OL/2018/32/E-I

32 E I

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கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2018 டிசெம்பர்
General Certificate of Education (Ord. Level) Examination, December 2018

10.12.2018 / 0830 - 1030

ගණිතය	I
கணிதம்	I
Mathematics	**I**

පැය දෙකයි
இரண்டு மணித்தியாலம்
Two hours

Index Number: .....

Certified Correct

.....
Signature of Invigilator

Important:

* This question paper consists of **8** pages.
* Write your **Index Number** correctly in the appropriate places on **this page** and on **page three**.
* Answer **all** questions **on this question paper itself**.
* Use the space provided under each question for working and writing the answer.
* Indicate the **relevant steps** and the **correct units** when answering the questions.
* Marks are awarded as follows:

  In Part A
  2 marks for each question

  In Part B
  10 marks for each question

* Blank papers can be obtained for scratch work.

For Marking Examiners' Use Only		
Part	**Question Numbers**	**Marks**
A	**1 - 25**	
B	**1**	
	2	
	3	
	4	
	5	
Total		

..... First Examiner	..... Code Number
..... Second Examiner	..... Code Number
..... Arithmetic Checker	..... Code Number
..... Chief Examiner	..... Code Number

[see page two

Part A

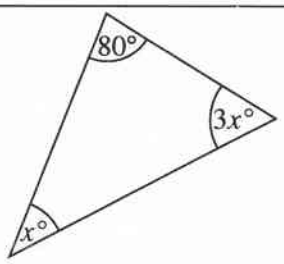
*Answer **all** questions **on this question paper itself.***

- Area of the curved surface of a right circular cylinder of radius r and height h is $2\pi rh$.
- Wherever necessary, use $\frac{22}{7}$ for the value of π.

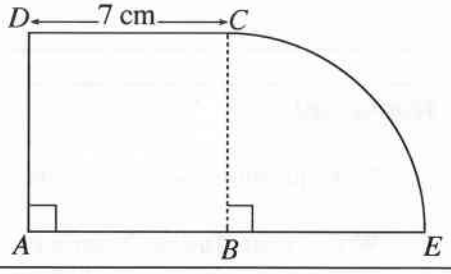
1. It has been estimated that it will take 10 men 6 days to complete a certain task. Find the number of days it will take 8 men to complete a job which is double that task.

2. Factorize: $2x^2 + x - 6$

3. Find the value of x based on the information given in the figure.

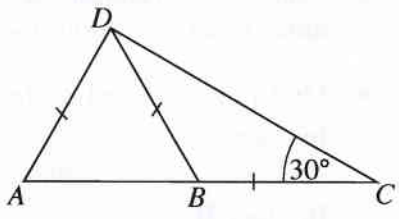


4. In the figure, *ABCD* is a square; *BCE* is a sector. Find the perimeter of the composite figure.



5. Simplify: $\frac{4}{x} - \frac{1}{2x}$

6. In the figure, *ABC* is a straight line. Find the magnitude of $D\hat{A}B$ based on the given information.

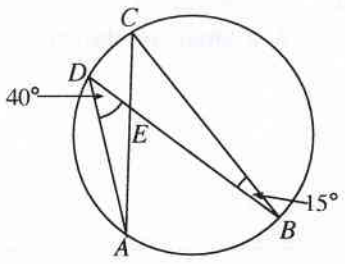


7. $26.3 = 10^{1.42}$.
What is the value of lg 26.3?

[see page three

8. A rectangular sheet of paper of area 880 cm^2 has been pasted such that it exactly covers the curved surface of a solid right circular cylinder of base radius 14 cm. Find the height of the cylinder.

9. A, B, C and D are 4 points on the circle. Find the magnitude of $D\hat{E}C$ based on the given information.



10. Solve: $x^2 - 36 = 0$

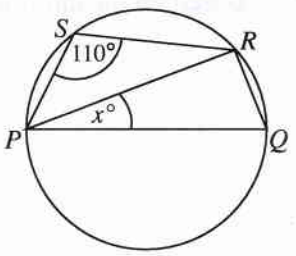
11. It takes 8 minutes to completely fill a tank of capacity 480 litres with water using a pipe through which water flows at a uniform rate. Find the rate at which water flows through the pipe.

