



தமிழக அரசு
கல்வி அமைச்சு
Ministry of Education

G. C. E. Ordinary Level | **அ. கோ. க. காலாறு சேல்** | 2022 (2023)

Student Seminar Series

இசு கல்வித் துறை மூலம்

Practice Paper | **உதாரண துறை துறை**

Mathematics

மணிதல்



Question Paper - I, II (English Medium)



தமிழ்நாடு
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The National e-Learning Portal for The General Education

தமிழ்நாடு அரசு கல்வி அமைச்சு | மணிதல் அமைச்சு

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Ministry of Education, Sri Lanka

32

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Ministry of Education, Sri Lanka

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கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை- மாணவர் கருத்தரங்கு தொடர் - 2022 (2023)

G. C. E. Ordinary Level Examination – Student Seminar Series - 2022 (2023)

ගණිතය

I, II

கணிதம்

I,

පැය තුනයි.

மூன்று மணித்தியாலம்

Three Hours

අමතර කියවීම් කාලය - මිනිත්තු 10 යි.

மேலதிக வாசிப்பு நேரம் - 10 நிமிடங்கள்

Additional Reading Time – 10 minutes

Use the extra time to read the questions and to select and organize the order of answering the questions

Mathematics I

Important:

- This paper consist of 7 pages.
- Write the answer for all the question in the paper itself.
- Use the space provided to write the answer and the procedure of obtaining the answer.
- It is required to write the necessary steps and the relevant measuring units when answering the questions.
- Marks were allocated for the questions as shown below.

Part A - 2 marks for each question.

Part B - 10 marks for each question..

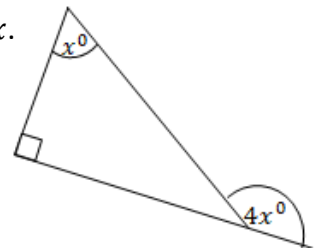
- You can ask for empty papers to do rough work.

Part A

Write answers for all the questions in this paper itself.

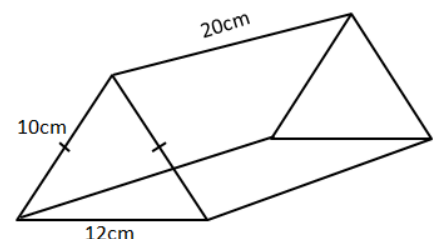
01. It is required to pay Rs. 750/= per a quarter to a certain provincial authority for a house which is assessed as Rs. 50 000/=. Calculate the assessment tax rate charged by that provincial authority.

02. According to the data given in the diagram, calculate the value of x .

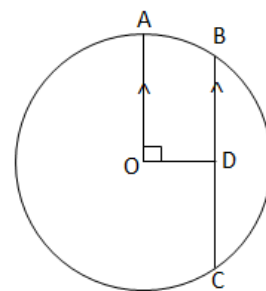


03. Factorize $2x^2 - 7x + 6$

04. The diagram shows a triangular prism. The measurements of it are marked in the diagram. Draw rough sketches of two different faces of the prism with measurements.

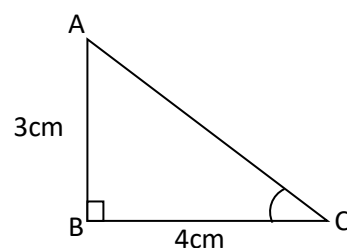


05. O is the radius of the circle given in the diagram. $AO = 20\text{cm}$ and $OD = 12\text{cm}$. Calculate the length of BC .



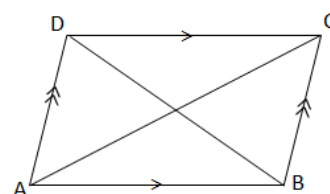
06. Calculate the Least Common Multiple of the following algebraic terms.
 $12ab$, $4a^2b^2$

07. According to the data given in the diagram, calculate the value of $\sin \theta$.



08. Use the following diagram to complete the given table, Put \checkmark for correct statements and \times for incorrect statements.

$AB = DC$, $AD = BC$	
$\angle DAB = \angle BCD$, $\angle ABC = \angle ADC$	
$\angle DAC = \angle BCA$, AC and BD are perpendicular to each other.	

