4$ cm, find the length of BC.



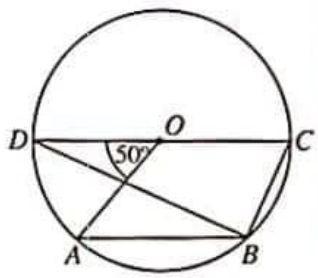
[see page five

20. Obtain the equation of the straight line AB shown in the figure.



21. The 6^{th} term of a geometric progression with common ratio 5 is 80. What is the 8^{th} term of this progression?

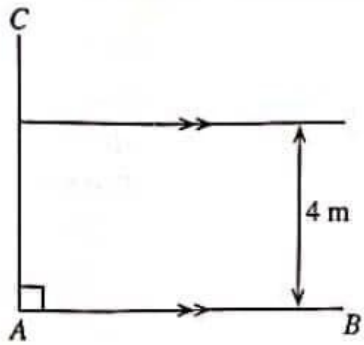
22. The centre of the given circle is O. Find the magnitude of $A\hat{B}C$.



23. $A = (1\ -3)$ and $B = \begin{pmatrix} -1 & 2 \\ -1 & 1 \end{pmatrix}$. Find the matrix AB.

24. A bag contains only identical red and black balls. The probability of a ball drawn at random from the bag being red is $\frac{2}{7}$. If there are 15 black balls in the bag, how many balls in total are there in the bag?

25. AB and AC are two perpendicular boundaries of a land. It is required to plant a tree at the point P which is 4 m from AB and 5 m from the corner A. An incomplete sketch relevant to finding this location is shown in the figure. Complete the figure using the knowledge on loci, and mark the point P.



50

[see page six

Part B

Answer all questions on this question paper itself.

1. (*a*) From a stock of a type of cosmetics produced by a certain company, $\frac{2}{5}$ is allocated for shops and $\frac{3}{8}$ for export.

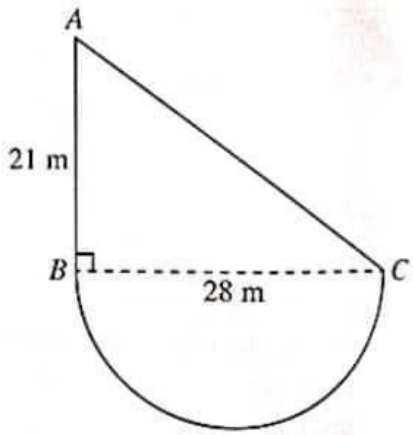
(i) What fraction of the total stock is the quantity allocated for shops and for export?

(ii) $\frac{1}{3}$ of the remaining quantity of cosmetics is kept for sale within the company itself. If the value of this quantity of cosmetics that is kept for sale is 6000 rupees, what is the value of the total stock of cosmetics?

(*b*) It has been estimated that 12 employees will take 7 days to produce the above stock of cosmetics. If it is required to produce twice the quantity of this stock in 8 days due to an urgent order, how many more such employees need to be engaged for this?

2. The figure shows a flower bed consisting of a right triangular plot of land *ABC* and a semicircular plot of land with *BC* as its diameter. (Take $\frac{22}{7}$ as the value of π.)

(i) Find the length of *AC*.
(Hint: $28 = 4 \times 7$, $21 = 3 \times 7$)



(ii) It is required to build a fence around the whole flower bed. Find the length of this fence.

(iii) Find the area of the semicircular portion.

(iv) It is required to add a rectangular plot that is of area equal to the area of the semicircular portion, with *AB* as a side, outside the triangular portion. Draw a sketch of this rectangle with its measurements, in the above figure.

[see page seven

3.

'Sundara' Company
Price of a share is 50 rupees.
Dividends of 2.50 rupees per share is paid annually.

Aruna invested 60 000 rupees to buy shares in the above company.

(i) How many shares did he buy?

(ii) After receiving dividends from the company at the end of a year, Aruna sells all the shares at 55 rupees per share. How much does he obtain in total as dividends and from selling all the shares?

