City International School

FIRST TERMINAL EXAMINATION – 2013 – 2014

Date : 29/07/2013 **Marks : 80**

Std : X **Subject : Mathematics** **Time :** 2½ hrs

Answers to this Paper must be written on the paper provided separately.
You will not be allowed to write during the first 15 minutes.
This time is to be spent in reading the question paper.
The time given at the head of this paper is the time allowed for writing the answers.
Attempt all questions from Section A and any four questions from Section B.

- All working including rough work must be clearly shown and must be done on the same sheet as the rest of the answers.
- Omission of essential working will result in loss of marks.

The intended marks for questions or parts of questions are given in brackets ( )
Mathematical tables are provided.

SECTION A [40 MARKS]
Attempt all questions in this section.

Q. 1 a. Solve for x correct to 3 significant figures. **(3)**

$$\frac{1}{x+1} + \frac{2}{x+2} = \frac{4}{x+4}, \quad x \neq -1, -2, -4$$

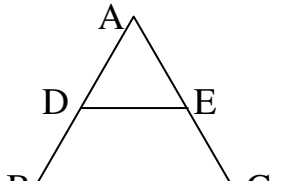
b. From a pack of 52 cards, a black Jack, a red Queen and a black King fell down. **(3)**
A card was then drawn from the remaining pack at random.
Find the probability that the card drawn is
i. A black card ii. A red face card iii. Not a face card

c. On a certain sum of money, the difference between the compound interest for a year payable half yearly and the simple interest for a year is ₹16. **(4)**
Find the sun lent out, if the rate of interest in both cases is 8%.

Q. 2 a. From a sold cylinder whose height is 2.4cm and diameters 1.4cm, A conical cavity of the same height and same diameter is hollowed out. **(3)**
Find the total surface area of the remaining solid to the nearest cm^2.

b. Draw a line AB = 6cm. Construct a circle with AB as diameter. **(3)**
Make a point P at a distance of 6cm from the midpoint of AB.
Construct two tangents from P to the given circle.
Measure and write down the length of the tangent segments.

c. In the figure given below, DE || BC and AD:DB = 1:2 **(4)**
Find i. Calculate DE if BC = 4.5cm
ii. If the area of $\Delta ABC = 18cm^2$,
Find area of trapezium DBCE



Q. 3 a. If $A = \begin{bmatrix} 4 & 4 \\ -2 & 6 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 \\ 3 & -2 \end{bmatrix}$, find the matrix D such that **(3)**

$3A - 2B + 2D = 0$

b. Construct ΔABC in which BC = 3.5cm, $\angle B = 60°$ and altitude AD = 2.5cm . **(3)**
Draw a circle touching the 3 sides of the triangle.

c. Given $A = \{x : 3 < 2x - 1 < 9, x \in R\}$ $B = \{x : 11 \leq 3x + 2 \leq 23, x \in R\}$ **(4)**

i. Represent A and B on number lines

ii. Show $A \cap B$, A – B on separate number lines

Q. 4 a. Without using trigonometric tables, calculate, **(3)**

$$\frac{4 \sin 32°}{\text{Cos } 58°} + 5\frac{\tan 48°}{\text{Cot } 42°} - 8\frac{\text{Sec } 72°}{\text{Cosec } 18°}$$

b. Mr. Tintin has a two year recurring deposit account in the State Bank of India and deposits ₹1500 per month. If he receives ₹37875 at the time of maturity, find the rate of interest. **(3)**

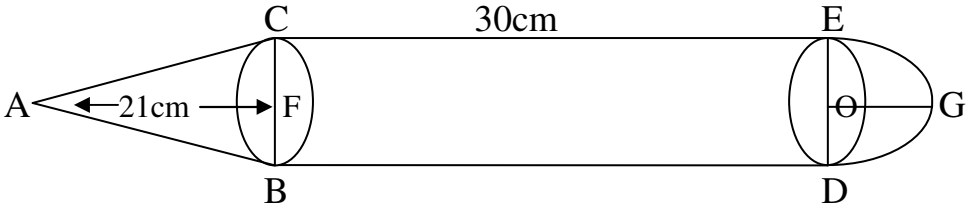
c. Draw a histogram for the following frequency distribution of marks obtained in a geometry test and estimate the mode. **(4)**

Marks	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
No of Students	13	15	12	3	9	5

SECTION B [40 MARKS]
Attempt any four questions from this section.

