



# MATHEMATICS POINT<sup>TM</sup>

[Platform for +1, +2, IIT-JEE, AIEEE & Maths Olympiad]

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**www.mathematicspoint.com**

**SAMPLE TEST-1 (11TH)  
PAPER - 2**

**Time : 1 Hour 45 Minutes**

**Maximum Marks : 122**

**Please read the Instructions carefully**

**(A) General instructions**

- This booklet contains 19 Questions and has 18 Pages.

**(B)** For each Question in **Section A**, you will be **awarded 5 marks** for the complete solution. **No Negative marking** will be awarded for incorrect answer.

**(C)** For each Question in **Section B**, you will be **awarded 8 marks** for the complete solution. **No Negative marking** will be awarded for incorrect answer.

**Name of the Candidate**

**Signature**

**StartingTime**\_\_\_\_\_

**Date :-**

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**Section A**

1.

a) Prove that :  $\frac{1}{\sec x - \tan x} - \frac{1}{\cos x} = \frac{1}{\cos x} - \frac{1}{\sec x + \tan x}$  [2.5]

b) If  $x^2 + x + 1$  is a factor of the polynomial  $3x^3 + 8x^2 + 8x + 3 + 5k$ , then find k. [2.5]

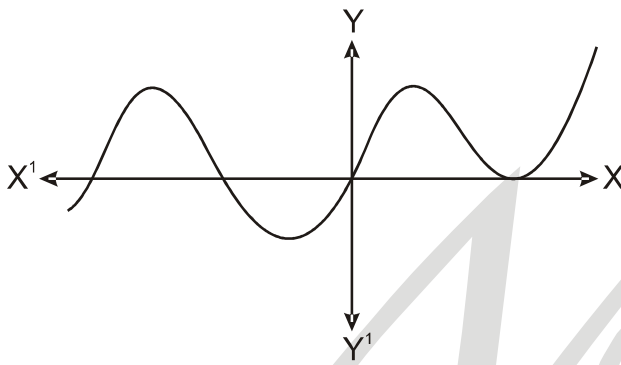
**Solution :**



2. A says to B "I am five times old as you were, when I was as old as you are" The sum of their present ages is 64 years. Find their ages.

**Solution :**

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3. a) Find the minimum degree for the polynomial whose graph is given below .



[1]

- b) Factorize  $x^8 - x^4 + 16$  completely into real factors.

[4]

**Solution :**

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4. If  $a + b + c = 5$ ,  $a^3 + b^3 + c^3 = 14$  and  $abc = 3$ . Find  $(ab)^2 + (bc)^2 + (ca)^2$ .

**Solution :**



5. A closed conical vessel is filled with water fully and is placed with its vertex down. The water is let out at a constant speed. After 21 minutes, it was found that the height of the water column is half of the original height. How much more time in minutes does it empty the vessel ?

**Solution :**

6. From the top of tower the angle of depression of an object on the horizontal ground is found to be  $60^\circ$ . On descending 20 m vertically downwards from the top of the tower, the angle of depression of the object is found to be  $30^\circ$ . Find the height of the tower.

**Solution :**

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7. Find the value of  $k$  for which following system of equations has infinitely many solutions.

a)  $kx + 3y = k - 3$   
 $12x + ky = k$

b)  $3x - 4y = -7$   
 $kx + 3y = 5$

**Solution :**

8. A factory kept increasing its output by the same percentage every year. Find the percentage if it is known that the output is doubled in the last two years.

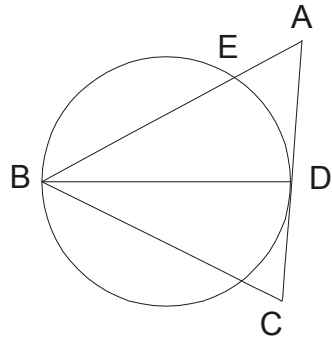
**Solution :**

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9. Find the sum of first 27 terms of the AP  $a_1, a_2, a_3, \dots$  if it is known that  $a_1 + a_5 + a_{11} + a_{17} + a_{23} + a_{27} = 228$ .

**Solution :**



10. In the given figure,  $AB = AC$ ,  $D$  is the mid point of  $AC$ ,  $BD$  is the diameter of the circle and  $AC$  is tangent to circle at  $D$ , then prove that  $AE = \frac{1}{4}AC$



**Solution :**





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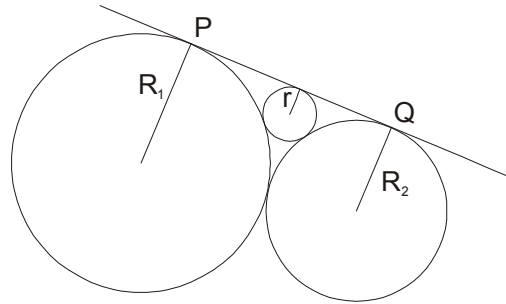
**Section B**

11. A circular metallic sheet is divided into two parts in such a way that each part can be folded in to a cone. If the ratio of their curved surface areas is 1 :2, then find the ratio of their volumes.