(iii) Aruna deposits the total amount he gets in a bank for one year. If he receives 3450 rupees as interest from the bank for the year, what is the annual interest rate the bank pays?

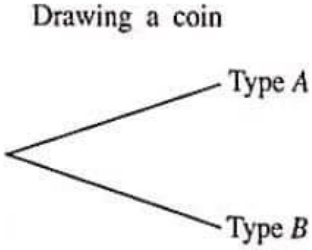
10

4. (*a*) In a bag there are 10 coins of two types as follows, which are identical in shape and size.

Type *A* – 7 fair coins

Type *B* – 3 coins with Head marked on both sides

(i) A coin is drawn at random from the bag. Complete the following incomplete tree diagram relevant to this.



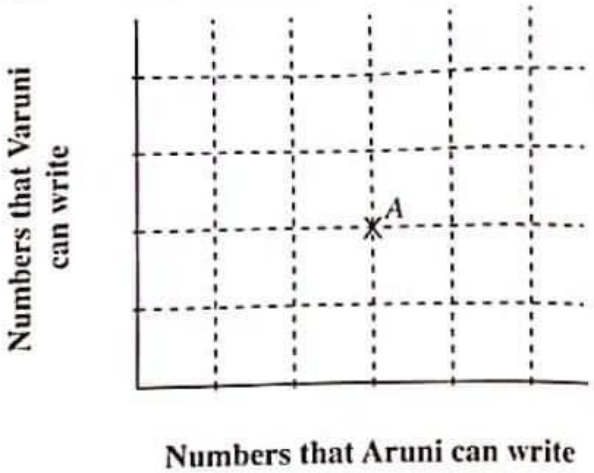
(ii) The coin which is drawn is tossed and the side which falls face up is observed. Extend the tree diagram accordingly and include the relevant probabilities.

(iii) Find the probability of obtaining a head in the above experiment of drawing a coin and tossing it.

[see page eight

(*b*) The teacher told Aruni to write an odd number which is greater than 0 and less than 10 and Varuni to write an even number which is greater than 0 and less than 10.

(i) Calibrate the axes in the figure indicating all the numbers that Aruni and Varuni can write and mark the elements of the sample space on the given grid with 'X'. Express the event represented by A in words.

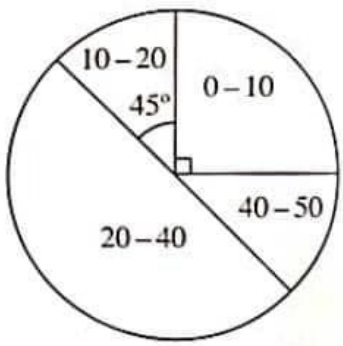


(ii) By considering that both Aruni and Varuni write correct numbers, encircle on the grid, the event of the number which Aruni writes being greater than the number which Varuni writes, and find its probability.

10

5. The figure shows a pie chart indicating the intervals which contain the marks that a group of students in a class obtained from a total of 50, for a mathematics test.

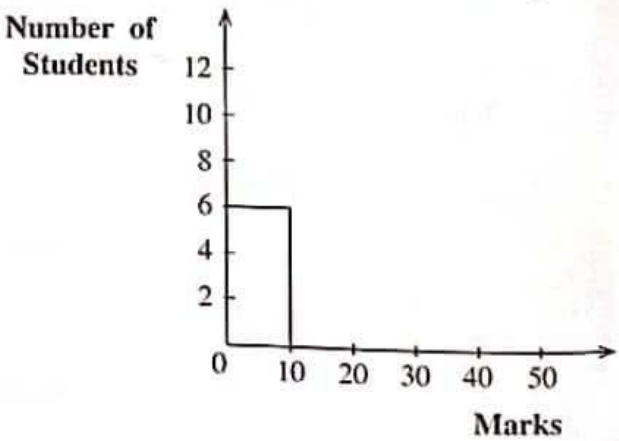
The number of students who obtained marks in the intervals 10 – 20 and 40 – 50 are equal.



(i) Find the magnitude of the central angle of the sector that represents the students who obtained marks in the interval 20 – 40.

