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SAMPLE PAPER TEST 07 (STANDARD) (2019-20)

SUBJECT: MATHEMATICS
CLASS : X
MAX. MARKS : 80
DURATION : 3 HRS

General Instruction:
(i) All the questions are compulsory.
(ii) The question paper consists of 40 questions divided into 4 sections A, B, C, and D.
(iii) Section A comprises of 20 questions of 1 mark each. Section B comprises of 6 questions of 2 marks each. Section C comprises of 8 questions of 3 marks each. Section D comprises of 6 questions of 4 marks each.
(iv) There is no overall choice. However, an internal choice has been provided in two questions of 1 mark each, two questions of 2 marks each, three questions of 3 marks each, and three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.
(v) Use of calculators is not permitted.

SECTION – A
Questions 1 to 20 carry 1 mark each.

1. If n is an even natural number, then the largest natural number by which n(n + 1)(n + 2) is divisible is
   (a) 6 (b) 8 (c) 12 (d) 24
   Ans: (d) 24

2. The largest number which divides 70 and 125, leaving remainders 5 and 8, respectively, is
   (a) 13 (b) 65 (c) 875 (d) 1750
   Ans: (a) 13

3. The point on the x-axis which if equidistant from the points A(−2, 3) and B(5, 4) is
   (a) (0, 2) (b) (2, 0) (c) (3, 0) (d) (−2, 0)
   Ans: (b) (2, 0)

4. If 3x + 4y : x + 2y = 9 : 4, then 3x + 5y : 3x − y is equal to
   (a) 4 : 1 (b) 1 : 4 (c) 7 : 1 (d) 1 : 7
   Ans: (c) 7 : 1

5. If sec 5A = cosec(A + 30°), where 5A is an acute angle, then the value of A is
   (a) 15° (b) 5° (c) 20° (d) 10°
   Ans: (d) 10°

6. The value of \(\sin^260^0 + 2\tan45^0 - \cos^230^0\) is
   (a) 1 (b) 2 (c) −1 (d) none of these
   Ans: (b) 2

7. If \(\tan A = \frac{5}{12}\), find the value of \((\sin A + \cos A) \cdot \sec A\).
   \(\frac{7}{12}\) (b) \(\frac{17}{12}\) (c) \(\frac{5}{12}\) (d) none of these
   Ans: (b) \(\frac{17}{12}\)

8. Ratio in which the line 3x + 4y = 7 divides the line segment joining the points (1, 2) and (−2, 1) is
   \(\frac{7}{12}\) (b) \(\frac{17}{12}\) (c) \(\frac{5}{12}\) (d) none of these
   Ans: (b) \(\frac{17}{12}\)

Prepared by: M. S. KumarSwamy, TGT(Maths)
(a) 3 : 5  (b) 4 : 6  (c) 4 : 9  (d) none of these

Ans: (c) 4 : 9

9. C is the mid-point of PQ, if P is (4, x), C is (y, -1) and Q is (-2, 4), then x and y respectively are
(a) -6 and 1  (b) -6 and 2  (c) 6 and -1  (d) 6 and -2

Ans: (a) -6 and 1

10. The median class of the following data is:

<table>
<thead>
<tr>
<th>Marks Below 10</th>
<th>Below 20</th>
<th>Below 30</th>
<th>Below 40</th>
<th>Below 50</th>
<th>Below 60</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of students</td>
<td>4</td>
<td>10</td>
<td>18</td>
<td>28</td>
<td>40</td>
</tr>
</tbody>
</table>

(a) 20 – 30  (b) 30 – 40  (c) 40 – 50  (d) 50 – 60

Ans: (c) 40 – 50

11. The 11th term of the AP: -5, -5/2, 0, 5/2, ... is _____

Ans: a = -5, d = 5/2

\[ a_{11} = a + 10d = -5 + 10 \times \frac{5}{2} = -5 + 25 = 20 \]

12. In the below figure, P and Q are points on the sides AB and AC respectively of a triangle ABC. PQ is parallel to BC and divides the triangle ABC into 2 parts, equal in area. The ratio of PA:AB = _____

Ans: 1 : \sqrt{2}

13. The volume (in cm³) of the largest right circular cone that can be cut off from a cube of edge 4.2 cm is _____

Ans: 19.4 cm³.