12. Fill in the blanks using suitable words.

The opposite ..... of a parallelogram are equal. The ..... of a parallelogram is bisected by each of its diagonals.

13. Find the probability of getting either a multiple of 2 or a multiple of 3 when a fair die with its sides numbered from 1 to 6 is rolled.

14. The diameter of the circle shown in the figure is PQ. Find the value of x based on the given information.

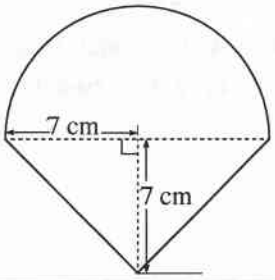


[see page four

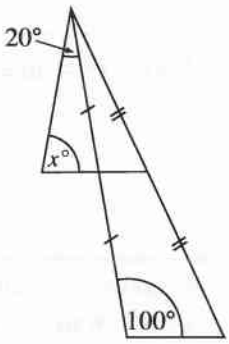
15. Find the income tax that a person who earns an annual income of 800 000 rupees has to pay according to this table.

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

16. A composite figure consisting of a semicircle of radius 7 cm and a triangle is shown here. Find the area of the entire figure.

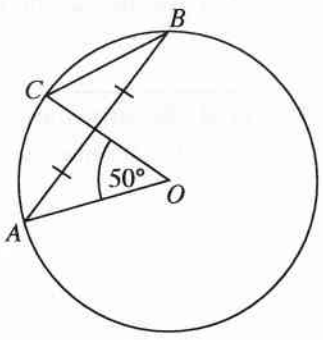


17. Find the value of x based on the information given in the figure.

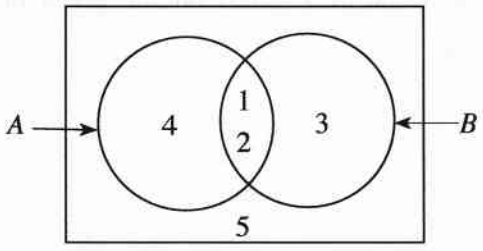


18. If $\begin{pmatrix} 2 & -1 \\ 0 & 3 \end{pmatrix}\begin{pmatrix} 1 & 3 \\ -2 & 1 \end{pmatrix} = \begin{pmatrix} x & y \\ -6 & 3 \end{pmatrix}$, then find the values of x and y.

19. The centre of the circle in the figure is O. Find the magnitude of $O\hat{C}B$ based on the given information.



20. Based on the information given in the Venn diagram, write the set $A' \cup B'$ in terms of its elements.



[see page five

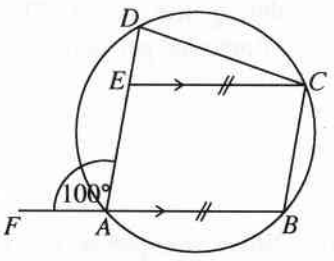
21. Write the 7th term of the geometric progression with first term 8 and common ratio 2, as a power of 2.

22. Find the gradient of the straight line that passes through the points (0, 8) and (2, 4).

23. The first quartile of an array of data that has been arranged in ascending order is in the 7th position. How many data are there in this array?

24. Simplify: $\frac{3a}{10b} \div \frac{9}{5b}$

25. In the given figure, $ABCE$ is a parallelogram. The 4 points A, B, C and D lie on the circle. Find the magnitude of $E\hat{C}D$ based on the given information.



[see page six

Part B

*Answer **all questions on this question paper itself**.*

1. A man intended to distribute a certain amount of money he had, by giving $\frac{2}{5}$ to his wife and the remaining amount equally to his three sons. However, he had to give $\frac{1}{6}$ of this amount to his brother before he distributed it as intended. He distributed the remaining amount as originally intended.

(i) What fraction of the initial amount that the man had, did the wife receive?

