

# Question Paper : MATHLETICS 2016, Assam Academy of Mathematics

by Gonit Sora - Friday, May 27, 2016

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Category: Classes IX, X and X appeared

Time: 3 Hours

Marks: 10X10=100

*[Answer in English or in your mother tongue. Two students of the team will discuss the solution of the problems and Write the answers in an answer book given to them. Earlier tradition of allowing coaches for teams has been slopped now.]*

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(Answer as many questions as you can from the following.

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1. Find the digit in the unit's place for the number

$$1^{2016} + 2^{2016} + 3^{2016} + \dots + 99^{2016}$$

$$1^{2016} + 2^{2016} + 3^{2016} + \dots + 99^{2016}$$

2. The number 27000001 has exactly four prime factors. Find their sum.

$$27000001$$

3. If  $x^{15} - x^{13} + x^{11} - x^9 + x^7 - x^5 + x^3 - x = 7$ , prove that  $x^{16} > 15$ .

4. Without extracting Square roots find the larger of the two surds

$\sqrt{12}-\sqrt{11}$  and  $\sqrt{7}-\sqrt{6}$ .

?????? ?????????,  $\sqrt{12}-\sqrt{11}$  ???  $\sqrt{7}-\sqrt{6}$ ? ????? ??????? ???????  
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5. Ramen has six friends and during a certain vacation, he met them during several dinners. He observed that he dined with all six exactly on one day; with every five of them on 2 days; with every four on 3 days; with every three on 4 days; with every two on five days. Further, every friend was present at 7 dinners and every friend was absent at 7 dinners. How many dinners did Ramen take alone?

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6. A triangle ABC has incentre I. Points X, Y are located on the line segments AB, AC respectively so that—

$BX \cdot AB = IB^2$  and  $CY \cdot AC = IC^2$ .

Given that X, I, Y are collinear, find the possible values of the measure of the angle A.

??? ?????????? ABC ? ??????????????? I? ????? AB ??? AC ? ?????????? X ??? Y ?????? ?????? ??????????  
 ?????? ?????? ??????  $BX \cdot AB = IB^2$  ???  $CY \cdot AC = IC^2$ ? X, I ??? Y ?????? ?????? ?????????? A  
 ?????? ?????????? ?????????? ?????????? ??????

7. Solve the inequation

????????????? ?????????? ??????????—

$\frac{x-2}{x+2} \geq \frac{2x-3}{4x-1}$

where ('?'), x is real (????????? ?????????)?

8. Given a point M inside an acute angle A, draw through M a straight line l so that it cuts from the arms of the angle a triangle of minimum area.

??? ?????????? A ? ?????????? ??? ?? ?????? M? ?????? ???? ??????? l ????? ?? ???? ?????????  
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9. Find the sum of all distinct four digit numbers that contain only the digits 1, 2, 3, 4 and 5 each at most once.

1, 2, 3, 4 ??? 5 ?????????? ?????????? ?? ???? ??????? ??????? ?? ?????? ?? ????????? ???? ?????????  
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10. Find the sum of the angles at the vertices of the five pointed star as shown below ??? ??????????  
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