උතුරු පළාත් අධ්‍යාපන දෙපාර්තමේන්තුව
Department of Education, Southern Province

දෙවන වාර පරීක්ෂණය 2022
Second Term Test, 2022

277 (11)

| 11 ශ්‍රේණිය Grade 11 | MATHEMATICS I | පැය දෙකයි Two hours |

PART A
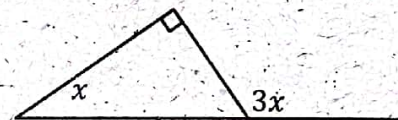
❖ Answer all the questions on this paper itself.

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01. Select and underline the nearest value of $\sqrt{57}$

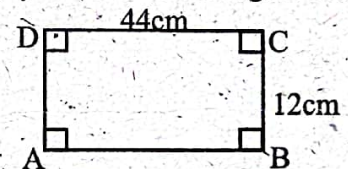   i) 7.3   ii) 7.4   iii) 7.5   iv) 7.6

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02. Find the Least Common Multiple of $4a^2, 2b^2, 8a$

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03. Using the information given in the figure find the value of x
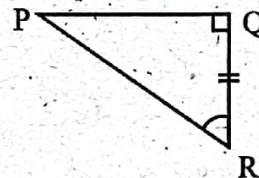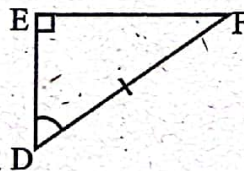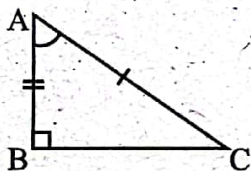

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04. Solve $(x - 2)(2x + 1) = 0$

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05. The thin metal sheet ABCD shown in the figure is folded to form a hollow cylinder of 12 cm high. Find the radius of the cylinder.

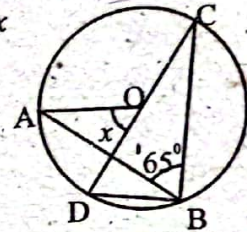06. Name the pair of congruent triangles and write the case of congruency.

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07. 6 men takes 4 days to complete a half of a certain task. How many days will be taken by 2 more men to complete the remaining task.

08. Find the value of $x - y$ without solving the equations.

$$3x + y = 7$$
$$x - 5y = 3$$

09. The centre of the circle shown in the figure is 'O'. If $A\hat{B}C = 65°$ find the value of x

10. When an electric item is imported 30% of its value has to be paid as customs duty. Find the custom duty has to be paid when an electric item of value Rs. 40 000is imported.

11. Solve the inequality $8 + 3x > 2$ and represent the solutions on a number line.

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|----|----|----|----|----|----|----|----|----|----|---->
  -5   -4   -3   -2   -1    0    1    2    3.   4    5
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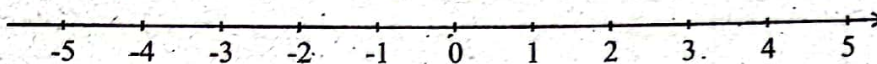
12. The diameter AB of the circle with centre O shown in the figure is 30 cm. If CD = 24 cm find the length OE.
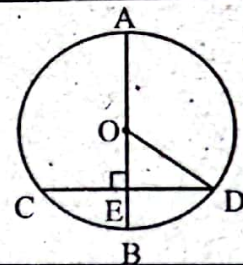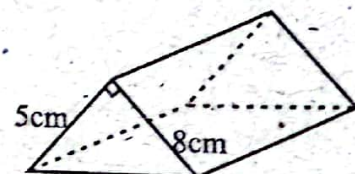
13. In the geometrical progression 3, -6, x, -24, ...
   i)   Find the common ratio
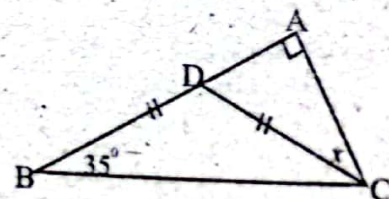
   ii) Find the value of x

14. It took 8 minutes to fill $\frac{1}{3}$ of a tank using pump through which water flows at a rate of 50 litres per minute. Find the capacity of the tank.
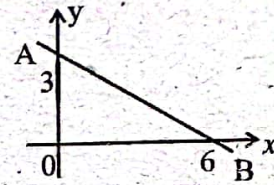
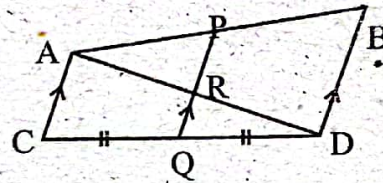15. If the volume of the given prism is 480 cm², find its length.