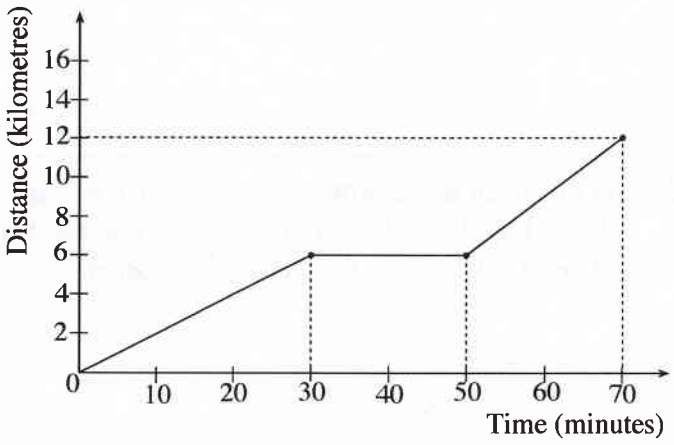
(ii) What fraction of the initial amount did he have remaining after giving his brother and his wife?

(iii) The amount a son received was 40 000 rupees less than the amount he was to receive originally. Find the amount the man had initially.

2. How a student travelled from his home to school is shown in the given distance-time graph.

(i) For how long did the student stop in between?

(ii) Find the speed at which he travelled during the initial 30 minutes in kilometres per hour.



(iii) What multiple of the speed at which he travelled the initial 30 minutes is the speed at which he travelled the final 20 minutes?

(iv) If he travelled the whole distance without stopping, in the same speed at which he travelled the initial 30 minutes, draw the relevant graph on this figure itself.
In this case, how many minutes earlier would the student be able to complete the journey?

[*see page seven*

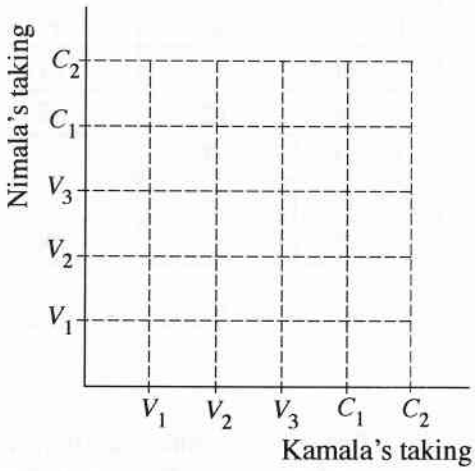
3. (a) Customs duty of 30% is charged when electrical items are imported. If 9 000 rupees has to be paid as customs duty when an item of this type is imported, what is the value of the item which is being imported?

(b) (i) The annual assessed value of a house is 30 000 rupees. If the municipal council charges annual rates of 8% on this property, find how much has to be paid as rates for a quarter.

(ii) After several years, the assessed value of the house changed. The annual rates percentage that the municipal council charges also increased to 9%. If the amount to be paid as rates for a quarter increased by 30 rupees as a result, find the new annual assessed value of the house.

4. (a) A bag contains 3 vanilla flavoured milk packets and 2 chocolate flavoured milk packets of the same size. After Kamala takes out a milk packet randomly, Nimala also takes out a milk packet randomly.

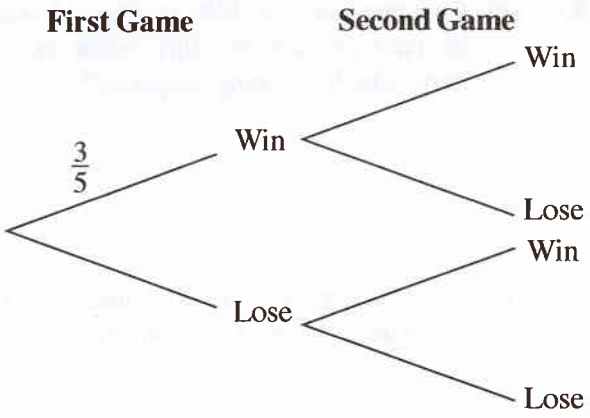
(i) Using the symbol '×', represent the sample space of the above experiment in the given grid. The vanilla flavoured milk packets are denoted by V_1, V_2 and V_3 and the chocolate flavoured milk packets are denoted by C_1 and C_2.



