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Department of Education, Southern Province
Department of Education, Southern Province

අවසාන වාර පරීක්ෂණය 2019
Year End Term Test 2019

II ශ්‍රේණිය
Grade 11

Mathematics - I

පැය දෙකයි
Two hours

- This question paper consists of 25 questions which carries 2 marks for each and 5 questions which carries 10 marks for each question. Answer all questions on this questions paper itself.

Part A

01. A provincial council charges Rs. 1 200 for a year as the rates from a house and the assessed annual value of the house is Rs. 30 000. Find the annual rates percentage.

02. If $2.65 = 10^{0.4232}$ the find the value of $\lg 26.5$

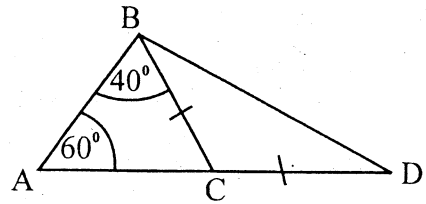
03. 3 men takes 4 days to complete $\frac{1}{3}$ of a certain task. How many days 3 men will take to complete $\frac{1}{2}$ of that task.

04. capacity of a water tank is 3600 l. This tank is filled using a pump which flows out water at a rate of 400 l per minute. Find the time taken to fill $\frac{1}{2}$ of the tank using this pump.

05. Simplify

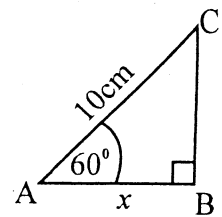
$$\frac{3}{2x} - \frac{1}{4x}$$

06. $\hat{A}BC = 40^\circ$, $\hat{B}AC = 60^\circ$ and $BC = CD$. Find the value of $\hat{C}BD$.



07. Find the least common multiple of the algebraic expressions $4x^2y$, xy , $3xy^2$

08. If $\cos 60^\circ = \frac{1}{2}$, $\sin 60^\circ = \frac{\sqrt{3}}{2}$, $\tan 60^\circ = \sqrt{3}$ then find the length of the side AB using the given data in the figure.

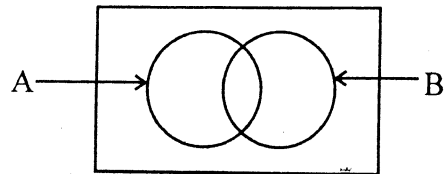


09. First term and the 4th term of a geometric progression are 5 and 135 respectively. Find the common ratio of this progression.

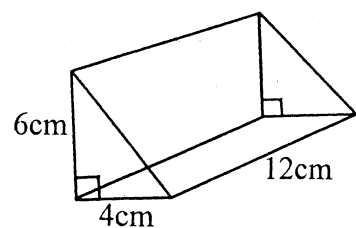
10. Write $2x^2 - x - 6$ as a product of 2 factors.

11. Include the given data in the Venn diagram.

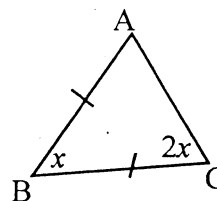
$$(A \cup B)' = \{8\}, A' = \{4, 6, 8\}$$



12. Using the given data find the volume of the triangular prism.

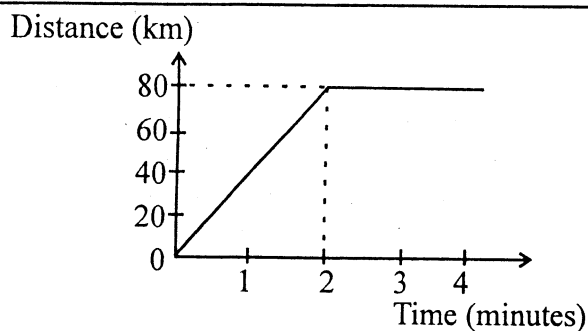


13. In this figure $AB = BC$, $\hat{ABC} = x$ and $\hat{ACB} = 2x$. Find the value of x



14. The faces of a fair dice numbered from 1 to 6. Find the probability of getting a prime number or a square number by rolling the dice.

15. How a bicycle travelled is shown in the distance - time graph. Find the speed of the bicycle within the first 2 minutes.

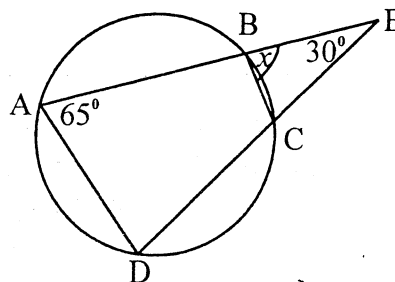


16. The base radius of a solid cylinder is 14 cm and the curved surface area is 1760 cm^2 . Find the height of the cylinder. (Take $\pi = \frac{22}{7}$)

17. If $\begin{pmatrix} 3 & -1 \\ 0 & 2 \end{pmatrix} \begin{pmatrix} 1 \\ -2 \end{pmatrix} = \begin{pmatrix} x \\ y \end{pmatrix}$ Find the values of x and y .

