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Royal College - Colombo 07
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Grade 10 - Diagnostic Test –August 2022
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Time : 2 hours
කාලය : පැය 2

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 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

Question Numbers		Marks
A	1 - 25	
B	1	
	2	
	3	
	4	
	5	
Total		

Part A

Answer **all** questions on this question paper itself.

(01) Find the selling price of a frock bought for Rs 2150 if it is sold at a profit of 10%.

(02) Factorize: $a^2 - 9b^2$

(03) Evaluate $1.01 + 0.11$

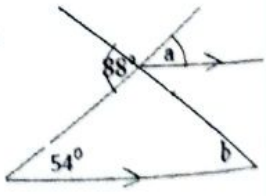
(04) Solve $\frac{x}{5} - 3 = 2$

(05) Simplify $\frac{4}{y} - \frac{5}{2y}$

(06) If Q = {2,3,7,9,11} and P= {3,6,9}, write the set PUQ

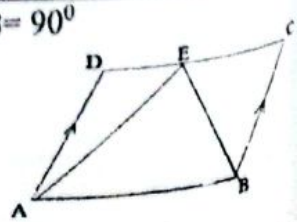
(07) Find the perimeter of a semi circular stage of radius 3.5 m.

(08) Find the value of a and b based on the information given in the figure.



(09) Approximate $\sqrt{17}$ to the first decimal place.

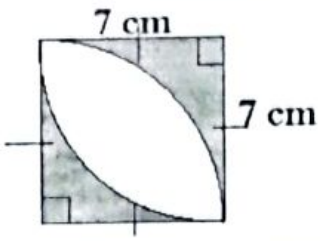
(10) The angles bisectors of $D\hat{A}B$ and $A\hat{B}C$ meet DC at E. Show that $A\hat{E}B = 90^0$



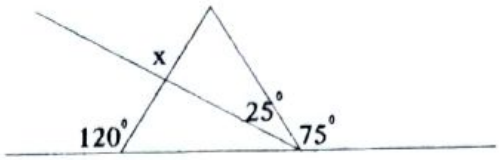
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Index Number .....

(11) Find the area of the unshaded part of the given figure.



(12) Using the information given in the figure, find the value of **z**.

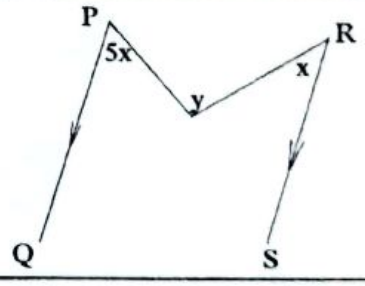


(13) It takes 6 men for 8 days, at 5 hours per day to complete $\frac{1}{4}$ of a certain work. How many days need to complete the same task 8 hours per day to 10 men.

(14) A tank is $\frac{4}{7}$ full of water. Another 300 ***l*** of water is required to fill it completely. Find the capacity of the tank in **liters.**

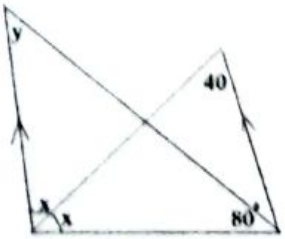
(15) Make ***r*** the subject of the formula $y = \frac{r}{(1-r)}$

(16) In the given figure PQ // RS. Find the value of y in terms of x.



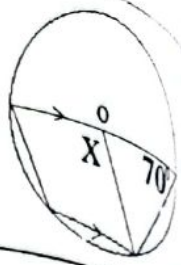
(17) If the price of a bedsheet was reduced by 15% and sold for Rs. 750 due to a misprint.on it. What was the marked price?

(18) According to the information given in the figure, find the value of x and y.



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(19) O is the centre of the circle. Find the value of x.



(20) Find the mode and the median of the group of the data 5x, 12x, 3x, 8x, 9x, 9x ,4x, 6x.

i) Mode .....

