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சபரகமுவ மாகாண கல்வித் திணைக்களம்  
Sabaragamuwa Provincial Department of Education

පළමු වාර පරීක්ෂණය 2017  
முதலாம் தவணைப் பரீட்சை 2017  
First Term Test 2017

11 ශ්‍රේණිය  
தரம் 11  
Grade 11

ගණිතය I  
கணிதம் I  
Mathematics I

පැය දෙකයි  
இரண்டு மணித்தியாலம்  
Two hours

Name / Index No. .... Class : .....

- ★ Answer all the questions on this paper itself.
- ★ Each question in part A carries 2 marks each.
- ★ Each question in part B carries 10 marks each.

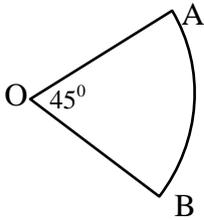
**Part - A**

(01)  $\frac{2}{5}$  of a heap of mangoes is 16. What is the total number of mangoes?

(02) Find the time, in minutes, it will take to completely fill a tank of capacity  $3\text{m}^3$  using a pipe through which water flows at a uniform rate of 150 litres per minute.

(03) Simplify :  $\frac{10}{x^2y} \times \frac{2x}{5}$

(04) Find the perimeter of the sector  $OAB$  with radius 14 cm.

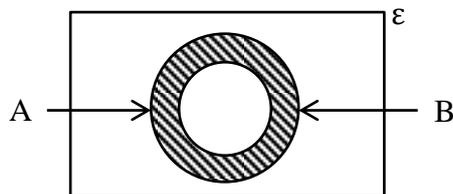


(05) Find the least common multiple of  $4x, 2x^2y$

(06) Find the mean of the frequency distribution where  $\Sigma f = 16$  and  $\Sigma fx = 480$

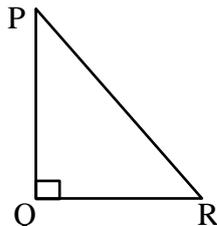
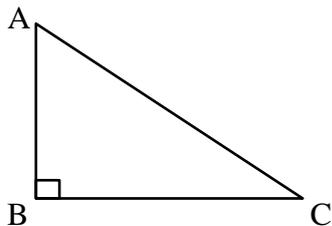
(07) Solve :  $\frac{5}{2x} = \frac{1}{2x} + 1$

(08)



According to the Venn diagram shown in the figure, indicate the shaded region in set notation.

(09)



For the two right - angled triangles ABC and PQR to be congruent, under the condition RHS

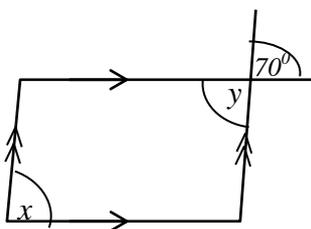
i) What is the pair of sides that should be essentially equal?

ii) Name the other pair of element.

(10) When  $81 = 3^4$ , what is the logarithm of 81 to the base 3?

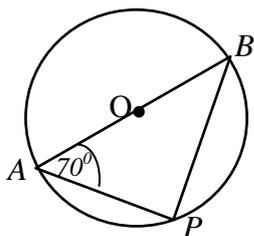
(11) Write down the solutions of the quadratic equation  $x(x+5) = 0$

(12)



Using the information given in the figure, find the values of x and y.

(13)



AB is a diameter of the circle with centre O.

i) What is the magnitude of  $\hat{A}PB$ ?

ii) Find the magnitude of  $\hat{A}BP$ .

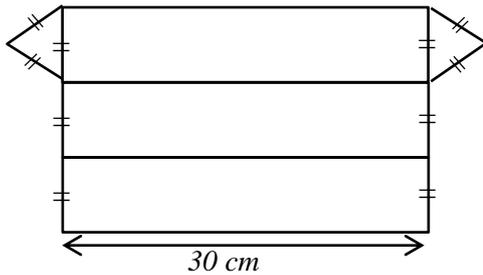
(14) For the inequality  $3x + 1 \leq 10$ , write down 2 integral values x can take where  $x \in \mathbb{Z}^+$

(15) In the table, place the mark '✓' in the boxes in front of the true statement and the mark '×' in the boxes in front of the false statement.