16. $B\hat{A}C = 90°$ and BD = DC in the figure. If $A\hat{B}C = 35°$ find the value of x

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17. Find the gradient of the line AB

18. AC // PQ // BD in the given figure. If CQ = QD, AC = 8 cm, BD = 14 cm, find the length PQ

19. Place the (✓) Infront of the c correct statement from the following statements about a parallelogram.

Diagonals are equal in length.	
Diagonals are bisected each other.	
The angles at the vertices are bisected by diagonals.	

20. Find the probability of getting 1 or 6 when tossing a die numbered from 1 – 6.

21. This histogram represents the information about the service period of employees working in an institution. (10-15 means greater than or equal 10 and less than 15)
  i) How many workers have less than 10 years of service?

  ii) Find the total number of workers
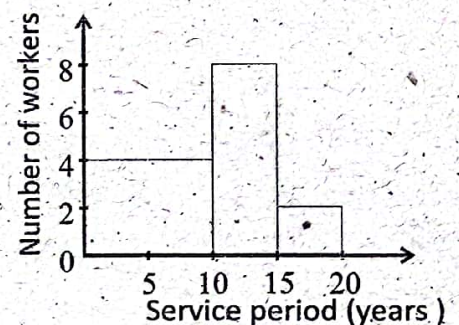
22. Solve. $\dfrac{3}{2x} - \dfrac{1}{x} = \dfrac{1}{12}$

23. A and B are two sets. If A ∩ B = {b, c}, A ∪ B {a, b, c, d, e, f}, A = {b, c, d, e }, write the set B

02. The figure shows a children's garden which consist with rectangular portion and sector of a circle.

    i) Find the length of curved border DE

    ii) Find the perimeter of the children's garden.
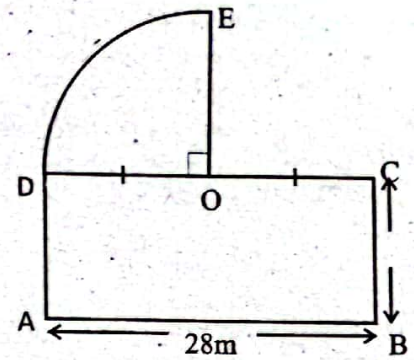
    iii) Find the area of the children's garden.

    iv) Instead of the sector, a right-angled triangular segment CDX is to be added such that area of the right-angle triangle is equal to the area of the sector and X lies on produced AD. Draw the triangle CDX and mark the length of DX.

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03. (a) A table with information on how the annual income tax are calculated based on annual income of a person.

Annual Income	Tax percentage
Initial Rs. 500 000	Tax free
Next Rs. 500 000	4%
Next Rs. 500 000	8%
Next Rs. 500 000	12%

    i) If the annual income of Jayamini who has a retail business, is Rs. 1 240 000 find the amount he has to pay as income tax.

    ii) If Waruna has to pay Rs.44 800 as income tax for his income, find his annual income.

    iii) Waruna borrowed Rs.150 000 from a lending society at a monthly simple interest to develop his business. After a month he paid Rs. 156 000 and released from the loan. Find the monthly simple interest rate charged for the loan.

04. (a) Three boys and two girls have been selected for the final round of a music competition. All these competitors have to face for a singing competition and instruments playing competition and first place in singing competition and first place in instruments playing competition will be selected.

i) Represent all the ways of selecting a student for the first place of singing and Instruments playing in the grid using 'x'
(B_1, B_2, B_3 represent boys and G_1, G_2 represent girls)

ii) Enclose the event of getting one first place goes to a boy and the other first place goes to girl.
Find the probability of that event.

