OL/2019/32/E-II

සියලු ම හිමිකම් ඇවිරිණි / முழுப் பதிப்புரிமையுடையது / All Rights Reserved]

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
இலங்கைப் பரீட்சைத் திணைக்களம் இலங்கைப் பரீட்சைத் திணைக்களம் இலங்கைப் பரீட்சைத் திணைக்களம் இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka
ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
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32 | E | II

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2019 දෙසැම්බර්
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2019 டிசெம்பர்
General Certificate of Education (Ord. Level) Examination, December 2019

ගණිතය II
கணிதம் II
Mathematics II

09.12.2019 / 1300 - 1610

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 in answering.

Important:

* *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 sphere of radius r is $\frac{4}{3}\pi r^3$.*

Part A

*Answer **five** questions only.*

1. The following notices have been published by Bank **A** and Company **B**.

Bank **A**	Company **B**
An interest of 9% per annum is paid for fixed deposits.	Price of a share is 25 rupees and dividends of 1.50 rupees per share is paid annually.

(i) Kamal deposited exactly half of the amount of 100 000 rupees he had in a fixed deposit in Bank **A** and spent the remaining amount in buying shares in Company **B**. At the end of a year he obtains the dividends from Company **B** and sells all the shares at 26 rupees per share. Show giving reasons, from which investment he receives a greater income at the end of a year.

(ii) Express the total income he receives at the end of a year as a percentage of the total amount invested.

2. An incomplete table showing the y-values corresponding to several x-values of the quadratic function $y = x^2 - 2x$, within the interval $-2 \leq x \leq 4$, is given below.

x	–2	–1	0	1	2	3	4
y	8	3	0	–1	0	...	8

(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 a graph paper, according to the above table of values.

(iii) Write the coordinates of the turning point of the graph.

(iv) Express the given quadratic function in the form $y = (x-a)^2 + b$. Here, a and b are two numbers.

(v) Write the interval of values of x on which the function increases within the interval $-1 < y \leq 3$.

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3. (a) There are 5 boys and 4 girls in a group of dancers. In a certain performance, all the boys wore costumes of the same price and all the girls too wore costumes of the same price. The price of two boys' costumes was 1000 rupees more than the price of three girls' costumes. The cost of the costumes of all the children in the group was 14 000 rupees.

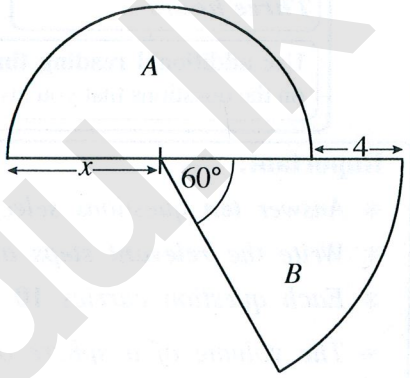
(i) Take the price of a boy's costume as x rupees and the price of a girl's costume as y rupees and construct a pair of simultaneous equations that represents the above information.

(ii) By solving these equations, find separately the price of a boy's costume and the price of a girl's costume.

(b) Simplify: $\frac{5x}{x^2-1} - \frac{4}{x+1}$

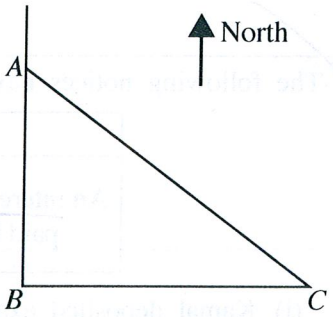
4. A lamina consisting of a semi-circle A of radius x units and a sector B with angle at the centre 60°, which is concentric with the semi-circle, is shown in the figure. If the area of A and the area of B are equal, show that x satisfies the quadratic equation $x^2 - 4x - 8 = 0$ and show with reasons that x can take exactly one value.

By using 1.73 for the value of $\sqrt{3}$, find an approximate value for the radius of the sector B, to the first decimal place.



5. A man standing at point A of a level ground observes a mango tree at point C, a distance of 100 metres away from him on a bearing of 127°. He also observes a coconut tree at point B which is to the south of point A and to the west of point C.

A rough sketch of the locations of the points A, B and C is given in the figure.



(i) Copy the given figure onto your answer script and indicate the above information in it.

(ii) Using the trigonometric tables, find the distance AB between the man and the coconut tree, to the nearest metre.

(iii) On the copied figure, mark the point D which is exactly halfway between the man and the coconut tree, and the point E which is 118 metres to the west of the coconut tree at point B. Using the approximate value obtained in part (ii) above for the distance AB, and the trigonometric tables, find the magnitude of $B\hat{D}E$.

6. Information collected on the masses of a sample of 40 bags of items that were brought to be loaded into a lorry is given in the following frequency table. Here, 0 – 10 denotes the mass interval "greater than 0 and less than or equal to 10" and the other intervals denote similarly.

Mass of a bag of items (kg)	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
Number of bags (frequency)	2	5	7	9	8	6	3

(i) Find the mean mass of a bag of items according to the given information.

(ii) If the above sample has been obtained from a stock of 200 bags of items, estimate the total mass of the stock of bags of items.

(iii) If it is given that the maximum mass that can be loaded into the lorry is 1500 kg, give reasons to show that there can be instances when the above 40 bags of items cannot be loaded into the lorry.

