



Royal College - Colombo 07
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Grade 11 - Second Term Test – October 2023
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Mathematics - I
ගණිතය - I

Time: 2 hours
කාලය : පැය 2

Name / Index No:.....

Certified Correct

.....
Signature of Invigilator

Important:

- ❖ This 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 paper itself.
- ❖ Use the space provided under each question for working and writing the answer.
- ❖ It is necessary to indicate the relevant steps and the correct units in answering the questions.
- ❖ Marks will be awarded as follows.
Two marks each for questions 1 - 25 in part **A**.
Ten marks each for questions in part **B**.
- ❖ A blank paper can be obtained for rough work from the supervisor on your request.

For Marking Examiner's use only

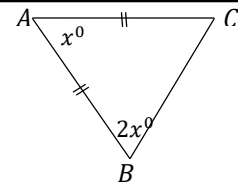
Part	Question Number	Marks
A	1 - 25	
B	1	
	2	
	3	
	4	
	5	
Total		
Signature of Invigilator		

Part - AAnswer **all** questions on this **paper itself**

- 1) It has been estimated that it will take 48 mandays to dig a drain. Find the number of men required to complete this task in 8 days.

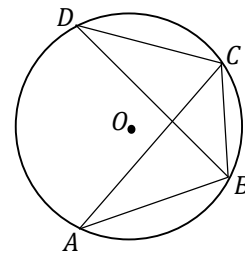
2) Solve: $\frac{m}{2} + 3 = m$

- 3) In the figure $AB = AC$, $\hat{ABC} = 2x^\circ$ and $\hat{BAC} = x^\circ$. Find the value of x .



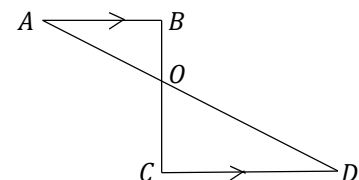
- 4) If the arc length of a sector of which central angle is 40° is 16 cm, find the circumference of that circle.

- 5) In the given figure, A, B, C, and D are points on a circle with center O. If $\hat{BDC} = 35^\circ$, and $\hat{ACB} = 35^\circ$. Find the magnitude of $\hat{ABC}$.



- 6) The interquartile range of a collection of data arranged in ascending order is 18 and the third quartile is 43. Find the first quartile.

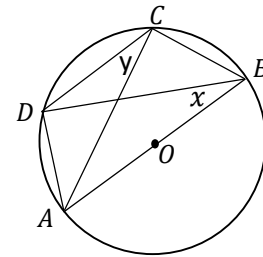
- 7) In the given figure $AB \parallel CD$, $3BO = OC$ and $AB = 8 \text{ cm}$. Find the length of CD.



- 8) $\lg 23.8 = 1.3766$. What is the value of $\lg 238$.

9) If $P(A) = \frac{2}{3}$, find the probability of $P(A')$

10) A, B, C and D are points on a circle with centre O. If $\angle BAD = 75^\circ$, find the values of x and y



11) Find the least common multiple of $2x$, $6xy$, $4x^2$

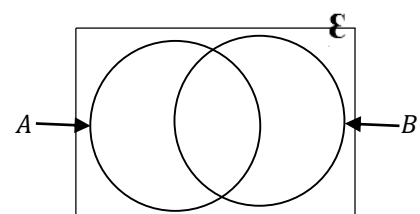
12) Area of a rectangle of length 15 cm is 97.5 cm^2 . Find its breadth.

13) If $A(3, 8)$ and $B(0, 2)$, find the equation of the straight line AB .

14) Simplify: $\frac{x^2-x}{y} \div \frac{x-1}{2y}$

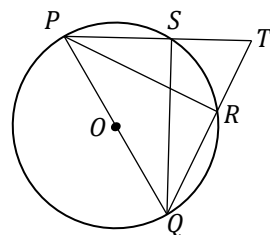
15) Find the curved surface area of a cylinder of base radius 14 cm and height 10 cm . (curved surface area of a cylinder is $2\pi rh$)

16) In the given Venn diagram, shade the region $(A' \cap B)$.



