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இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka

| 32 | E | II |

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2024(2025)
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2024(2025)
General Certificate of Education (Ord. Level) Examination, 2024(2025)

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

පැය තුනයි
மூன்று மணித்தியாலம்
Three hours

අමතර කියවීම් කාලය
மேலதிக வாசிப்பு நேரம்
Additional Reading Time

- මිනිත්තු 10 යි
- 10 நிமிடங்கள்
- **10 minutes**

Use additional reading time to go through the question paper, select the questions and decide on the questions that you give priority to in answering.

Instructions:

* *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 right pyramid of base area A and height h is $\frac{1}{3}Ah$.*
* *The volume of a right circular cylinder of base radius r and height h is $\pi r^2 h$.*

Part A
Answer five questions only.

1. A stock of television sets worth 84 000 rupees each is available for sale. The method used by Ruvini to buy a television set and the method used by Manel to buy another television set is given below.

Ruvini: A loan of 84 000 rupees is taken from a finance company for a year at an annual simple interest and the television set is bought. At the end of the year, the loan is settled by paying the loan amount and interest of 10 920 rupees.	**Manel:** The television set is bought on hire purchase with the amount and interest to be paid in 12 equal monthly installments. Here, the interest is calculated on the reducing balance. When the payment of the installments is completed in a year, the same total interest of 10 920 rupees that is paid by Ruvini has been paid.

   Find separately the annual interest rates at which the interest is paid by the two of them and show that the annual interest rate charged in the hire purchase method is more than the annual interest rate charged by the finance company.

2. An incomplete table showing the *y*-values corresponding to several *x*-values of a quadratic function of the form $y = f(x)$, within the interval $-2 \le x \le 4$ is given below.

x	−2	−1	0	1	2	3	4
y	−5	0	3	4	…	0	−5

   (i) By considering the symmetry of the quadratic function, find the value of *y* when $x = 2$.

   (ii) Using the standard system of axes and a suitable scale, draw the graph of the quadratic function on the given graph paper, according to the table given above.

   (iii) (*a*) Write the coordinates of the two points of intersection of the graph and the *x*-axis.

   (*b*) By considering the coordinates of the two points mentioned in the above part, write the given quadratic function in the form $y = -(x + p)(x + q)$.

   (iv) Let us take that the line $y = 1$ intersects the graph at the points *A* and *B*.

   (*a*) Write the interval of values of *x* on which $y > 1$.

   (*b*) Obtain the length of *AB* to the nearest first decimal place.

[see page two

3. In a competition, the competitors had to run up an inclined plane, climb up a vertical ladder and then slide down another inclined plane. The side view of the two inclined planes and the vertical ladder used for this are denoted by AC, DE and CD respectively in the figure. Here, ABE is a horizontal plane. $AC = BE = 50$ m, $C\hat{A}B = 26° 10'$, BCD is perpendicular to ABE, and $DC = BC$.

Copy the given figure in your answer script and include the given information in it.

Using trigonometric ratios, show that the difference between the incline of DE (that is $D\hat{E}B$) and the incline of AC (that is $C\hat{A}B$) is more than $15°$.
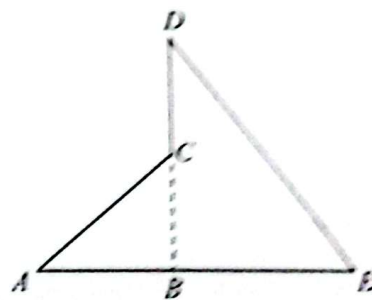
4. The top of a birthday cake is in the shape of a right angled isosceles triangle. Its two equal sides are of length $2x$ cm each. As shown in the figure, the words 'HAPPY BIRTHDAY' are written on a rectangular piece of white icing of length $(x + 2)$ cm and breadth $(x - 4)$ cm. The remaining portion is decorated in pink and is of area 132 cm^2.
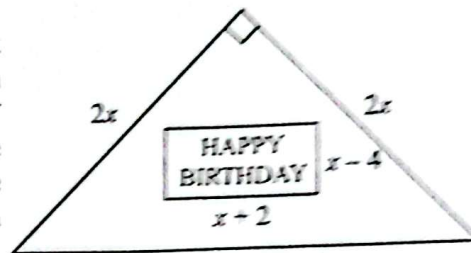
   (i) Show that x satisfies the equation $x^2 + 2x - 124 = 0$ and find the value of x to the nearest centimetre. (Take the value of $\sqrt{5}$ to be 2.24)

