අධ්‍යාපන අමාත්‍යාංශය
கல்வி அமைச்சு
Ministry of Education

G. C. E. Ordinary Level | අ. පො. ස. සාමාන්‍ය පෙළ | 2022 (2023)

Student Seminar Series
ශිෂ්‍ය සම්මන්ත්‍රණ මාලාව

Practice Paper | උපකාරක ප්‍රශ්න පත්‍ර

Mathematics
ගණිතය

Question Paper - I, II

දුරස්ථ අධ්‍යාපන ප්‍රවර්ධන ශාඛාව | ගණිත ශාඛාව

32	E	I

අ. පො. ස. සාමාන්‍ය පෙළ විභාගය – ශිෂ්‍ය සම්මන්ත්‍රණ මාලාව – 2022 (2023)
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை- மாணவர் கருத்தரங்கு தொடர்- 2022 (2023)

G. C. E. Ordinary Level Examination – Student Seminar Series

ගණිතය	I, II
கணிதம்	I, II
Mathematics	**I, II**

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 reading time to read the paper and select questions and organize the questions to prioritize when writing answers.

Mathematics I

Important

* This paper consists of 7 pages.
* Answer all the questions on this paper itself.
* Use the space provided under each question for working and writing the answers.
* Indicate the relevant steps and the correct units when answering the questions.
* Marks will be given as follows.

   Each question in part A carries 2 marks.

   Each question in part B carries 10 marks.

*Blank paper is available for needlework.

PART A
Answer all the questions on this paper itself.

(1) Rs. 10 000 is lent at 8% annual interest. Find the total amount due to the creditor after 3 years.

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(2) The surface area of a right circular cylinder is $750cm^2$. If the area of its bottom is $150cm^2$ then the area of the curved surface is

   i. $600cm^2$.   ii. $450cm^2$.   iii. $900cm^2$.

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(3) Find the value of y according to the given data in the figure.

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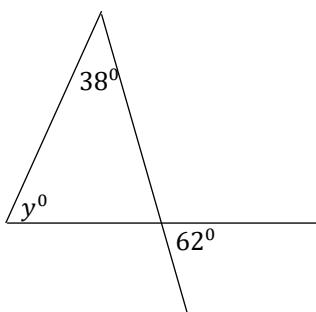
(4) Find the factors : $x^2 + 4x - 5$

(5) Select and underline a geometric progression from the following sequence of numbers.

   i. $100, 90, 80, 70$ ii. x, x^2, x^3, x^4

   ii. $a, a+d, a+2d, a+3d$ iv. $1, 3, 6, 10, 15$

---

(6) Find the least common multiple of the following algebraic expressions.

    $2x^2, \ 6xy, \ 9x^2y^2$

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(7) In the figure $UT = TS = SR$ and $TV = VS$.

    Using the given information,

      i. Name the pair of congruent triangle.

   ii. Mention the relevant case.

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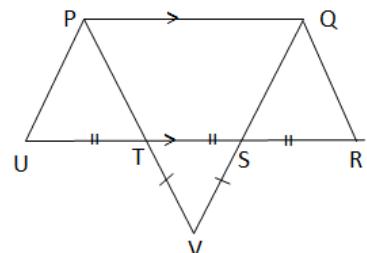
(8) The perimeter of the sector in the figure is 50cm and the arc length is 22cm. Find its radius.

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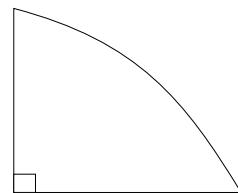
(9) Solve : $\dfrac{2}{x} - \dfrac{1}{3x} = \dfrac{5}{3}$

(10) Find the value of x according to the given data in the figure.

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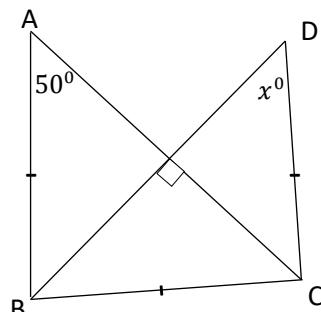
(11) Express in logarithm form : $a^x = b$

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(12) Find the gradient of the straight line AB given in the figure.
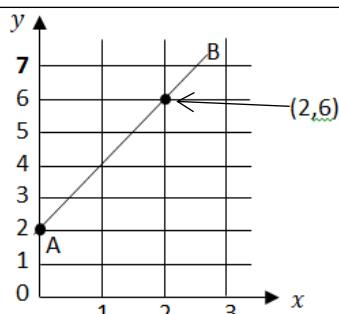
(13) Find the value of x according to the given data in the figure.
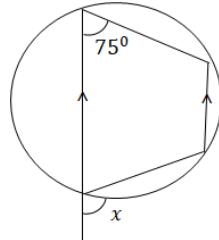
(14) Find the length of AB according to the measurements shown in the diagram.