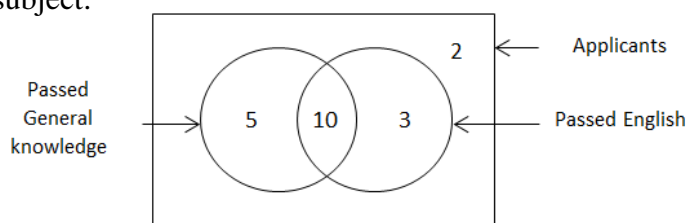


09. Simplify $\frac{3a^2b}{5} \times \frac{15x}{ab}$

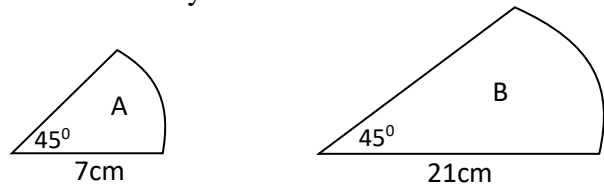
10. Select and underline the first approximation of $\sqrt{20}$ from the given numbers.

(i) 4.3 (ii) 4.5 (iii) 4.4

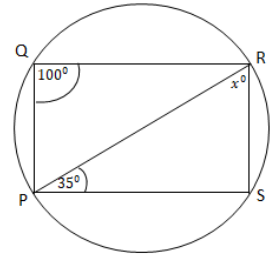
11. The following Venn diagram shows data on how the participants passed the English Language paper and the General Knowledge paper. Calculate the number of participants who passed only one subject.



12. A and B are two sectors of circles with the central angle of 45° and with the radius of 7 cm and 21 cm respectively. The area of B is how many times as the Area of A?

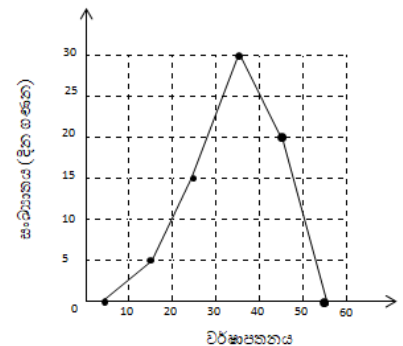


13. According to the data given in the diagram, Find the value of x .

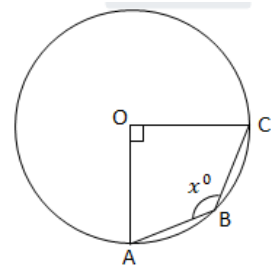


14. Solve $(x - 2)(x + 3) = 0$

15. The following is the frequency polygon drawn by considering the mid value of each class interval and the relevant frequency of the daily rainfall in a certain area. Find the total number of days represented in the frequency polygon.

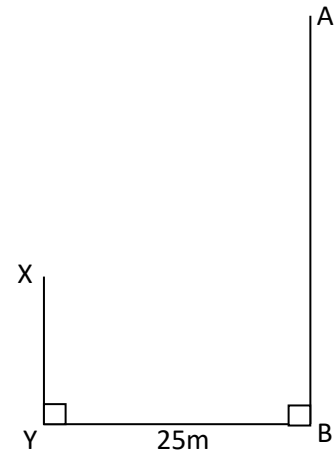


16. If $\angle AOC = 90^\circ$ in the circle whose radius is O, Calculate the value of x .

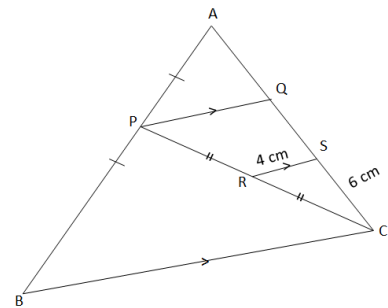


17. In the number sequence of 2, 6, 18, 54, the tenth term is how many times as its eighth term?

18. XY and AB are two buildings located 25 cm apart from each other. Risith, who is in the upstairs at X in the building XY was able to see the top A of the building AB in an angle of elevation of 65° and the bottom B of that building with the angle of depression of 42° . Mark these data in the given diagram.