(ii) In the grid, encircle the event of both of them taking out vanilla flavoured milk packets and find its probability.

[see page eight

(b) The probability of a certain sports team winning the first game they participate in is $\frac{3}{5}$. If they win the first game, then the probability of them winning the second game is $\frac{7}{10}$. If they lose the first game, then the probability of them winning the second game is $\frac{1}{2}$. An incomplete tree diagram drawn to represent this information is shown in the figure.

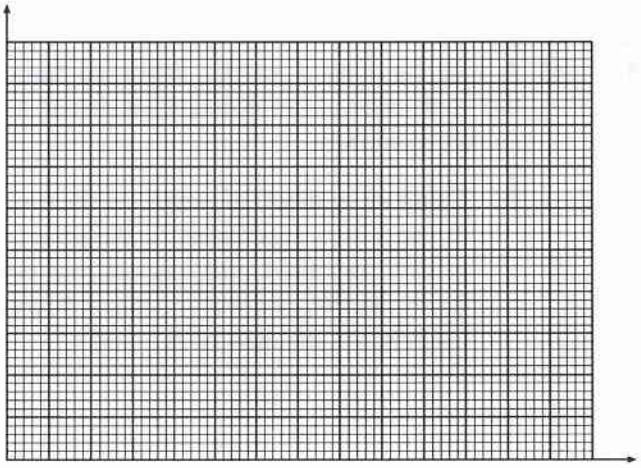


(i) Complete the tree diagram by indicating the relevant probabilities.

(ii) Find the probability of the team winning at least one game.

5. Given below is a grouped frequency distribution of 48 continuous data. All the data which are greater or equal to 10 but less than 20 belong to the class interval 10 - 20. Likewise, the other class intervals.

Class Interval	Frequency	Cumulative frequency
10 - 20	6	6
20 - 30	8	14
30 - 40	12	26
40 - 50	15	...
50 - 60	5	...
60 - 70	...	48



(i) Fill in the blanks in the table.

(ii) Draw the cumulative frequency curve on the given coordinate plane and thereby obtain the median of the frequency distribution.

(iii) By how much does the median that was obtained in part (ii) above deviate from the midpoint of the class interval it belongs to?

* * *

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இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka

32 E II

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2018 දෙසැම්බර්
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2018 டிசெம்பர்
General Certificate of Education (Ord. Level) Examination, December 2018

ගණිතය II
கணிதம் II
Mathematics II

10.12.2018 / 1300 - 1610

පැය තුනයි
மூன்று மணித்தியாலம்
Three hours

අමතර කියවීම් 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 and decide on the questions that you give priority in answering.

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 right circular cylinder of base radius r and height h is $\pi r^2 h$.*

Part A

Answer ***five*** *questions only.*

1. The following notices have been issued regarding the interest paid by two banks **A** and **B** for deposits.

A	B
An annual simple interest of 5.2% for your deposit!	An annual compound interest of 5 % for your deposit!

Saman had 80 000 rupees. He deposited exactly half of it in bank **A** and the remaining half in bank **B**.

(i) Find the interest that Saman receives for a year from his deposit in bank **A**.

(ii) For his deposits, from which bank will he receive a greater income at the end of two years? Give reasons for your answer.

(iii) After two years Saman added the amount he initially deposited and an extra amount to the total income he received from the two deposits and invested this whole amount to buy shares of a company. The market price of a share of this company is 50 rupees. The company pays a dividend of 2 rupees per share annually. He received a dividend income of 3600 rupees at the end of a year. Find the extra amount he added when he bought the shares.

2. The sum of the lengths of two adjacent sides of a rectangle is 16 cm and the length of a diagonal is 14 cm. Show that, when the breadth of the rectangle is taken as x cm, it satisfies the quadratic equation $x^2 - 16x + 30 = 0$, and find separately the length and the breadth of the rectangle to the first decimal place.
(Use 5.83 for the value of $\sqrt{34}$.)

[see page two

3. y is a quadratic function of x. An incomplete table containing the values of y corresponding to several values of x is given below.

x	–1	0	1	2	3	4	5
y	6	1	–2	–3	–2	...	6

(i) By considering the symmetry of the quadratic function, obtain the value of y when $x = 4$.