$Sin\theta = 0.7$
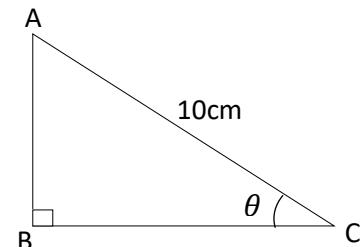
(15) Simplify : $\dfrac{2x}{3} \div \dfrac{4x^2}{9a}$

(16) AD $=$ DB of the circle with centre O. Find the length of OC if AB $=$ 24cm and OD $=$ 5cm .
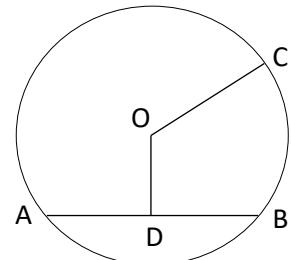
(17) Denote the shaded area in the given figure using the set notation.
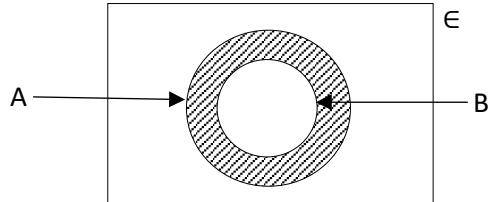
(18) Solve the inequality $2x - 1 < 3$ and write the lagerst integer that can take for x.

(19) AB is a vertical building. A car is parked at C on the ground BC. Mark on the diagram the angle of depression seen by the car to a person looking from A and find its magnitude.
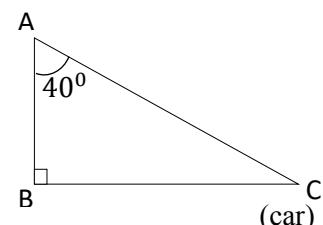
(20) A balanced coin and an unbiased dice with six sides marked 1, 1, 2, 2, 3, 3 are tossed simultaneously. Find the probability of the event of an even number on the dice with the coin being heads marked in the grid below.
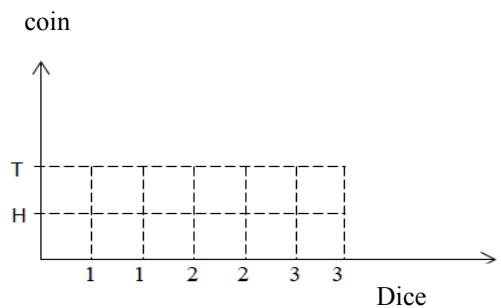
(21) Find the magnitude of $A\hat{C}B$ of the circle with centre O.
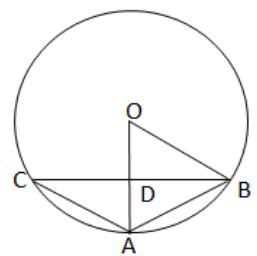
(22) A semicircle with center O and diameterAB intersects AC and DB at E . EO//BC. Find the magnitude of $B\hat{D}C$ if $A\hat{O}E = 65^0$.
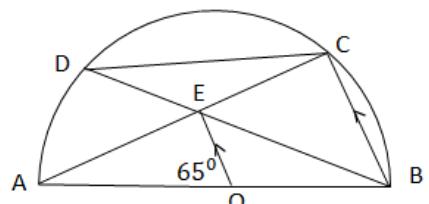
(23) It is estimated that 3 men take 12 days to do a certain task. If 3 men work for 5 days and after that 4 others join to do the same work, how many days before the estimated number of days can the work be completed?

(24) The pie chart shown here is constructed from data obtained from a sample of 60 people about their preferred media.

i. Find the number of people who like television.

ii. Find the central angle of the segment representing social media if the number of people who like social media is 20.
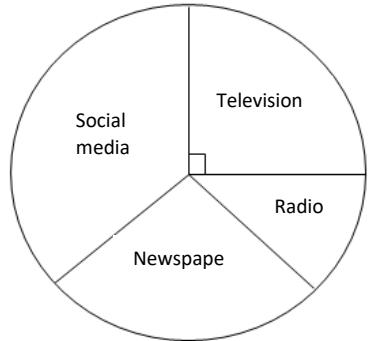
(25) Three cities P, Q and R are located as shown in the figure. PQ and QR are two straight lines. A bus stand is situated equidistant from PQ and QR routes and 6km from PQ route. Mark the location of the bus stands as T using knowledge of loci.
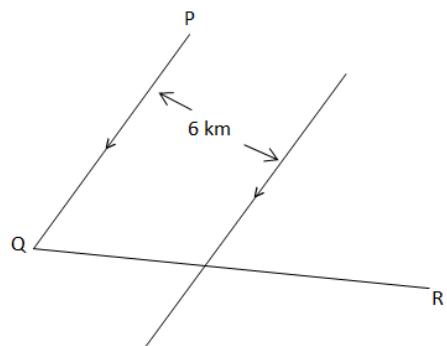
PART B
Answer all the questions on this paper itself.

01. Of the total number of students in a class, $\frac{3}{7}$ students study Geography, $\frac{1}{3}$ study Citizenship and the rest study Accounting.

  i.   Write the number of students studying Geography and Civics as a fraction of the total number of students.

 ii.   What is the number of students studying Accounting as afraction of the total number of students?

iii.   If the number of students studying accounting is 4 less than the number of students studying citizenship, what is the total number of students in the class?

iv.   It has been decided to hold a feedback program with 50% of the students studying citizenship education and accounting and also 14 students in total. How many geography students should participate for that?

---

02. The figure shows a rectangular plot of land ABCD and a semicircular platform APD arranged near to it. AD = 14m.

    i.   Find the area of the semi circular platform.

    ii.   If the area of the rectangular plot of land is three times the area of the platform, find the length AB.

    iii.   Find the length of the fence, if a fence is built around the plot of land and platform.

    iv.   Poles are planted at 2m intervals along the semi-circular section of the fence. If two poles are planted at A and D also, find the total number of poles planted.

    v.   A right triangle triangular plot of land is added to the rectangular plot of land with side DC extending BC so the area of the figure is $506m^2$. Draw the triangular section in the above figure with measurements.
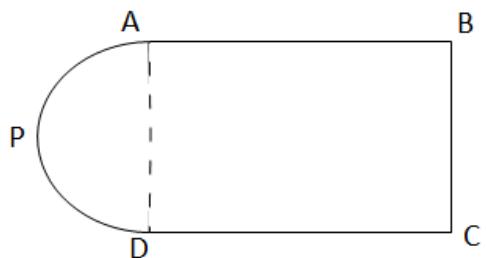
03.