19. In the given diagram, $BC \parallel PQ \parallel RS$. If $AP = PB$, $PR = RC$, $RS = 4 \text{ cm}$ and $CS = 6 \text{ cm}$. Find the length of
- BC
 - AC



20. Find the gradient and the intercept of the straight line which is passing through the points (0,3) and (0,4).
21. When a vehicle travels in a uniform speed of 60 kmh^{-1} It takes 4 hours to travel a certain distance. If the speed of the vehicle reduced to a uniform speed of 40 kmh^{-1} . How many more hours will it take to travel the same distance?
22. Complete the blanks of the following statements.
The angle subtended by a sector of a circle at the (i) is (ii) as the angle subtended by that sector at the remaining part of the circle.
23. An unbiased coin tossed twice. Calculate the probability of obtaining the same side in both instances.

24. $2x + 3y = 16$ -----(1)
 $5x + 3y = 22$ ----- (2)

Following are some incomplete steps written to solve the above mentioned simultaneous equations. Complete those sentences.

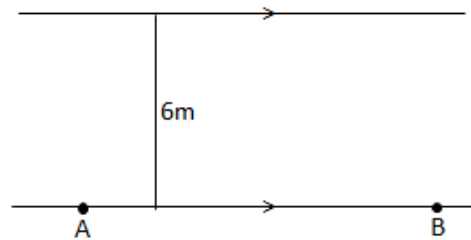
From (2) – (1) $3x = \dots\dots\dots$

$$\therefore x = 2$$

By substituting the value of x in (2)

$$\dots\dots\dots + 3y = 22$$

25. In a straight fence a jack tree was planted at A and a “Na” tree was planted at B. The well C is located 6 m away from that fence and with an equi distance to those two trees. Mark the location of the well in the given diagram by using the knowledge of loci.

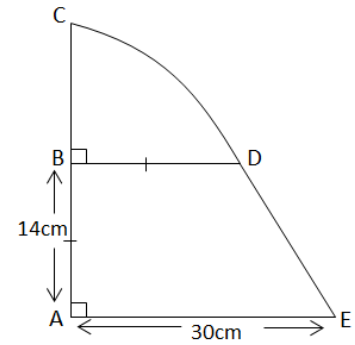


Part B

Answer for **all the questions** in the paper itself

01. In a certain province $\frac{1}{7}$ of the total population was displaced due to floods and $\frac{2}{3}$ of the remaining were due to the damages caused to houses from the wind.
- What fraction of the total population was not displaced due to the flood?
 - Calculate the total fraction of displaced population due to the damages caused by wind.
 - Write the fraction of the total population who were not displaced due to the flood or the wind.
 - If 24 500 people remain without any displacements, What is the total population of that area?
 - The total population who were displaced is how many times of the ones who were not displaced?

02. A board which was showing a trademark of a company consists of a trapezium and a sector of a circle. (Take $\pi = \frac{22}{7}$)



- Calculate the area of the sector of a circle BCD..
- Calculate the area of the board which is displaying the trademark.
- Calculate the arc length of the sector of the circle BCD.
- If the perimeter of ABDE is 79 cm, Calculate the perimeter of the board.
- It is decided to replace the sector of the circle by a rectangular part with the same area as the sector of the circle. One side of that rectangular part is BD. Calculate the length of the other side of the rectangular part.

03. a) There were 36 hostelers in a certain hostel. The food in that hostel was sufficient for 20 days. After 5 days, 9 of them left the hostel and 3 came to it.

- Calculate the number of days the food remained in the hostel was sufficient for one person?
- After the above mentioned exchange in the hostelers, the remaining food was sufficient for how many days?

- b) The following table shows a part of a table how the income tax was calculated by the department of inland income tax since 2011.