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

(iii) Describe the behaviour of y as the value of x increases from 0 to 2.

(iv) Express the quadratic function in the form $y = (x - a)^2 + b$.

(v) $y = t$ is a straight line parallel to the x-axis. What is the interval in which t should lie for this straight line and the graph of the quadratic function to intersect at two points with positive x-coordinates?

4. The number of fours and sixes the winning team hit in a cricket match was 38. The number of runs scored from only fours and sixes was 176.

(i) Take the number of fours hit as x and the number of sixes hit as y, and construct a pair of simultaneous equations by using the above information.

(ii) By solving the pair of simultaneous equations, find separately the number of fours and the number of sixes that were hit.

(iii) If the number of sixes hit by the losing team is a, then it satisfies the inequality $2(2a-5)+3a \leq 54$. Find the **maximum** number of sixes the losing team may have hit.

5. The base of a cuboid shaped glass container of height one metre is a square. The length of a side of the base is 25 cm. The container is filled with water to exactly half its height.

(i) Find the volume of water in the container in cubic centimetres.

(ii) Rani has several identical solid right circular metal cylinders of unknown base radius and height 10 cm. To find the base radius r of a cylinder, she puts them one by one into the above container half filled with water. When exactly 25 of them are put, the water reaches the level of the container being completely filled.

Show that $r = 5\sqrt{\frac{5}{\pi}}$ cm.

(iii) Find the value of r in centimetres to the first decimal place, by using 3.14 for the value of π.

6. Nimal is involved in a small industry which produces sports items. Information regarding the number of items he produced each day during a period of 50 days is shown in the following frequency distribution.

Number of Items	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
Number of Days	5	8	10	12	9	6

Nimal gains a profit of 60 rupees by selling one of these items. He expects to gain a profit of 370 000 rupees during the next 120 days by working and selling the items in the above manner. Find the mean number of sports items he produces in a day, and show with reasons whether his expectation is fulfilled.

[see page three

Part B

*Answer **five** questions only.*

7. A decoration consists of several circles containing small bulbs. There are 5 bulbs in the first circle, 9 bulbs in the second circle, 13 bulbs in the third circle, and so on. Starting from the first circle, when the number of bulbs in each of the circles is considered in order, they are in an arithmetic progression.

   (i) How many bulbs are there in the 10th circle?

   (ii) If the total number of bulbs in the first n circles is S_n, show that $S_n = n(2n + 3)$.

   (iii) If the decoration consists of 40 circles, find the total number of bulbs in the decoration.

   (iv) Among the circles, starting from the 10th circle, every circle which counts as a multiple of 5 consists of only yellow bulbs while all the other bulbs are red. Find the number of red bulbs in the decoration.

8. 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) Draw a straight line segment AB of length 7.5 cm and construct its perpendicular bisector.

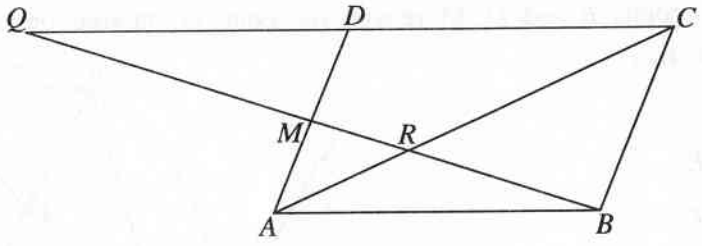
   (ii) Take the midpoint of AB as C and construct a semicircle with C as the centre and AB as the diameter.

   (iii) Construct the locus of a point that moves at an equal distance from the perpendicular bisector of AB and the line CB and name the point at which it intersects the semicircle as P.

   (iv) Construct the tangent to the semicircle at P and name the point at which it meets the perpendicular bisector of AB as D.

   (v) Construct the other tangent that can be drawn to the semicircle from D and give reasons why this tangent is parallel to the line PC.

9. In the parallelogram $ABCD$ shown in the figure, M is the midpoint of the side AD. The point of intersection of BM and AC is R. Moreover, the lines BM and CD produced meet at Q.