18. Solve $x^2 - 49 = 0$

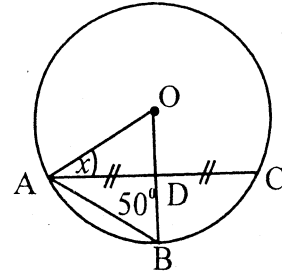
19. Using the data in the figure find the value of \hat{CBE} .



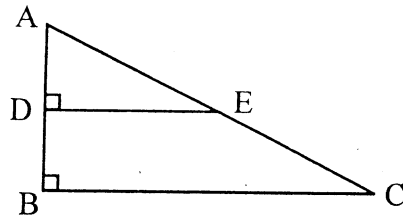
20. Simplify

$$\frac{2x^2y}{5} \div \frac{xy}{4}$$

21. O is the centre of the circle. If $AD = DC$ and $\hat{A}BO = 50^\circ$. Find the value of $\hat{O}AD$.

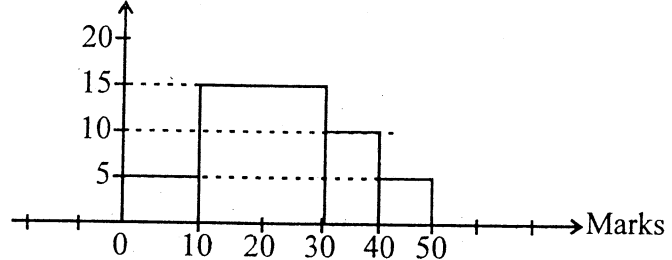


22. In this figure $AB = 10$ cm and $BC = 24$ cm. D is the midpoint of AB. Find the length of AE.

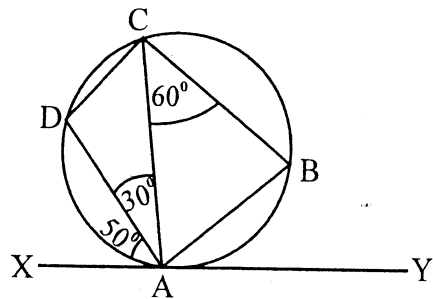


23. The below histogram drawn using the mathematics marks scored by the students in a class. Using the histogram complete its frequency polygon.

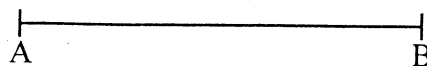
Number of Students



24. XY is a tangent to the circle drawn at the point A. If $\hat{X}AD = 50^\circ$, $\hat{D}AC = 30^\circ$, $\hat{A}CB = 60^\circ$ find the value of $\hat{C}AB$.



25. It is needed to draw a circle with radius 3 cm and passes through A and B points. Draw sketches of the constructions to find the centre "C" of that circle.



Part B

(01) (a) $\frac{1}{8}$ of the part of a betel tree which is used for a new year game is under the ground.

(i) Write down the part of the betel tree above the ground.

(ii) $\frac{1}{14}$ of the part of the betel tree above the ground has been cut out because the length of the betel tree is too long. Find the part of the betel tree above the ground now.

(iii) If the length of the removed part is 50 cm. Find the height of the part above the ground.

(b) Simplify. $\left(\frac{4}{5} - \frac{2}{3}\right) \div 2\frac{1}{5}$

(02) Imported price of a vehicle is Rs. 5 000 000. Mr. Ranil can buy this vehicle free of customs duty which is the duty percentage is 25% and free of VAT which is the VAT percentage is 10%. For this he borrowed a loan from a financial institute. He can pay back it within 5 years with equal monthly installments. The annual simple interest rate for the loan is 4%.

(i) Find the total interest for the loan he should be paid in 5 years for the financial institution.