Annual Income	Tax Percentage
First Rs. 500 000	Free from tax
Next Rs. 500 000	4%
Next Rs. 500 000	8%

Use
the above
table to

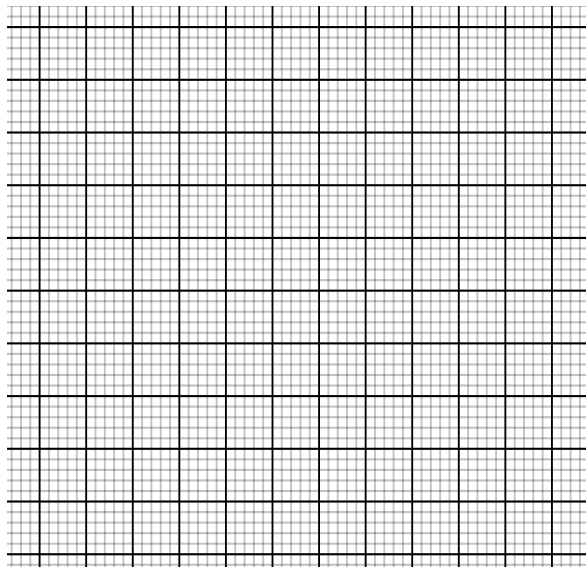
do the following calculations.

- If the annual income of a businessman was Rs. 800 000, Calculate the tax that he should pay.
- As a received an income from another company the income tax that he had to pay was increased upto Rs. 36 000. Calculate the income received to him by the company.

04. The following table shows the grouped frequency distribution of marks obtained by 60 students. The class interval 20 - 30 represent all the students who scored 20 marks or more and less than 30 marks. The other class intervals are also in the same manner.

Class Interval (Marks)	Frequency
20 – 30	8
30 – 40	10
40 – 50	12
50 – 60	15
60 – 70	6
70 – 80	5
80 - 90	4

- i. Insert the cumulative frequency column to the above table and complete it.

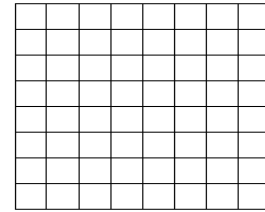


- ii. Draw the cumulative frequency curve in the given square grid and use that curve to calculate the median mark obtained by the students in that class.

By using the cumulative frequency curve,

- iii. Find the cut off mark to indicate the 25% of students who scored high marks.
 iv. Calculate the number of students who scored more than 75 marks.

05. (a) In a certain fruit stall there are 5 identical apples which are equal in size and shape. 2 of them were spoiled and others are ripped. Raja who came to that fruit stall took an apple randomly from the container, checked it out and took another apple randomly **without replacing** it and checked on it.

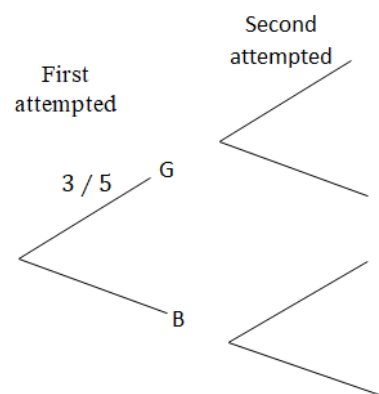


- i. Take ripped apples as G_1, G_2 and G_3 and spoiled apples as B_1 and B_2 . Represent the sample space of the above incident in the given square grid.

By using the drawn square grid,

- ii. Calculate the probability of only one apple being ripped from the two apples that Raja took.

- (b) i. The following is an incomplete tree diagram for the above random experiment. Complete it by mentioning the relevant events and the probabilities. The spoiled apples represents by B and ripped apples represents by G



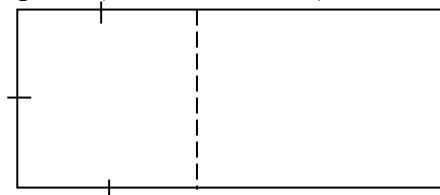
- ii. Calculate the probability of at least one apple being ripped out of the two apples taken out in this random experiment.

- (02) The following is an incomplete table which indicate the relevant y values of some x values in the range of $-1 \leq x \leq 5$ of the quadratic function of $y = -(x - 2)^2 + 3$