   (ii) Show that the length of the longest side of the top of the cake is given by $2\sqrt{2}x$ and show that this length is greater than 28 cm. (Take the value of $\sqrt{2}$ to be 1.41)

5. Packs of 10 small plates each and packs of 5 large plates each were bought to serve sweetmeats to the adults and children who attended a party. The price of a pack of small plates was 150 rupees and the price of a pack of large plates was 120 rupees. The total number of plates that were bought was 200 and the total cost of these plates was 3720 rupees.

   (i) By taking the number of packs of small plates bought as x and the number of packs of large plates bought as y, construct a pair of simultaneous equations and by solving them, find separately the number of packs of small plates and the number of packs of large plates that were bought.

   (ii) Each small plate had the same number of sweetmeats and each large plate had two sweetmeats more than a small plate. If the total number of sweetmeats that were served was 1160, find the number of sweetmeats that a small plate had.

6. The frequency table given below provides information related to the number of hires a certain three-wheeler engaged in each week.

Number of hires	5-9	10-14	15-19	20-24	25-29	30-34	35-39
Number of weeks	1	3	4	6	5	7	4

   (i) Find the mean number of times the three-wheeler was hired a week.

   (ii) How many hires can the three-wheeler driver expect in total in 52 weeks?

   (iii) Let us take that the average distance of a hire is 5 km. If the three-wheeler driver charged a fee of 100 rupees per kilometre, what can he expect as his income for four weeks?

   (iv) What is the minimum number of times the three-wheeler may have been hired in total in the weeks in which the number of times it was hired was less than 20?

Part B
Answer five questions only.

7. Use only a straight edge with a cm/mm scale and a pair of compasses for the following geometric constructions. The construction lines should be clearly drawn.

    (i) Construct a straight line segment AB of length 6 cm. Construct an angle of 60° at B on AB and bisect it.

    (ii) Construct the isosceles triangle ABC such that $AB = AC$ and $A\hat{B}C = 30°$.

    (iii) Construct the perpendicular bisector of AC. Construct a semicircle on the side AC, outside the triangle ABC, such that AC is its diameter.

    (iv) Construct a straight line through A parallel to BC such that it intersects the semicircle at D, and join CD.

    (v) What is the magnitude of $A\hat{C}D$?

8.
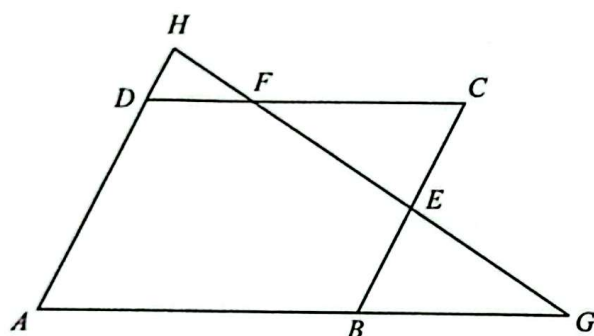
In the figure, $ABCD$ is a parallelogram. E is the midpoint of BC and F is a point on DC such that $DF = \frac{1}{3}DC$. Here, the line AB produced meets the line FE produced at G and the line AD produced meets the line EF produced at H.

Copy the given figure in your answer script.

   (i) Show that $\triangle BGE \equiv \triangle CFE$.

   (ii) Join BF and GC and give reasons why $BGCF$ is a parallelogram.

   (iii) Show that $\triangle DFH$ and $\triangle BGE$ are equiangular.

