



Royal College - Colombo 07
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32 E I

Grade 11 – Diagnostic Test – August 2022
අනාවරණ පරීක්ෂණය - 2022 අගෝස්තු - 11 ලේඛය

Time : 2 hours
කාලය : 2 ඔටුප්ප

Mathematics – I
ගණිතය - I

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 write relevant steps and correct units.
- ❖ Marks will be awarded as follows :
02 marks each for questions 1 - 25 in part A
10 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

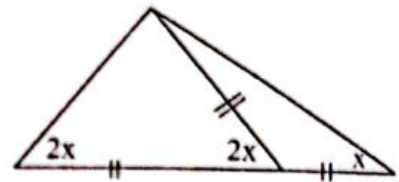
Question Number		Marks
A	1 - 25	
B	1	
	2	
	3	
	4	
	5	
Total		
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PART A
Answer all questions on the paper itself

01. Duty of 22% has to pay when an item of Rs. 7 000 is imported. Find the duty.

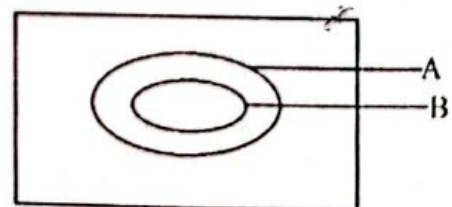
02. Find the value $3^{-2} + 3$

03. Find the value of x in the given figure.



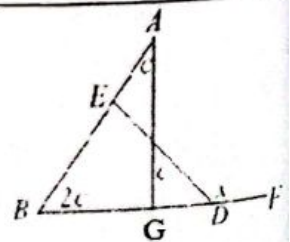
04. If $\log_2 5 = a$, find the value of $\log_2 40$ in terms of a .

05. Shade the region $B' \cap A$



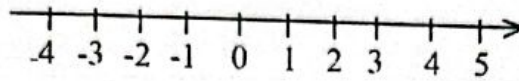
06. Find the LCM of $4a^2x, 9a^2y, 12xb^2$

07. Solve $5 - \frac{2x}{3} = 3$.



08. Using the knowledge of factors, find the value of $\frac{0.5 \times 9 - 0.09}{1 - 0.02}$.

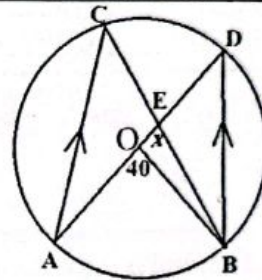
09. Represent the inequalities $x > -2$ and $x \leq 4$ on the given number line.



10. Write down the equation of the straight line that passes through the points $(-1, 1)$ and $(0, -4)$.

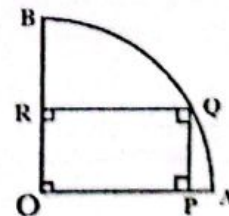
1. A certain hostel has enough food stored for 8 days for 15 students. However, after 6 days of starting work, 5 hostel students had to leave the hostel due to personal reasons. Find the number of days enough food remains.

2. In the given figure O is the center of the circle. Find x .

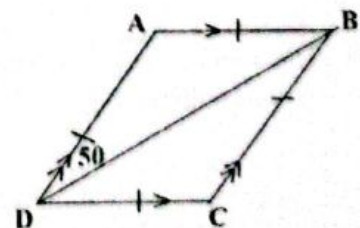


3. In a map drawn to the scale $1:25\ 000$ distance between the two cities P and Q is 6 cm, find the actual distance of two cities.

4. The figure shows a sector of a circle of radius 10 cm. If OP is 8 cm, find the area of the triangle OQR.



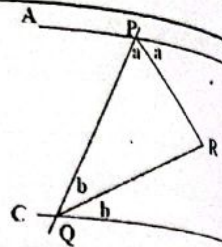
5. In the given rhombus $\hat{A}DB = 50^\circ$. Find the magnitude of $\hat{D}CB$.