15% annual interest on fixed deposit accounts

    i.   Find the interest earned in one year by a person who deposited Rs. 600000.

       If the interest is earned monthly, the annual interest rate is 14%.

    ii.   Find the monthly interest earned on the above amount, if the interest is earned monthly.

Higher interest on Fixed Deposit Accounts for a period of 5 years

    iii.   The above amount will be deposited in a fixed deposit account for a period of 5 years. Find the rate of interest paid if an amount equal to the amount deposited is received as interest after 5 years.

b. A person who estimated that it would takes 10 men 8 days to lay cement bricks and prepare a yard, employed 12 men in the first two days.

i.   How many man-days is the total work estimated?

ii. If a man is paid Rs.2000 for one day find the amount paid for the amount of work completed at the end of the first two days.

---

04. A bowl on a table in a house contains 4 milk toffees and 2 fruit toffees of the same colour and size. A small child of that house came there and randomly took out a toffee from the bowl. He checked it and put it back in the bowl. Again he took out a toffee from the as before.

    i.   Name a milk toffee as M and a fruit toffee as F and mark the sample space of the above random experiment using 'X' marks on the given grid.

    ii.   Find the probability that the child gets two toffees of the same type in both cases.

iii.   If the number of milk toffees in the above bowl was 3 and
the number of fruit toffees was 2, the following is an incomplete
tree that can be used to find the probability of the child getting a
toffee as above. Complete it.

1 st taken   2 nd taken

M

F

$\frac{2}{5}$
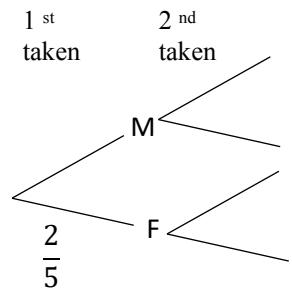
iv.   Using the graph, find the probability that the child gets two toffees that are **not of the same type.**

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05. Below is an incomplete cumulative frequency distribution showing information about the electricity consumption of 100 houses in a certain village in one month.

Class intervals (Units of electricity)	15 - 20	20 - 25	25 - 35	35 - 50
Frequency (Number of houses)	10	25	-	45
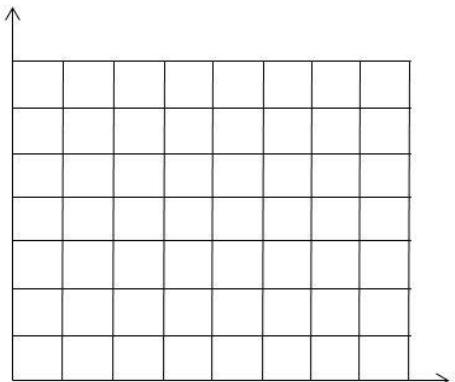
(15 - 20 means 15 and above but below 20 classes are taken here.)

i.   Find the nuber of houses belonging to the class interval $25 - 35$ electrical units.

ii. Calibrate the axes to an appropriate scale on the given grid and draw the histogram on it.

iii. Use the histogram to draw the frequency polygon.

iv. The following table shows the information about the electricity consumption of the same 100 houses in the same village in another month.

Class intervals (Units of electricity)	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40
Frequency / (Number of houses)	20	25	30	15	10
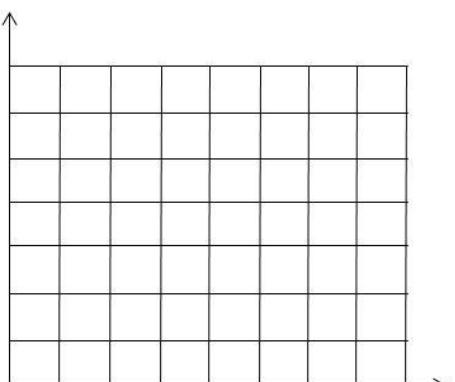
a. Add a mid value column to the table above and complete it.

b. Draw a frequency polygon using the mid value and frequency

on the grid shown above. **අධ්‍යාපන අමාත්‍යාංශය**

கல்வி அமைச்சு

Ministry of Education, Sri Lanka

| 32 | E | II |

අ. පො. ස. සාමාන්‍ය පෙළ විභාගය – උපකාරක සම්මන්ත්‍රණ මාලාව – **2022 (2023)**

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

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

ගණිතය	**II**
கணிதம்	**II**
Mathematics	**II**

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 reading time to read the paper and select questions and organize the questions to prioritize when writing answers.

උපදෙස්:

* **Answer ten questions selecting five questions from part A and five questions from part B**.
* Write down the relevant steps and correct units while answering the questions.
* Each question carries 10 marks.
* The volume of a right circular cylinder of base radius r and height h is $\pi r^2 h$.

PART A
Answer 5 questions only.

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01. Thewindu, equal amounts of Rs. 75,000 each were deposited for a period of 2 years in an account paying a simple interest rate of 21% per annum and an account paying a compound interest rate of 20% per annum. At the end of 2 years, consider the total amount received from each account and calculate the total amount he can get at the end by choosing the more profitable account and depositing the total amount received from both the accounts in that account for a period of another 2 years.