First place in instruments playing

G_2
G_1
B_3
B_2
B_1

B_1 B_2 B_3 G_1 G_2

First place in singing
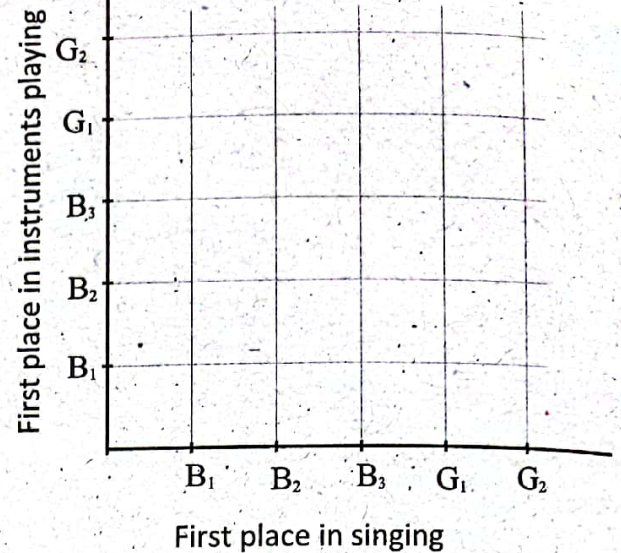
(b) Out of the five members in the above group, one was in grade 10 and the other four were in grade 11.

i) Below is an incomplete tree diagram related to represent the winner of the above competition goes to a grade 10 student or grade 11 student.

Singing competition   instruments playing competition

Grade 10

Grade 10

Grade 11

Grade 11
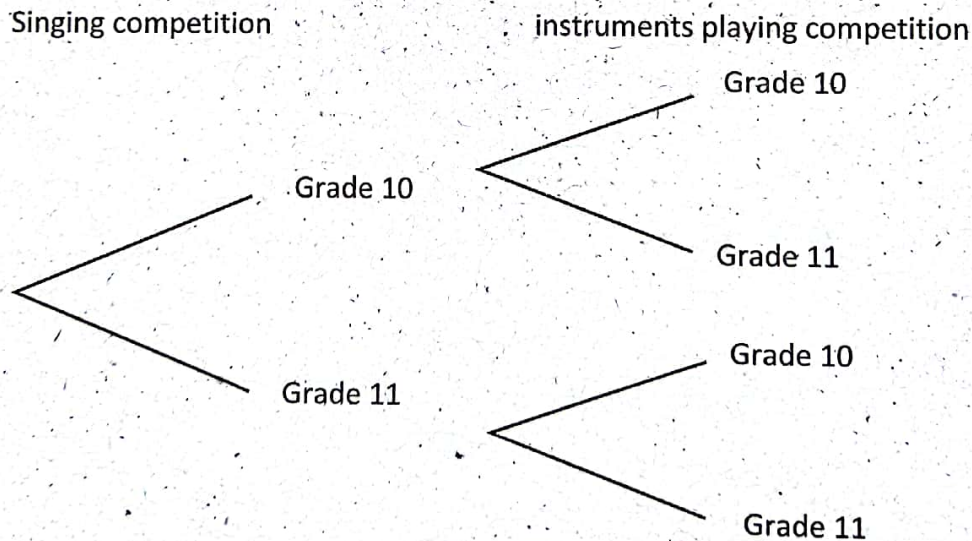
Grade 10

Grade 11

ii) Find the probability that student of grade 11 will have the winning from at least one competition.

05. Below is the information about a group of patients who were hospitalized for a certain non – communicable disease. (30 – 40 means greater than or equal 30 and less than 40)

Class intervals (age in years)	Frequency (number of patients)	Cumulative frequency
30 - 40	2	2
40 - 50	4	6
50 - 60	12	....
60 - 70	....	34
70 - 80	10	44
80 - 90	4	48

i) Complete the above table.