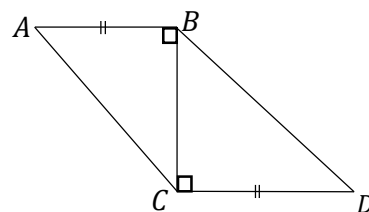
- 17) The distance between two cities P and Q on a map is 4 cm. If the actual distance between P and Q is 20 km, find the scale of the map.

- 18) PQ is a diameter of the circle with centre O. The points R and S lie on the circle. The lines PS and QR produced meet at T. If $\angle QPR = 35^\circ$ and $\angle PQS = 30^\circ$, find $\angle PTQ$.



- 19) Factorize: $2x^2 - 18$

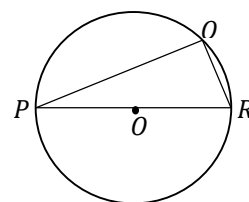
- 20) In the given diagram $\triangle ABC$ and $\triangle BCD$ are right angled and $AB = CD$. State whether the triangles ABC and BCD are congruent and if they are congruent, state the case of congruency.



- 21) Find the common ratio of the geometric progression with 4th term 2 and 7th term 16.

- 22) Solve: $x^2 + 5x + 6 = 0$

- 23) The radius of the circle with centre O is 6.5 cm and $QR = 5$ cm. Find the length of the chord PQ.



- 24) Find the volume of a square based right pyramid of height 10 cm and base length 12 cm.

- 25) A, B and C are three houses. An electric light pole should be erected at an equidistant from these three houses. Using your knowledge of loci draw a sketch to find the place of electric light pole on the given figure.

C •

A •

•B

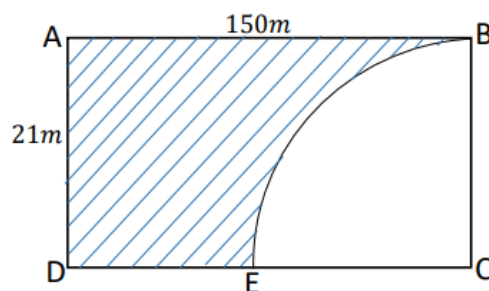
Part - B

Answer all questions on this question paper itself

1. Supun decides to give $\frac{1}{4}$ of the money he had to his brother and $\frac{1}{3}$ to his sister and to deposit the rest in a bank. But he had to give $\frac{2}{5}$ of the amount to be deposited in the bank to his friend due to an urgent need.
 - i. Find what fraction of the total amount of money was given to Supun's brother and sister.
 - ii. What fraction of the total amount of money was given for the friend's needs?
 - iii. Supun had Rs. 27 000 left after giving a portion to his friend. What is the total amount Supun had with him?
 - iv. Supun's friend should pay off a loan amount of Rs. 15 000 obtained from a financial institution at the annual simple interest rate of 14% in one year. State whether the amount taken from Supun is sufficient for him to settle that loan amount, give reasons.

2. The front plot of a tourist hotel is a rectangular block ABCD. The section BCE in the shape of a sector has been allocated for a small car park and the shaded section ABED is a lawn.

- i. Find the radius of the sector of the given block.
- ii. If a security wall is constructed along the arc of the sector, find its length.



- iii. It has been decided to place flower pots at 3 m intervals on the prepared security wall. Find the number of flower pots required.

iv. If it is reserved an area of $50 m^2$ for a vehicle in the car park, find the maximum number of vehicles that can be parked.

v. Find area of the portion allocated for the lawn.