02. Below is an incomplete table showing the value of y corresponding to several values of x of the quadratic function $y = x^2 + 4x - 2$ in the interval $-5 \le x \le 1$.

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

a. (i)   Find the value of y when x = -1.
   (ii)   Draw the graph of the quadratic function given in the above table of values using the standard axis system and a suitable scale, on graph paper.

b.   Using the graph you drew,
   (i) Write the equation of the axis of symmetry.
   (ii) Write down the intervals of values of x which the function decreases in the interval $3 > y > -6$

c.   Arrange the above quadratic function as $y = (x + a)^2 + b$. Here a and b are constant. Consider the x coordinate of a point where the graph and the line $y = 0$ intersect, find the value of $\sqrt{6}$ to the nearest first decimal place.

03. a. It costs Rs. 500 to buy 3 oranges and 5 mandarins. 5 mandarins can be bought for the same price that cost to buy 2 oranges.
       i. Let the cost of an orange bought at Rs. a and the cost of a mandarin at Rs. b, construct a pair of simultaneous equations containing a and b.
      ii. Find the price of an orange and a mandarin separately by solving the pair of equations.
      b. Simplify.

$$\frac{5}{x-2} + \frac{1}{x^2-4}$$

04. Below is a cumulative frequency distribution containing information about the mass of a certain variety of rice received daily during a month at a rice processing plant.

| Class interval (Mass) kg	500-600	600-700	700-800	800-900	900-1000	1000-1100
Number of days (Frequency)	2	6	8	5	4	5

   i.   What is the modal class of this frequency distribution?
   ii.   Find the mean of the mass of rice received daily at the rice processing center by taking the mid value of the class interval $700 - 800$ as the assumed mean.
   iii.   If the price of paddy is Rs.120 per 1 kg, find the monthly expenditure for purchasing paddy from the rice processing center.
   iv.   The mass of rice obtained by threshing the rice stock received by the center during the month is 18.225 metric tons. Show that the mass of rice obtained by harvesting one kilogram of paddy is less than 0.8 kg.

05. B is the base of the pillar AB standing on the horizontal ground. C is a boundary stone on level ground from B to C. Lahiru at A on the top of tower AB sees boundary stone at C at an angle of depression of $64^0 37^1$ and a distance of 70 m .


   i.   Mark the above information in the given diagram.
   ii.   Find the height of the tower to the nearest meter using trigonometric ratios. (Ignore Lahiru's height).
   iii.   Consider the answer given to the nearest meter of the height of the pillar and show that the angle of elevation seen by Lahiru to Risith on the boundary stone 30m from the base of the pillar when he comes to rest 12m down from the top of the pillar is close to 60^0.
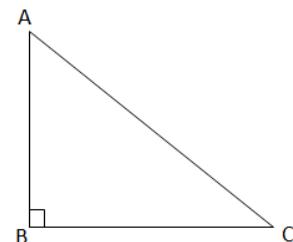
06. The given diagram shows a rectangular land whose length of a side is x m. In this land, grass is planted in such a way that one side is 8 m long and the other side is half the length of the rectangular land. If the area of the part planted with grass is $44m^2$, by considering the area of that part and constructing a quadratic equation containing x and solving it, show that the total area of the land does not exceed $81m^2$.
   ($Take \sqrt{3} = 1.73$.)
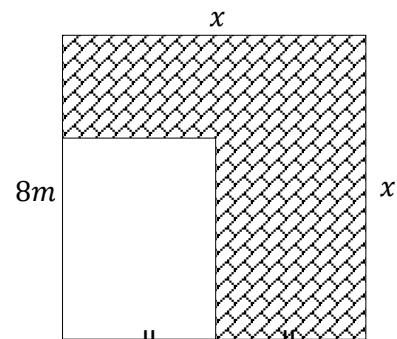
PART B
Answer 5 questions only.

07. A theater has 12 seats in the first row and 3 seats in each row after that.
   i. Write down the number of seats in the first 4 rows respectively. Then show that the resulting sequence is an arithmetic progression.
   ii. How many seats are there in 12 th row of this theater?
   iii. Which row has 69 seats ?
   iv. If this theater has 25 rows of seats, write down with reasons whether 1200 audience can all be seated in the theater when they arrive.
   v. On another day all seats in first 12 rows and only 8 seats in 13 row of this theater are fully occupied. All other seats are empty. If they charge 500 rupees per audience, how much will be the revenue on that day?

08. **Using only a straight edge with cm/mm scale and a pair of compasses and showing the construction lines clearly,**
   i. Construct the triangle ABC   AB = 9cm, $B\hat{C} = 45^0$ and $AB = BC$.
   ii. Draw a perpendicular to the line AB from C and mark the point where it meets the base AB as X.
   iii. Construct the circumcircle of the triangle BXC.
   iv. Draw the locus of a point along the lines CX and CB. Name the point where the locus meets the circle as Y.
   v. Giving reasons, find the value of $C\hat{Y}X$.

