Name _____Jatin soney_____ Class & Section _X -A_ Roll No. _24_.

FIRST TERMINAL EXAMINATION–2013-2014
Class–X
Subject–Mathematics

Time Allowed : 3 Hrs.   M.M. : 90

Do not write any answers on the question paper. Check the total marks.

General Instructions :

1. *All questions are compulsory.*

2. *The question paper consistsof 34 questions divided into four sections A, B, C and D.*

3. *Section A comprises of 8 questions of 1 mark each. For each question four alternatives have been provided of which only one is correct. You have to select the correct option.*

4. *Section B comprises of 6 questions of 2 marks each.*

5. *Section C comprises of 10 questions of 3 marks each.*

6. *Section D comprises of 10 questions of 4 marks each.*

Section-A

1. The lines representing the linear equations $2x - y = 3$ and $4x - y = 5$

   (a) intersect at a point   (b) are parallel

   (c) are coincident   (d) intersect at exactly two points

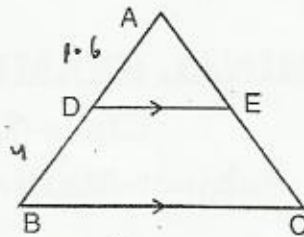2. A rational number which has non-terminating decimal representation is :

   (a) $\dfrac{111}{125}$ (b) $\dfrac{127}{8}$

   (c) $\dfrac{19}{5^3 \times 2^2}$ (d) $\dfrac{9}{455}$

3. If the polynomial $p(x)$ is divisible by $x - 4$ and 2 is a zero of $p(x)$ then which of the following is a factor of $p(x)$?

   (a) $x^2 + 6x - 8$ (b) $x^2 - 6x - 8$

   (c) $x^2 - 6x + 8$ (d) $x^2 + 6x + 8$

4. In the following figure, DE ∥ BC, if AB = 5.6 cm, AD = 1.6 cm then AE : EC is :
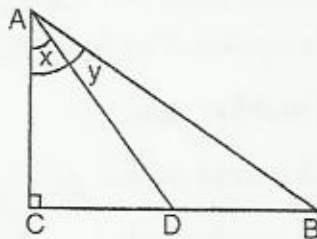
    (a) 2 : 5

    (b) 2 : 7

    (c) 5 : 2

    (d) 7 : 2

5. $n^2 - 1$ is divisible by 8, if n is :

    (a) an integer   (b) a natural number

    (c) an odd integer   (d) an even integer

6. If D is the mid-point of BC, the value of $\dfrac{\tan x^\circ}{\tan y^\circ}$ is :

    (a) $1/3$

    (b) 2

    (c) 1

    (d) ½

7. If $x = 3\sec^2\theta - 1$ and $y = \tan^2\theta - 2$ then $x - 3y$ is :

    (a) 3   (b) 8

    (c) 4   (d) 5

8. The mode is equal to :

    (a) 2 median – 3 mean   (b) 3 median + 2 mean

    (c) 3 median – 2 mean   (d) 2 median + 3 mean

Section-B

9. Prove that $2\sqrt{3} - \sqrt{5}$ is irrational.

10. If α and β are the zeroes of the polynomial $p(x) = 2x^2 + 15x - 3$, then find the value of $\alpha^2 + \beta^2$.

11. Find the value of k, if $\dfrac{\cos 30^\circ}{\sin 60^\circ} + \dfrac{2\cos\theta}{\sin(90 - \theta)} = \dfrac{k}{2}$

12. Solve : $37x + 43y = 123$

$\qquad 43x + 37y = 117$

OR

Solve : $x + \dfrac{6}{y} = 6$

$\qquad 3x - \dfrac{8}{y} = 5$

13. ABCD is a trapezium in which AB ∥ DC and its diagonals intersect each other at O. Prove that $\dfrac{AO}{BO} = \dfrac{CO}{OD}$

14. The following distribution gives the number of people examined in the age group 12 to 37 under an initiative by medical students of a certain college to provide free medical checkup in the slum areas.

Age group	12–17	17–22	22–27	27–32	32–37
No. of people examined	2	22	19	14	13

(a) Construct the cumulative frequency distribution.

(b) What values are shown by the students ?

Section-C

15. Divide $5x^3 - 13x^2 + 21x - 14$ by $3 - 2x + x^2$ and verify the division algorithm.

16. If $\sin\theta - \cos\theta = \sqrt{2}\,\sin(90 - \theta)$, then find the value of $\tan\theta$.

OR

Find the value of cosec 60° geometrically.