14. If x = 3 is one zero of the quadratic polynomial \( x^2 - 2kx - 6 \), then the value of k is _____

Ans: \((3)^2 - 2k(3) - 6 = 0 \Rightarrow 9 - 6k - 6 = 0 \Rightarrow 6k = 3 \Rightarrow k = \frac{3}{6} \Rightarrow k = \frac{1}{2} \)

OR

The value(s) of k for which the equation \( x^2 + 5kx + 16 = 0 \) has real and equal roots is _____

Ans: Here, \( a = 1 \), \( b = 5k \), \( c = 16 \)

\[ b^2 - 4ac = 0 \Rightarrow 25k^2 - 4(1)(16) = 0 \Rightarrow 25k^2 = 64 \Rightarrow k^2 = \frac{64}{25} \Rightarrow k = \frac{8}{5} \]

15. The probability of getting a bad egg in a lot of 400 is 0.035. The number of bad eggs in the lot is _____

Ans: No. of bad eggs = 400 x 0.035 = 14

16. In an AP, if the common difference (d) = -4, and the seventh term (a₇) is 4, then find the first term.

Ans: \( a + 6d = 4 \Rightarrow a + 6(-4) = 4 \Rightarrow a - 24 = 4 \Rightarrow a = 28 \)
17. Find the values of \( x \) and \( y \) is the given figure.

\[
\begin{array}{c}
1001 \\
x \\
143 \\
11 \\
y
\end{array}
\]

Ans: \( x = 7, \ y = 13 \)

18. \( AB \) and \( CD \) are two common tangents to circles which touch each other at a point \( C \). If \( D \) lies on \( AB \) such that \( CD = 4 \text{ cm} \) then find \( AB \).

Ans: \( AB = 8 \text{ cm} \)

OR

Two chords \( AB \) and \( CD \) of a circle intersect at \( E \) such that \( AE = 2.4 \text{ cm}, \ BE = 3.2 \text{ cm} \) and \( CE = 1.6 \text{ cm} \). Find the length of \( DE \).

Ans: \( DE = 4.8 \text{ cm} \)

19. If \( \alpha, \beta \) are the roots of the quadratic equation \( x^2 - p(x + 1) - c = 0 \), then find the value of \( (\alpha + 1)(\beta + 1) \)

Ans: Here, \( \alpha + \beta = -p \) and \( \alpha\beta = -p - c \)

\[(\alpha + 1)(\beta + 1) = \alpha\beta + \alpha + \beta + 1 = -p - c - p + 1 = 1 - c \]

20. The areas of two similar triangles \( ABC \) and \( PQR \) are in the ratio \( 9 : 16 \). If \( BC = 4.5 \text{ cm} \), then find the length of \( QR \).

Ans: \( QR = 6 \text{ cm} \)

### SECTION – B

Questions 21 to 26 carry 2 marks each.

21. The radii of two concentric circles are 13 cm and 8 cm. \( AB \) is a diameter of the bigger circle and \( BD \) is a tangent to the smaller circle touching it at \( D \) and intersecting the larger circle at \( P \) on producing. Find the length of \( AP \).

Ans: \( \angle APB = 90^\circ \) (angle in semi-circle)

\( \angle ODB = 90^\circ \) (radius is perpendicular to tangent)

We know that perpendicular from centre to the chord bisect the chord. So, \( BD = PD \)

By converse of Midpoint theorem, \( OD \parallel AP \) and then \( \triangle ABP \sim \triangle OBD \) by AA Similarity

\[
\Rightarrow \frac{AB}{OB} = \frac{AP}{OD} \Rightarrow \frac{26}{13} = \frac{AP}{8} \Rightarrow AP = 16 \text{ cm}
\]
22. In the given figure, express \( x \) in terms of \( a, b \) and \( c \).

![Diagram of triangle with angles and sides labeled: \( M, N, K, P, L \) and \( a, b, c, x, 46^\circ \)]

**Ans:** In \( \triangle KPN \) and \( \triangle KLM \), we have

\[
\angle KNP = \angle KML = 46^\circ
\]

\( \angle K = \angle K \) (Common)

\( \triangle KNP \sim \triangle KML \) (By AA criterion of similarity)

\[
\frac{KN}{KM} = \frac{NP}{ML} \Rightarrow \frac{c}{b+c} = \frac{x}{a} \Rightarrow x = \frac{ac}{b+c}
\]

**OR**

It is given that, \( \triangle ABC \sim \triangle EDF \) such that \( AB = 5 \text{ cm} \), \( AC = 7 \text{ cm} \), \( DF = 15 \text{ cm} \) and \( DE = 12 \text{ cm} \), then find the sum of the remaining sides of the triangles.

