

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
 இலங்கைப் பரீட்சைத் திணைக்களம் இலங்கைப் பரීட்சைத் திணைக்களம் இலங்கைப் பரීட்சைத் திணைக்களம் இலங்கைப் பரීட்சைத் திணைக்களம் இலங்கைப் பரීட்சைத் திணைக்களம்
 Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka
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32 E II

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2020
 கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2020
 General Certificate of Education (Ord. Level) Examination, 2020

ගණිතය II
 கணிதம் II
 Mathematics II

පැය තුනයි
 மூன்று மணித்தியாலம்
 Three hours

අමතර කියවීමේ කාලය - මිනිත්තු 10 යි
 மேலதிக வாசிப்பு நேரம் - 10 நிமிடங்கள்
 Additional Reading Time - 10 minutes

Use additional reading time to go through the question paper, select the questions you will answer and decide which of them you will prioritise.

Important:

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

Part A

Answer *five* questions only.

- Amal takes a loan of 50 000 rupees from a bank for two years at an annual simple interest of 12%.
 - Find the total interest amount he has to pay for the two years.
 - Amal deposits the loan amount he obtained, in a fixed deposit account that pays an annual interest of 15% compounded annually, for two years. Find the amount in this account at the beginning of the second year.
 - At the end of the two years, he withdraws the total amount in his fixed deposit account and settles his bank loan by paying the loan amount and the interest. Show that he now has more than 4000 rupees remaining in hand.

- An incomplete table showing the y -values corresponding to several x -values of the quadratic function $y = x^2 + 2x - 2$ within the interval $-4 \leq x \leq 2$ is given below.

x	-4	-3	-2	-1	0	1	2
y	6	1	-2	-3	-2	...	6

- Find the value of y when $x = 1$.
 - Using the standard system of axes and a suitable scale, draw the graph of the given quadratic function on a graph paper, according to the above table of values.
- Using the graph that you drew,
 - write the equation of its axis of symmetry.
 - write the interval of values of x on which the quadratic function is negative.
- For the graph that is obtained by translating the above graph upwards by five units on the coordinate plane without changing the shape of the graph, write the coordinates of the minimum point, and write the relevant quadratic function in the form $y = (x + p)^2 + q$. (Here p and q are constants.)

[see page two]

3. Information on the runs scored by a cricket team in the 40 matches they played during the last year is given in the following frequency distribution.

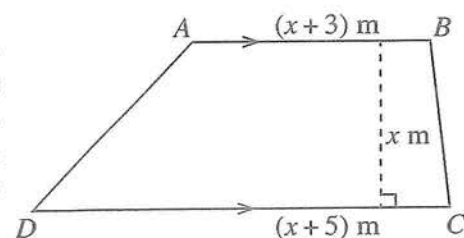
Interval of runs	Number of matches
131 – 141	2
142 – 152	4
153 – 163	5
164 – 174	6
175 – 185	8
186 – 196	5
197 – 207	4
208 – 218	3
219 – 229	3

- (i) Taking the mid value of the interval 175 – 185 as the assumed mean, find the mean number of runs this team scored in a match to the nearest whole number and thereby find the total number of runs that this team can be expected to score in the 60 matches that will be held this year.
- (ii) Show that the maximum number of runs that this team may have scored in total, in the 10 matches in which they scored the most number of runs during the last year, is less than 2170 runs.
4. A solid right circular cylindrical metal block of base radius 8 cm and height 10 cm is melted and 12 identical small solid right circular cones are made. The height of a cone is 6 cm. In making these, a volume of 125.6 cm^3 of metal is wasted. Taking 3.14 as the value of π ,
- (i) calculate the volume of the cylindrical metal block,
- (ii) find the volume of a cone that is made, and show that the base radius r of a cone is given by $r^2 = \frac{157}{6.28}$,
- (iii) find the value of r^2 using the logarithms table and then obtain the value of r .
5. (a) A hall is decorated with white lotus flowers and red lotus flowers. Three times the number of white lotus flowers used for this is 100 more than the number of red lotus flowers used. Each white lotus flower is 12 rupees and each red lotus flower is 11 rupees. The cost of the lotus flowers used for the decoration is 1600 rupees.
- (i) Take the number of white lotus flowers used for the decoration as x and the number of red lotus flowers used as y and construct a pair of simultaneous equations using the above information.
- (ii) Solve the pair of simultaneous equations and find separately the number of white lotus flowers and the number of red lotus flowers used for the decoration.
- (iii) Show that the difference between the amount spent on the red lotus flowers and the amount spent on the white lotus flowers is more than 150 rupees.
- (b) Make h the subject of the following formula:

$$u = \sqrt{2gh}$$

6. The figure shows a lamina in the shape of a trapezium, with its measurements. If the area of the lamina is 20 m^2 , show that x satisfies the quadratic equation $x^2 + 4x - 20 = 0$. Find the perpendicular distance between the two parallel sides of the lamina and show that this distance is less than half the length of AB .

(Take the value of $\sqrt{6}$ as 2.45.)

