Royal College - Colombo 07
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Grade 11 – Third Term Evaluation –November 2020

තෙවන වාර පරික්ෂණය – 2020 නොවැම්බර් –11 ශ්‍රේණිය

Time: 2 hours
කාලය : පැය 2

Mathematics – I
ගණිතය - I

| 32 | E | 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.
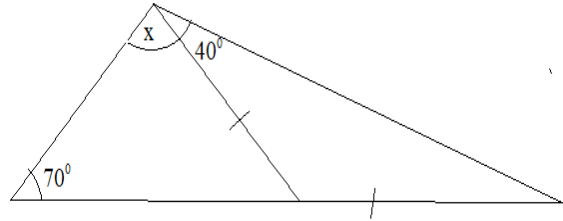
For Marking Examiner's use only

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

PART A

Answer **all questions** on the **paper itself.**

01. A custom duty of Rs. 720 is charged for a certain item that is imported. Find the percentage of duty, if the value of this item is Rs. 9 000.
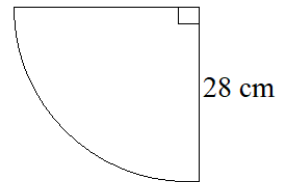
02. Find the value of x in the figure given.

03. Solve : $\dfrac{4}{(x-1)} - \dfrac{2}{(1-x)}$

04. Find the factors : $x^2 - 13x + 30$

05. Given here is a sector of radius 28 cm. find the circumference of the base of a cone which can be made by using the sector given. (take $\pi = \dfrac{22}{7}$).

    28 cm

06. Solve : $2x^2 = 8x$

07. 8 men can finish the half of a certain work in 6 days. Find how many days it takes for 12 men to complete the remaining work.

08. According to the given figure ABCD is a rhombus. E is a point on AB. By considering the diagram mark (✔) in front of the correct statement and (X) in front of the incorrect statement.

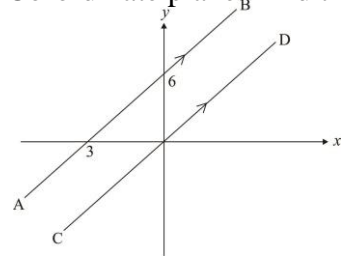|	
The area of ΔADC = The are of ΔBCD	
The area of ΔBOC = $\dfrac{1}{2} \times A0 \times B0$	
The length of AC = The length of BD	
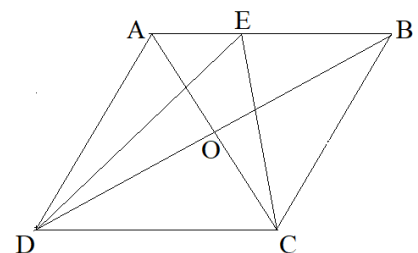
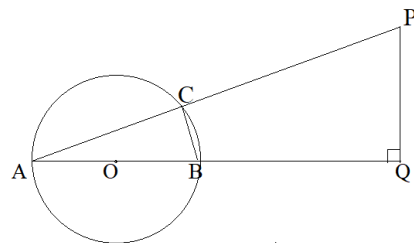09. Express the shaded portion in set notation.
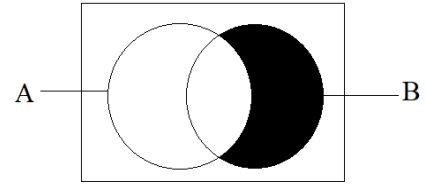
10. Find the least common multiple of $4x^2y^2$, $6xy^3$, $8x^3y^3$