3. a) Mr. Kamal is a business man. The assessed annual value of his business institution is Rs. 120 000. If the relevant provincial council institution charges 9% of the value as rates,

i. How much does Kamal have to pay as annual rate.

ii. If Mr. Kamal pays the rates quarterly, find how much has to be paid as rates for a quarter.

iii. Mr. Kamal imported a machine for his business and had to pay a duty of 35% for it. If the value of the machine is Rs. 3 712 500 alone with the customs duty, find the value of the machine before paying customs duty.

iv. Mr. Kamal's business has an annual net income of Rs. 1 400 000. Find the annual income tax payable by Mr. Kamal according to the following attachment.

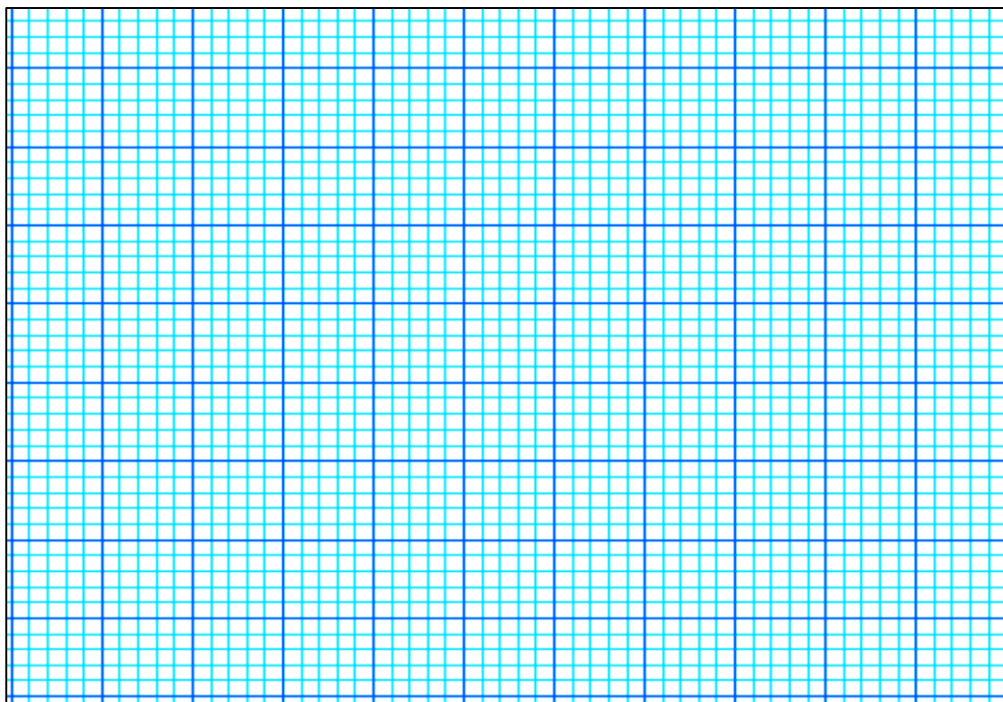
The first Rs. 500 000 of income is exempt from tax and the next Rs. 500 000 is taxed at 4% and the next Rs.500 000 is also subject to income tax at the rate of 8%.

4. Kavini and Sachini participate in a two-round table tennis match. According to past matches, it has been found that the probability of Kavini winning in the first round of the match is $\frac{2}{3}$, if Kavini wins the first round, the probability of winning the second round is $\frac{3}{4}$, and if she loses the first round, the probability of winning the second round is $\frac{2}{5}$.
- Draw a tree diagram indicating the probabilities of Kavini winning or losing the first round.
 - Extend the above tree diagram to indicate Kavini winning or losing the second round.
 - Using the tree diagram
 - find the probability that Kavini wins both rounds.
 - Find the probability that Kavini loses only one round.
 - Kavini has about 80% chance of winning at least one round, says her trainer. Show the truth/falsity of the trainer's statement with reasons.

5. An incomplete frequency distribution showing information on the number of coconuts plucked from each coconut tree in a coconut plantation of 40 coconut trees is given below.