**Ans:** Given that \( \triangle ABC \sim \triangle EDF \)

\[
\frac{AB}{ED} = \frac{AC}{EF} = \frac{BC}{DF} \Rightarrow \frac{5}{12} = \frac{7}{EF} = \frac{BC}{15}
\]

Now, \( \frac{5}{12} = \frac{7}{EF} \Rightarrow EF = 16.8 \text{ cm} \) and \( \frac{5}{12} = \frac{BC}{15} \Rightarrow BC = 6.25 \text{ cm} \)

Sum of the remaining sides of triangle = \( EF + BC = 16.8 + 6.25 = 23.05 \text{ cm} \)

23. A tree breaks due to storm and the broken part bends so that the top of the tree touches the ground making an angle \( 30^\circ \) with it. The distance between the foot of the tree to the point where the top touches the ground is \( 8 \text{ m} \). The teacher asked the students to find the height of the tree. All the students failed but Neeraj took initiative and calculated it correctly using trigonometry. What height Neeraj calculated?

**Ans:** NCERT Exercise 9.1 Q2 (Height of the tree = \( 8\sqrt{3} \text{ m} \))

24. A juice seller was serving his customers using glasses as shown in below figure. The inner diameter of the cylindrical glass was \( 5 \text{ cm} \), but the bottom of the glass had a hemispherical raised portion which reduced the capacity of the glass. If the height of a glass was \( 10 \text{ cm} \), find its actual capacity of the glass. (Use \( \pi = 3.14 \).)

![Diagram of cylindrical glass with hemispherical bottom]

**Ans:** NCERT Surface Areas and Volumes Example 6, p-246

25. If 7 times the 7th term of an A.P is equal to 11 times its 11th term, then find its 18th term.

**Ans:**

\[
7a_7 = 11a_{11} \quad \Rightarrow \quad 7(a + 6d) = 11(a + 10d)
\]

\[
\Rightarrow a + 17d = 0 \quad \Rightarrow \quad a_{18} = 0
\]
26. A card is drawn at random from a well shuffled deck of 52 cards. Find the probability of getting neither a red card nor a queen.

Ans: Probability of either a red or a queen = \( \frac{26+2}{52} = \frac{28}{52} \)

\[ P(\text{neither red card nor a queen}) = 1 - \frac{28}{52} = \frac{24}{52} \]

OR

Two different dice are tossed together. Find the probability:
(i) of getting a doublet
(ii) of getting a sum 10, of the numbers on the two dice.

Ans: Total number of outcomes = 36

(i) Total number of doublets = 6. Required probability = \( \frac{6}{36} = \frac{1}{6} \)

(ii) Total number of favourable outcomes = 3. Required probability = \( \frac{3}{36} = \frac{1}{12} \)

SECTION – C

Questions 27 to 34 carry 3 marks each.

27. There sets of Mathematics, Science and Biology books have to be stacked in such a way that all the books are stored subject wise and the height of each stack is the same. The number of Mathematics books is 240, the number of Science books is 960 and the number of Biology books is 1024. Find the number of stack of Mathematics, Science and Biology books, assuming that the books are of the same thickness.

Ans: The prime factorisation of 240, 960 and 1024 is given below:

\[ 240 = 2 \times 2 \times 2 \times 2 \times 3 \times 5 = 2^4 \times 3 \times 5 \]
\[ 960 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 5 = 2^6 \times 3 \times 5 \]
\[ \text{and } 1024 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 2^{10} \]

HCF of 240, 960 and 1024 = \( 2^4 = 16 \)

Hence, there must be 16 books in each stack.

Now, number of stacks of Mathematics books = \( \frac{240}{16} = 15 \)

Number of stacks of Science books = \( \frac{960}{16} = 60 \)

and, number of stacks of Biology books = \( \frac{1024}{16} = 64 \)

OR

Find HCF of 81 and 237 and express it as a linear combination of 81 and 237.

Ans: By using Euclid’s Division Lemma, we have

\[ 237 = 81 \times 2 + 75 \quad \text{...(1)} \]
\[ 81 = 75 \times 1 + 6 \quad \text{...(2)} \]
\[ 75 = 6 \times 12 + 3 \quad \text{...(3)} \]
\[ 6 = 3 \times 2 + 0 \quad \text{...(4)} \]

Hence, H CF (81,237) = 3.