11. AB and CD are two parallel straight lines drawn on the same Co-ordinate plane. Find the equation of CD?

12. If $log_{10} 2 = a$ find $log_{10} 5$ in terms of a.

13. In the given figure O is the centre of the circle. $A\hat{Q}P = 90^0$, explain why BCPQ is a cyclic quadrilateral.


14. A histogram illustrates how a group of students from a class obtained marks for a paper for which the marks given out of 50. Find the total number of student in the class.
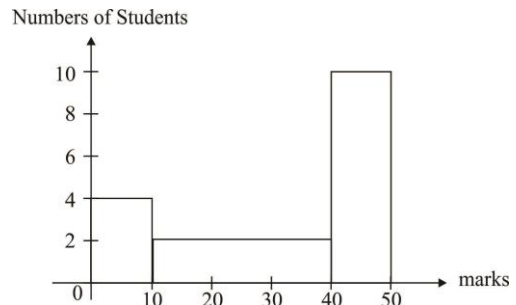

15. The nth term of a geometric progression is given by $Tn = 4 \times r^{n-1}$. If the common ratio of the progression is 2, Find the 5th term of the progression.

16. In the figure, ABCD is a cyclic quadrilateral. AB is produced to E and BC is produced to F
Find the value of x and y.
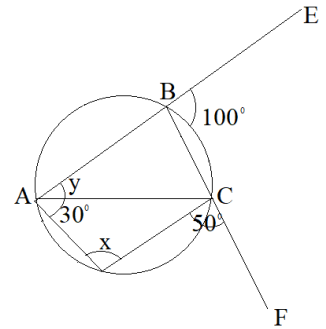
17. Fill in the blanks in the following statement using suitable geometric terms. The line drawn
_____ a side of a triangle from the mid-point of another side
_____ the third side.

18. The figure shows a cylinder and a cone of equal radius and equal height. The cone is placed inside
the cylinder and the remaining part was filled with water. If the amount of water needed to fill
the remaining portion is 500 *ml*. Find the capacity of the cylinder.
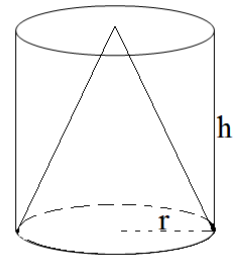
19. What is the constant value that should be added to make the expression $x^2 - \frac{1}{2} x$ a perfect
square.

20. In the figure ACB is a tangent when touches the circle at the point C. D and E are points on the
circle if $D\hat{E}C = 60^0 \ and \ C\hat{D}B = 20^0.$ Find the magnitude of x.
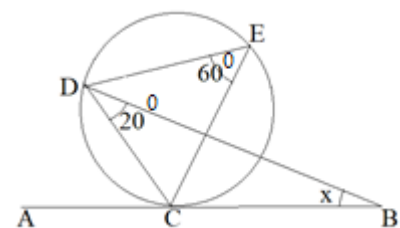
21. The figure shows a vertical post AB on the horizontal ground AC. Find the angle of depression of C When observed from the point B.
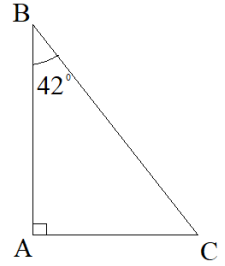
22. X and Y are two mutually exclusive events of a random experiment. If $P(X) = \frac{1}{3}$, $P(Y) = \frac{2}{5}$ Find $P(X \cup Y)$.

23. ABC is a triangle, X is a point on AB and Y is a point on AC such that BC is parallel of XY.

    If A, B and C are on the circumference of the same circle with Y as the centre. Find the length of AY?
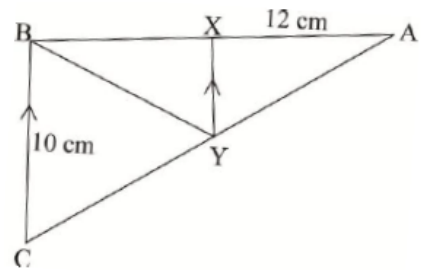
24. A distance time graph that represents the motion of a car. Find the speed of the car in km/h.
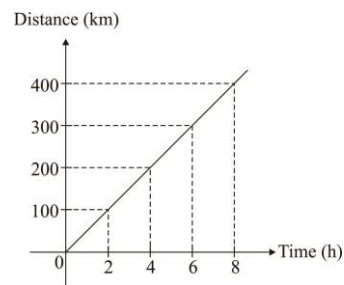
25. In the figure, PQR is a triangle. X is a point moving on the line QR. Describe the locus of the mid-pint of PX.