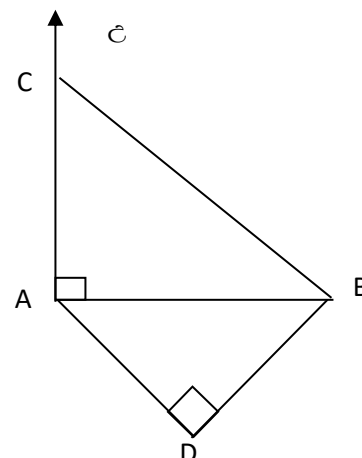
x	-1	0	1	2	3	4	5
y	-6	-1	2	3	2	-6

- (a) (i) Find the value of y when $x = 4$.
- (ii) Draw the graph of the above quadratic function by using the table above. Use a suitable scale to draw the graph in a graph paper.
- (b) By using the graph that you have drawn,
- (i) Write the coordinates of the vertex point.
- (ii) Write the range of x where the function is positively increasing..
- (c) Find the roots of $x^2 - 4x + 1 = 0$ by using the drawn graph.
- (03) (a) Solve : $\frac{5}{x+2} = \frac{3}{x-1}$
- (b) Jayani has x number of Rs. 50 stamps and y number of Rs. 10 stamps. The total value of the stamps is Rs. 1 340 and there are 30 stamps in total.
- (i) Build up two simultaneous equations which includes x and y . Solve it and find the number of Rs. 50 stamps and Rs. 10 stamps that she had separately.

- (04) The following diagram shows a rectangular lamina which consist of a square shaped lamina with the side length of x cm and a rectangular lamina whose width is x cm and the length is 8 cm more than its width. The area of that compound lamina is 32cm^2 show that x satisfying the equation of $x^2 + 4x - 16 = 0$ and find the value that can be obtained to x in the nearest first decimal place.(Take $\sqrt{5} = 2.24$)



- (05) Wishwa is standing at C which is located in the direction of 20 m North to the house A which is situated in a flat land. He can see a motorbike B which is a certain distance away from him and with the bearing of 116° . The motorbike is parked at a place which is located in the direction of East to the house. The gate D is located 20.5 m away from B. If $\angle ADB = 90^\circ$ and the points A, B, C and D were located in the same horizontal plane, calculate the bearing of D from B by using trigonometric ratios.



- (06) The following table illustrates the mass of tea leaves received daily by a certain tea factory within 2 months.

Class Interval (Mass of tea leaves) Metric ton	4 - 6	6 - 8	8 - 10	10 - 12	12 - 14	14 - 16
(Number of days) Frequency	10	15	18	8	6	3

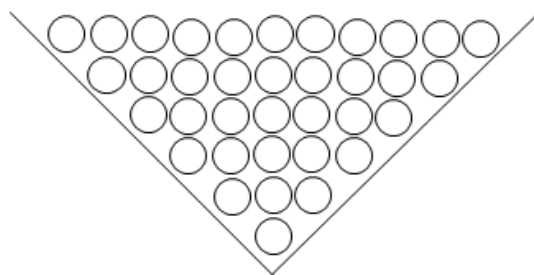
The class interval 4 - 6 means the masses of 4 or greater than 4 and less than 6. The other class intervals also represent in the same manner.

- What is the median class interval of this frequency distribution?
- Write the modal class of this distribution.
- Calculate the mean value of the mass of tea leaves received to that tea factory daily.
- 60% of tea leaves received daily to that tea factory are high quality tea leaves. The price of 1 kg of high quality tea leaves is Rs. 300 and the price of 1 kg of other tea leaves is Rs. 250. Calculate the cost that the tea factory should spend on tea leaves in these two months.

Part B

Answer for **only 5** questions

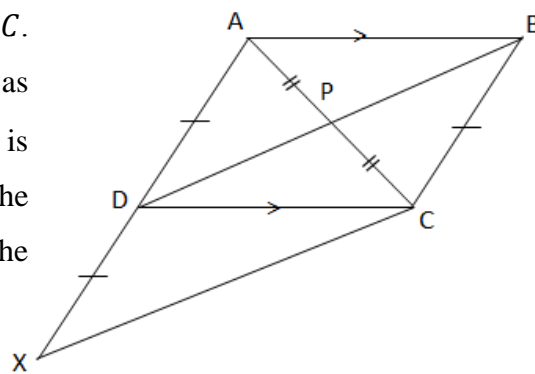
- (07) The following diagram shows how the bulbs were arranged as a pattern..



