Centre for Advancement of Standards in Examinations

GRADE X 'PATHFINDER'-2011

Grade: X | **Max.Marks:50**
Subject: MATHEMATICS | **Duration:2Hrs(Writing)**
No.of Pages:8 | **15 Min (Reading)**
Date:15/2/2011

General Instructions

1. The Q-Paper consists of 3 Sections
2. Section-A : MCQ(QNos1-6)of 2 marks each
3. Section-B : Column Matching(QNos 7-9) of ½ mark each.
4. Section-C: **a.**Numericals(QNos 10-15) of 3 marks each & **b.**Decision Making/Proving Mathematical relationship (Qnos 16-18) of 4 marks each.
5. There is no overall choice. However, internal choice has been provided in Section-C. You may attempt only one question in all such questions.
6. **All Questions to be answered neatly and legibly on the paper provided.**

SECTION - A

I.MULTIPLE CHOICE QUESTIONS(2 marks each)

1. The pair of equations y=a and y=b graphically represent lines that are

   a. Intersecting at(a,b) b. Parallel

   c. coincident d. Intersecting at (b,a)

2. The condition so that the roots of quadratic equation $ax^2+bc+c=0$, where $a\neq0$ may be equal in magnitude but opposite in sign is

   i. a= -1 ii. c=0 iii. a=0 iv. b=0

3. The areas of 3 adjacent faces of a cuboid are X,Y,Z respectively. The volume of the cuboid is

a. $x^2y^2z^2$ b. $\sqrt{xyz}$ c. xyz d. $x^3y^3z^3$

4. If one of the root of quadratic equation $ax^2+bx+c=0$ is three times the other, then

a. $b^2=16ac$ b. $b^2=3ac$ c. $3b^2=16ac$ d. $16b^2 = 3ac$

5. In Δ ABC, $\sin\left(\frac{B+C}{2}\right)$ in terms of $\angle A$ is equal to

a. Cosec A/2 b. Sec A/2 C. Sin A/2 d. Cos A/2

6. If the circumference of circle is equal to the perimeter of square, then the ratio of their areas is

a. 22 :7 b. 14:11 c. 7:22 d. 7:11

SECTION - B

II. Column Matching Type (1/2 mark each)

Write the values as answers against the Question number.

7. Match the trigonometric ratio in column I with the values in column II. (5 x ½ =2 ½)

Q. No.	**Column I**	**Column II**
a.	If 3SinA = 4CosA, then Value of CoSecA is	-1
b.	If $\sin A=\sqrt{3}/2$ and Cos B=1/2 Then value of (A-B) is	2
c.	$\cot^2 A - \operatorname{CoSec}^2 A$	5/4
d.	The value of $\sin^2 37^\circ+\sin^2 90+\sin^2 53^\circ$	½

e.	If SinA - CosA=0 the Value of $\sin^4 A+\cos^4 A$ is	0

8. Consider the following distribution (8x ½ =4)

Height (cm)	Number of Students
135-140	3
140-145	9
145-150	22
150-155	15
155-160	8
160-165	5
165-170	2

On the basis of the data match the following columns

Q. No.	Column I	Column II
I.	Lower limit of median class	12
II.	Upper limit of modal class	57
III.	Number of students with heights less than 160cm	5
IV.	Number of students with heights more than 150cm	145
V.	Number of students in the median class	150
VI.	Cumulative frequency of the class preceding the modal class	15
VII.	Class size	30
VIII.	Number of students in the class succeeding the modal class	22

9. Match the relationship in column A with that in Column B (3x ½ = 1 ½)

Q. No.	**Column A**	**Column B**
a.	The volume of right circular cylinder is 2πr cubic units, then height of cylinder is	4r
b.	A sphere of radius r has same volume as that of a cone with a circular base of radius r. Then the height of cone is	$\sqrt{2}r$
c.	If the radius of cone is equal to its vertical height, then the slant height of the cone is	2/r

SECTION -C

a.Numerical Problems (3 marks each)

10. Form the pair of linear equations in the following problem and find the solution graphically.

10 students of Grade X took part in Math Olympiad. If the number of girls are 4 more than the number of boys, find the number of boys and girls who participated in the Olympiad

11.

A	D
B	E
C	F

The given figure shows the top view of an Open Square Box that is divided into 6 compartments with walls of equal height. Each of the rectangle D, E, F has twice the area of the squares A,B,C. When a marble is dropped in the box at random, it falls into one of the compartment

a. Find the probability that the marble falls into compartment E.

b. Probability of marble falling on D or E Or F.

12. The mean of 1,7,3,4,5,4 is K . The number 3,2,4,2,3,3,p have K-1 as mean and median as q. Find K,P and q.

13. The perimeter of right angled triangle is 5 times the length of its shortest side. The numerical value of area of triangle

is 15 times the numerical value of length of its shortest side. Find the length of the 3 sides of triangle.

14. The sum of n terms of an Arithmetic progression whose first term is 5 and common difference is 36 is equal to the sum of 2n terms of another Arithmetic progression whose first term is 36 and common difference is 5. Find n.

OR

A polygon has 31 sides, the length of which starts from the smallest to the largest and are in Arithmetic Progression. If the perimeter of the polygon is 527cm and the length of the largest side is 16 times the smallest, find the length of the smallest side and the common difference of the A.P.

15. 3 horses are tied with 7m long rope at the 3 corners of a triangular field having sides 20m, 34m, 42m. Find the area of the plot which cannot be grazed by the horses.

OR

A sector of circle of radius 15cm has an angle of 120^0. It is rolled up so that the 2 bounding radii are joined together to form a cone. Find the volume of the cone. (Take $\sqrt{2} = 1.414$)

b. Decision Making/Proving Mathematical relationship

(4 marks each)

16. If P & Q are 2 points whose co-ordinates are $(at^2, 2at)$ and $\left(\frac{a}{t^2}, \frac{-2a}{t}\right)$ respectively and S is a point $(a,0)$ Show that $\frac{1}{SP} + \frac{1}{SQ}$ is independent of **'t'**.

OR

PQRS is a rectangle formed by the points P(-1,-1); Q(-1,4); R(5,4); S(5,-1). A, B, C, D are midpoints of PQ, QR, RS, SP respectively.

1. Tom says "The quadrilateral ABCD formed is a rectangle".
2. Tina says "ABCD is rhombus".
3. Joe says "ABCD is a square". Who among the three is right? **Justify**.

17. If the p^{th}, q^{th}, r^{th} terms of an AP are a, b, c respectively, then show that:

$a(q-r)+b(r-p)+c(p-q)=0$ **OR**

If the p^{th} term of an AP is $\frac{1}{q}$ and the q^{th} term is $\frac{1}{p}$ show that the sum of its pq terms is $\frac{1}{2}(pq + 1)$

18. If the roots of equation :-

$(a^2 + b^2)x^2 - 2(ac + bd)x + c^2 + d^2 = 0$ are equal,

prove that $\underline{ad = bc}$.

OR

A vulture is sitting on the top of 9m high pillar. 27m away from the base of the pillar, a snake is moving to its hole which is located at the base of the pillar. Seeing the snake, the vulture attempts to pounce on it. If the snake and the vulture are moving at the same speed, then at what distance from the hole will the snake be caught?

1. Reena says, "The snake is caught at a distance of 18m from the hole".
2. Seena says, "It is caught at a distance of 12m from the hole".
3. Meena says," It is caught at the hole".

Who among the three is right? Justify.