Number of coconuts	Number of trees (frequency)	Cumulative frequency
6 - 10	2	2
11 - 15	3	5
16 - 20	8	13
21 - 25	10	
26 - 30	7	30
31 - 35		36
36 - 40		

- Fill in the blanks in the table.
- Draw a cumulative frequency curve on the given coordinate plain.



- Using the cumulative frequency curve,
 - Find the first and third quartiles.
 - Find the interquartile range.



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32 E II

Grade 11 – Second Term Test – October 2023
දෙවන වාර පරීක්ෂණය – 2023 ඔක්තෝබර් - 11 ශ්‍රේණිය

Mathematics - II
ගණිතය - II

Time : 3 hours
කාලය : පැය 3

Instructions:

- Answer 10 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)

A washing machine worth Rs. 140 000 is available for a down payment of Rs. 40 000 and paying the remainder in 20 equal monthly instalments at an annual interest rate of 12 % on the reducing loan balance or in direct cash payment.

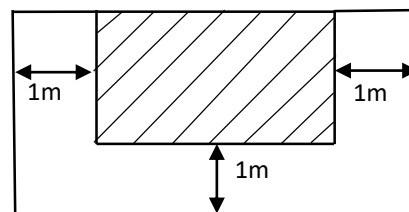
Dulran takes a loan of Rs. 140 000 at a compound interest rate of 5 % per year from a bank for the purpose of buying a washing machine in cash. Ganesh has bought the washing machine under the reducing balance scheme. Calculate the total amount required to repay the entire loan in two years by Dulran and the total amount to be paid in instalments by Ganesh. Show that Dulran has to pay Rs.3 850 more than the amount that Ganesh has to pay.

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

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

- a) i. Find the value y when $x = 1$
 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.
 b) Using the graph that you drew,
 i. write the interval of values of x on which the function is increasing in the interval $-1 < y < 3$
 ii. express the function in the form $y = b - (a - x)^2$, here a and b are two constants.
 iii. find the value of the positive root of the quadratic equation $2 + 2x - x^2 = 0$ to the nearest first decimal place and thereby obtain a value for $\sqrt{3}$.

- 3) Shaded area in the figure is a rectangular pond of length $2x$ m and breadth x m. Flowers are planted on three sides of the pond to a width of 1 m as shown in the figure. The area of the pond and the flower bed is 100 m^2 . Show that x satisfies the quadratic equation, $x^2 + 2x - 49 = 0$ and by solving it, find the value of x . Hence find the area of the pond to the nearest first decimal place. (Take the value of $\sqrt{2} = 1.41$)



- 4) A student at the top of a building of 50 m high observes the top of a tree with an angle of depression of 30° from his eye level and the base of the tree with an angle of depression of 45° from the same position (Ignore the student's height).
- Draw a rough sketch to indicate the above information.
 - Draw a scale diagram using the scale $1 : 1000$
 - Hence, find the height of the tree.
- 5) The ratio of boys to girls in a class is $5:7$. The class teacher has brought a parcel containing 120 gingelly rolls. When one boy was given four gingerly rolls each and one girl was given three gingerly rolls each, three gingerly rolls were not enough.
- Taking the number of boys in the class as x and the number of girls as y , construct a pair of simultaneous equations containing x and y .
 - Find the number of boys and girls in the class separately by solving the above equations.
- 6) Information on the number of hours spent by 25 students for their studies during a week is given in the following frequency distribution.

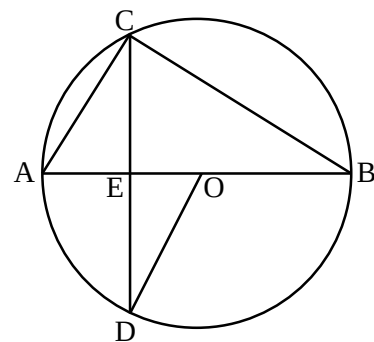
Number of hours	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
Number of Students	1	5	6	5	4	3	1

(Here the class interval $10 - 20$ represents number of hours greater than or equal 10 less than 20)