PART B
Answer all questions on this paper itself.

01. $\frac{1}{3}$ of the total income of a person is spent on food, $\frac{1}{4}$ of the remaining portion is spent on education.

    (i)   Find the remaining portion after spending on food?

    (ii)   What fraction of the total income was used on education?

    (iii)   The remaining portion was equally divided in to three portions and deposited in three different banks accounts. Find the portion deposited in a bank as a fraction of the whole.
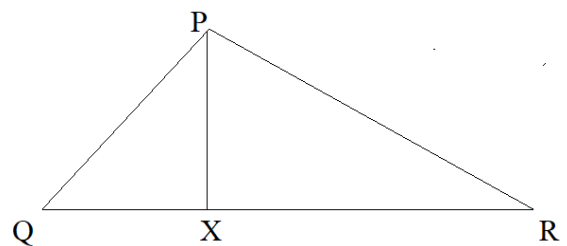
    (iv)   If the amount deposited in a bank is Rs. 15,000. Find the total income of the person.

02. A metal sheet consist of portion ABC which is in the shape of a right angles triangle. AB=AC, BDE is a sector and BFD is a semi-circular metal sheet attached to the triangle ABC. D is a point on the side BC. (take $\pi = \frac{22}{7}$).

    (i)   Find the area of the sector BED.

    (ii)   Find the ratio between the area of the sector BED and the area of the semi-circular BFD.

    (iii)   Find the area of the portion ACDE.
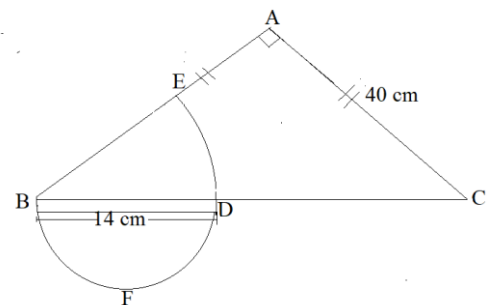
    (iv)   A sector is to be drawn in the portion ACDE taking $A\hat{C}D$ as central angle and the area of which is also equal to the total area of the sector BED and the semi-circle BFD. Find the radius of the sector is to be drawn in the portion ACDE as mentioned above? (take $\sqrt{2}=1.4$).

03. (a) Nimal invested an amount of Rs.100,000 in a bank for annual compound interest of 12% and Kamal invested Rs.100,000 at annual simple interest of 2%.

   (i)   Find the total amount received at the end of a year by Kamal?

   (ii)   Find the difference between the total interest obtained by both Nimal and Kamal at the end of 2 years.

   (b)   A person invest an amount of Rs, 65,000 in a company which pays a dividend of Rs. 4 per share at Rs. 13 per share for a year.

      (i)   Find the dividend income he received at the end of an year.

After receiving the dividend income for a year, he sold all his shares at Rs. 20 each and he invest the money he received by selling all the shares to buy shares from another company which pays dividend of Rs. 6 per share to Rs. 50 per share.

      (ii)   Find the difference between the dividend income he receives from both companies.

04. An incomplete pie-chart in the figure shows how a certain number of students from a school taken their breakfast on a certain day.
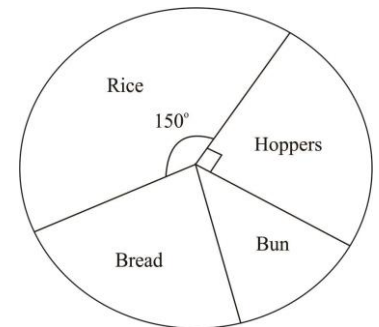
   (i)   The number of students who ate rice is 600, find the number of students ate hoppers.

   (ii)   The number of students those who ate bun is 120. Find the magnitude of central angle that represent the students who ate bun.

   (iii) Find the total number of students in the school.