16. Make 'h' the subject of the formula $A = \pi r \sqrt{h^2 + r^2}$.

17. If $x + y = 5$ and $xy = 8$, find the value of $\frac{1}{x} + \frac{1}{y}$.

18. According to the information given in the figure, find $\widehat{PRQ}$.

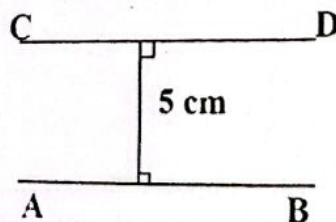


19. Mark (✓) in front of the correct statement and (X) in front of the incorrect statement.

(i)	$\lg 0.01 < -2$	
(ii)	$\log_3 [\log_5(125)] = 1$	
(iii)	$\lg(0.0001) = -(\lg 10\,000)$	

20. Find the value of 'k' and 'a' such that $x^2 - kx + 49 = (x + a)^2$.

21. It is required to find a location of point 'X' which is equal distance from the line AB and 8 cm from the point A. An incomplete sketch of this shows in the diagram. Complete it and mark the point 'X' on the diagram.



22. Find the profit percentage obtained when an item which is bought 25% less than the marked price is sold to 5% more than the marked price.

23. A and B are two independent events. If $P(A) = \frac{1}{2}$ and $P(B) = \frac{2}{3}$, find $P(A \cup B)$.

24. The sum of the first n^{th} terms of an arithmetic progression is given by $S_n = 3n - 5n^2$. Find the common difference.

25. The sum of the deviations is 90 when the assumed mean of the marks obtained by 15 students is 65. Find the mean of the students' marks.



PART B

Answer all questions on this paper itself.

01. A fuel transport bowser with a capacity of 13,200 liters has arrived at the Maradana fuel filling station. $\frac{2}{5}$ of it was released to that filling station and the rest was taken to Borella filling station.

(i) What fraction of the total fuel in the bowser is taken to the Borella fuel station?

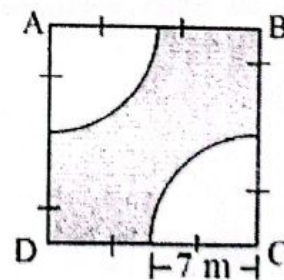
(ii) The manager of the Borella fuel station arranged to give $\frac{1}{3}$ of the fuel given to the fuel station to the essential services and the rest to the general public. What fraction of the total fuel in the bowser is the amount of fuel left over to give to the general public?

(iii) A liter of fuel Rs. 560 and as per government rules, fuel is issued subject to a maximum limit of Rs 4200 per vehicle. Show that a new entrant into a fuel queue of 700 vehicles can get fuel.

02. The figure shows a square shape swimming pool. Blue ceramic tiles are fixed in the shaded part. (Take $\pi = \frac{22}{7}$)

(i) Find the length of a side of the swimming pool.

(ii) Find the area of the shaded portion of the swimming pool.



(iii) Find the perimeter of the shaded region.

(iv) If a new rectangular section is to be added to the swimming pool with perimeter equal to the perimeter of the shaded region with AD as one side, draw it in the above figure with measurements.

03. A certain urban council charges 8% as annual rates.

(i) The assessed annual value of a f Shanta's business premises is Rs. 200 000. Calculate the amount that have to be paid for a quarter.

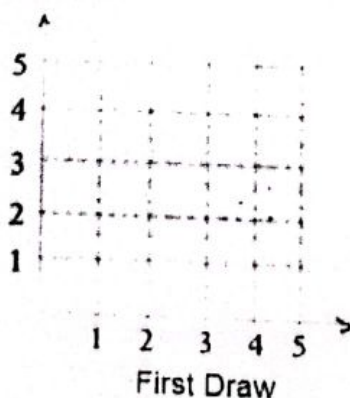
(ii) Shanta rents out his business premises at a monthly rent of Rs.25 000 for a year and receives six months' rent in lump sum as an advance. Find the amount left for Shanta after he pays the amount of annual rates from that amount and spends Rs.12 500 on repairs to the business premises.

(iii) If Shanta puts the remaining amount in a fixed deposit for six months in a bank paying 12% annual interest, how much interest will he get after six months?

04. (a) In a certain game, a person gets a chance to roll a dice numbered 1 to 6 two times.

(i) Represent the sample space of the above event in the grid.