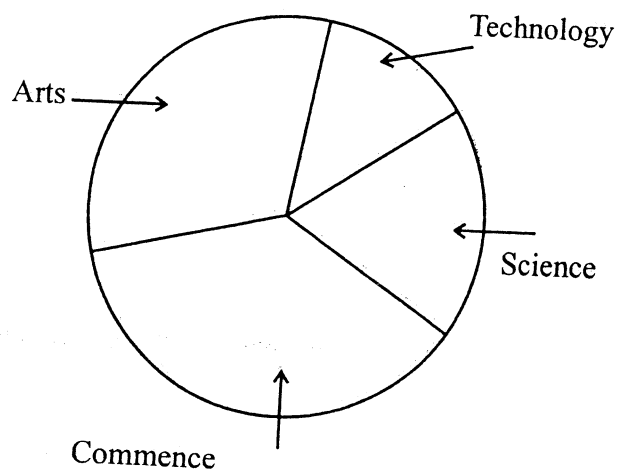
(ii) Find the total amount he has to pay for the financial institution.

(iii) Find the value of a monthly installment.

(iv) If Mr. Ranil has to pay both customs duty and VAT for the vehicle find the total amount he has to pay.

(03) Below picture graph shows how 180 students those who passed the O/L exam apply for their subject stream for A/L.

Number of students who applied for science stream is twice the students who applied for technology. Number of students who applied commerce is twice the students who applied for science. 75 students applied for arts stream.



(i) Find the angle at the centre of the sector which represent the students who applied for Arts.

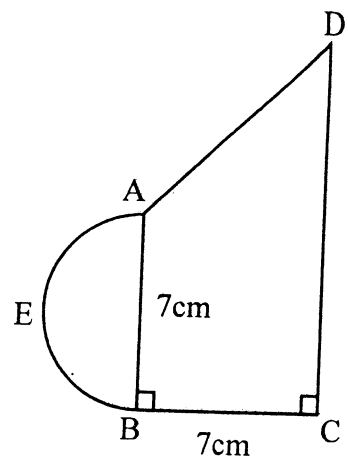
(ii) Find the angles at the centre of the other streams and represent them on the given pie chart.

- (iii) 10 students who applied for commerce stream changed their subject stream to technology. By considering this data find the angle at the centre of the sector of technology stream now.

- (04) This figure shows a zinc sheet which is on a plank. It consists of a semi circular part and a trapezium. The diameter of the semi circle is 7 cm and the perpendicular distance between the parallel sides of the trapezium is 7 cm.

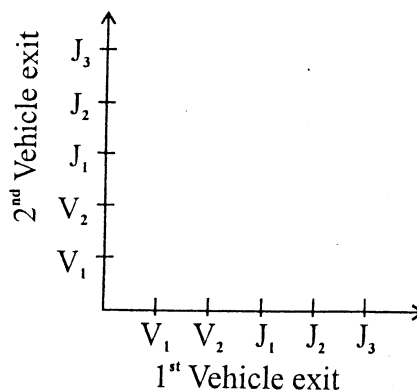
(Take $\pi = \frac{22}{7}$)

- (i) Find the area of the semi circular part.
- (ii) If the area of the trapezium is six times as the area of the semi circle then find the length of CD.
- (iii) Find the arc length AEB.
- (iv) By taking $AD = 20.4$ cm find the perimeter of the zinc sheet.



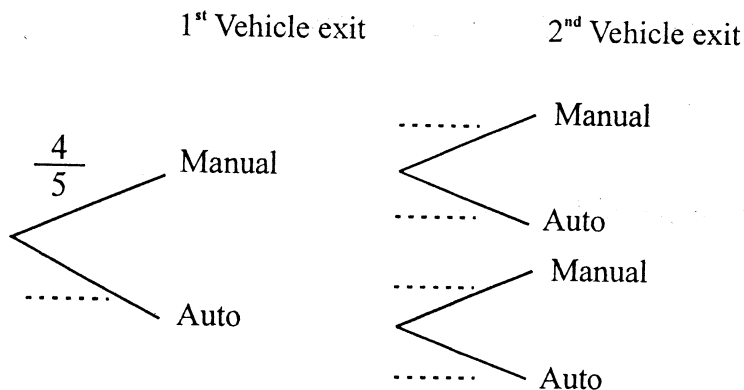
(05) 2 Vans and 3 jeeps are parked in a protected place. A vehicle exit from that place and then another vehicle exit from that place.

(i) Using the symbol "X" represent the sample space of the above experiment in the given grid. (2 Vans are represented by V_1, V_2 and jeeps are represented J_1, J_2, J_3)



(ii) Find the probability of the 2 went out vehicles are in the same type of vehicles.

(iii) 4 vehicles out of these vehicles are manual transmission and the other vehicle is an auto transmission vehicle. An incomplete tree diagram is given below regarding this experiment.



(iv) Find the probability of the 2 vehicles went out from that place are with the same type of transmission.

- Answer 10 questions selecting 5 questions from part A and 5 questions from Part B. Each question carries 10 marks.