In order to write 3 in the form of 81x + 237y ,
\[ 3 = 75 - 6 \times 12 \]
\[ = 75 - (81 - 75 \times 1) \times 12 \quad \text{[Replace 6 from (2)]} \]
\[ = 75 - 81 \times 12 + 75 \times 12 \]
\[ = 75 + 75 \times 12 - 81 \times 12 \]
\[ = 75(1 + 12) - 81 \times 12 \]
\[ = 75 \times 13 - 81 \times 12 \]
\[ = 13(237 - 81 \times 2) - 81 \times 12 \quad \text{[Replace 75 from (1)]} \]
\[ = 13 \times 237 - 81 \times 2 \times 13 - 81 \times 12 \]
\[ = 237 \times 13 - 81(26 + 12) \]
\[ = 237 \times 13 - 81 \times 38 \]
\[= 81x(-38) + 237 \times (13)\]
\[= 81x + 237y\]
Hence \(x = -38\) and \(y = 13\). These values of \(x\) and \(y\) are not unique.

28. Find all zeroes of the polynomial \((2x^4 - 9x^3 + 5x^2 + 3x - 1)\) if two of its zeroes are \((2 + \sqrt{3})\) and \((2 - \sqrt{3})\).

**Ans:**
\[p(x) = 2x^4 - 9x^3 + 5x^2 + 3x - 1\]
\[2 + \sqrt{3}\] and \[2 - \sqrt{3}\] are zeroes of \(p(x)\)
\[\therefore p(x) = (x - 2 - \sqrt{3})(x - 2 + \sqrt{3})g(x) = (x^2 - 4x + 1)g(x)\]
\[(2x^4 - 9x^3 + 5x^2 + 3x - 1) \div (x^2 - 4x + 1) = 2x^2 - x - 1\]
\[\therefore g(x) = 2x^2 - x - 1 = (2x + 1)(x - 1)\]
Therefore other zeroes are \(x = -\frac{1}{2}\) and \(x = 1\).

29. If \(sec \theta + tan \theta = p\), then find the value of \(cosec \theta\).

**Ans:** Given: \(sec \theta + tan \theta = p \quad ----- (i)\)
We know that \(sec^2 \theta - tan^2 \theta = 1 \Rightarrow (sec \theta + tan \theta)(sec \theta - tan \theta) = 1\)
\[\Rightarrow (p)(sec \theta - tan \theta) = 1 \Rightarrow sec \theta - tan \theta = \frac{1}{p} \quad ----- (ii)\]
On solving (i) & (ii), we get
\[sec \theta + tan \theta + sec \theta - tan \theta = p + \frac{1}{p} \Rightarrow 2sec \theta = \frac{p^2 + 1}{p} \Rightarrow sec \theta = \frac{p^2 + 1}{2p}\]
\[cos \theta = \frac{1}{sec \theta} = \frac{2p}{p^2 + 1}\]
Now, \(sin^2 \theta = 1 - cos^2 \theta = 1 - \left(\frac{2p}{p^2 + 1}\right)^2 = \left(\frac{p^2 - 1}{p^2 + 1}\right)^2 \Rightarrow sin \theta = \frac{p^2 - 1}{p^2 + 1}\]

Now, We know that \(cosec \theta = \frac{1}{sin \theta} = \frac{p^2 + 1}{p^2 - 1}\)

OR

Prove that: \(sin \theta (1 + tan \theta) + cos \theta (1 + cot \theta) \equiv sec \theta + cosec \theta\).

**Ans:**
\[LHS = sin \theta (1 + tan \theta) + cos \theta (1 + cot \theta)\]
\[= sin \theta \left(1 + \frac{sin \theta}{cos \theta}\right) + cos \theta \left(1 + \frac{cos \theta}{sin \theta}\right)\]
\[= sin \theta \left(\frac{cos \theta + sin \theta}{cos \theta}\right) + cos \theta \left(\frac{sin \theta + cos \theta}{sin \theta}\right)\]
\[= (cos \theta + sin \theta) \left(\frac{sin \theta + cos \theta}{cos \theta sin \theta}\right)\]
\[= \frac{cos \theta + sin \theta}{cos \theta sin \theta} = cosec \theta + sec \theta = RHS\]