ii) Draw the cumulative frequency curve on the following coordinate plane.
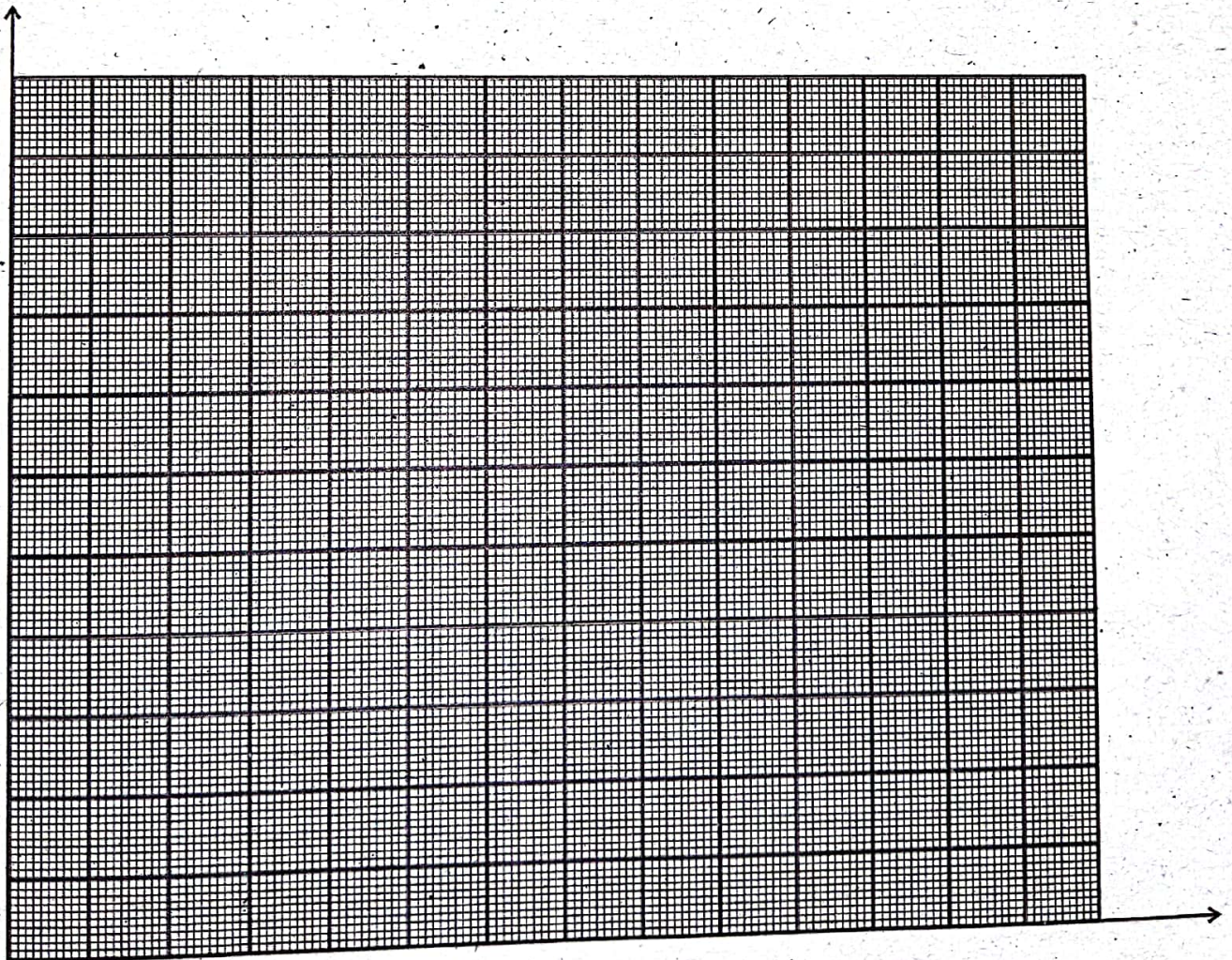
iii) Find the median age of a patient with this disease by using the cumulative frequency curve.

iv) Below is a table prepared to represent the age groups of the above patients in a pie chart.

Age groups	Angle at the cetre in the pie chart
30 - 50	45^0
50 - 70	....
70 - 90	....

R C D

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දෙවන වාර පරීක්ෂණය 2022
Second Term Test, 2022   277

11 ශ්‍රේණිය
Grade 11   **MATHEMATICS II**   පැය තුනයි
Three hours

Important: Extra 10 minutes for reading

❖ Answer 10 questions by selecting 5 questions from part A and 5 questions from part B.
❖ Write the relevant steps and units when answering the questions.
❖ Each questions carries 10 marks.
❖ the volume of a cone of radius r and height h is $\frac{1}{3}\pi r^2 \cdot h$

Part A

❖ Write the answers for 5 questions only.

01.

| 20% annual interest for deposit | | A dividend of Rs. 4 per annum for share of market price Rs.30 |

Financial Institute **A**   Company **B**

Mr. Dhanasiri deposited half of his Rs.300 000 in a fixed deposit in the financial institute A at a compound interest and the rest he used to buy shares of the company B.

i) Find the total amount that Mr.Dhanasiri can get from financial institute A after closing the accounts at the end of two years.

ii) Find dividend income per year that Mr.Dhanasiri receives from his investment in company B.

iii) After receiving the dividend income at the end of the second year, he sold all his shares in the company B. At the end of the two years, total amount earned from both investments was Rs. 116 000. How much did he sell a share of the company?