   (iv)   Find the ratio between the number of students who ate bread and hoppers.

05. A bag contains 4 red marble and 2 green marbles of all identical. A marble is drawn randomly from the bag and examined, and without replacing this marble, another marble is drawn randomly from the bag and examined.

(i)   Using the symbol 'X' represent the sample space of the experiment of drawing marbles in the given grid?
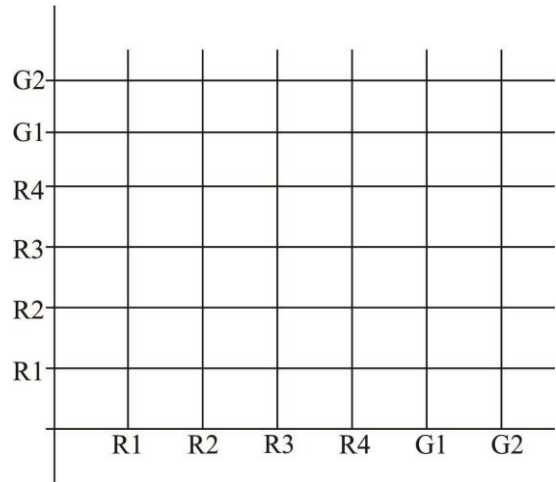
(ii)   In the grid encircle the event of drawing at least one red marble and find its probability.

(iii)   An incomplete tree diagram relevant to the above experiment is given below. Complete the tree diagram by indicating the corresponding probability.
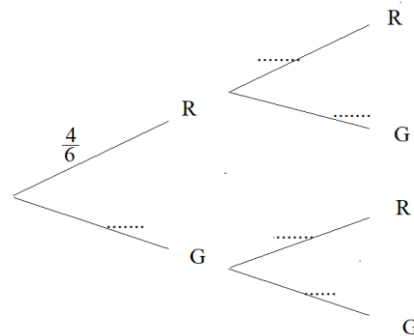
(iv)   Using the tree diagram, find the probability that both marbles are of same colour.

Royal College - Colombo 07
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| 32 | E | II |

Grade 11 – Third Term Evaluation – November 2020
තෙවන වාර පරීක්ෂණය – **2020** නොවැම්බර් –**11** ශ්‍රේණිය

Mathematics - II
ගණිතය - II

Time: 3 hours
කාලය : පැය 3

Name: - .... Class: -................ Index no: - ....

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 cylinder with radius of the base *r* is **πr²h** and the volume of a sphere of radius *r* is $\frac{4}{3}\pi r^3$

Part - A
Answer **five** questions **only**.

01. (a) According to the assessment made by the relevant provincial council, the annual value of a building is Rs 750 000. If Rs 18 000 has to be paid as quarterly rates, calculate the rates percentage charged by the council.

(b) Nishan bought a certain number of shares at Rs. 40 per share in a company which pays annual dividends of Rs 5 per share. His dividend income at the end of the year from this investment was Rs 30 000.

   i) Find the number of shares Nishan owns in this company.
   ii) Find the amount Nishan invested to buy shares in this company.

(c) The price of gold increases by 10% every year. What is the percentage of the necklace owner's profit from selling a gold necklace two years after purchase?

02. An incomplete table of values prepared to draw the graph of the function $y = x^2 + x - 3$ is given below.

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

(a) (i) Find the value of y when $x = -2$

   (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) Answer the following questions using the graph.

   i) Draw the line of symmetry of the function and write the equation of that line.
   ii) Find the roots of the equation $(x + \frac{1}{2})^2 - 3\frac{1}{4} = 0$.
   iii) Write the minimum value of the graph, hence deduce the coordinates of the minimum point of the function $y + 5 = x^2 + x - 3$
   iv) Describe the behavior of the function in the range $0 \le x \le 3$.

