Name **K. Kapur** Class & Section **X–S** Roll No. **15**

SUMMATIVE ASSESSMENT–I—2016-17
CLASS–X
SUBJECT–MATHEMATICS

BVN

Time : 3 Hours   M.M. : 90

Please Check the Total Marks

General Instructions :

1. *All questions are compulsory.*

2. *The question paper consists of 31 questions divided into four sections A, B, C and D. Section-A comprises of 4 questions of 1 mark each; Section B comprises of 6 questions of 2 marks each; Section-C comprises of 10 questions of 3 marks each and Section-D comprises of 11 questions of 4 marks each.*

3. *There is no overall choice in this question paper.*

4. *Use of calculator is not permitted.*

Section-A

Question numbers 1 to 4 carry one mark each.

1. X and Y are points on the sides AB and AC respectively of a triangle ABC such that $\dfrac{AX}{AB} = \dfrac{1}{4}$, AY = 2 cm and YC = 6 cm. Find whether XY ‖ BC or not.

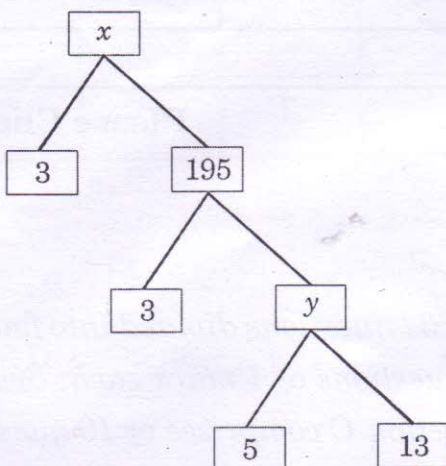2. If $\sin\theta = \sqrt{3} - 1$, then find the value of $\sec(90° - \theta)$.

3. Write the expression in simplest form : $3\sin^2\theta + 2\cos^2\theta - \dfrac{1}{\csc^2\theta}$

4. Write an empirical relationship between the three measures of central tendency i.e. mean, median and mode.

Section-B

Question numbers 5 to 10 carry two marks each.