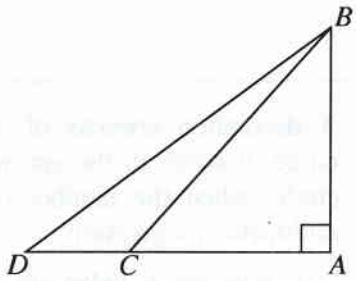
Copy this figure in your answer script.

   (i) Join AQ and BD, and show that $ABDQ$ is a parallelogram.

   (ii) Show that $\frac{MR}{RB} = \frac{1}{2}$ and that $QR = 2RB$.

[see page four

10. A vertical post AB erected on a level horizontal ground and a point C located 30 m from it are shown in the figure. The angle of elevation of the top of the post B, when observed from the point C is 48°. The length of a wire tied to B from the point D located in the same direction as C from A, is 50 m.



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

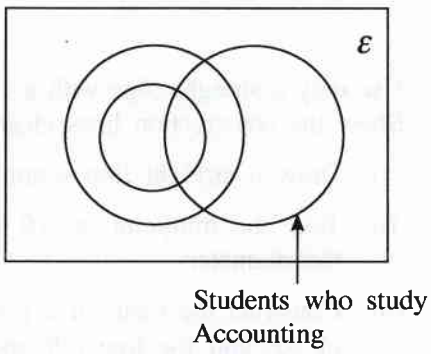
Show that the angle of elevation of B when observed from D is greater than 40°.

11. An incomplete Venn diagram drawn to represent information on the number of students who study the subjects Economics, Business Statistics and Accounting in the A'level classes of a certain school is shown here.

In this school, every student who studies Business Statistics also studies Economics.

(i) Copy the given Venn diagram in your answer script and name the sets of students who study the other two subjects suitably.
Include the following information in the Venn diagram.

- 45 students study Accounting.
- 30 students study Business Statistics.
- 18 students study only Economics from these three subjects.



(ii) Shade the regions which represent the students who study only two of these three subjects.

(iii) 55 students study at least one of the two subjects Business Statistics and Accounting. Find the number of students who study all three subjects.

(iv) If the number of students who study only Accounting from these three subjects is twice the number of students who study Business Statistics but do not study Accounting, then find the number of students who study Economics.

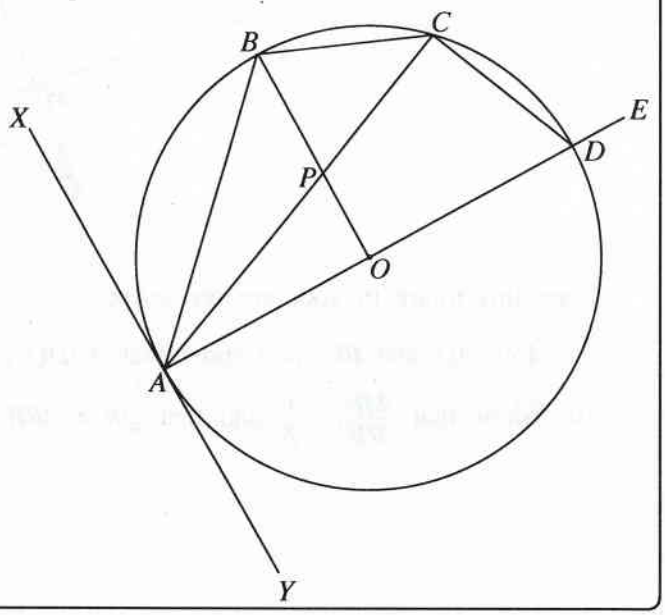
12. In the given figure, the tangent drawn to the circle with centre O, at the point A, is XAY. The chord AB bisects $X\hat{A}O$. The diameter AD has been produced to E and the point C lies on the circle between the points B and D. Moreover, the point of intersection of AC and OB is P.

With reasons show that,

(i) $A\hat{C}B = 45°$

(ii) $Y\hat{A}C = C\hat{D}E$

(iii) $B\hat{P}C = O\hat{D}C$.



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