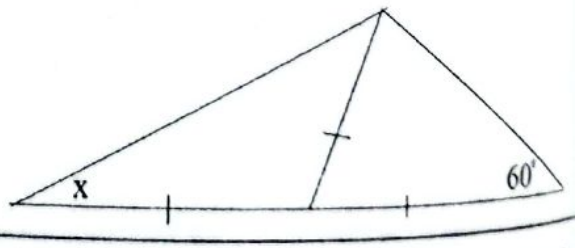
ii) Median .....

(21) Find the magnitude of an exterior angle and the number of sides, of a regular polygon whose interior angle is 144^0.

(22) Find the gradient and the intercept of the straight line $\frac{1}{4}y - 3 = 2x$

(23) Find the least common multiple of the following expressions 3, $2x^2y$ and $5x^2y^2$.

(24)According to the information given in the figure, find the value of x.



(25) AC diagonal of a rhombus ABCD is given in figure. If AC = 8 cm and BD = 6 cm, sketch a suitable geometry diagram to obtain the vertices B and D of the rhombus.



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Part B

Answer **all** questions **on this question paper itself.**

(01) In an LP gas cylinder $\frac{3}{5}$ of the gass amount was propane gas, $\frac{1}{4}$ of the remaining amount was water vapor. The balance was butane gas. Total gas capacity of the the cylinder was 600 *l* .

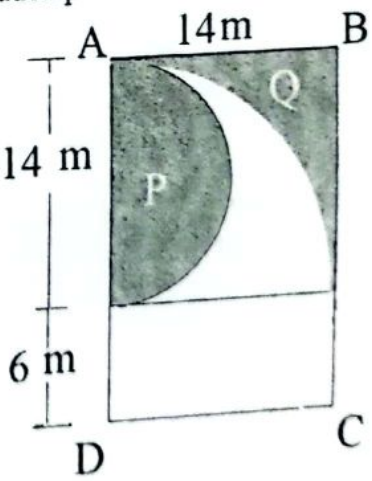
(i) What fraction of the whole gas of cylinder was filled with butane gas?

(ii) State the volume of each gas in the cylinder in litres.

(iii) State the ratio between propane, butane and water vapor in the simplest form.

(iv) At the end of the first day of consumption of the new gas cylinder, 200 *l* of gas has been used up. Indicate the amount of propane gas used that day as a percentage.

2) A rough plan of a rectangular garden is shown in the figure. The shaded part **P** shows a semi-circular pond and the shaded part **Q** shows a flower bed.



i. Find the arc length of the flower bed.

ii. Find the perimeter of the flower bed.

iii. What is the surface area of the pond in square metres?

iv. Except for the pond and the flower bed, the rest of the area is designed to be covered with grass.

(a) Find the area of the portion covered with grass.

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(b) If it costs Rs.200 to cover one square meter of grass, find the cost.

(03) (a) A coconut plantation owner estimated that it would take 20 men 15 days to remove husks from a pile of coconuts. He employed 10 men for the work in the first 5 days.

(i) What is the magnitude of the task in man days?

(ii) What is the amount of work completed in the first 5 days in man days?

(iii) If the owner of the coconut plantation expects to completely the task done in days, how many more men should he employ for that purpose?

(b) If the owner of the coconut plantation intends to pay an amount of Rs.1200 per day f the removal of coconut husks for the first five days and Rs.2 000 for each d thereafter,

(i) How much will it cost him in the first five days?

(ii) How much will he have to pay on completion of the whole work?

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(04) (a) ε = {Counting number from 1 to 12 }

P = {Digits of the numbers 308 435 105}

Q = {Prime numbers less than 11}

R= {Prime factors of 180}

(i) List the elements of the above sets.

ϵ =

P =

Q =

R =

(ii) List the elements of the following sets.