(ii) If 6 students have obtained marks in the interval 0 – 10, fill in the blanks in the given table.

Interval of Marks	Number of Students
0 – 10	6
10 – 20	...
20 – 40	...
40 – 50	...



(iii) Complete the histogram on the given system of axes such that the above information is represented.

(iv) Two of the students who obtained marks in the interval 20 – 40 in the above test obtained marks in the interval 40 – 50 in the next test, while the marks of the rest of the students remained unchanged. If a new pie chart is drawn to represent this information, find the magnitude of the central angle of the sector representing the interval 20 – 40.

10

PAST PAPERS WIKI

OL/2021(2022)/32/E-II

සියලුම හිමිකම් ඇවිරිණි / முழுப் பதிப்புரிமையுடையது /All Rights Reserved]

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இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka

32 E II

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2021(2022)
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2021(2022)
General Certificate of Education (Ord. Level) Examination, 2021(2022)

ගණිතය II
கணிதம் II
Mathematics II

පැය තුනයි
மூன்று மணித்தியாலம்
Three hours

අමතර කියවීම් කාලය - මිනිත්තු 10 යි
மேலதிக வாசிப்பு நேரம் - 10 நிமிடங்கள்
Additional Reading Time - 10 minutes

Use additional reading time to go through the question paper, select the questions and decide on the questions that you give priority to in answering.

Instructions:

* *Answer **ten** questions selecting **five** questions from* **Part A** *and **five** questions from* **Part B**.
* *Write the **relevant steps** and the **correct units** in answering the questions.*
* *Each question carries* **10** *marks.*
* *The volume of a right circular cylinder of base radius r and height h is $\pi r^2 h$.*
* *The volume of a sphere of radius r is $\frac{4}{3}\pi r^3$.*

Part A

*Answer **five** questions only.*

1. An incomplete table of y values corresponding to several x values of the quadratic function $y = x^2 - 2x - 2$ is given below.

x	-3	-2	-1	0	1	2	3	4
y	13	6	1	-2	-3	-2	...	6

(*a*) (i) Find the value of y when $x = 3$.

(ii) Using the standard system of axes and a suitable scale, draw the graph of the given quadratic function on the provided graph paper, according to the above table.

(*b*) Using the graph that you drew,

(i) write the interval of values of x on which the function is positive and increasing.

(ii) write the coordinates of the minimum point of the graph and thereby write the quadratic function in the form $y = (x - a)^2 + b$. Here a and b are constants.

(*c*) By considering the x-coordinate of an intersection point of the graph and the line $y = 0$, find a value for $\sqrt{3}$ to the nearest first decimal place.

2.

A television set can be purchased by making an initial payment of 8000 rupees and paying the remainder in instalments.

A television set which is sold outright for 80 000 rupees can be purchased by making a down payment of 8000 rupees and paying the remainder in 18 equal monthly instalments. Here, an annual interest rate of 24% is charged and the interest is calculated on the reducing loan balance. How much is a monthly instalment that has to be paid when a television set is purchased in this manner?

[see page two

3. (*a*) The classrooms in a primary school have only square tables and round tables. There are 4 chairs placed around each square table and 5 chairs placed around each round table. The number of square tables is 45 more than the number of round tables. The total number of chairs around all the tables is 720. Taking the number of square tables as x and the number of round tables as y, construct a pair of simultaneous equations and by solving them, find separately the number of square tables and the number of round tables in the classrooms in the school.

(*b*) $x - 1 \leq 1$
$2x - 1 > -2$
Write all the integral values of x that satisfy both the above inequalities.

4. Information obtained regarding the number of units of electricity consumed in a month by each house in a housing scheme consisting of 60 houses is given below.