   (iv) Show that $DH = \frac{1}{4}AD$.

9. Nine small solid metal right pyramids, each with a square base of side length a, and height $2a$, are melted and a solid right circular cylinder of base radius r and height $3r$ is made without any wastage of metal.

Show that $a^3 = \frac{\pi}{2}r^3$.

If $r = 1.725$ cm, by taking $\pi = 3.14$, find the value of a^3 using the logarithms table and obtain the side length a of the base of a pyramid to the nearest centimetre.

From a solid cuboid with a square cross section of side length a, and height $2a$, if one small pyramid with the above mentioned measurements is cut and removed, find the volume of metal that is remaining. (Use the above obtained value of a.)

10. Amala and Sumana decide to read a certain novel during the holidays. Amala reads 20 pages on the first day and on each day thereafter she reads three pages more than the previous day.

   (i) Write the number of pages that Amala reads on the 1st, 2nd and 3rd days respectively.

   (ii) How many pages does Amala read on the 16th day?

   (iii) If she completes the novel on the 16th day, how many pages does the novel consist of?

   (iv) How many pages does Sumana read on the first day if she takes 17 days to complete the novel and if on each day after the first, she reads 4 pages more than the previous day?

   (v) If the two of them started reading the novel on the same day, on which day do they both read the same number of pages?

11. In the given figure, AB is a diameter of the circle with centre O and CD is a chord which is bisected at X by AB. Moreover, CP is perpendicular to PAR, the tangent to the circle at A.

   Copy the given figure in your answer script and join OC.

   (i) Show that $PAXC$ is a cyclic quadrilateral and that the chord AC bisects $P\hat{C}O$.

   (ii) State with reasons two angles which are equal to $D\hat{A}R$.
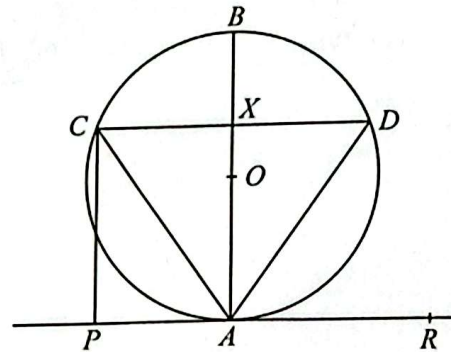
12. An incomplete Venn diagram with information on 100 customers who came to a certain store is shown here.

   Those who bought fish

   Those who bought eggs

   Those who bought lentils (shaded set)
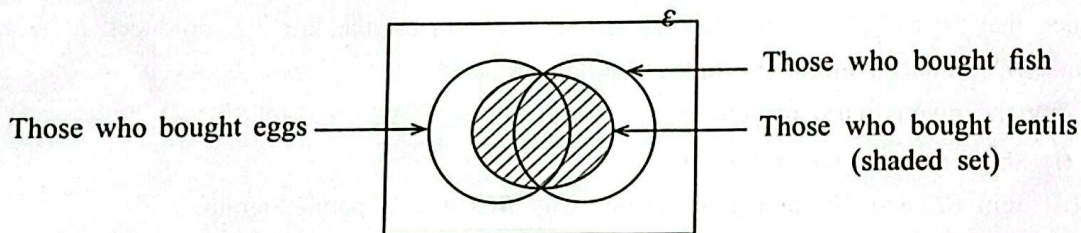
   ✳ 14 customers did not buy fish, lentils or eggs. 60 customers bought lentils.

   Copy the given figure in your answer script and enter the given information in it.

   (i) How many customers bought exactly one of the three items fish, eggs and lentils?

   (ii) If the number of customers who bought all these three items is equal to the number of customers who bought exactly two of these items, how many customers bought all three items?

   (iii) If the number of customers who bought only eggs and lentils is twice the number of customers who bought only fish and lentils, how many customers bought eggs and lentils?

   (iv) If the number of customers who bought fish is 52, how many customers bought only eggs?

* * *