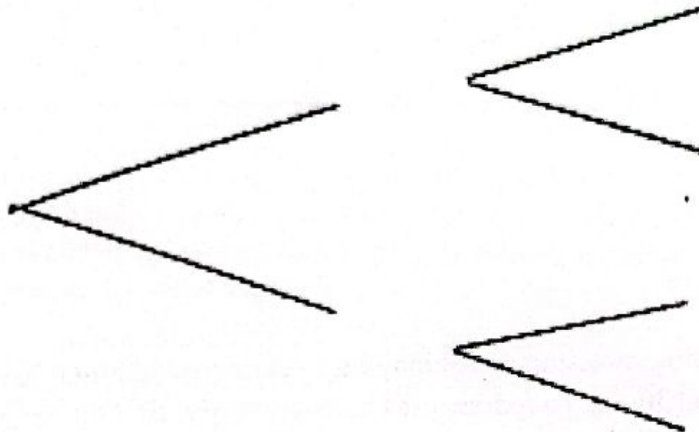
Second Draw



(ii) Indicate the event that the sum of the numbers obtained in both times is greater than 10 by encircling it in the grid, and write down its probability.

(b) If the sum of the numbers obtained in the above dice roll is greater than ten, a coin is tossed and the side that falls is given an opportunity to be observed.

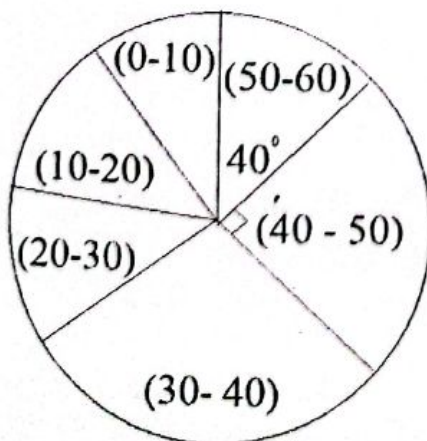
(i) Complete the incomplete tree diagram relevant to this above given information.



) If the head of the coin obtained then the game can be won. Find the probability of winning the game.

Given below is a grouped frequency distribution of marks obtained by 40 students for a certain test of 60 marks.

(i) According to the pie chart fill in the blanks in the table.



Class Interval	Frequency
00 – 10	02
10 – 20	05
20 – 30	07
30 – 40	
40 – 50	
50 – 60	

(ii) Calculate the magnitude of the angle at the centre of sector which represents the intervals of marks (30 – 40).

(iii) Due to an error in data recording, two students belonging to class period 50-60 have been recorded ahead of class period 30-40. To redraw pie charts correctly, find the magnitude of the angle at the centre that represents the certain class intervals

(v) Indicate the number of students who scored more than 50 marks as a percentage of the total number of students.





Mathematics - II

ගණිතය - II

Important

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.

Part - A

Answer five questions only.

The value of a camera which is being imported is Rs. 40 000. If the customs duty that has to be paid is 20% of the value of the item.

- What is the value of the camera after the customs duty has been paid.
- If the value added tax (VAT) is added to the product after importation,
 - Find the percentage of tax if the value of the goods including Value Added Tax (VAT) is Rs 53,760.
 - What is the selling price if a profit of 25% is expected after giving a discount of 5% from the marked price?
 - Find the marked price.
 - What is the profit percentage if the product is sold at the marked price?

An incomplete table of values prepared to draw the graph of the function $y = x^2 - 7$ is given below.

x	-2	-1	0	1	2	3	4
y	-3	-6	-7		-3	2	9

- Find the value of y when $x = 1$.
 - 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.
- Answer the following questions using the graph,
 - Write the equation of the axis of symmetry.
 - Write the range of values of x for which the function is negative.



write the equation of the new function. a triangle ABC is $5x$ cm.

3. The length of the base BC of triangle ABC is $5x$ cm. The height of the perpendicular AD drawn from A to BC is $(x + 6)$ cm and its area is 40 cm².

- Sketch a diagram to depict the given information.
- Construct a quadratic equation of x using these relations.
- Solve the quadratic equation and find the length of the side BC.

4. (a) Simplify : $\lg 125 + \lg 32 - \lg 4$

- (b) The curved surface area of a cylinder is given by $A = 2\pi rh$, where the radius of the base is r cm and its height is h cm. ($\pi = 3.142$)

- (i) Make r the subject of the above formula.

- (ii) Taking that $A = 644.11$ cm², $h = 12.5$ cm using logarithmic tables, find the value of r .