(a) $P \cap R$ =

(b) QUR =

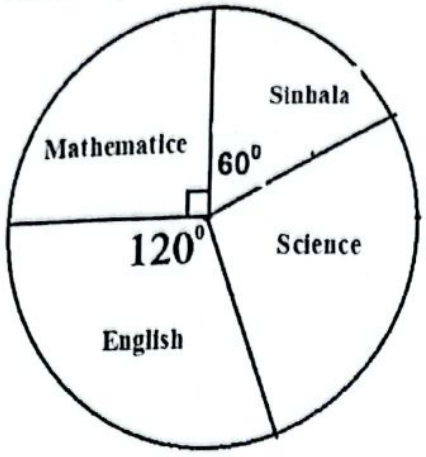
(c) $(P \cap Q)'$

(d) P' =

(b) When a number is selected randomly from the above universal set,write the probability of the selected number being a multiples of 2.

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(05) The pie chart below shows the data collected from 120 grade 10 students of a school about their preferred major subjects.



(i) Which subject is preferred by the largest number of students?

(ii) How many students like mathematics?

(iii) What is the central angle representing students who like science?

(iv) Indicate the number of students who prefer science as a percentage.

(v) Complete the following table according to the number of students interest each subject.

Subject	Number of students
Sinhala	.....
Mathematice	.....
Science	.....
vEnglish	.....

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Grade 10 – Diagnostic Test– August 2022
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32 | E | II

Time : 3 hours
කාලය : පැය 3

Mathematics - II
ගණිතය - II

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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**.

tailor sells one frock in an order of frocks to a wholesaler at a profit of 25% and the wholesaler sells it a retailer for Rs.1200 at a profit of 20%. A retailer sells one frock to a customer at a profit of 30%.

(i) What is the price the retailer paid for a frock.
(ii) Find the price the wholesaler paid for the frock.
(iii) Find the cost of a frock to the tailor.
(iv) Find the percentage of profit earned by the tailor if the tailor had sold the garment directly to the customer at the same price as the customer bought it without intermediaries.

n incomplete table of values prepared to draw the graph of the function $y = 2x - 1$ is given below.

X	-1	0	1	2	3
Y	-3	-1		3	5

(i) Find the value of y, when $x = 1$.
(ii) Using a suitable scale draws the graph of the function $y = 2x - 1$.
(iii) Write the gradient of the graph $y = 2x - 1$.
(iv) Draw the graph of the function $y = 2x$ in the same Cartesian plane and write a special characteristic that you can observe from the above two straight lines by giving reasons.

3. The following frequency ... recruitment to a private institution.

Marks	Mid Value (x)	Frequency (f)	(fx)
0 – 2		1	
3 – 5		3	
6 – 8		5	
9 – 11		10	
12 – 14		11	
15 – 17		6	
18 – 20		4	
		$\Sigma f =$	$\Sigma fx =$

Copy down the table and answer the following questions.

(i) What is the modal class of the distribution?

(ii) What is the median class of the distribution?

(iii) Find the mean mark obtained by an applicant.

(iv) If the applicants scored 15 or more in the interview, is recruiting by the institution. Fin... percentage of applicants who are recruited.

4.

(i) Find the factors. $4x^2 - 9$.

(ii) If $m^2 + n^2 = 272$ and $mn = 64$,

a) find the value of $m + n$.

b) find the value of $m - n$.

(iii) Find the value using the knowledge of factors ; $115^2 + 115 \times 85$.

5. (i) The cost of 6 books and 5 pens is Rs 230. The price of a book is 3 times of the price of ... taking the price of a book as Rs. x and the price of a pen as Rs. Y, construct a pair of sim... equation .By solving the above simultaneous equation find the cost of a book and a pen sepa...

(ii) Solve; $3x + 2\left\{\frac{1}{2}(4x-2) - x + 3\right\} = 9$

6. A and B are two cuboid shaped vessels. The area of the bottom of the container A is 450 cm^2 ... height is 10 cm. The length, breadth, and height of container B are 10 cm, 5 cm and 6 cm respe...

(i) Find the capacity of container A in l.

(ii) Find the capacity of vessel B in ml.

(iii) B is filled with water and the water is poured into A. How many times should water be ... from container B to fill container A completely?

(iv) If container A is completely emptied of water and 2.7 l of water is poured into it, to w... height will the water be filled?

