



Royal College - Colombo 07
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Grade 11 – Second Term Evaluation – January 2022
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Time : 2 hours
කාලය : පැය 2

Mathematics – I
ගණිතය - I

Name / Index No : -

Certified Correct.

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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		

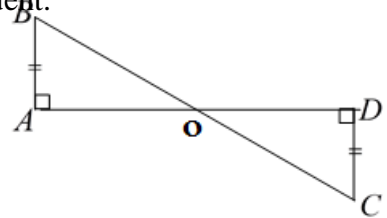
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PART A
Answer **all** questions on the **paper itself**

01. Simplify : $1001_{\text{two}} - 11_{\text{two}}$

02. Solve : $\frac{3}{a} + \frac{2}{a} = \frac{1}{2}$

03. Write the case where triangle AOB and triangle COD are congruent.

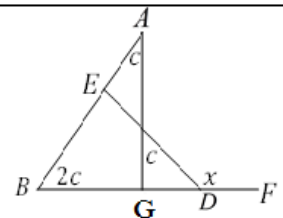


04. $\frac{3}{4}$ of the tank filled with water. If that volume is 300 l , find the capacity of the tank.

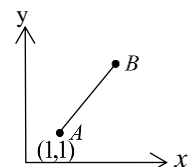
05. If $(3x - 2)^2 = 9x^2 - ax - b$, find the value of a and b .

06. Simplify : $\frac{1}{x-1} + \frac{x}{1-x}$

07. Find the value of x in terms of c .

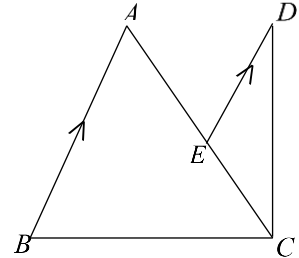


08. The gradient of the straight line AB is 3 and the coordinates of the point A is (1,1). Find the equation of the straight line AB.



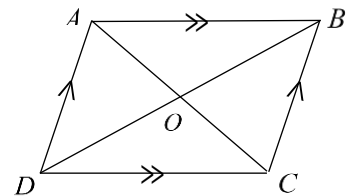
17. Kamal's monthly phone bill is Rs. 2 500. If 15% VAT is imposed for this , find the amount of tax added to the bill.

18. In the given figure $AB = AC$, $AB \parallel DE$ and $\widehat{ECD} = \widehat{EDC} = 35^\circ$, Find the value of \widehat{BCD} .



19. Find the value of $x+y$, without solving the equations $4x + 3y = 11$ and $2x + y = 15$.

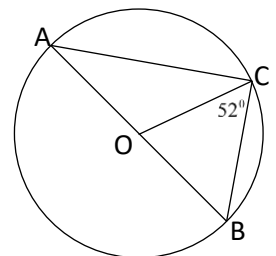
20. ABCD is a parallelogram. If the area of the triangle AOD is a and the area of the triangle DOC is b express the area of the parallelogram ABCD in terms of a and b .



21. Write the ratio between the areas of two sectors of which with radius r ,central angle a° and the radius $2r$, central angle $\frac{a^\circ}{2}$, In the simplest form.

22. If one of the roots of the quadratic equation $x^2 + 5x + 6 = 0$ is -3 . Find the other root of it.

23. AB is a diameter of the circle with centre O . If $\widehat{OCB} = 52^\circ$, find the value of \widehat{BAC} .



24. A and B are two sets, If $n(A) = 10$, $n(B) = 13$ and $n(A \cup B) = 15$, find the value of $n(A \cap B)$.

25. The assumed mean of the marks of 15 students for an assessment is 65 and the sum of the deviations is 90. Find the mean mark of a student.

PART B

Answer all questions on this paper itself.

01. The capacity of a domestic water tank is 1500 liters. If $\frac{7}{20}$ of this capacity of the tank is used daily.

(i) Express the remaining volume of water at the end of the first day as a fraction of the whole amount.

(ii) $\frac{5}{13}$ of the remaining amount of water is used for a construction work for the second day. Express the remaining amount of water as a fraction of whole volume at the end of the second day.

(iii) How many liters of water are left at the end of the second day? The owner of the house says that the remaining amount of water is less than the amount of water used for the construction work. Confirm the true falsity of that statement.

02. Owner of the house took a loan to renovate the house on annual simple interest, promising to settle the loan in 1 year and 5 months by paying Rs. 397 800. However he was able to settle the loan in 1 year and 8 months by paying Rs. 408 000.

(i) What was the loan amount he has borrowed?

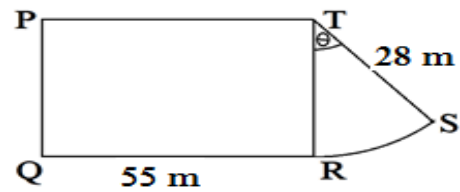
(ii) What was the annual simple interest rate for the loan?