The square root of a number which is not a perfect square is always a decimal number.	
The square root of 12 lies between 3 and 4	
The square root of 12 is 4.3	

(16) A fair coin and a fair cubical die numbered from 1 to 6 are tossed together. What is the probability of obtaining the head in the coin and a prime number in the die?

(17)



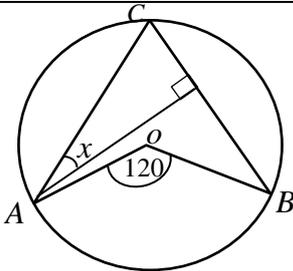
The area of the cross section of the solid made using the above net is  $24\text{cm}^2$ . Find the volume of the solid.

(18) The first three terms of an arithmetic progression are given below.

$$5, 5 + 2 \times 1, 5 + 2 \times 2, \dots$$

What is the 6th term of this arithmetic progression?

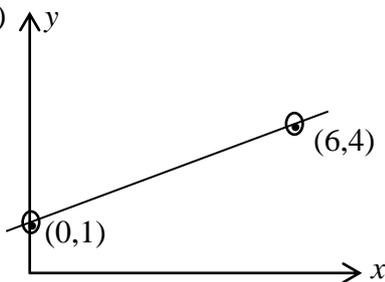
(19)



The three points  $A$ ,  $B$  and  $C$  are located on the circle with centre  $O$ .

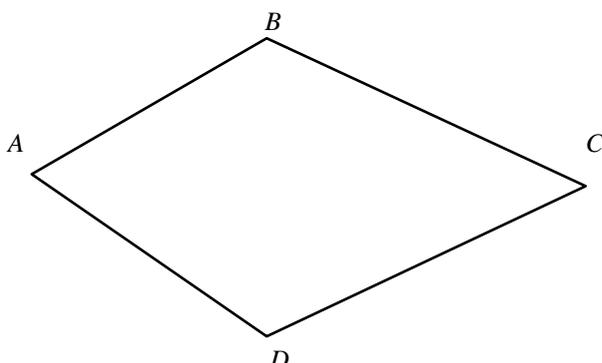
Using the information given in the figure, find the value of  $x$ .

(20)



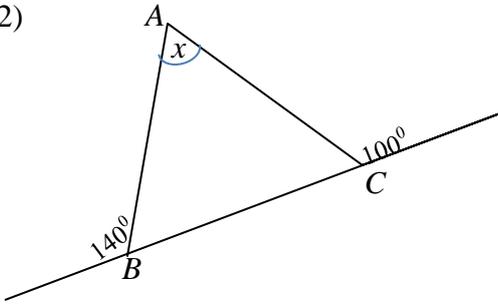
Find the gradient of the straight line shown in the figure and write its equation.

(21)



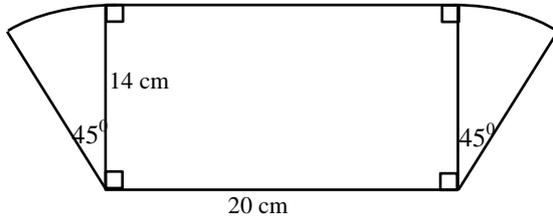
$ABCD$  is a block of land. Using your knowledge of loci, find the point on  $CD$  that is equidistant from the points  $A$  and  $B$ , and indicate this point by naming as  $P$

(22)



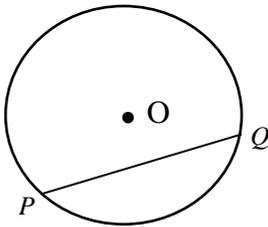
The side  $BC$  of the triangle  $ABC$  has been produced in either side as shown in the figure. Find the value of  $x$ , using the given information.

(23)



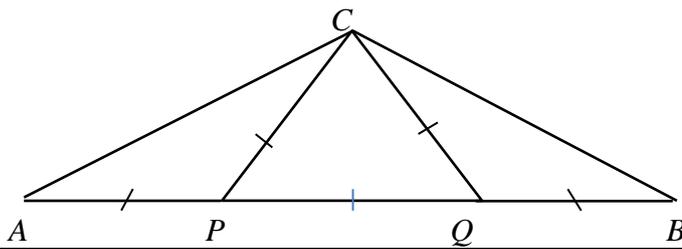
Based on the information given in the figure, find the area of the figure.