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Part - B

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

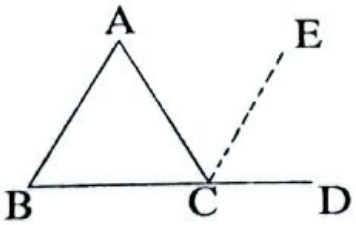
bons are cut into pieces for a decoration. The length of the first piece is 5 cm and every piece is m longer than the previous piece.

i) Write the lengths of the first four pieces in order.
ii) Write an expression for the length of n^{th} piece in terms of n.
iii) Write an expression for the length of $(n+1)^{th}$ piece.
iv) Find the length of the 15^{th} piece.
v) Which piece is 82 cm *long*.

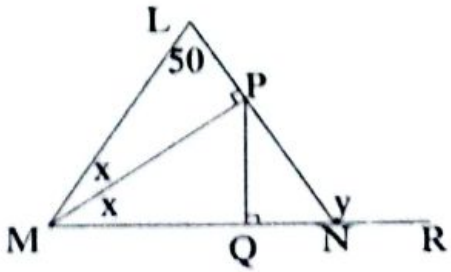
: only a straight edge with a cm/mm scale and a pair of compasses for the following constructions. ow the construction lines clearly.

(i) Construct the triangle PQR of which $PR = 5\ cm, PQ = 6\ cm$ *and* $Q\hat{P}R = 90^0$.
(ii) Construct the locus of points equidistant from point P *and* Q.
(iii) Name the point of intersection of the locus drawn above part(ii) and QR *as* O.
(iv) Construct the circle with the centre O and the radius OR.
(v) Write the length of the radius.

Prove that the exterior angle formed when a side of a triangle is produced, is equal to the sum of two erior opposite angles. Use the below diagram.



(i) According to the given diagram, find the value of x.
(ii) By finding the values, show that $M\hat{L}P = M\hat{P}Q$.
(iii) Show that $M\hat{L}P = Q\hat{N}P$.
(iv) Hence show that $N\hat{P}Q = 40^0$.



10. A ship journeying from harbour L approaches harbour M after travelling 100 km on a bearing 50°. It then travels 175 km on a bearing of 120° and approach to harbour N.

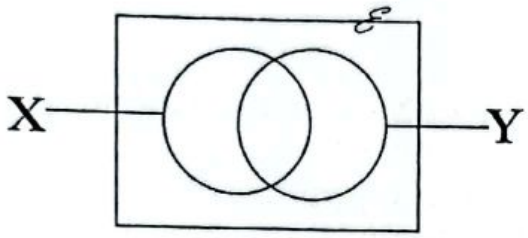
(i) Draw a rough sketch based on the above information.

(ii) Using a suitable scale draw a scale diagram and find,

a) the actual distance from harbour L to harbour N.

b) the bearing of L from N.

11. $\mathcal{E}$ = {Counting numbers less than 10}
X = {Even numbers between 1 and 10}
Y = {Prime numbers between 1 and 10}



(i) Write sets $\mathcal{E}$, X and Y by listing the elements.

(ii) Copy the given Venn diagram and represent the above data on it.

(iii) Find $n(X \cap Y)$

(iv) Find $n(X \cup Y)'$

(v) Find $n(X')$

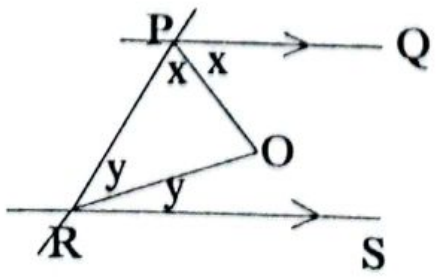
12. a) In the ABCD Quadrilateral, AB // DC. The foot of the perpendicular drawn from the point A to D E and the foot of the perpendicular drawn from the point C to DB is F. If AE = CF.

(i) Show that $ABE \Delta \equiv DFC\Delta$

(ii) Hence show that AB = DC

(iii) Show that DE = FB

c) In the given figure PQ // RS. Angle bisectors of the angles $Q\hat{P}R$ and $P\hat{R}S$ meets at O. Show that $P\hat{O}R = 90^0$



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