5. Complete the following factor tree and find the composite numbers, x, y..

```
        ┌───┐
        │ x │
        └───┘
       /     \
  ┌───┐     ┌─────┐
  │ 3 │     │ 195 │
  └───┘     └─────┘
           /       \
       ┌───┐     ┌───┐
       │ 3 │     │ y │
       └───┘     └───┘
                /     \
           ┌───┐     ┌────┐
           │ 5 │     │ 13 │
           └───┘     └────┘
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6. What type of decimal expansion does a rational number has ? How can you distinguish it from decimal expansion of irrational numbers ?

7. Given the linear equation $2x + 3y - 12 = 0$, write another linear equation in these variables, such that the geometrical representation of the pair so formed is :

   (i) parallel lines   (ii) coincident lines

8. In a right angled $\triangle ABC$, $\angle B = 90°$. If $\dfrac{AB}{AC} = \dfrac{1}{\sqrt{2}}$, find $\dfrac{BC}{AC}$.

9. Given $\tan(A + B)$ is not defined and $\cot(A - B) = \sqrt{3}$, find A and B.

10. Given below is a frequency distribution table showing daily income of 100 workers of a factory :

Daily income of workers (in ₹)	200–300	300–400	400–500	500–600	600–700
No. of workers	12	18	35	20	15

Convert this table to a cumulative frequency distribution table of 'more than type'.

Section-C

11. Find the LCM and HCF of 26, 72 and 108 by prime factorization method.

12. Check whether polynomial $x - 3$, is a factor of the polynomial $x^3 - 3x^2 - x + 3$. Verify by divison algorithm.

13. Quadratic polynomial $2x^2 - 3x + 1$ has zeroes as α and β. Now form a quadratic polynomial whose zeroes are 3α and 3β.

14. Solve for x and y :

    $2x - y + 3 = 0$

    $3x - 5y + 1 = 0$

15. In the adjoining figure, two triangles ABC and DBC lie on the same side of BC. P is a point on BC such that PQ ∥ BA and PR ∥ BD. Prove that QR ∥ AD.
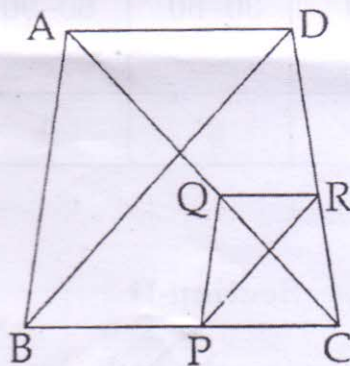
16. In given figure ΔABC is an equilateral triangle, whose each side measures x units. P and Q are two points on BC produced such that PB = BC = CQ.

    Prove that

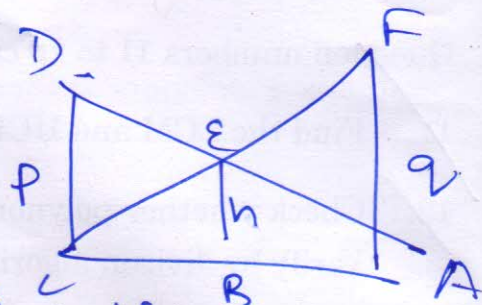   (a) $\dfrac{PQ}{PA} = \dfrac{PA}{PB}$

    (b) $PA^2 = 3x^2$
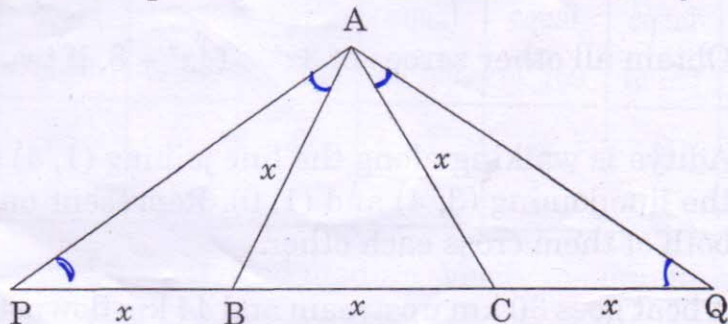
17. Evaluate the following :

$$\frac{2\left(\cos^2 45° + \tan^2 60°\right) - 6\left(\sin^2 45° - \tan^2 60°\right)}{\tan 30° + \cot 60°}$$

18. Prove that :

$$\sqrt{\sec^2 \theta + \csc^2 \theta} = (\tan \theta + \cot \theta)$$

19. Find the mean of the following frequency distribution, using step deviation method :

Class interval	0–10	10–20	20–30	30–40	40–50
Frequency	7	12	13	10	8

20. Following frequency distribution shows the daily expenditure on milk of 30 households in a locality :

Daily expenditure on milk (in ₹)	0–30	30–60	60–90	90–120	120–150
No. of households	5	6	9	6	4

Find the mode of the above data.

Section-D

Question numbers 21 to 31 carry four marks each.

21. Show that $7\sqrt{3} - 3$ is an irrational number.

22. Obtain all other zeroes of $3x^4 - 14x^2 + 8$, if two of its zeroes are $\sqrt{\dfrac{2}{3}}$ and $-\sqrt{\dfrac{2}{3}}$.

23. Aditya is walking along the line joining (1, 4) and (0, 6), Aditi is walking along the line joining (3, 4) and (1, 0). Represent on graph and find the point where both of them cross each other.

24. A boat goes 30 km upstream and 44 km downstream in 10 hours. The same boat goes 40 km upstream and 55 km downstream in 13 hours. On this information some students guessed the speed of the boat in still water as 8.5 km/h and speed

of the stream as 3.8 km/h. Do you agree with their guess ? Explain. What do we learn from the incident ?

25. In $\triangle ABC$, $AD \perp BC$ and point D lies on BC such that 2 DB = 3 CD. Prove that $5\,AB^2 = 5\,AC^2 + BC^2$.
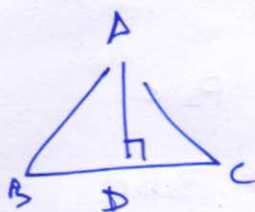
26. Two poles of height 'p' and 'q' metres are standing vertically on a level ground, 'a' metres apart. Prove that the height of the point of intersection of the lines joining the top of each pole to the foot of the opposite pole is given by $\dfrac{pq}{p+q}$.

27. If $\theta = 60°$, show that :

(i) $\sin\theta = \dfrac{\tan\theta}{\sqrt{1+\tan^2\theta}}$

(ii) $\tan\theta = \dfrac{\sqrt{1-\cos^2\theta}}{\cos\theta}$

28. If $\sec\theta = \dfrac{1}{4x} + x$, then prove that $\sec\theta + \tan\theta = 2x$ or $\dfrac{1}{2x}$.

29. Prove that : $\sqrt{\dfrac{\text{cosec } A + 2\cos A}{\text{cosec}A - 2\cos A}} = \dfrac{\sin A + \cos A}{\sin A - \cos A} = \dfrac{\tan A + 1}{\tan A - 1}$

30. The frequency distribution of weekly pocket money received by a group of students is given below :

Pocket money (in ₹)	More than or equal to 20	More than or equal to 40	More than or equal to 60	More than or equal to 80	More than or equal to 100	More than or equal to 120	More than or equal to 140	More than or equal to 160	More than or equal to 180	More than or equal to 200
No.of students	90	76	60	55	51	49	33	12	8	4

Draw a 'more than type' ogive and from it, find median. Verify median by actual calculations.

31. If median of the number of patients attending a hospital is 36, then find the missing frequencies f_1 and f_2 in the following frequency distribution, when it is given that total number of days is 100 :

No. of patients	0–10	10–20	20–30	30–40	40–50	50–60	60–70
No. of days	5	12	f_1	f_2	15	11	14

$BD + DC = BC$

$3BD + \dfrac{2BD}{3} = 3BC$

$5BD = 3BC$

$BD = \dfrac{3BC}{5}$

$\dfrac{\sqrt{cosecA + 2cosA}}{cosecA - 2cosA}$

$\dfrac{cosecA + 2cosA}{\sqrt{cosec^2A - 2cos^2A}}$

$\dfrac{cosecA + 2cosA}{\sqrt{1}}$

$2DB = 3CD$

$DB = \dfrac{3}{2}CD$

$CD = \dfrac{2}{3}BD$

$3DC + 2DC = 5BC$

$5DC = 2BC$

$DC = \dfrac{2BC}{5}$

$\dfrac{9 - 4}{\cancel{25}}$