03.(a) If the length of a rectangular flower bed is increased by 40 m and the breadth is decreased by 30 m, its area is reduced by 1400 m². Decreasing the length by 12 m and increasing the breadth by 24 m the area is increased by 672 m². Take the length of the flower bed as x and the breadth y,

     i)   Construct a pair of simultaneous equations that represents the above information.

     ii)   By solving these equations, find separately the length and the breadth of the flower bed.

     iii) If a barbed wire fence with three strands around the flower bed is made with poles with a spacing of 5 m between the two poles, find the number of poles required and the total length of the wire.

  (b) Factorize : $4 - 25x^2$

04. Consider the area of the rectangular lamina (A) and the surface areas of the cylinder (B).


    3πx, A, 4x — X, B, x + 4
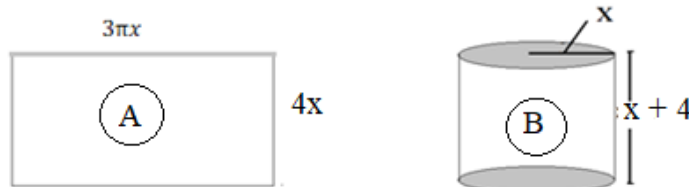
After making a cylinder (with a lid) shown in the figure B using the rectangular lamina shown in the figure A, the area of the remaining part is $2\pi\ m^2.$ Construct a quadratic equation in terms of x .

By completing squares or by another method, solve the equation and find the value of x to the nearest centimeter and thereby calculate the height of the cylinder.(take $\sqrt2 = 1.41$)

05. There is a narrow passage of 4 m between a vertical building and a tree. When a foot of a 3 m long ladder is kept on the passage and lean to the tree, the top of the ladder is at a point A which is 2.4 m height of the tree. When the top of the ladder keeps on the wall without changing the position of the foot of the ladder, it hits the window B in the wall.

     i)   Represent this information in a rough sketch.

     ii)   What is the angle of rotation of the ladder from the original position to the window of the building?

     iii) Calculate the height of the window of the building from the flat ground.

     iv) Does window B have an angle of elevation or an angle of depression when viewed from the point A of the tree? Give reason.

4 m
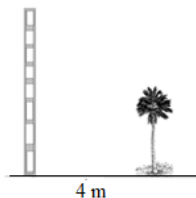
06. The table below shows how 50 students of grade 11 at Royal College participated in an online education program held over 60 holidays.

Number of days	0 - 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
Number of students	7	8	14	10	5	6

     i)   What is the modal class of the distribution?

     ii)   Taking the mid-value of the modal class as the assumed mean, find the mean number of days in which one student participated in this program.

     iii) If one subject is taught for 80 minutes a day and 3 subjects are taught in a day, what is the mean time learned by one student in two months?

     iv) If it costs Rs 262.50 to use the internet for one hour, what is the total amount spent by all students in using the internet in a month?

     v) If Google pays a commission of 5% of the total amount they receive in a month to the company that runs the program, what is the commission received in two months by the local company that runs the program?

Part - B

(**Answer five questions only.**)

07. (**a**). There are 1500 workers in a garment factory. They were suspected as infected for Covid-19 and carried PCR tests. 100 PCR tests can be carried within one hour and 8 workers recorded as Covid-19 positive during the first hour. During the second hour, the numbers of positive cases were 5 more than the previous hour. Between any two consecutive hours, the number of positive cases recorded during the second hour, is 5 more than the first hour. All the patients are taken for quarantine.

.

(i) Write the number of patients recorded within the first four hours and mention what progression do the number of patients belongs. Give reasons for your answer.

(ii) In which hour do you expect the maximum number of patients? How much it is?

(iii) How many patients can you expect from this factory?

(iv) The government says that the cost for one PCR test is Rs. 7500 and the cost for the quarantine process for one person is Rs. 53 000. If the total cost is paid by the factory owner, find that total amount..

(b) Blood tests were carried from patients. Doctors found that the viruses increase during the first hour as 2×10^5, during the second hour as 4×10^5 and during the third hour as 8×10^5. A certain worker was tested for PCR during the first hour. How much viruses can be expected in her body during the hour which all the workers have completed the test. (Express the final answer as a power).