Part A

(01) An incomplete table is given below to draw the graph of the function $y = x^2 - 4x - 1$

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

- (i) Find the value of y when $x = 2$
- (ii) Draw the graph of the function by taking 10 small divisions along the both x and y axes as one unit.
- (iii) Describe the behaviour of y when the value of x is, $2 \leq x \leq 5$
- (iv) Express the function in the form $y = (x - a)^2 + b$
- (v) Using the graph write down the positive root of the equation $x^2 - 4x - 1 = 0$ and write down the value of $\sqrt{5}$ to the first decimal place.

(02) The production of the number of shoes during 40 days in a certain company is represented by the below frequency distribution.

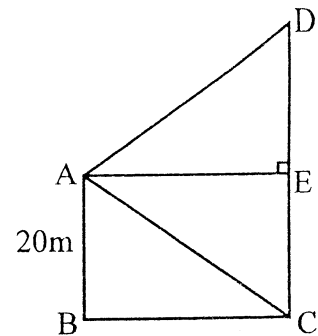
| | | | | | | |
|-----------------|---------|---------|---------|---------|---------|---------|
| Number of shoes | 10 - 24 | 25 - 39 | 40 - 54 | 55 - 69 | 70 - 84 | 85 - 99 |
| Number of days | 02 | 05 | 10 | 12 | 08 | 03 |

- (i) By taking the mid value of the class interval (55-69) as the assumed mean or any other method find the mean number of shoes produced during a day to the nearest whole number.
- (ii) Find the expected number of shoes will be produce during the next 60 days.
- (iii) The mean cost of production of a pair of shoes is Rs. 1200. The company expect to keep a mean profit of Rs. 480 from a pair of shoes. Find the profit percentage the company expect to gain.

(03) Mr. Dharmadasa is a retired government worker. His pension gratuity is Rs. 2 000 000. He allocated his pension gratuity as given below.

- (a) A portion of his gratuity used to buy 20 000 shares at the market price of a share Rs. 40 which pays Rs. 5 per share as annual dividends. At the end of a year after receiving the annual dividends he sold out all the shares when the market price of a share is R. 50. Then he invested this total amount he received in another company to buy shares at the market price Rs. 55 per share and annual dividends per share is Rs. 8. At the end of a year after receiving the dividends he sold out the shares Rs. 60 each. Find the profit he received in this investment.
- (b) The remaining amount of his gratuity is deposited in a bank for 2 years which pays 15% annual compound interest rate. Find the profit he gain after two years from this.

(04) "A" is the top of a flat which 20 m in height and B is the bottom of the flat. CD is a pole. The angle of elevation of the top of the pole from A is 35° and the angle of depression of the bottom of the pole from A is 40° . A and CD are on the same vertical plane. Find the lengths of BC and DE to the nearest whole number then find the angle of elevation of D seen from B.

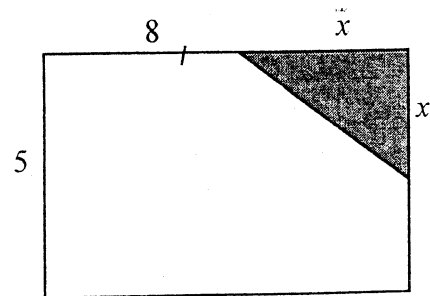


(05) (a) 65 students who went on a trip bought lunch packets from a shop. A set of students bought lunch packets with vegetables and price of that lunch packet is R. 80 others bought lunch packets with fish and its price is Rs. 140. The total cost of the lunch packets is Rs. 7 600

- (i) By taking the numbers of students who bought lunch packets with vegetables as x and lunch packets with fish as y and build up a pair of Simultaneous equations.
- (ii) By solving the pair of simultaneous equations find the values of x and y separately.

(b) Solve the inequality $3x - 2 \leq 7$ and mark all the solutions of x on a number line.

(06) Length of the rectangular lamina is $(x + 8)$ units and breadth is 5 units. From the rectangular lamina a right angled isosceles triangular part has been removed. The area of the remaining part is 50 square units. Show that the value of x is satisfied by the equation $x^2 - 10x + 20 = 0$ using the formula or any other method. Find the value of x and then find the area of the rectangle. ($\sqrt{5} = 2.2$)