Number of units of electricity	60 – 80	80 – 100	100 – 120	120 – 140	140 – 160	160 – 180	180 – 200
Number of houses	4	8	11	12	10	8	7

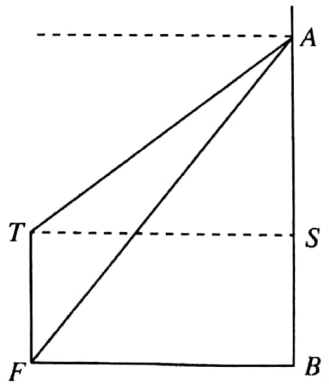
(i) What is the modal class of this frequency distribution?

(ii) By taking the mid-value of the modal class as the assumed mean, find the mean number of units of electricity that is consumed by a house in a month, to the nearest whole number.

(iii) Show that more than 3900 units of electricity can be saved if the number of units of electricity that is consumed in 3 months by 100 houses that consume electricity in this manner is reduced by 10%.

(iv) Show that the maximum number of units of electricity that may have been consumed by the 23 houses that consumed the least amount of electricity during the given month is less than the least number of units of electricity that may have been consumed by the 15 houses that consumed the most amount of electricity that month, from the 60 houses from which information was obtained.

5. Amal, from the window A of a vertical building and Sumith, from the window S of the building, observe a vertical tree FT located on the same level ground, 50 m from the building. The window S and the top T of the tree are at the same level. Amal observes the top of the tree with an angle of depression of 22°.



(*a*) Copy the figure onto your answer script and include the given information in it.

(*b*) By using trigonometric ratios, do the following calculations.

(i) Find the height SA between the two windows S and A. (Disregard the heights of the windows.)

(ii) The length of a wire drawn from the window A to the foot F of the tree is 60 m. Find the magnitude of the angle between the wire AF and the vertical wall AB.

(*c*) Give reasons why $FB > AB$.

6. (i) The length of a side of the square lamina B is 4 cm more than the length of a side of the square lamina A. The sum of the areas of the two laminas is 88 cm^2. By taking the length of a side of lamina A as x cm, show that x satisfies the quadratic equation $x^2 + 4x - 36 = 0$.

(ii) By taking the value of $\sqrt{10}$ as 3.16, find the length of a side of lamina A.

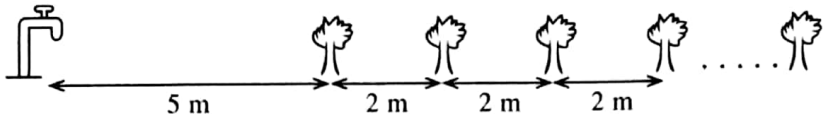
(iii) Show that the difference in the areas of the two laminas is 8×6.32 cm^2.

[*see page three*

Part B

*Answer **five** questions only.*

7. As shown in the figure, a tap and 18 flowering bushes are located such that they are collinear. The distance from the tap to the first flowering bush is 5 m and the distance between every two consecutive flowering bushes is 2 m.



(i) Write separately, the distance from the tap to the first, second and third flowering bushes respectively.

(ii) How far is the 8^{th} flowering bush from the tap?

(iii) Which flowering bush is 37 m from the tap?

(iv) Piyumi fills a bucket with water from the tap, carries it to the first flowering bush, waters it and returns to the tap. She fills the bucket again with water, carries it to the second flowering bush, waters it and returns to the tap. She waters the flowering bushes up to the 18^{th} one in this manner by carrying a separate bucket of water to each flowering bush respectively. Finally, she places the empty bucket next to the tap. Show that the total distance she walks during this activity is more than 790 metres.

8. Use only a straight edge with a cm/mm scale and a pair of compasses for the following constructions. Show the construction lines clearly.

(i) Construct the triangle ABC such that $AB = 8.5$ cm, $A\hat{B}C = 90°$ and $BC = 8.5$ cm.

(ii) Construct the bisector of $A\hat{B}C$. Name the point at which it meets AC as D.

(iii) Find the centre of the circle that has BD as a diameter and construct this circle.