(c)

08. In the following constructions, use a straight edge with cm/mm scale and a pair of compasses only. Show your construction lines clearly.

(i) Construct the triangle ABC which AB is 7 cm, $C\hat{A}B = 60^0$ and AC=BC.
(ii) Construct the perpendicular bisector of AC and name its point of intersection with AC as P.
(iii) Construct the line which passes through P and parallel to AB and name its point of intersection with BC as Q.
(iv) Draw the circle which touches AC at P and BC at Q.
(v) Write the relationship between the sides CP, CQ and AB, PQ by giving reasons.

09. In the triangle ABC, the mid-point of the side BC is F. The straight line drawn through G which is a mid point of side AF, parallel to BA, meets the sides AC and BC at D and E respectively. Prove that $ED = \frac{3}{4} AB$.
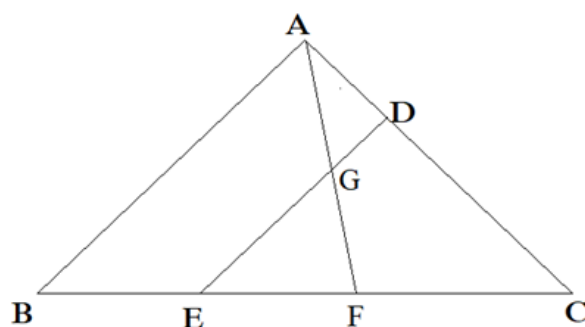
10. AB is a diameter of a circle with centre **O**. The diagonals AC and BD of the cyclic quadrilateral ABCD intersect at P. AD=DC.
Copy the given figure onto your answer script and indicate the above information in it. Write the answers for the following questions by giving reasons.

    (i) Name two right angles.

    (ii) Find the value of $B\hat{D}C$.

    (iii) What is the magnitude of $D\hat{A}C$.

    (iv) Find the value of $A\hat{B}C$.

    (v) Give reasons for being $A\hat{B}P + C\hat{D}P = C\hat{P}B$.
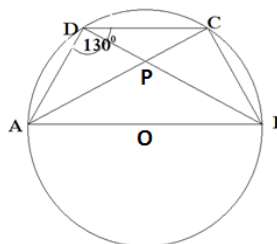
11. **(a)** An election was held in the parliament for the 20th amendment. Out of 225 members of the parliament, 5 were absent for the session. 9 members were voted only for the dual citizenship act. 163 were voted against the dual citizenship act but 43 out of them were voted only for the act of abolishing the commission and executive powers of president. The ratio between the voters who voted only for the act of abolishing the commission and who voted only for executive powers of president is 5:3. 23 members voted only for the executive powers of president and dual citizenship act. The number of voters who voted only for the dual citizenship act and abolishing the commission is equal to the number of absentees.

    (i) Copy the Venn diagram given in the picture and enter the above information.

    (ii) Explain the shaded area of the Venn diagram.

    (iii) How many members voted only for one act?

    (iv) If the acts are passed in the parliament when 2/3 of votes are in favour, what are the acts passed from above three? Give reasons for your answer.
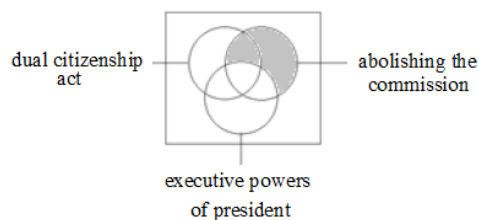
  (b) The probability of voting by an absentee is 20%. Two members are selected for the voting process. Draw a tree diagram to represent it and find the probability of voting by both.

12. A glass cuboid has a square cross section of side **3a**. The glass cuboid is **3πa** in length. A trophy is made by melting this cuboid and the dimensions are showed in figure below. Show that $h = \frac{474\,a}{25}$ cm . By taking the value of **a** as 2.76 cm, find the value of **h** in centimeters to the first decimal point using logarithms. Hence find the total height of the trophy.

Figure 1

Figure 2