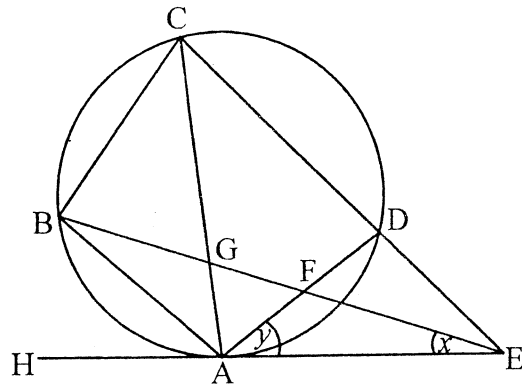


Part B

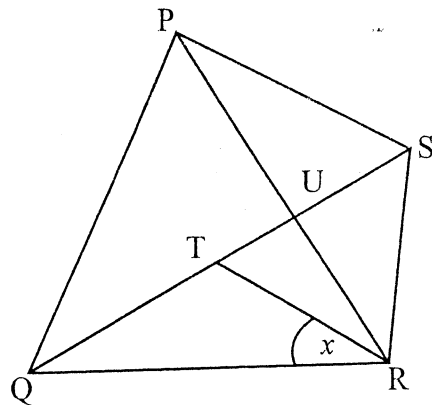
- (07) First term of an arithmetic progression is 4 and 30th term (last term) is 120 using the formulae of arithmetic progression,
- (i) Find the common difference.
 - (ii) Find the sum of the terms which remains after removing the terms which counts as a multiple of 3.

- (08) Use only a straight edge with a cm/mm scale and a pair of compasses for the following constructions. Show the construction lines clearly.
- (i) Construct the triangle PQR such that $PQ = 6\text{cm}$, $PR = 5\text{cm}$ and $\hat{QPR} = 60^\circ$
 - (ii) Construct the perpendicular bisectors of PQ and QR then construct the circle which passes through P, Q and R.
 - (iii) Construct a tangent to the circle at Q and name the ~~intersection point~~ of the perpendicular bisector of QR and the tangent as "S".
 - (iv) State the relationship between the SR line and the circle with reasons.
 - (v) Without measuring write the value of \hat{RQS} and write down the reason for the answer.

- (09) HE is a tangent to the circle AEC angle is bisected by the EB line. Take $AB = AE$, $\hat{FAE} = y$ and $\hat{FEA} = x$
- (i) State the value of \hat{CBG} in terms of x and y .
 - (ii) Show that the triangle AFG is an isosceles triangle.



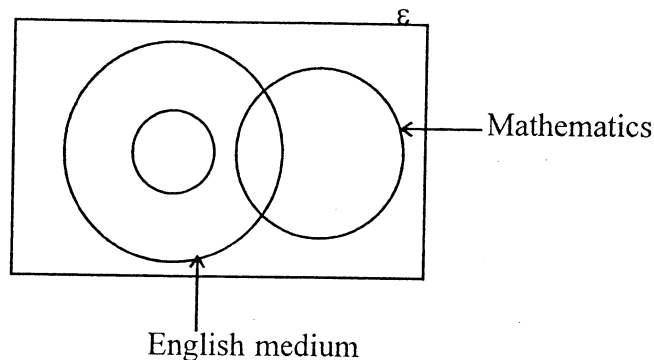
- (10) PQR and RST triangles are ^{equilateral} isosceles triangles. $\hat{QRT} = x$
- (i) Write the value of \hat{PRS} in terms of x .
 - (ii) Write the value of \hat{RQT} in terms of x .
 - (iii) Show that $QRT \triangle \cong PRS \triangle$
 - (iv) Prove that PQRS quadrilateral is a cyclic quadrilateral.



$$r = \frac{21}{\sqrt[3]{40}}$$

- (11) Diameter of the base of a solid iron cylinder is 21 cm and height is 14 cm. By melting that cylinder 5 solid spheres are made without any wastage of iron. Assume that there isn't any volume change in this process. If the radius of a sphere is r show that $r = \frac{21}{\sqrt[3]{40}}$ and using the logarithms table. Find the value of r to the first decimal place. (Volume of a cylinder with base radius r and height h is $\pi r^2 h$ and sphere of radius r is $\frac{4}{3} \pi r^3$)

- (12) For a teacher training college 280 students are entered for the courses science, mathematics and primary. Mathematics and primary courses are conducted in both Sinhala and English mediums. But science course is conducted only in English medium.



Copy the above Venn diagram,

- (i) Name the remaining set
- (ii) Represent the below data in the above Venn diagram
 - 100 students study mathematics course.
 - 140 students study in English medium.
 - 80 Students study primary course in Sinhala medium.
- (iii) How many students study mathematics course in Sinhala medium.
- (iv) If the number of students who study science in English medium is twice the number of students who study Mathematics in English medium find the number of students who study primary in English medium.
- (v) Then it is decided to conduct science in both mediums. 30 students who learned science in ^{English}Sinhala medium entered for the course science in ^{Sinhala}English medium. Represent this new data in another Venn diagram.