30. In order to complete the project work, Aditya went to a company to collect the data of 280 persons working in the company. After collecting the data, he analyzed the data and prepared a report on the salary of all the employees. Using the report, he drew the following graph as given below. Identify the type of the graph. Construct the frequency distribution table using the given curve and then find the median of the data.
Ans: The frequency distribution table of the data:

<table>
<thead>
<tr>
<th>Salary (in thousand Rs.)</th>
<th>No. of persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5 – 7.5</td>
<td>49</td>
</tr>
<tr>
<td>7.5 – 12.5</td>
<td>133</td>
</tr>
<tr>
<td>12.5 – 17.5</td>
<td>63</td>
</tr>
<tr>
<td>17.5 – 22.5</td>
<td>15</td>
</tr>
<tr>
<td>22.5 – 27.5</td>
<td>6</td>
</tr>
<tr>
<td>27.5 – 32.5</td>
<td>7</td>
</tr>
<tr>
<td>32.5 – 37.5</td>
<td>4</td>
</tr>
<tr>
<td>37.5 – 42.5</td>
<td>2</td>
</tr>
<tr>
<td>42.5 – 47.5</td>
<td>1</td>
</tr>
</tbody>
</table>

No. of persons

\[ \text{Median Class is } 7.5 - 12.5 \]

Median = \( l + \frac{h}{f} \left( \frac{n}{2} - cf \right) \]

\[ = 7.5 + \frac{3.42}{133} (140 - 49) \]

\[ = 7.5 + 3.42 = 10.92 \]

31. To raise social awareness about hazards of smoking, a school decided to start "No Smoking" campaign. 10 students are asked to prepare campaign banners for four places A, B, C and D so that ABCD will form a parallelogram. If A(–2, 1), B(a, 0), C(4, b) and D(1, 2) are the vertices of a parallelogram ABCD, find the values of a and b. Hence find the lengths of its sides.

Ans: Diagonals of parallelogram bisect each other

⇒ midpoint of AC = midpoint of BD

\[ \left( \frac{a + 1}{2}, \frac{2}{2} \right) = \left( \frac{-2 + 4}{2}, \frac{b + 1}{2} \right) \Rightarrow \frac{a + 1}{2} = 1 \Rightarrow a = 1 \text{ and } \frac{b + 1}{2} = 1 \Rightarrow b = 1 \]

Length of its sides are \( \sqrt{10} \) units each

32. A boat goes 30 km upstream and 44 km downstream in 10 hours. In 13 hours, it can go 40 km upstream and 55 km down-stream. Determine the speed of the stream and that of the boat in still water.

Ans: NCERT Pair of linear equations in two variables Example 19 p-65

OR
33. Solve the pair of linear equations:

\[(a - b)x + (a + b)y = a^2 - 2ab - b^2\]
\[(a + b)(x + y) = a^2 + b^2\]

Ans: NCERT Exercise 3.7 Q7(iv)

33. In the below figure, two circular flower beds have been shown on two sides of a square lawn ABCD of side 56 m. If the centre of each circular flower bed is the point of intersection O of the diagonals of the square lawn, find the sum of the areas of the lawn and the flower beds.

![Diagram of a square lawn with two circular flower beds]

Ans: NCERT Areas Related to Circles Example 4 p-231

34. The sum of four consecutive numbers in an AP is 32 and the ratio of the product of the first and the last term to the product of two middle terms is 7 : 15. Find the numbers.

Ans: Let the four consecutive terms of the AP be \(a - 3d, a - d, a + d, a + 3d\)

According to the given conditions, 
\[a - 3d + a - d + a + d + a + 3d = 32 \Rightarrow 4a = 32 \Rightarrow a = 8\]

and 
\[
\frac{(a - 3d)(a + 3d)}{(a - d)(a + d)} = \frac{7}{15} \Rightarrow 8a^2 = 128d^2 \Rightarrow d^2 = 4 \Rightarrow d = \pm 2
\]

\[\therefore \text{Numbers are 2, 6, 10, 14 or 14, 10, 6, 2}\]

SECTION – D

Questions 35 to 40 carry 4 marks each.

35. A plane left 30 minutes late than its scheduled time and in order to reach the destination 1500 km away in time, it had to increase its speed by 100 km/h from the usual speed. Find its usual speed.