- Write the total number of bulbs in the first four lines in order and show that the number sequence obtained is an arithmetic progression.
- Calculate the number of bulbs in the 15th row.
- In which row are there 39 bulbs?
- In the rows 1, 3, 5, the bulbs are Red in color and in the rows 2, 4, 6, the bulbs are Green in color. This bulb pattern consists of 65 rows. Show that the total number of Red bulbs is 65 more than the total number of Green bulbs.

- (08) (i) Construct the triangle ABC as $AB = 8 \text{ cm}$, $\hat{ABC} = 120^\circ$ and $BC = 6 \text{ cm}$.
 (ii) Construct a circle with the radius of 6 cm which pass through the points A and C and the centre of the circle located in the either side of B from the line AC. Name the centre of the circle as O.
 (iii) Construct a line parallel to BC through A. Name the intersection point of that line and the circle as X.
 (iv) Construct a tangent to the circle at X.
 (v) Find the magnitude of \hat{BAX} by providing reasons..

- (09) In the quadrilateral ABCD, $AD \parallel BC$. Diagonals of the quadrilateral intersect at P as $\hat{BAP} = \hat{PCD}$ and $AP = PC$. The side AD is extended upto X. Prove that the area of the quadrilateral DBCX is twice as the area of the triangle ABC.

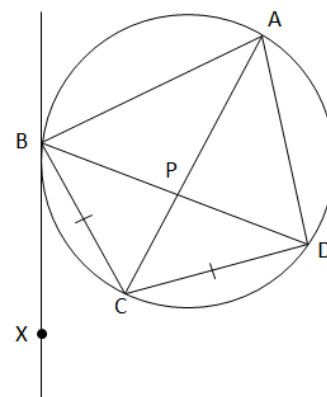


- (10) (a) By melting a right triangular prism with the area of the cross section of 20 cm^2 and the length of $h \text{ cm}$, without wasting the metal small spheres were constructed with the radius of $r \text{ cm}$. If the total number of sheres that can be constructed is n , show that $n = \frac{15h}{\pi r^2}$.
 (b) Substitute the values $h = 23.08$, $r = 0.82$, $\pi = 3.14$ to the above equation and by using the trigonometric tables calculate the value of n into the nearest whole number.

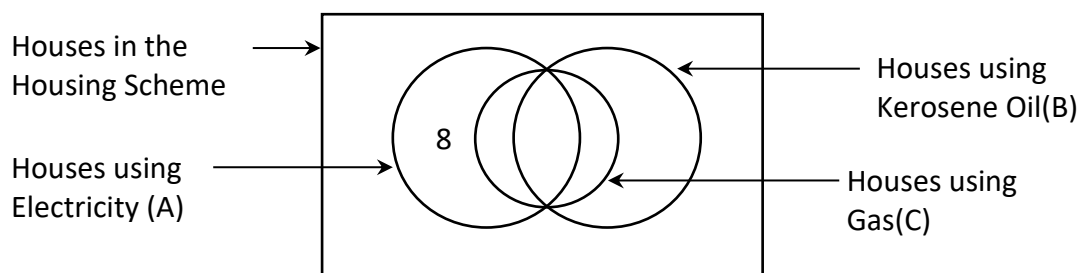
- (11) In the cyclic quadrilateral ABCD, $BC = CD$. The chords AC and BD intersect at P. X is located on the tangent drawn to the circle at point B.

Show that,

- (i) $\hat{CBX} = \hat{CAD}$.
 (ii) $\frac{AB}{CD} = \frac{AP}{DP}$.
 (iii) $\hat{ADC} + \hat{BPC} = 180^\circ$.



- (12) In a certain housing scheme there are 32 houses. The following is an incomplete Venn diagram drawn to represent the data collected by those houses on three types of fuel used to prepare food.



Copy this Venn diagram in the answer sheet. Represent the following data in it and answer the given questions.

- (i) $n(A) = 21$ and the total number of houses using all three types of fuel is 4. How many houses use only Electricity and Gas?
- (ii) 16 houses use only 2 types of fuel from the above mentioned fuels. Calculate the number of houses using only Gas and the Kerosine oil.
- (iii) If the number of houses using only the Kerosine oil and the number of houses which are not using the above mentioned types of fuel, Find the value of $n(B \cap C')$.
- (iv) “More than 60% of houses in this housing scheme use gas” verify this statement.