02. An incomplete table prepared to draw the graph of the function $y = x(4-x)$ is given below.

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

i) Find the value of y when $x = 2$
ii) Select a suitable scale and draw the graph of the function using standard axes.
iii) Write the coordinates of the turning point.
iv) Write the interval of the values of x when the function is increasing in $-5 \le y < 3$
v) Write the equation of the graph in the form $y = (x+a)^2 + b$ which the minimum value is -4 and intersects the x-axis at the same point where it intersects the x axis in the above graph.

03. In ABCD rectangular metal plate AB = $(2x + 7)$ cm and BC = $(x + 5)$ cm. When a rectangular section is cut out from the above metal plate such that PC = x the remaining area of AQPD is 44 cm²

   i) Show that the x is given by $x^2 + 12x - 9 = 0$
   ii) Solve the above quadratic equation by using the method of completing squares or any other method and show that value of x does not exceed 1cm (take $\sqrt{5} = 2.24$)
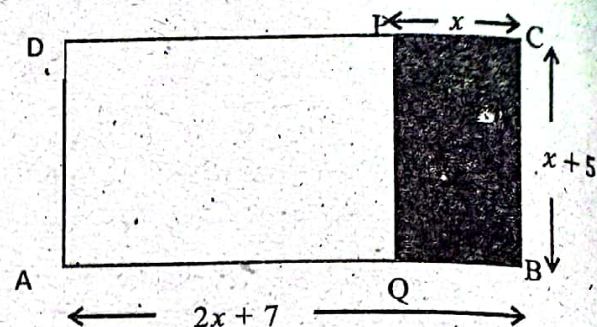
04. (a)
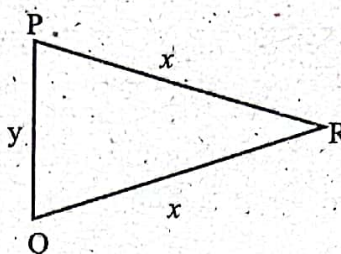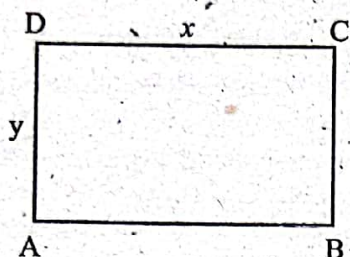
ABCD is a rectangular metal sheet of length x and width y and PQR is an isosceles triangular metal sheet. The perimeter obtained by welding the two edges of the two plates BC and PQ coincide is 68 cm and the perimeter obtained by welding the two edges AB and PR coincide is 54 cm.

   i) Construct a pair of simultaneous equations using the above information.
   ii) Find the length and width of the rectangular metal sheet by solving the above equations.

(b) Simplify. $\dfrac{x^2 + 2xy + y^2}{x^2 - y^2} \times \dfrac{x^2}{x^2 + xy}$

05. The following table shows the information about the electricity consumption of 40 houses in September to nearest unit in a housing scheme.

Units of electricity consumption	1 - 25	26 - 50	51 - 75	76 - 100	101 - 125	126 - 150	151 - 175
Number of houses	2	7	12	10	5	2	2

   i) What is the modal class?
   ii) Using the mid value of the 76 – 100 as the assumed mean, find the mean units of electricity consumption of a house to the nearest whole number.
   iii) The electricity company charges Rs. x per unit from 1- 30 units, Rs. $3x$ per unit from 31 – 60 units and Rs. $4x$ per unit above 60 units. If monthly fixed charge is Rs. P, find the mean electricity charge of a house in this housing scheme in terms of x and P.

06. P is the top and Q is the base of a vertical tower PQ which is on a horizontal ground. The angle of elevation of the top of the tower when observed from A on the ground which is in some distance away from the base Q of the tower is 30^0. When the observer travels 25m from A to Q and arrives at B and observes the top of the tower with angle of elevation of 50^0. Draw a scale diagram according to the given information by taking the scale as 1 : 500. Find the actual height of the tower and the actual distance BQ.

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Part B

07. Prarthana collected money to a till. She put Rs.200 on the 1st of January, Rs. 195 on 2nd of January likewise on every day she put Rs.5 less than the previous day.

   i)   Find the amount of money she put in to the till on 12th of January.

   ii) If she put Rs.55 on the last day, find the number of days she saves money.

   iii) From every day that Prarthana started collecting money, her younger brother took Rs. 20 per day from the till and bought a cricket bat. Will the amount left in the till be enough to buy a school bag worth Rs. 3150? Give reasons.