09. In the triangle ABC, $A\hat{B}C = 90^0$. P is the midpoint of base AB. A line drawn from P parallel to BC meets AC at Q. A line drawn from Q parallel to AB meets BC at R.
   i. Show that PQRB is a rectangle.
   ii. Show that the AQRP is a parallelogram.
   iii. Prove that $P\hat{A}Q = P\hat{B}Q$
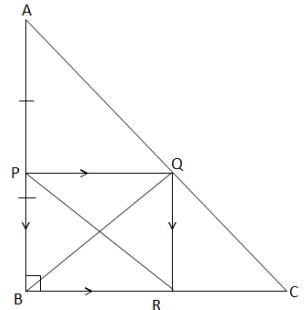
10. a. The base radius of a right circular cylinder is r and its height is three times the base radius. 1/3 of the total height of the cylinder is filled with water. When any number of metal spheres of radius a are immersed in this cylinder, the vessel is completely filled with water. Given that the number of spheres placed in the cylinder as n and show that $n = \frac{3}{2} \left(\frac{r}{a}\right)^3$. Find the number of spheres placed in the cylinder if the radius of a sphere is 3.5cm and the radius of the cylinder is 7cm.

   b. Find the value of this using the lagarithmic tables.
   $$\frac{4.32 \times 542}{25.71}$$

11. Below is the information about the number of houses with bicycles and motorcycles in a small village near a city.

The number of houses that had cycles is 23, and 16 of them had only bicycles. The number of houses that only had motorcycles or bicycles was 24. The number of houses without bicycles is 17.

Houses with motorcycles

Houses with bicycles

i.   Enter this information in the incomplete Venn diagram provided.

ii.   Shade the area that depicts houses with only motorcycles in it.
iii.   What is the total number of houses in that village?
iv.   Find the ratio of the number of houses in the village to the number of houses with a motorcycle.
v.   If a house that only had a motorcycle sold that motorcycle and bought a bicycle, how many houses in this village do not have cycles?
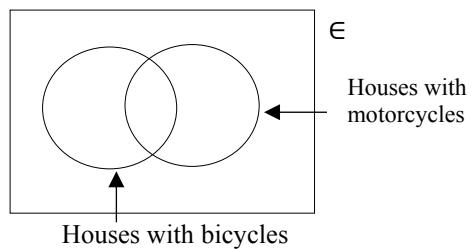
12.   Points A, B, C and D lie on the circle with center O. AB = AD. The extended line AO meets the circle at X. Prove that $D\hat{O}X + B\hat{C}D = 180^0$
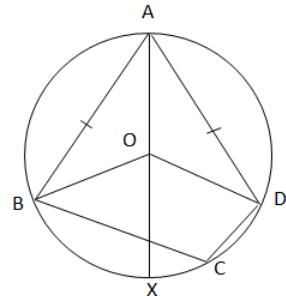
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கல்வி அமைச்சு
Ministry of Education

G. C. E. Ordinary Level | අ. පො. ස. සාමාන්‍ය පෙළ | 2022 (2023)

Student Seminar Series

ශිෂ්‍ය සම්මන්ත්‍රණ මාලාව

Practice Paper | උපකාරක ප්‍රශ්න පත්‍ර

Mathematics

ගණිතය

Answer Sheet - I, II |


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Mathematics - Paper 1 - PART A

Question Number			Answers	Marks		
(01)			Interest $10\,000 \times \frac{8}{100} \times 3$ or 2400	1		
			Total Amount $10\,000 + 2400 = \text{Rs.}\,12\,400$		②	△2
(02)			$750cm^2 - 150 \times 2cm^2$	1		
			$450cm^2$		②	△2
(03)			$y + 38^0 + 62^0 = 180$	1		
			$y + 100 = 180$			
			$y = 80^0$	1	②	△2
(04)			$x^2 + 5x - x - 5$	1		
			$(x+5)(x-1)$	1	②	△2
(05)		ii	x, x^2, x^3, x^4		②	△2
(06)			$18x^2y^2$		②	△2
(07)		i	$\Delta PTU \equiv \Delta QRS$	1		
		ii	[S.A.S.]	1	②	△2
(08)			$\dfrac{50 - 22}{2}$	1		
				1	②	△2
			$\dfrac{28}{2} = 14cm$			
(09)			$\dfrac{2 \times 3}{x \times 3} - \dfrac{1}{3x} = \dfrac{5}{3}$	1		
			$\dfrac{5}{3x} = \dfrac{5}{3}$	1	②	△2
			$x = 1$			
(10)			$x + 50^0 + 90^0 = 180^0$	1		
			$x = 40^0$	1	②	△2
(11)			$\log_a b = x$	2	②	△2
(12)			$\dfrac{6-2}{2-0}$	1		
				1	②	△2
			$\dfrac{4}{2}$ or 2			
(13)			$180 - 75 = 105^0$	1		
			$x = 105^0$	1	②	△2
(14)			$\dfrac{AB}{10} = \dfrac{7}{10}$	1		
			$AB = 7cm$	1	②	△2
(15)			$\dfrac{2x}{3} \times \dfrac{9a}{4x^2}$	1		
			$\dfrac{3a}{2x}$	1	②	△2
(16)			$OB^2 = 5^2 + 12^2$	1		
			$= 169$			△2
			$OB = 13$			
			$OC = 13cm$	1	②	
(17)			$A \cap B^1$	2	②	△2
(18)			$x < \dfrac{4}{2}$	1		
			$x < 2$	1		
			$x = 1$		②	△2