(24)



The radius of the circle with centre  $O$  is  $13\text{ cm}$ . The length of the chord  $PQ$  is  $24\text{ cm}$ . Calculate the shortest distance to  $PQ$  from  $O$ .

(25)



Find the magnitude of  $\hat{ACB}$  using the information given in the figure.

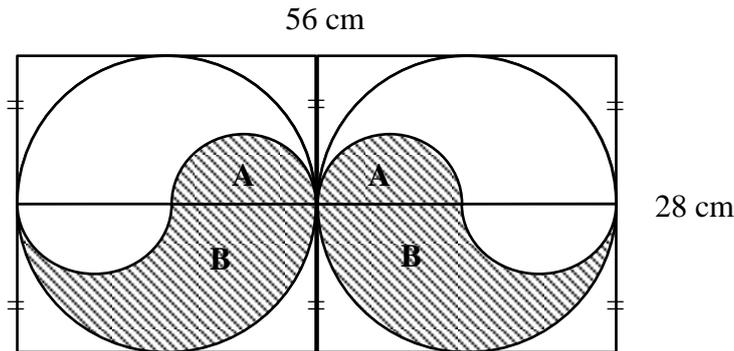
### Part - B

(Answer all questions on this question paper itself)

- (01) a)  $\frac{3}{4}$  of a tank was filled with water.  $\frac{1}{3}$  of this amount of water was used. Find the remaining amount of water as a fraction of the whole tank.
- b) Of the tourists who came to Sri Lanka in the first quarter of the year 2016,  $\frac{2}{5}$  were from European countries, 35% were from western countries and the rest were from Asian countries.
- Indicate the percentage of tourists who came from Western countries as a simple fraction.
  - What fraction of the total number of tourists was the number of tourists from European and Western countries?
  - What fraction of the total number of tourists was the number of tourists from Asian countries?

- iv) If the number of tourists who came from Asian countries was 15250, what is the total number of tourists who came to Sri Lanka in the first quarter of the year 2016?

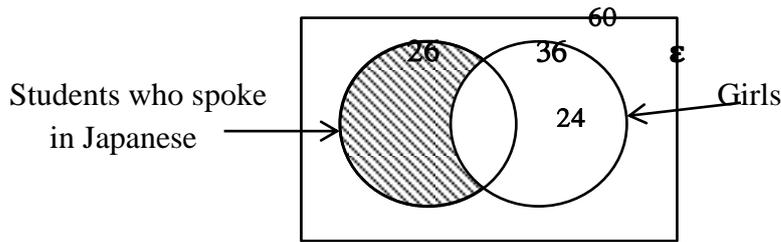
(02)



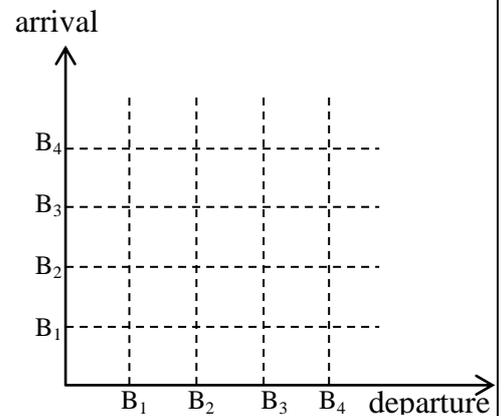
The figure shows a sketch of a rectangular grill design fixed in a wash room and it is made of iron wires. The length of the grill is 56 cm and the breadth is 28 cm. The rectangular frame has been partitioned into two squares of length of side 28 m by fastening a 28 cm long iron wire. Each square consists of a circle made of iron wire that touches the square internally. The diameter of each circle is an iron wire and on either side of each diameter are two semi circles made of iron wires.

- i) What is the radius of a semi-circular arc?
  - ii) Find the length of one semi-circular arc.
  - iii) Find the length of iron wires used to make one circle.
  - iv) Find the total length of wire used to make the whole grill design to the nearest metre.
  - v) If it is proposed to cover the shaded portion indicated by A and B with glass sheet, find the total area of the glass sheet required for this purpose.
- (03) a) Kamal who owns a house of assessed annual value Rs. 80000 rents it for Rs. 4000 per month. The relevant urban council charges 6% of the assessed annual value of the property as rates.
- i) What is the amount of money he gets as rent for a year?
  - ii) How much does he have to pay as rates for a quarter?
  - iii) Find the amount of money that remains after paying the rates.
- b) Kamal bought a refrigerator for Rs. 48000. If the customs duty he had to pay was 60%, find the value of the refrigerator before paying the customs duty.