(iii) The annual assessed value of a certain house is Rs. 800 000. If the relevant municipal council charges 9% of the value of the house as annual rates, calculate the rates that have to be paid for a quarter.

(iv) The owner of the house rented it for 2 years of the monthly rent of Rs. 40 000. Find the amount left with the house owner after all expenses have been settled at the end of the two years.

03. The diagram represents the plot of a land to construct a garden in a city. The portion of the sector is allocated for children.

(i) Find the breadth of the rectangular part.



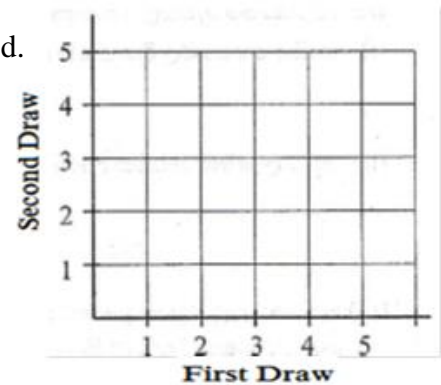
(ii) If the area of the rectangular part is twice the area of the sector, find the angle θ .

(iii) It is intend to fixed lamp post around the children's garden at the gap of 3 m, find the total number of lamp post required?

(iv) It is planned to construct a rectangular water pool with an area is equal to the area of the children's garden with a boundary PQ inside of the PQRT rectangular section . Draw a rough sketch on the above diagram related to the information with the measurements.

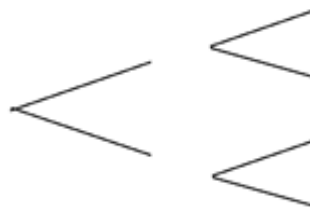
04. There are five identical cards numbered from 1 to 5 in a box. A card is drawn randomly from the box and its number is recorded and put back to the box. Another card is drawn from the box again and its number is also recorded.

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



(ii) Find the probability of having both cards being an odd numbers.

(iii) Draw a tree diagram by considering whether the card drawn being a prime number or not.



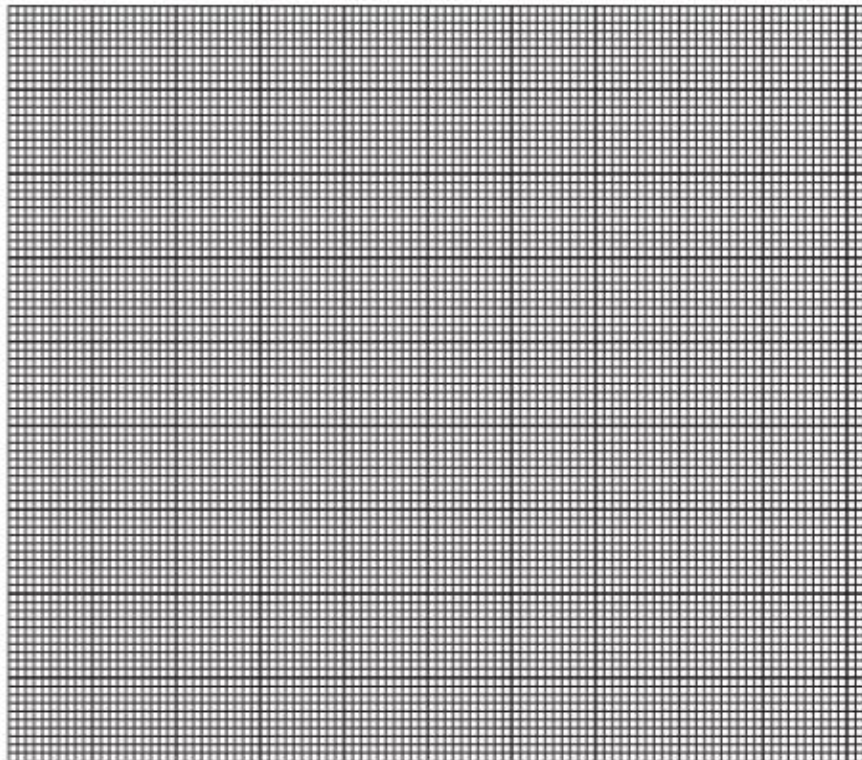
(iv) Write the relationship between the two events getting prime numbers in both occasions and getting odd numbers in both occasions.

05. The following table shows the marks obtained by 80 students of grade11 for mathematics at particular school.

(i) Complete the following table by filling the blanks.