Question Number			Answers	Marks		
(19)			Marking an angle 50^0	1 1	②	△02
(20)			Coin Dice $\frac{2}{12}$ or $\frac{1}{6}$	1 1	②	△02
(21)			$A\hat{O}B = 60^0$ $A\hat{C}B = 30^0$	1 1	②	△02
(22)			$A\hat{C}B = 90^0$ $B\hat{A}C = 90^0 - 65^0 = 25^0$ $B\hat{D}C = 25^0$	1 1	②	△02
(23)			$3 \times 12 = 36$ man days $3 \times 5 = 15$ man days $36 - 15 = 21$ man days $\frac{21}{7} = 3$ days $12 - 8 = 4$ days	1 1	②	△02
(24)		i. ii.	$60 \div 4 = 15$ $\frac{90}{15} \times 20 = 120^0$	1 1	②	△02
(25)					②	△02
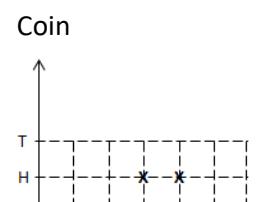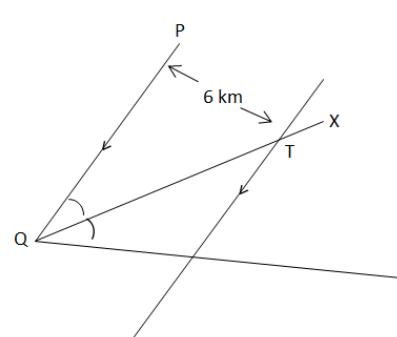
Mathematics - Paper 1 - PART B

Question Number			Answers	Marks		
(01)		i	$\frac{3}{7} + \frac{1}{3}$ $\frac{9+7}{21} = \frac{16}{21}$	1 1	②②	
		ii	 $1 - \frac{16}{21}$ $\frac{5}{21}$	1 1	②	
		iii	 $\frac{1}{3} - \frac{5}{21} = \frac{7-5}{21} = \frac{2}{21}$ $\therefore \frac{2}{21} \Rightarrow 4$	1 1+1 1	③	
		iv	$\therefore$ *Total number of students* $= \frac{4}{2} \times 21 = 42$ $14 - \left(42 \times \frac{1}{3} + 42 \times \frac{5}{21}\right) \times \frac{50}{100}$ $14 - (14 + 10) \times \frac{50}{100}$ $14 - 12$ 2	1 1 1	③	◹10◺
(02)		i	Area of the semi-circle *APD* $= \frac{22}{7} \times 7 \times 7 \times \frac{1}{2}$ $= 77 m^2$	1 1	②②	
		ii	 Area of the rectangular part $77 \times 3 = 231 m^2$ $\therefore$ Length of AB $= \frac{231}{14} = 16.5 m$	1 1	②②	
		iii	 Arc length $= 2 \times \frac{22}{7} \times 7 \times \frac{1}{2}$ $= 22 m$ Perimeter of the whole part $= 22 + 16.5 + 16.5 + 14$ $= 69 m$	1 1	②②	
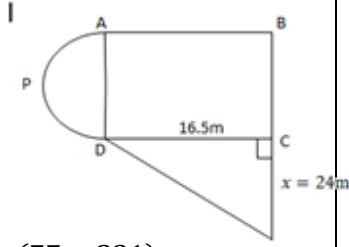
	Iv	No of poles $= \frac{22}{2} + 1 = 12$	1+1	⑫	
	v	Area of the triangular = $506 - (77 + 231)$ part = $198 m^2$ $\frac{1}{2}x \times 16.5 = 198$ ∴ $x = 24m$	1 1	⑫	△10

Question Number			Answers	Marks		
(03)	(a)	i	*Interest for a year* $= 600\,000 \times \frac{15}{100}$ $= Rs.\,90\,000$	1 1	⑫	
		ii	Interest for a month $= 600\,000 \times \frac{14}{100} \times \frac{1}{12}$ $= Rs.\,7000$	1 1	⑫	
		iii	Interest for a year $= Rs.\,\frac{600\,000}{5}$ $= Rs.\,120\,000$ ∴ Annual interest rate $= \frac{120\,000}{600\,000} \times 100$ $= 20\%$	1 1 1	⑬	
	(b)	i	Total number of man days $= 10 \times 8$ $= 80$	1		
		ii	Number of people worked in the first 2 days = 12 The number of man days for that $= 2 \times 12$ $= 24$ ∴ The amount paid for it $= 24 \times 2000$ $= Rs.\,48\,000$	1 1 1	⑬	△10

Question Number			Answers	Marks		
(4)		i	Marking X $\vdots$ Correct notation	2 1	③	
		ii	$\dfrac{20}{36}$ or $\dfrac{5}{9}$		②	
		iii		1+1+ 1	③	
		iv	$\left(\dfrac{3}{5}\times\dfrac{2}{5}\right)+\left(\dfrac{2}{5}\times\dfrac{3}{5}\right)$ $\dfrac{12}{25}$	1 1	②	$\triangle$10

Question Number				Answers	Marks		
(05)		i.		$100 - (10 + 25 + 45)$	1		
				20	1	②2	
		ii.					
				Marking axes	1		
				25-35 and 35-50	1		
				Completing histogram	1	③3	
		iii.		To the two end points	1		
				Completing frequency polygon	1	②2	
		iv.			1	①1	

Frequency (histogram diagram with x-axis "Class intervals" marked 10, 15, 20, 25, 30, 35, 40, 45, 50, 55 and y-axis "Frequency" marked 5, 10, 15, 20, 25, 30, 35)

Class interval	15-20	20-25	25-30	30-35	35-40
Mid value	17.5	22.5	27.5	32.5	37.5
Frequency	20	25	30	15	10