- (04) a) The 60 students who got the highest marks from the G.C.E. (A/L) examination were selected for a tour in Japan. On the tour, a group of students spoke only in English and 26 students spoke only in Japanese. The number of girls who participated in the tour was 36. An incomplete Venn diagram showing the above information is given below.

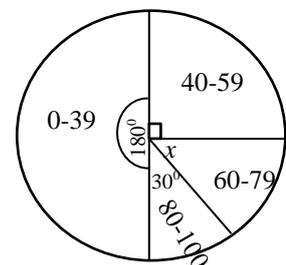


- What is the number of girls who spoke in Japanese?
  - Describe the group of students represented by the shaded part in the above Venn diagram.
  - Find the number of boys who spoke only in English.
- b) Four busses travel from Kegalle to Rathnapura in the morning and then travel from Rathnapura to Kegalle in the evening. All four busses leave Kegalle at the same time every morning and leave Rathnapura at the same time every evening. On a certain day, Mr. Perera wanted to travel from Kegalle to Rathnapura and vice versa. Represent the sample space with respect to Mr. Perera selecting a bus from Kegalle in the morning and selecting a bus from Rathnapura in the evening in the grid shown in the figure below, name the event of taking the same bus to travel to Rathnapura and then to Kegalle as  $A$  and find the probability of event  $A$ .



- (05) The pie chart given below shows how a group of grade 11 students obtained marks for mathematics in the intervals 0-39, 40-49, 60-79, 80-100.

- Find the value of  $x$
- Find the number of students who obtained over 40 marks as a percentage of total number of students.
- If the total number of students in the class was 48, what is the number of students who obtained marks in the interval 60-79?
- Complete the table given below using the information given above.
- If 6 students who got less than 40 marks should have gone to the class interval 40-59, find the value of one angle of the two sectors that represent the number of students belonging to the above two mark intervals



Class interval	Number of students
0 - 39	.....
40 - 59	.....
60 - 79	.....
80 - 100	.....

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First Term Test 2017

11 ශ්‍රේණිය  
தரம் 11  
Grade 11

ගණිතය II  
கணிதம் II  
Mathematics II

පැය 3.00  
இரண்டு 3.00  
3.00 hrs

- \* Answer ten questions selecting five questions from Part A and five questions from Part B.
- \* Each question carries 10 marks

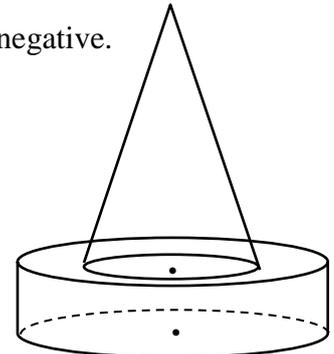
**Part - A**

**Answer five questions only.**

- (01) A person who borrowed Rs. 325 000 from a bank started a business by investing that amount of money. He gained an income of Rs. 750 000 at the end of one year and he had to pay a 6% income tax for the amount of income that exceeds Rs. 500 000.
- Find the amount of income tax he had to pay for that year as a percentage of the income he received.
  - If he had obtained the above loan at 12% annual simple interest rate and he had to pay back Rs. 422 500 as the amount to get released from the loan, find the period of the loan.
- (02) i) An incomplete table prepared to draw the graph of the function  $y = 2x^2 - 3$  is given below.

$x$	-3	-2	-1	0	1	2	3
$y$	15	.....	-1	.....	-1	5	15

- Complete the above table.
  - using the scale of 10 small divisions as one unit along the x-axis and 10 small divisions as two units along the y - axis, draw the graph of the above function.
  - What is the minimum value of the function?
  - Write down the interval of values of x for which the function is negative.
- (03) The figure shows a compound solid metal object made by combining a right circular solid cylindrical part of base radius  $2a$  and height  $\frac{a}{2}$  and a right circular solid conical part of base radius  $a$  and height  $2a$ .