5. (a) (i) Factorize $2x^3 - 18x$

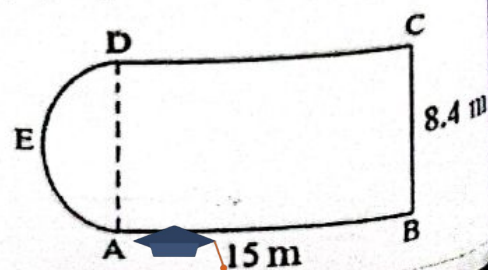
- (ii) Simplify $\frac{2x^3 - 18x}{6x^3 - 12x^2 - 18x}$

- (b) Simplify $\frac{5}{x-2} - \frac{5x+6}{(x-1)(2-x)}$

- (c) Solve $2x + 3y = 1$
 $3x + 2y = 4$

6. A swimming pool made up a ABCD rectangular part and a AED semicircular part is shown in figure. Its AB = 15 m and BC = 8.4 m.

- A metal wire is expected to be fixed around the pool. Find the length of the wire used for it.
- The pool is filled with water to a height of 1.25 m. Find the area of the vertical walls of the pool.
- Find the volume of water in the pool in liters.



Part - B
Answer five questions only.

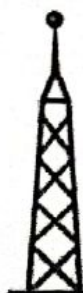
A non-government organization has established a house repairing project. They have repaired 17 houses in the 8th month and 31 houses in the 15th month. The number of houses repaired in each month as a form of an arithmetic progression.

- (i) How many houses were repaired in the first month?
- (ii) In which month they have repaired 25 houses?
- (iii) If this project is carried out for 3 years, then how many houses are repaired in the last month?
- (iv) An amount of Rs. 100 000 is allocated per house. What is the total amount allocated for the project?

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 which $AB = 7$ cm, $\angle B = 45^\circ$, and $\angle C = 60^\circ$.
- (ii) Draw the locus of the point which moves equidistant to B and C.
- (iii) Construct a perpendicular to AB from B.
- (iv) Name the intersection point of the perpendicular drawn above and the locus as O. Draw a circle by taking O as the centre and OB as the radius.
- (v) Measure and write the radius of the circle drawn.

A communication tower Q is located on the flat ground. A supporting cable which is 26m long, is tied to the tower and fixed to the point R on the ground. R is located 24 m from P. A technician who is at the point Q observes the control unit on the ground level at an angle of depression 24° . (Point S is located opposite of P which is not in the side of R). Sketch this information in a diagram and calculate the height of the communication tower and the distance between P and S, using a scale diagram.



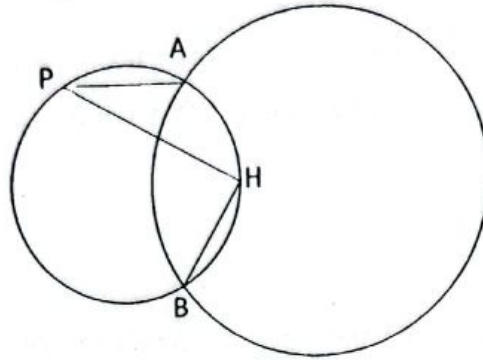
10. (a) Indicate the theorem "the angles in the same segment are equal" using a diagram.

(b) PA and BH lines produced meets the large circle at the points Q and K respectively.

(i) Copy the figure and indicate the information given above in it.

(ii) By joining two suitable points, name an angle equal to $\angle B\hat{K}Q$. Give reasons.

(iii) Show that the lines PH and KQ are parallel.



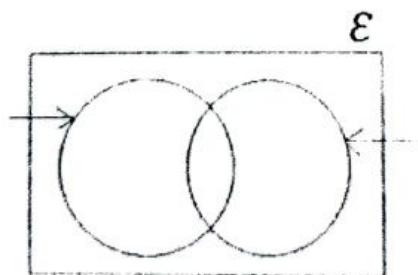
11. A group of 60 students from a school participated in a field trip. 25 of them are girls. While they travelling bought 36 ice creams. 8 boys did not eat ice cream.

(i) Show this information in a Venn diagram.

(ii) Find the number of girls who did not eat the ice cream.

(iii) How many boys ate ice-cream?

(iv) Express the number of students who ate ice cream as a percentage of the total students..



12. In the triangle ABC , $AB=BC$. The points R , P and Q are located respectively on the produced line AC , AB and BC accordingly as $AP=PR$ and $BP=BQ$. The intersection point of PQ and AR is T . Indicate this information on a sketch and prove that AR line is perpendicular to the line PQ .