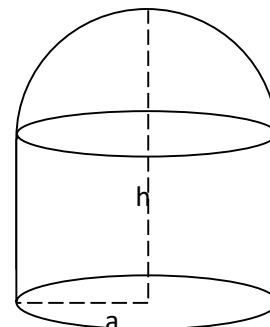
- What is the modal class of this frequency distribution?
- By taking the mid-value of the modal class as the assumed mean, find the mean number of hours spent by a student for the studies during the week to the nearest whole number.
- Show that the maximum number of hours spent by the 12 students who spent the least amount of time during the week is less than the least number of hours spent by the 8 students who spent the most amount of time during the week.

Part - BAnswer **five** questions only

- 7)
- In a certain sequence, the n^{th} term is given by $T_n = 1 - 4n$
 - Which type of a sequence is given above? Give reasons.
 - Find the 15th term of the progression.
 - Calculate the sum of the first 25 terms
 - A thin long wire is cut into pieces so that the first piece is 6 cm in length and each subsequent piece is twice the length of the previous piece.
 - Write the length of the first four pieces.
 - If the length of the wire is 3066 cm, find the number of pieces of wire that can be cut as above.
- 8) Use only a straight edge with a *cm/mm* scale and a pair of compasses for the following construction. Show the construction lines clearly.
- Construct the triangle ABD such that $AB = 6 \text{ cm}$, $\angle A = 105^\circ$, $BD = 8.5 \text{ cm}$.
 - Mark the point C such that $BC = DC$ and $AC = 6.5 \text{ cm}$, and complete the quadrilateral $ABCD$.
 - Measure and write the length of BC .
 - Construct a line parallel to BD through C and mark the point it meets AB produced as E .
 - Name a triangle which is equal in area to the quadrilateral $ABCD$ and write the theorem you have used for this.
- 9) The center of the circle in the given figure is O . The diameter AB and the chord CD intersect at E and $\angle ABC = \angle AEC$.
- Show that AB is perpendicular to the chord CD .
 - Show that $\triangle OCE \cong \triangle ODE$.
 - Show that $\angle COD = 4\angle ABC$

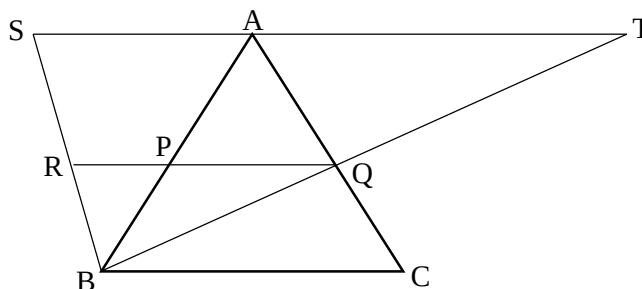


- 10) a) Given figure is a compound metallic solid object of height h cm made by joining a part of a cylinder and a hemisphere of which the radius of the base a cm. Show that the volume of the object, $V = \frac{\pi a^2(3h-a)}{3}$



- b) Find the value of $\frac{\sqrt{6.21} \times 0.4^2}{0.352}$ using the logarithm table

- 11) In the triangle ABC, the mid points of AB and AC are P and Q respectively. QP is produced such that the line drawn through B parallel to AC, meets at R. The line drawn through A parallel to BC, meets the produced BR and BQ at S and T respectively. Copy the diagram in the answer script and mark data on it. Prove that,
- A is the midpoint of ST.
 - ARBQ is a parallelogram.
 - The area of the triangle $ABC = \frac{1}{2}$ area of the triangle BTS .



- 12) The information on the marks obtained by 50 students for the second term test in Mathematics and Science in a grade 11 class is given below.
- * 5 students have failed both subjects.
 - * 25 students passed Science and all of them have also passed mathematics.
- Show the above information in a Venn diagram.
 - How many students have passed mathematics?
 - How many students passed only mathematics?
 - Write in set notation the region indicating the students who passed only Mathematics.