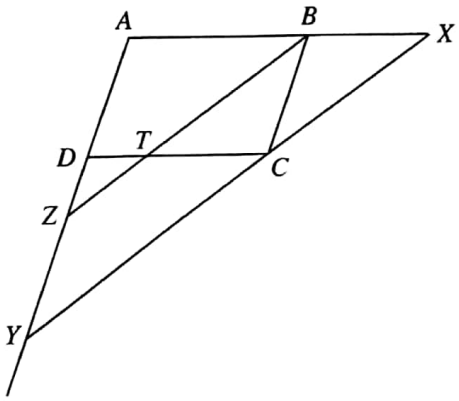
(iv) Give reasons why the line AC is the tangent to the circle at D.

(v) Construct another tangent to the circle from A.

9. (*a*) Prove the theorem, 'The opposite sides of a parallelogram are equal'.

(*b*) $ABCD$ is a parallelogram. The bisector of $A\hat{B}C$ meets CD at T. The straight line drawn through C parallel to BT meets AB produced at X and AD produced at Y. Moreover, BT produced meets AY at Z.

Show that DZT is an isosceles triangle and thereby show that $AB + AD = BX + DY$.

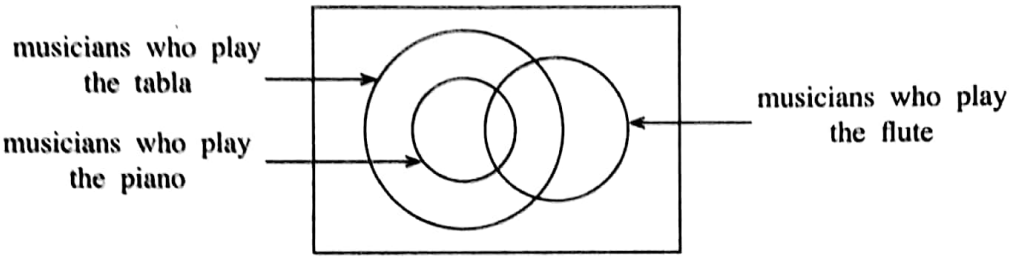


[see page four

10. (*a*) A right circular cylindrical container of base radius r is filled with water to a height of 12 cm. The water in this container is just enough to completely fill 16 hemispherical containers, each of radius 4 cm. Show that $r = \frac{16\sqrt{2}}{3}$ cm.

(*b*) $A = \frac{\sqrt{65.2} \times 0.722}{3.06}$. Find the value of A to the nearest second decimal place using the logarithms table.

11. An incomplete Venn diagram drawn to represent the information collected from 142 musicians on whether they play the piano, tabla or flute is shown below.
Of the 55 who play the piano from these musicians, 15 also play the flute.



(i) Copy the incomplete Venn diagram given in the figure onto your answer script and include the above given information in it.

(ii) If 60 musicians play exactly two of these instruments, how many musicians play both the tabla and the flute but **not** the piano?

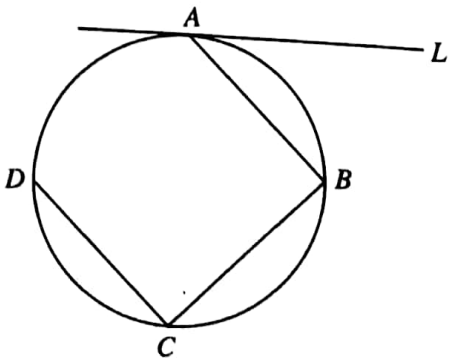
(iii) The number of musicians who play only the tabla from these three instruments is equal to the number of musicians who play the flute and the tabla. How many musicians play only the tabla?

(iv) The number of musicians who play the flute is exactly half the number of musicians that play the tabla. How many musicians **do not play** any one of these three instruments?

12. (*a*) The points A, B, C and D lie on the circle shown in the figure such that $AB = BC$ and $DC \parallel AB$. The tangent drawn to the circle at A is AL.

(i) Copy the figure onto your answer script and include the above information in it. Join DB and AC.

(ii) If $L\hat{A}B = 35°$, find the magnitude of $B\hat{A}C$ and show that $DB \parallel AL$.



(*b*) The points P, Q, R and S lie on a circle. If PR and QS are diameters of the circle, what type of quadrilateral is $PQRS$? Give reasons for your answer.

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