- i) Find the slant height of the conical part in terms of  $a$  and indicate it in surd form.
- ii) Show that the total surface area of the compound object is given by  $\pi(9+\sqrt{5})a^2$
- iii) Find the volume of the compound object in terms of  $\pi$  and  $a$
- iv) This compound metal solid object is melted without any wastage of metal and a cylindrical metal wire of radius of cross-section  $3\text{ cm}$  is made. Find the length of the wire. (Take  $a = 10.5\text{ cm}$ )

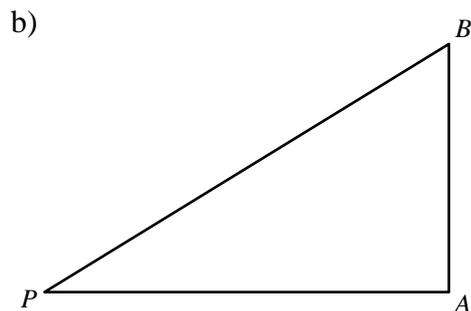
(04) i) Solve :  $2^{x-1} = \frac{1}{4}$

ii) Find the value of  $\frac{1}{2} \lg 16 + \lg 5$

iii)  $\frac{(2.475)^3 \times 0.273}{\sqrt{8.624}}$  Find the value using logarithms table.

(05) a) i) Expand :  $(x+3)^3$

ii) Simplify :  $\frac{2x^2-4x}{4} \div \frac{x-2}{6}$



In the figure,  $AB$  is a vertical post erected in the level ground  $AP$ .  $PB$  is a supporting wire whose one end is tied to the top of the post and the other end is fixed to the ground. The length of  $PA$  is  $\frac{1}{2} m$  more than the length of  $AB$  and the length of  $PB$  is  $1\text{ m}$  more than the length of  $AB$ .

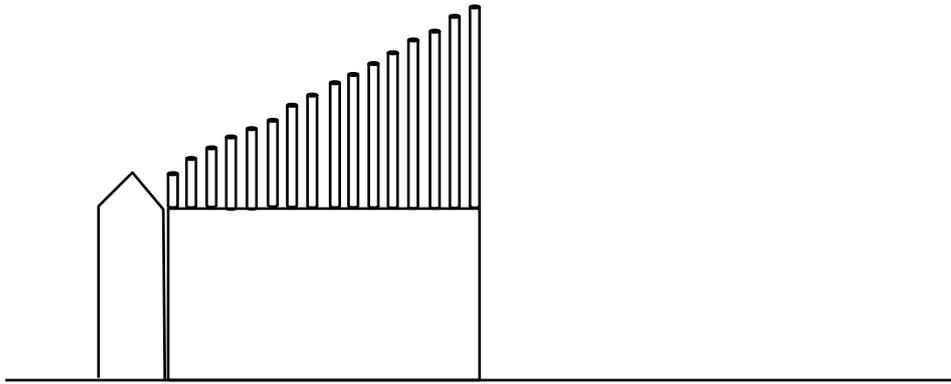
- i) If the length of  $AB$  is  $x$  metres, write down the lengths of  $PA$  and  $PB$  in terms of  $x$ .
- ii) Obtain the relation between the lengths of sides  $AB$ ,  $PA$  and  $PB$  in terms of  $x$ .
- iii) Simplify the above relation and show that the value of  $x$  satisfies quadratic equation  $4x^2 - 4x - 3 = 0$  and find the value of  $x$ .

(06) A group of teachers and students who went on an educational tour bought pineapples and melons on their way. Each pineapple was cut into 6 equal pieces and each melon was cut into 8 equal pieces. Then the pieces of pineapples and melons were given out among the teachers and the students such that each teacher received 3 pieces of pineapples and 2 pieces of melon and each student received 2 pieces of pineapples and one piece of melon. For this, 18 pineapples which cost Rs. 80 per fruit and 7 melons which cost Rs. 80 per fruit were exactly sufficient. Using these information, and taking the number of teachers as  $x$  and number of students as  $y$ , construct a pair of simultaneous equations and find the number of teachers and the number of students who joined the tour. Find the amount of money each teacher had to spend.

## Part - B

Answer 5 questions only.