Marks	Frequency	Cumulative frequency
20 – 30	11	11
30 – 40	9	.....
40 – 50	12	32
50 – 60	.....	51
60 – 70	14	65
70 – 80	8	.....
80 – 90	.....	78
90 - 100	2	80

(ii) Draw the cumulative frequency curve on the given coordinate plane.



(iii) Using the above cumulative frequency curve obtain the median of the frequency distribution.

(iv) 25% of these students fail the examination, Find the mark that students fail?



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Grade 11 - Second Term Evaluation – January 2022

දෙවන වාර පරීක්ෂණය - 2022 ජනවාරි - 11 ශ්‍රේණිය

Time : 3 hours
කාලය : ෩ පැය 3

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.
- The volume of a right circular cone of base radius r and height h is $\frac{1}{3}\pi r^2 h$.

Part - A

Answer **five** questions **only**.

- Mr. Perera took a loan of Rs. 500 000 from a financial institute, at an annual simple interest rate of 8% to settle the loan in 2 years. He fully invested this loan amount to buy shares at Rs. 20 per share, in a certain company which pays annual dividends of Rs. 4.50 per share.
 - Calculate the interest he has paid for 2 years.
 - Find the annual dividends income that he receives from this investment.
 - After two years, he sold all the shares at the current market price of Rs. 28 per share and paid off the loan together with the interest. Find the final profit made by Mr. Perera from his investment.
- An incomplete table of values prepared to draw the graph of the function $y = x^2 - 2x - 5$ is given below.

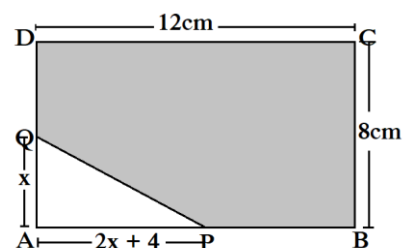
x	-2	-1	0	1	2	3	4
y	3	-2	-5	.....	-5	-2	3

- 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.
 - If this graph is moved upwards along the y axis by 3 units without changing the shape of the graph, write the relevant quadratic function in the form $y = (x + a)^2 + b$.
(Here a and b are constants)
 - Deduce the coordinates of the minimum point of the function given by $y - 3 = x^2 - 2x - 5$.

3. The following frequency distribution shows the information on amount of rice sold per day during a month of 30 days at a certain shop.

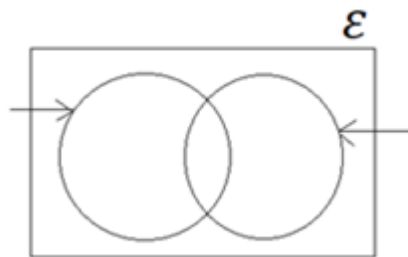
Amount of rice sold in a day (kg)	10 - 16	16 - 22	22 - 28	28 - 34	34 - 40	40 - 46	46 - 52
Number of days	4	3	6	7	5	3	2

- (i) What is the modal class of this distribution?
- (ii) Find the mean amount of rice sold in a day to the nearest kilograms by using the mid-value of the class interval 28 – 34 as the assume mean.
- (iii) Estimate the amount of rice that should be stored for the next three months.
- (iv) The shop owner expects to make a profit of Rs. 32 400 by selling rice assuming that the price of rice has remained unchanged for the next 30 days. Find the selling price of one kilogram of rice if the purchase price of one kilogram of rice Rs. 80.
4. The base of a cuboid shaped container of height 10 cm is a square. The length of a side of the base is 4 cm. The container is filled with water up to the height of 8 cm.
- (i) Find the volume of water in the container in cubic centimeters.
- (ii) When twelve identical solid right circular metal cones of radius r cm and height 2 cm are put in to this container, 25 cm³ amount of water flows out from the container.
- Show that $r = \frac{\sqrt{57}}{2\sqrt{2\pi}}$
- (iii) Find the value of r to the nearest second decimal place using the logarithms table.
(Take $\pi = 3.14$)
5. (a) A bunch of bulbs used for decoration have red and yellow colour bulbs. Twice of the number of red colour bulbs are equal to the two bulbs less than 3 times of number of yellow colour bulbs. A cost of a red colour bulb and a yellow colour bulb are Rs. 50 and Rs. 55 respectively. The total cost of the bulbs used in the decoration is Rs. 2 550. Take the number of red colour bulbs as x and the number of yellow colour bulbs as y .
- (i) Using the above information build up two simultaneous equations.
- (ii) By solving the equations, find the number of red colour bulbs and number of yellow colour bulbs in the decoration separately.
- (b) While in use n number of red bulbs and twice of that amount of yellow bulbs were burnt out, If the amount spent to buy new bulbs (same colour) to replace is less than Rs. 500.
- (i) Build up an inequality in terms of n .
- (ii) Solve the above inequality and find the maximum number of red bulbs should be bought.
6. From the rectangular piece of cardboard ABCD, the triangular part APQ is cut away. (See figure)
- (i) Write an expression in terms of x , for the area of the remaining part of the cardboard.
- (ii) If the area of the remaining part is 89 cm², show that x satisfies the equation $x^2 + 2x - 7 = 0$
- (iii) Using the quadratic formula or any other method, find the value of x to the nearest first decimal place. (Take $\sqrt{2} = 1.414$)



Part - BAnswer **five** questions **only**.