**Solution :**



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12. Three circles with radii  $R_1$ ,  $R_2$  and  $r$  touch each other externally as shown in the adjoining figure. If  $PQ$  is their common tangent and  $R_1 > R_2$ , then find the relation between  $R_1$ ,  $R_2$  and  $r$ .



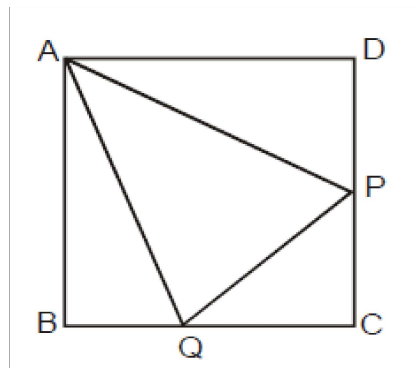
**Solution :**



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13. A solid sphere is cut into identical pieces by three mutually perpendicular plane passing through its centre. Find the increase in total surface area of all the pieces with respect to the total surface area of the original sphere.

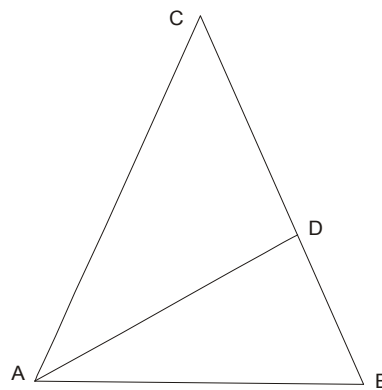
**Solution :**

14. In the figure, ABCD is a square of side 1 dm and  $\angle PAQ = 45^\circ$ . The perimeter (in dm) of the triangle PQC is



**Solution :**

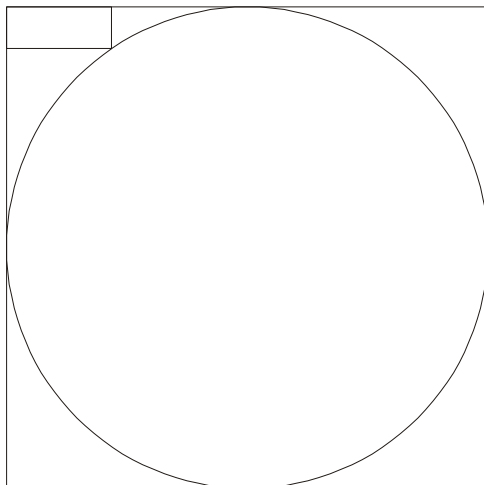
15. In the figure, ABC is a triangle in which AD bisects  $\angle A$ ,  $AC = BC$ ,  $\angle B = 72^\circ$  and  $CD = 1$  cm, Length of BD (in cm) is



**Solution :**



16. In the figure below, the rectangle at the corner measures 4 cm x 8 cm. What is the radius of the circle in cm?



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**Solution :**



17. On the right, you see a silver pot and a golden pot. One of these pots contains a treasure and the other one is empty. Assume that you can determine from the text prints which pot contains the treasure. The text prints on the pots are the following:

**The silver pot: "This pot is empty."**

**The golden pot: "Exactly one of these texts is true."**

Which pot contains the treasure?

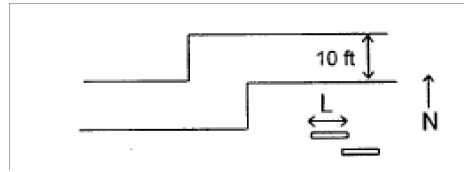
**Solution :**

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18. You are given some matches, a shoelace, and a pair of scissors. The lace burns irregularly like a fuse and takes 60 minutes to burn from end to end. It has a symmetry property in that the burn rate a distance  $x$  from the left end is the same as the burn rate the same distance  $x$  from the right end. What is the minimum time interval you can measure?

**Solution :**



19. The river shown below is 10 feet wide and has a jog in it. You wish to cross from the south to the north side and have only two thin planks of length  $L$  and width 1 ft to help you get across. What is the least value for  $L$  that allows a successful plan for crossing the river?



**Solution :**







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Answers

- |     |    |  |     |                   |     |    |                        |     |   |
|-----|----|--|-----|-------------------|-----|----|------------------------|-----|---|
| 1.  | b) | $\frac{2}{5}$  | 2.  | 40,24             | 3.  | 5  | 4.                     | 34  |   |
| 5.  |    | 3 Min  | 6.  | 30 m              | 7.  | a) | 6                      |     |   |
| b)  |    | Not possible   | 8.  | $100(\sqrt{2}-1)$ | 9.  |    | 1026                   | 11. | $\frac{V_1}{V_2} = \frac{1}{\sqrt{10}}$ |
| 12. |    | $\frac{1}{\sqrt{r}} = \frac{1}{\sqrt{R_1}} + \frac{1}{\sqrt{R_2}}$ | 13. | 150%              | 15. |    | $\frac{\sqrt{5}-1}{2}$ | 16. | $r = 20 \text{ cm}$                     |