To the two end points   1

Completing frequency polygon   1   ②2

10

Mathematics – Paper 11

Question Number			Answers	Marks	
(1)			Total amount for the 21% simple interest rate $$75\,000 \times \frac{21}{100} \times 2 + 75\,000$$		
			$= \qquad 750 \times 42 + 75\,000$	1	
			$= \qquad 31\,500 + 75\,000$	1	②
			$= \qquad$ Rs. $106\,500$		
			Total amount for the 20% compound interest rate $$75\,000 \times \frac{120}{100} \times \frac{120}{100}$$	2	②
			$= \qquad 750 \times 144$	1	
			$= \qquad$ Rs. $108\,000$		
				1	②
			$106500 < 108000$ So compound interest is more profitable.		
				1	①
			Amount received in both accounts $= 106\,500 + 108\,000$ $=$ Rs. $214\,500$	2	
			Toatal amount $= 2\,14\,500 \times \frac{120}{100} \times \frac{120}{100}$ $= 2\,145 \times 144$ $=$ Rs. $308\,880$	1	③
					△10
(2)	(a)	i	$y = x^2 + 4x - 2$ $x = -1 \qquad y = (-1)^2 + 4x(-1) - 2$ $= \ 1 - 4 - 2$ $= \ -5$	1	①
		ii	Correct axes If 5 points are correct Smooth curve	1 1 1	③
	(b)	i	$x = -2$	1	①
		ii	$-5 < x < -2$	2	②

Question Number			Answers	Marks		
(2)	(c)		$y = (x+2)^2 - 6$ $y = 0$ when $x = 0.5$ $y = (x+2)^2 - 6$ $0 = (x+2)^2 - 6$ $(x+2)^2 = 6$ $(x+2) = \sqrt{6}$ Substitute $x = 0.5$ $0.5 + 2 = \sqrt{6}$ $2.5 = \sqrt{6}$	1 1 1	③	⟋10⟍
(3)	(a)	i	$3a + 5b = 500$ ——— ① $2a = 5b$ ——— ② $2a - 5b = 0$ ——— ③ (1)+ (3) $5a = 500$ $a = 500$ By substituting $a = 500$ in (2) $2 \times 100 = 5b$ $200 = 5b$ $b = 40$ Price of an orange Rs. 100/- Price of a mandarin Rs. 40/-	1 1 1 1 1 1 1	⑦	
	(b)		$\dfrac{5}{x-2} + \dfrac{1}{x^2 - 4}$ $= \dfrac{5}{x-2} + \dfrac{1}{(x-2)(x+2)}$ $= \dfrac{5(x+2)+1}{(x-2)(x+2)}$ $= \dfrac{5x+11}{(x-2)(x+2)}$	1 1 1	③	⟋10⟍
(4)		i	$700 - 800$	1	①	
		ii	(table below)			

Class interval	Mid value	Frequency f	Deviation d	fd
500-600	550	2	-200	-400
600-700	650	6	-100	-600
700-800	750	8	0	0
800-900	850	5	100	500
900-1000	950	4	200	800
1000-1100	1050	5	300	1500
				2800-1000
Amount		30		1800

Question Number		Answers	Marks	
(4)		Mean $= 750 + \frac{1800}{30}$	1	
		$= 750 + 60 = 810$kg	1	
		Column of mid values		
		Column of d	1	
		Column of fd	1	
			1	⑤
	iii	Monthly cost $= \acute{o}_i.\,810 \times 30 \times 120$	1	
		$= $ Rs. 2 916 000	1	②
	iv	Mass of paddy $= 810 \times 30 = 24300 kg$		
		Mass of rice $= 18.225 \times 1000 = 18225 kg$	1	①
		The mass of rice obtained from 1 kg of paddy		
		$= \frac{18225}{24300} = 0.75kg$		
		$0.75 < 0.8$		
			1	①
		$\therefore$ *The mass of rice obtained from* $1\,kg$ *of paddy is less than* $0.8\,kg.$		
				⑩
(5)	i.	Representing data	2	②
	ii.	$Sin\ 64^0 37^1 = \dfrac{AB}{70}$	1	
			1	
		$0.9035 \times 70 = AB$	1	
		$AB = 63.245$	1	④
		$\therefore$ *Height AB to the nearest meter* $= 63m$		
	iii.		1	
		$tan\theta = \dfrac{51}{30}$	1	
		$tan\theta = 1.7000$	1	
		$\theta = 59^0 32^1$	1	④
				⑩
		$\therefore$ Angle of elevation closest to 60^0.		
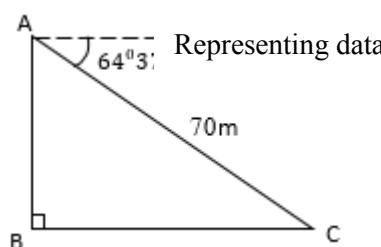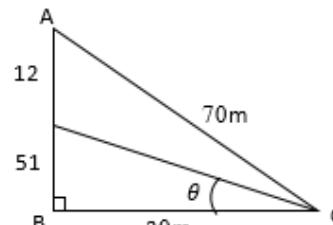
Question Number			Answers	Marks		
(6)			$x^2 - 8 \times \dfrac{x}{2} = 44$ $x^2 - 4x = 44$ $(x-2)^2 = 44 + 4$ $(x-2)^2 = 48$ $x - 2 = \pm\sqrt{48}$ $x - 2 = \pm 4\sqrt{3}$ $x - 2 = \pm 4 \times 1.73$ $x - 2 = \pm 6.92$ $x - 2 = 6.92$ or $x - 2 = -6.92$ $x = 8.92 \ or \ x = -4.92$ $x < 0$ $\therefore x = 8.92$ $Area \ x^2 = (8.92)^2$ $(8.92)^2 < 9^2$ or $x^2 < 81$	1 1 1 1 1 1 1 1 1 1	③ ⑤ ② 	△10
(7)		i.	12, 15, 18, 21 Since the difference between terms is 3, this is an arithmetic progression.	1 1	②	
		ii.	$Tn = a + (n-1)d$ $T_{12} = 12 + (12-1)3$ $= 12 + 33$ $= 45$	1 1	②	
		iii.	$T_n = a + (n-1)d$ $69 = 12 + (n-1)3$ $\dfrac{57}{3} = \dfrac{(n-1)3}{3}$ $19 = n - 1$ $20 = n$	1 1	②	
		iv.	$S_n = \dfrac{n}{2}\{2a + (n-1)d\}$ $S_{25} = \dfrac{25}{2}\{24 + (25-1)3\}$ $= \dfrac{25}{2}\{24 + 72\} = \dfrac{25}{2} \times 96 = 1\ 200$	1 1	②	