7. (a) In a farmhouse a well and 25 mango trees are situated in a same line. The distance between two mango trees is 5 m each and the distance from the well to the nearest mango tree is 10 m. A gardener carries one bucket of water to the nearest mango tree first and he returns to the well and take again another bucket of water to the second mango tree. He proceeds this pattern until the last mango tree.
- Show that the distance he carries water to the first, second and third mango trees respectively are three consecutive terms of arithmetic progression.
 - What is the distance the gardener walks to water to the 19th mango tree.
 - Find the total distance the gardener has walked to water all of 25 mango trees.
- (b) In contaminated water, the number of bacteria doubles every 3 hours. At the beginning of the polluted water, the bacteria spread over 50 m². After 24 hours, calculate the area where the bacteria have spread.
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.
- Construct the triangle ABC such that $AB = 7 \text{ cm}$, $BC = 5 \text{ cm}$ and $\hat{A}BC = 60^\circ$.
 - Constructed the angle bisector of $\hat{A}BC$.
 - Mark the point D on the above angle bisector of $\hat{A}BC$ such that $BD = 7 \text{ cm}$ and complete the quadrilateral ABCD.
 - Construct the line through D parallel to AC and name the intersection point of produce BA and the parallel line as E.
 - Join EC and name a triangle which is equal in area to the quadrilatera ABCD.
9. (a) As the employees of a company showed the symptoms of flu, the employer directed all 80 employees of the company to rapid antigen testing. In that study, 15 male employees were infected with Covid-19. The number of non-infected female employees was 5. It was found that the number of infected female employees was five times the number of non-infected male employees.
- Copy the diagram in your answer sheet and include the above information.
 - Find the total number of employees infected with Covid-19?
 - Find the number of males and females employees who underwent the Covid test separately.
 - Find out the probability of an infected female employee out of the total number of infected employees?



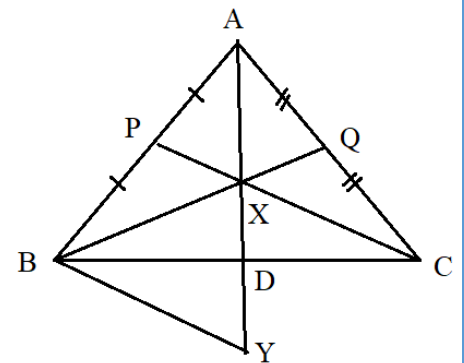
- (b) If the probability of an infected employee showing symptoms is $\frac{3}{5}$, use the answer above part (iv) to draw a tree diagram and find the probability that an infected male employee will not show symptoms.

10. (a) A flag post fixed on top of a hill is being observed from a point A on horizontal ground. It was noted that the angles of elevation to the top and the bottom of the flag post from the point A are 50° and 40° respectively. The point A is 25 m away from the foot of the hill. Find the vertical height of the hill and the flag post by drawing a suitable scale diagram.

(b) An aircraft starting from a point O flies on a bearing of 025° for 110 km and then on a bearing of 115° from 450 km and reaches to the point B. Draw a rough sketch to indicate the above data.

11. In the triangle ABC, P and Q are the midpoint of the sides AB and AC respectively. The lines BQ and PC intersect at X. The straight line drawn through B parallel to PC meets produced AX at Y. The straight lines XY and BC intersect at D. Show that,

- (i) $AX = XY$,
- (ii) $YC \parallel BQ$,
- (iii) BYCX is a parallelogram,
- (iv) the triangle ABC and the triangle APQ are equiangular. Write down the ratio of the sides, $\frac{BC}{PQ}$, $\frac{AB}{AP}$ and $\frac{AC}{AQ}$
- (v) Write down the theorem that you used in the part(iv).



12. The figure shows the points P, Q, R and S, on a circle of radius 5 cm and $\widehat{SPR} = 30^\circ$, $\widehat{RTQ} = 120^\circ$ and $\widehat{PQS} = 60^\circ$. Answer the following questions by giving reasons.

- (i) Find the value of \widehat{RQS} .
- (ii) Find the value of \widehat{PSR} .
- (iii) Find the length of the line PR.
- (iv) If $PQ = 8$ cm, find the length of the line RQ.
- (v) Name a triangle which is equiangular to the triangle PQR.