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08. Use only a straight edge with cm / mm scale and a pair of compass and show the construction lines clearly.

   i) Construct the triangle ABC such that AB = 5 cm, $A\hat{B}C = 60^0$ and BC = 7.5 cm.

   ii) Draw a parallel line to BC through A.

   iii) Construct the locus of the points which is equal distance from A and C, name the intersection point of it and the parallel line as ' O '.

   iv) Construct a circle by taking ' O ' as centre and OA as radius.

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09. The figure shows a metal block with square base of side length 7 cm and height 10 cm. 15 right circular metal cones of radius a cm and the height is twice of it are made by melting the metal block.
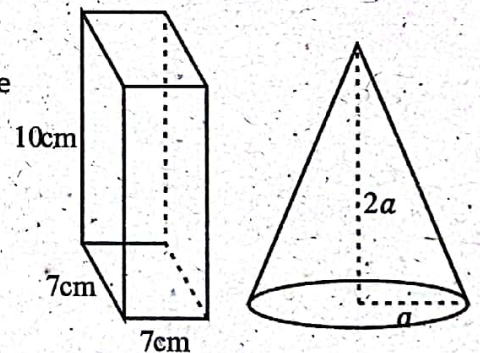
If 10 cm³ volume of metal was wasted, show that $a = 2 \times \sqrt[3]{\dfrac{6}{\pi}}$
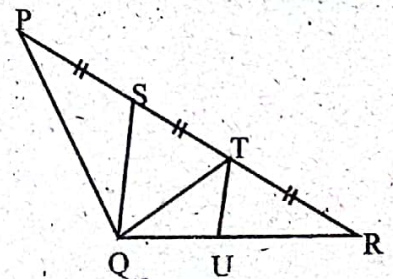
And find the value of a using logarithmic tables to the nearest first decimal place. (Take $\pi = 3.142$)

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10.   i) In PQR triangle PQ = QR. S and T are on PR such that PS = ST =TR.

   If U is the midpoint of QR , Show that PQS and QTR Δ are congruent triangles and TU $= \frac{1}{2}$ QT
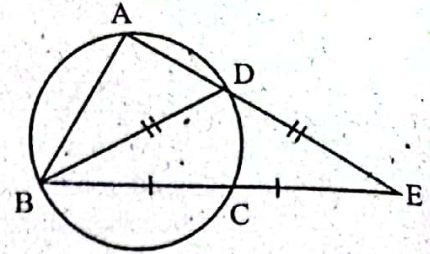
   ii) If PU and QS are intersected at M, show that MS $= \frac{1}{4}$ QT

11. A, B, C, D are points on the circle. BC produced and AD produced meet at E.

BC = CE and BD = DE.

   i)   Show that BDC $\Delta \equiv$ CDE Δ

   ii) Show that DB is a diameter of the circle.

   iii) If A$\hat{B}$C is bisected by DB, show that ABC is an equilateral triangle.

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12. Below is an incomplete venn diagram related to the information obtained about 25 people working in a private trading company.

$$\varepsilon = 25$$

male $\longrightarrow$ $\longleftarrow$ married

7
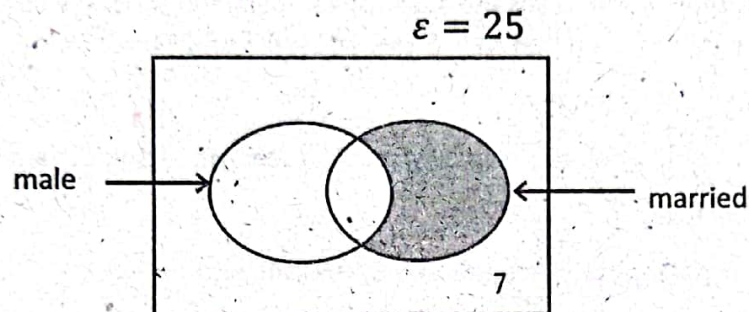
   i)   Name the group represented by the shaded area in the venn dagram.

   ii) Out of 15 males working in the company , 14 are married. Copy the venn diagram on your answer sheet and write the number of elements in each region.

   iii) If unmarried man working in that company married an unmarried woman in this company. Consider the data changed and draw a suitable venn diagram and write the number of elements belonging to each region.

   iv) How many married workers in that company now?