(07)

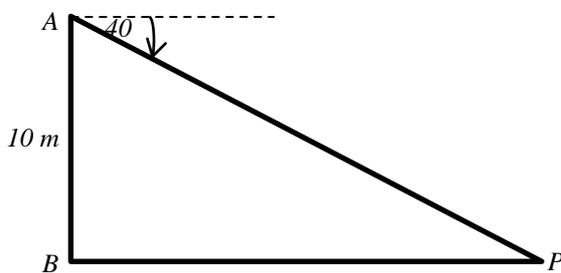


The figure shows a sketch of the gate constructed at the entrance of a house. There are two pillars on either side of the gate. 16 iron pipes have been fastened along the top edge of the gate such that the heights of the pipes are in an arithmetic progression and in ascending order. The height of the third pipe is 13 cm and the sum of the heights of the fifth pipe and the sixth pipe is 41 cm. Using the relevant formulae, show that the total length of the pipes required for the gate is not more than 5 m.

(08) Using only a straight edge with a cm/mm scale and a pair of compasses and showing the construction lines clearly.

- i) Construct the triangle ABC such that  $AB = 7.5\text{cm}$ ,  $\hat{A}BC = 120^\circ$  and  $BC = 6\text{ cm}$ . Measure and write down the magnitude of  $\hat{B}AC$ .
- ii) Construct a line through C parallel to AB.
- iii) Complete the parallelogram ABCD
- iv) Construct the perpendicular bisector of AB and name the point it meets AC as P.
- v) Construct a circle taking P as the centre and PA as the radius.

(09)

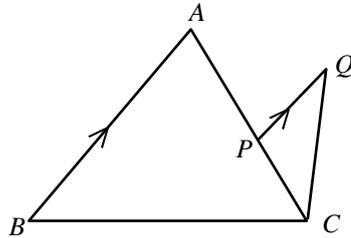


From a window of a vertical building, located on a horizontal ground, a person observes a monitor lizard moving away from the point P on the same horizontal ground at an angle of depression of  $40^\circ$ . After a while, he observes the monitor lizard at the point Q which is 8 m away from the point P in the same direction on the same horizontal ground. The window is 10 m above the ground.

- i) Select a suitable scale that can be used to represent the above information in a scale diagram and indicate the scale as a ratio.
- ii) Using the selected scale, draw a scale diagram to represent the above information.

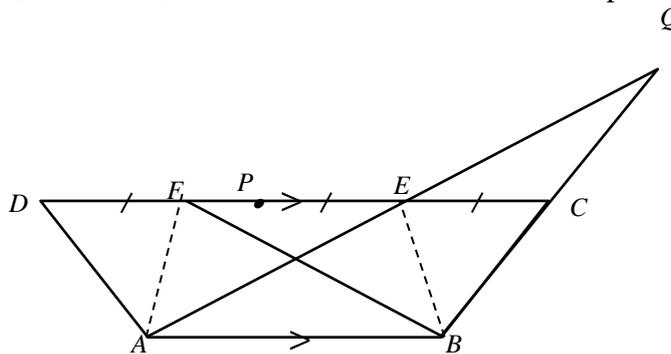
- iii) Using the scale diagram, find the distance (BP) from the foot of the building to the point P.
- iv) Find the angle of elevation of point A observed from the point Q.

(10) In triangle  $ABC$ ,  $AB = AC$ . The point  $P$  lies on the side  $AC$ . The line segment  $PQ$  has been drawn parallel to  $BA$  such that  $PC = PQ$ .  $QC$  has been joined.



- i) Name an angle which is equal to  $\hat{PCQ} + \hat{PQC}$ .
- ii) Show that  $\hat{BAC} = 2\hat{PCQ}$ .
- iii) Show that  $\hat{BCQ} = 90^\circ$ .

(11) In the figure,  $AB \parallel CD$ ,  $AP \parallel BC$  and  $DF = CE = EP$ .  $BC$  produced and  $AE$  produced intersect at  $Q$ .



- i) Write down the theorem you have learnt for which the area of  $\Delta ABF = \text{area of } \Delta ABE$   
Show that
- ii) area of the quadrilateral  $ABFD = \text{area of the quadrilateral } ABCE$ .
- iii)  $\Delta AEP \cong \Delta ECQ$
- iv)  $ACQP$  is a parallelogram.

(12) In a circle with centre  $O$ , the two chords  $AB$  and  $CD$  produced intersect at the point  $P$  which lies outside the circle. Draw a figure including the above information and prove that

- i)  $\hat{ADP} = \hat{CBP}$
- ii)  $\hat{AOC} = 4\hat{APC}$ , if  $AD = DP$

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