Q. 5 a. If $\begin{bmatrix} 2 & 4 \\ 6 & 2 \end{bmatrix} \begin{bmatrix} 3x \\ 2 \end{bmatrix} + 2\begin{bmatrix} 3 \\ 4 \end{bmatrix} = 5\begin{bmatrix} 4 \\ y \end{bmatrix}$ Find the values of x and y **(3)**

b. In the diagram given below if AF = 21cm, CE = 30cm, FB = 7cm, and OD = OE = OG. Find the volume of the figure to 2 decimal places. **(3)**



c. Calculate the mean of the following frequency distribution correct to the nearest integer by step deviation method. **(4)**

x	5	10	15	20	25	30	35	40	45	50
f	20	43	75	67	72	45	39	9	8	6

Q. 6 a. Solve the following quadratic equation for x and give your answer correct to 3 significant figures $2x^2 - 4x - 3 = 0$ **(3)**

b. Two different coins are tossed simultaneously. Find the probability of getting **(3)**
i. At most two tails ii. At least one head iii. No tail

c. Calculate the mean upto 1 decimal place, the mode and median for the following data. **(4)**

X	25	31	34	40	45	48	50	60
F	3	8	10	15	10	9	6	2

Q. 7 a. A trader buys x articles for a total cost of ₹600. **(3)**
i. Write down the cost of one article in terms of x. If the cost per article were ₹5 more, the number of articles that can be bought would be four less.
ii. Write down the equation in x for the above situation and solve it to find x.

b. Viraj invests ₹6000 for 3 years at a certain rate of interest compounded annually. At the end of the first year it amounts to ₹6720. **(3)**
Calculate: i. The rate of interest.
ii. The interest at the end of the 2nd year.
iii. The amount of the nearest rupee at the end of the third year.

c. Mr. A. Ramchander has an account with the Central Bank of India. **(4)**
The following entries are from his pass book.

Date	Particulars	Withdrawal	Deposit	Balance
05.01.2009	B/F			8000
20.01.2009	To Self	2500		
04.02.2009	By Cash		9000	
20.02.2009	By Cash		3000	
04.03.2009	To Self	1000		
15.04.2009	By Cash		12000	
11.06.2009	By Cash	2000		

Calculate the interest accumulated on 30.06.2009 at the rate of 3.5% p.a.
Hence find his balance on that day.

Q. 8 a. Prove that $\tan^2\theta + \cot^2\theta + 2 = \sec^2\theta \cdot \operatorname{cosec}^2\theta$ **(3)**

b. Solve the inequation and graph its solution on the number line. **(3)**
$-2\frac{1}{2} + 2x \leq \frac{4}{3}x < \frac{4}{3} + 2x, \qquad x \in R$

c. Without using a setsquare or protractor, construct rhombus ABCD with side of length 4cm and diagonal AC of length 5cm. Find a point R on AD such that RB = RC. Measure the length AR. Mark a point Q which is equidistant from points B and C and also from sides AB and BC. **(4)**

Q. 9 a. Two dice are thrown simultaneously. Find the probability of getting **(3)**
i. The sum of numbers on the dice is 9
ii. The total of the numbers on the dice is at most 7
iii. The product of numbers is not less than 20

b. Construct a regular hexagon of side 3.8cm. Draw a circle passing through the vertices of the hexagon. **(3)**

c. Find the value of k for which the following equation has real and equal roots. **(4)**
$(k + 1)x^2 - 2(3k + 1)x + 8k + 1 = 0$

Q. 10 a. The following table shows the distribution of the heights of a group of students. **(6)**

HT (In cm)	140-145	145-150	150-155	155-160	160-165	165-170	170-175
No of Students	8	12	18	22	26	10	4

Use a graph sheet with 2cm = 10 students, to draw an ogive for the distribution. Use the ogive to find.
i. The interquartile range.
ii. Estimate the median.
iii. The number of students whose height is more than 168cm.
iv. The No of Students whose height is less than 147cm.

b. Let B be a matrix satisfying $AB = \begin{bmatrix} 10 \\ -4 \end{bmatrix}$ where $A = \begin{bmatrix} 6 & -2 \\ 2 & 3 \end{bmatrix}$ **(4)**
i. State the order of matrix B
ii. Find matrix B
iii. Also find the value of 'm' If $[2 \quad 3]\, B = [3 + m]$