17. The HCF of 18 and 24 gives the number of hours that a student of class X puts in to teach under privileged children in an NGO in a week.

(a) Calculate the number of hours using Euclid's division algorithm.
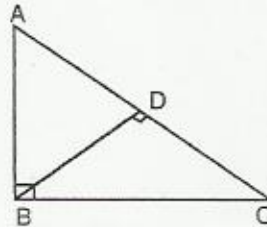
(b) What values are shown by the student ?

18. BL and CM are medians of $\triangle ABC$, right angled at A. Prove that
$$4(BL^2 + CM^2) = 5BC^2$$

OR

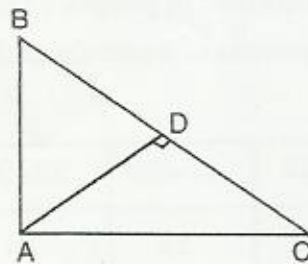In the given figure, $AB = a$, $BC = b$, $AC = c$ and $BD = p$. Show that

(i) $ab = pc$

(ii) $\dfrac{1}{p^2} = \dfrac{1}{a^2} + \dfrac{1}{b^2}$

19. If three times the larger of two numbers is divided by the smaller one, we get 4 as the quotient and 3 as the remainder. Also, if 7 times the smaller number is divided by the larger one, we get 5 as the quotient and 1 as the remainder. Find the numbers.

20. In the given figure $AD \perp BC$ and $AD^2 = BD \cdot CD$. Show that $\angle A = 90°$.

21. Calculate the median of the distribution :

Class	0–10	10–20	20–30	30–40	40–50
Frequency	5	25	25	18	7

22. If $\sin(A - B) = \dfrac{1}{2}$ and $\cos(A + B) = \dfrac{1}{2}$; $A > B$ and $0 < A + B < 90°$ then find A and B.

23. Find the mode of the following data :

Height (in cm)	160–162	163–165	166–168	169–171	172–174
No. of students	15	118	142	127	18

24. Use Euclid's division lemma to show that the square of any positive integer is either of the form $3m$ or $3m + 1$ for some integer m.

Section-D

25. State and prove Thales theorem.

OR

In $\triangle PQR$, right angled at Q, X and Y are points on PQ and QR such that $PX : XQ = 1 : 2$ and $XY : YR = 2 : 1$. Prove that

$$9(PY^2 + XR^2) = 13PR^2$$

26. Determine the solution of the following system of linear equations graphically :

$$4x - 5y - 20 = 0$$

$$3x + 5y - 15 = 0$$

Also, determine the area of the triangle formed by these lines and the y-axis.

27. If $\tan\theta + \sin\theta = m$ and $\tan\theta - \sin\theta = n$ show that $m^2 - n^2 = 4\sqrt{mn}$

OR

If $\sec\theta + \tan\theta = p$, show that $\dfrac{p^2 - 1}{p^2 + 1} = \sin\theta$

28. Obtain all zeroes of $x^4 + 4x^3 - 2x^2 - 20x - 15$ if one of the zeroes is $\sqrt{5}$
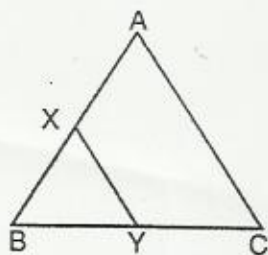
29. Calculate the mean for the following data :

Class	0–10	10–20	20–30	30–40	40–50	50–60
Frequency	14	8	15	21	9	8

Also, if the median is 29, find the mode.

30. Prove that $(\sec\theta - \tan\theta)^2 (1 + \sin\theta) = (1 - \sin\theta)$

31. In the given figure, the line segment XY ∥ AC of $\triangle ABC$ and divides the triangle into

two parts of equal area. Prove that $AX : AB = \left(2 - \sqrt{2}\right) : 2$

32. A boat goes 16 km upstream and 24 km downstream in 6 hours. Also it covers 12 km upstream and 36 km downstream in the same time. Find the speed of the boat in still water and that of the stream.

33. Prove that $\sqrt{\dfrac{1+\cos\theta}{1-\cos\theta}} + \sqrt{\dfrac{1-\cos\theta}{1+\cos\theta}} = 2\cos ec\theta$

34. Convert the following distribution into a "less than type" cumulative frequency distribution and draw its ogive. Also find the median from the ogive.

Class	0–10	10–20	20–30	30–40	40–50	50–60
frequency	7	10	23	51	6	3