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Part B

*Answer **five** questions only.*

7. Sunitha who hopes to participate in a sports event trains by jogging daily. She spends 105 minutes in the first week and 119 minutes in the second week for this. The time she spends training each week when taken consecutively, lie in an arithmetic progression.

(i) Find the common difference of this arithmetic progression.

(ii) Find in minutes, the time she spends training in the 7th week.

(iii) In which week does the time she spends training during a week first exceed 221 minutes?

(iv) (a) Find the total time she spends jogging during the first 10 weeks of training.

(b) If the average speed at which she jogs is $6\,km\,h^{-1}$, find the total distance she jogs during that time.

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

(i) Construct a straight line segment AC of length 6 cm and construct the line AB such that $C\hat{A}B = 60°$.

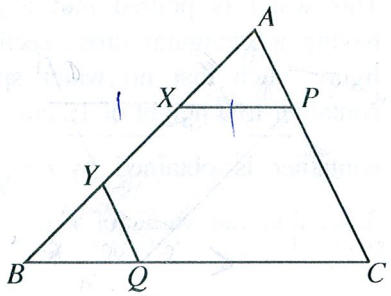
(ii) Construct the angle bisector of $C\hat{A}B$.

(iii) Construct the circle that has its centre O on the above constructed angle bisector and touches AC at C. Produce the line AO such that it meets the circle at D.

(iv) Construct the tangent to the circle at D and mark the point of intersection of this tangent and AC produced as P.

(v) Give reasons why $D\hat{P}C = A\hat{O}C$.

9. In the given figure, ABC is a triangle. X and Y are two points on AB such that $AX = BY$. Moreover, P is a point on AC such that $XP \parallel BC$ and Q is a point on BC such that $YQ \parallel AC$.



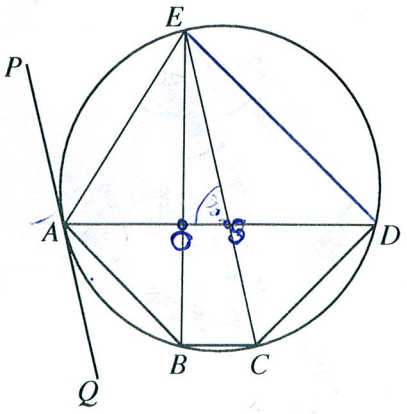
Copy the given figure onto your answer script and indicate the above information in it.

(i) Show that $\Delta\ AXP \equiv \Delta\ BYQ$.

(ii) Draw the straight line PQ and show that $PQ \parallel AB$.

(iii) The lines PX and QY produced meet at D. If $DX = XP$, show that $XY = \frac{1}{2}PQ$.

10. In the cyclic quadrilateral $ABCD$ shown in the figure, $D\hat{A}B = A\hat{D}C = 45°$. The straight line drawn from B perpendicular to AD meets the circle at E. The line PAQ is the tangent drawn to the circle at A.

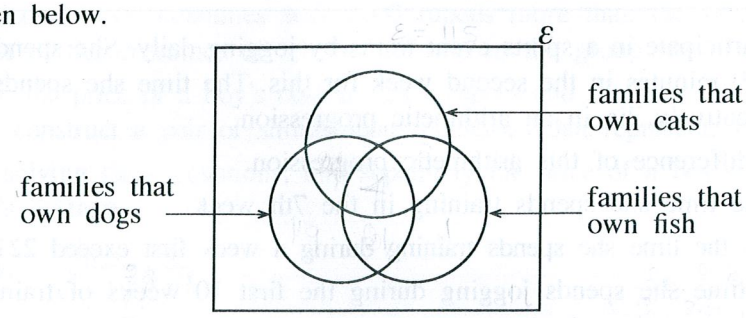


Prove that CE is a diameter of the circle and that it is parallel to the tangent PAQ.

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11. A survey was conducted on 115 families that own pets. Information on the families that own dogs, cats and fish as pets from these families and an incomplete Venn diagram drawn corresponding to it are given below.



- 4 families own all the above three types of pets.
- The number of families that own only dogs is 19.
- 24 families own both dogs and cats while 21 families own both dogs and fish.
- 11 families do not own any of the above three types of pets.

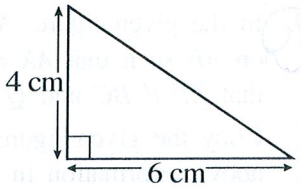
(i) Copy the given Venn diagram onto your answer script and include the above information in it.

(ii) The number of families that own dogs is twice the number of families that own fish. Find the number of families that own fish but **do not** own dogs.

(iii) How many families own only cats?

(iv) The number of families that own only fish is twice the number of families that own cats and fish but **not** dogs. Find the probability of a family selected at random from those surveyed being a family that owns only fish.

12. A hemispherical container of radius r is completely filled with water. This water is poured into a glass container in the shape of a prism, having a triangular cross section with the measurements shown in the figure, such that no water spills out. Then the water fills this glass container to a height of 10 cm. Show that the radius r of the hemispherical container is obtained by $r = \sqrt[3]{\frac{180}{\pi}}$ cm, and taking the value of π as 3.14, find the value of r in centimetres to the first decimal place.



* * *

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