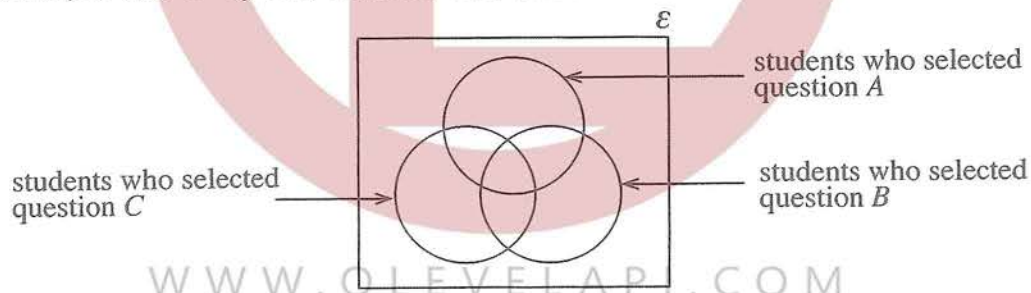


[see page three]

Part B

Answer five questions only.

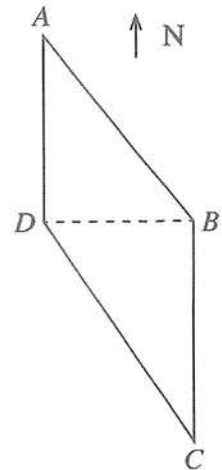
7. A flower bed consists of 50 rows of red flowering shrubs and white flowering shrubs. There are red flowering shrubs at both ends of each row and between every two consecutive red flowering shrubs there is a white flowering shrub. There are 13 flowering shrubs in the first row and each row thereafter has one red flowering shrub and one white flowering shrub more than the previous row.
- Write the number of flowering shrubs there are in the first, second and third rows respectively.
 - How many flowering shrubs are there in the 28th row?
 - How many rows are there with less than 90 flowering shrubs?
 - Find the total number of flowering shrubs there are in the flower bed. How many more red flowering shrubs are there in the bed than white flowering shrubs?
8. Use only a straight edge with a cm/mm scale and a pair of compasses for the following geometric constructions. Show the construction lines clearly.
- Construct a straight line segment AB of length 9.0 cm and its perpendicular bisector.
 - Construct a semicircle with diameter AB and label its centre as C .
 - Mark the point P on the semicircle such that AP is equal to the radius of the semicircle, and draw the triangle APB .
 - Construct the trapezium $APQB$ such that Q lies on the semicircle, and construct the bisector of $P\hat{Q}B$.
 - Find the magnitude of $P\hat{Q}B$.
9. The following Venn diagram has been drawn to represent information on the selection of the questions A , B and C by 100 students who faced a certain examination.



- * The number of students who selected both questions B and C is 10, while no student selected only the questions B and C from these three questions.
 - * The number of students who selected both questions A and B but not question C is 20.
 - * The number of students who selected only question C from these three questions is 8.
- Copy the Venn diagram onto your answer script and include the above information in it.
 - If the number of students who selected question C is equal to the number of students who selected both questions A and B , how many students selected both questions A and C but **not** question B ?
 - 15 students selected only question B from these three questions. The number of students who selected question A is 10 more than the number of students who selected question B . How many students selected only question A from these three questions?
 - From these 100 students, how many students **did not select** any of the three questions A , B and C ?

[see page four]

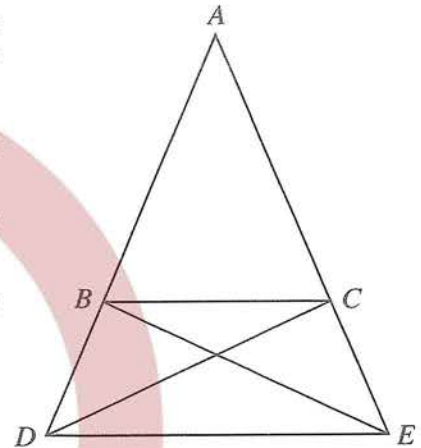
10. The figure shows four points A, B, C and D on a level ground. D is located to the south of A , B to the east of D and C to the south of B . The bearing of B from A is 145° , $AD = 20$ m and $DC = 42$ m. Copy the given figure onto your answer script and include the above information in it.



Using trigonometric ratios, find the distance DB to the nearest whole number and show that $2\hat{BCD} > \hat{DAB}$.

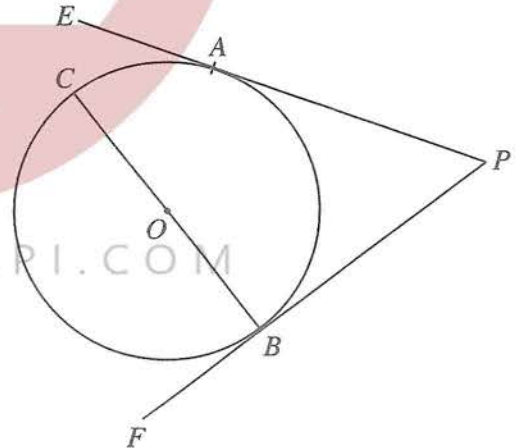
11. In the triangle ABC shown in the figure, $AB = AC$. The side AB is produced to D and the side AC is produced to E such that $BD = CE$.

- Show that $\hat{CBD} = \hat{BCE}$ and then show that the triangles CBD and BCE are congruent.
- Show that the triangle ADE is isosceles and then show that $\hat{ABC} = \hat{ADE}$.
- Show that the triangles ABC and ADE are equiangular and then show that $3BC = 2DE$ when $BD = \frac{1}{2}AB$.



12. As shown in the figure, PAE and PBF are the two tangents to the circle with centre O , drawn at the points A and B on the circle. BC is a diameter. Copy this figure onto your answer script and,

- join OA and show that $OAPB$ is a cyclic quadrilateral.
- join CA, AB and OP and show that $\hat{ACB} = \hat{POB}$ and $\hat{EAC} = \hat{OAB}$.



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