Question Number			Answers	Marks		
		v.	$S_{12} = \dfrac{12}{2}\,(12 + 45)$ $= 6 \times 57$ $= 342$ Number of seats filled $= 342 + 8 = 350$ $Amount = 350 \times 500$ $= \text{Rs.}\,.175\,000$	1 1	②	△10
(8)		i.	Drawing the line AB Drawing 45^0 Drawing the triangle ABC	1 1 1	③	
		ii.	Constructing the perpendicular CX	1	①	
		iii.	Constructing a perpendicular to a side Marking the centre Drawing the circle	1 1 1	③ ①	
		iv.	Constructing a locus of the points equi- distant from XC and CB	1		
		v.	$A\hat{B}C = 45^0$ (Data) $C\hat{B}X = C\hat{Y}X$ (Angles in the same segment) $\therefore\ C\hat{Y}X = 45^0$	1 1	②	△10
(9)		i.	$BC \parallel PQ$ $\therefore BR \parallel PQ$ $AB \parallel QR$ $\therefore PB \parallel QR$ $\therefore PQRB$ is a parallelogram (The opposite sides of a parallelogram are equal) $A\hat{B}C = 90^0$ $PBC = 90^0$ $\therefore PQRB$ is a rectangle (If one of the angles of a parallelogram is a right angle, then it is a rectangle)	1 1 1 1	④	

Question Number			Answers	Marks	
(9)		ii.	P is a midpoint of the side AB $BC \parallel PQ$ $\therefore$ Q is a midpoint of the side AC (Converse of the mid point theorem) $AB \parallel QR$ $\therefore$ R is a midpoint of the side BC (Converse of the mid point theorem) $\therefore AC \parallel PR$ (Mid point theorem) $AQ \parallel PR$ $\frac{1}{2}AC = PR$ $AQ = PR$ $\therefore AQRB$ is a parallelogram (A pair of opposite side is equal and parallel)	1 1 1 1	⑭
		iii.	$AQ = PR$ (Proved) $PR = BQ$ (The diagonals of a rectangle are equal) $\therefore P\hat{A}Q = P\hat{B}Q$ (Angles opposite equal sides of an isosceles triangle)	1 1	⑫ ⚠️10
(10)	(a)		Volume of n spheres = Volume of the empty cylinder $\frac{4}{3}\pi a^3 \times n = \pi \times r^2 \times 2r$ $\frac{4a^3 n}{3} = 2r^3$ $n = \frac{3r^3}{2a^3}$ $n = \frac{3}{2}\left(\frac{r}{a}\right)^3$	1 1 1	⑬
	(b)		Substituting $n = \frac{2}{3}\left(\frac{r}{a}\right)^3$ $= \frac{3}{2} \times \frac{7}{3.5} \times \frac{7}{3.5} \times \frac{7}{3.5}$ $= 12$	1 1 1 2	⑫
			$lgx = \lg 4.32 + \lg 542 - \lg 25.71$ $= 0.6355 + 2.7340 - \lg 1.4101$ $= 1.9594$ $x = antilog\ 1.9594$ $= 91.08$	1 1	⑮ ⚠️10

Question Number			Answers	Marks	
(11)		i.	One per area	1	④
		ii.	Shading the area	1	①
		iii.	40	1	①
		iv.	40 : 15 8 : 3	1 1	②
		v.	$7 + 9$ 16	1 1	②
					△10
(12)			In the triangle AOB and AOD $AB = AD$ (Data) $BO = DO$ (The radii of the same circle are equal) $AO = AO$ (Common side) $\therefore AOB\Delta \equiv AOD\Delta$ (SSS) $B\hat{A}X = D\hat{A}X$ (Corresponding angles of congruent triangle are equal) $B\hat{A}D = B\hat{A}X + D\hat{A}X$ $B\hat{A}D = 2\,D\hat{A}X$ $D\hat{O}X = 2\,D\hat{A}X$ (The angle subtended at the centre by an arc of a circle is twice the angle subtended by the arc on the remaining part of the circle) $B\hat{A}D + B\hat{C}D = 180^0$ (Opposite angles of a cyclic quadrilateral are supplementry.) $\therefore 2D\hat{A}X + B\hat{C}D = 180^0$ $D\hat{O}X + B\hat{C}D = 180^0$	1 1 1 1 1 1 1 1 1 1	④ ① ③ ②
					△10

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