Ans:

Let the usual speed of the plane be \(x\) km/hr.

\[\therefore \frac{1500}{x} - \frac{1500}{x + 100} = \frac{30}{60} \Rightarrow x^2 + 100x - 300000 = 0\]

\[\Rightarrow x^2 + 600x - 500x - 300000 = 0 \Rightarrow (x + 600)(x - 500) = 0\]

\[x \neq -600, \quad \therefore x = 500\]

Speed of plane = 500 km/hr

OR
A train takes 2 hours less for a journey of 300km if its speed is increased by 5 km/h from its usual speed. Find the usual speed of the train.

**Ans:** Let the usual speed of the train be \( x \) km/h

According to the statement, \[
\frac{300}{x} - \frac{300}{x + 5} = 2
\]

\[\Rightarrow x^2 + 5x - 750 = 0 \Rightarrow (x + 30)(x - 25) = 0 \Rightarrow x = -30, 25\]

\[\therefore \text{Usual Speed of the train} = 25 \text{ km/h}\]

36. A man on the top of a vertical observation tower observes a car moving at a uniform speed coming directly towards it. If it takes 12 minutes for the angle of depression to change from 30° to 45°, how long will the car take to reach the observation tower from this point?

**Ans:**

Let the speed of car be \( x \) m/ minutes

In \( \triangle ABC \), \[\frac{h}{y} = \tan 45^0 \Rightarrow h = y\]

In \( \triangle ABD \), \[\frac{h}{y + 12x} = \tan 30^0\]

\[\Rightarrow h\sqrt{3} = y + 12x\]

\[y\sqrt{3} - y = 12x\]

\[y = \frac{12x}{\sqrt{3} - 1} = \frac{12x(\sqrt{3} + 1)}{2}\]

\[\Rightarrow y = 6x(\sqrt{3} + 1)\]

Time taken from \( C \) to \( B \) = \( 6(\sqrt{3} + 1) \) minutes

37. Draw a triangle \( ABC \) with \( BC = 6 \text{ cm}, AB = 5 \text{ cm} \) and \( \angle ABC = 60^\circ \). Then construct a triangle whose sides are \( \frac{7}{4} \) of the corresponding sides of the \( \triangle ABC \).

**OR**

Draw a line segment \( AB \) of length 8 cm. Taking \( A \) as centre, draw a circle of radius 4 cm and taking \( B \) as centre, draw another circle of radius 3 cm. Construct tangents to each circle from the centre of the other circle.

38. Prove that "The ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides."

39. Water is flowing at the rate of 15 km per hour through a pipe of diameter 14cm into a rectangular tank which is 50 m long and 44 m wide. Find the time in which the level of water in the tank will rise by 21 cm.

**Ans:** Volume of water flowing through pipe in 1 hr = \[\frac{22}{7} \times 15 \times 1000 \times \frac{7}{100} \times \frac{7}{100} = 231 \text{ m}^3\]

Volume of rectangular tank = \[50 \times 44 \times \frac{21}{100} = 22 \times 21 \text{ m}^3\]
Time taken to flow $231 \text{ m}^3$ of water = 1 hours

\[ \therefore \text{Time taken to flow } 22 \times 21 \text{ m}^3 \text{ of water} = \frac{1}{231} \times 22 \times 21 = 2 \text{ hours} \]

**OR**

The diameters of the lower and upper ends of a bucket in the form of a frustum of a cone are 10 cm and 30 cm respectively. If its height is 24 cm, find the area of the metal sheet used to make the bucket. [Use $\pi = 3.14$]

**Ans:**

Here $r_1 = 15 \text{ cm}$, $r_2 = 5 \text{ cm}$ and $h = 24 \text{ cm}$

Area of metal sheet = CSA of the bucket + area of lower end

\[ = \pi l(r_1 + r_2) + \pi r_1^2 \]

where $l = \sqrt{24^2 + (15 - 5)^2} = 26 \text{ cm}$

\[ \therefore \text{Surface area of metal sheet} = 3.14(26 \times 20 + 25) \text{ cm}^2 = 1711.3 \text{ cm}^2 \]

40. The mean of the following distribution is 18. Find the frequency $f$ of the class 19 – 21.

<table>
<thead>
<tr>
<th>Class</th>
<th>11 - 13</th>
<th>13 - 15</th>
<th>15 - 17</th>
<th>17 - 19</th>
<th>19 - 21</th>
<th>21 - 23</th>
<th>23 - 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>3</td>
<td>6</td>
<td>9</td>
<td>13</td>
<td>$f$</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

**Ans:**

Mean $= 18 = \frac{704 + 20f}{40 + f} \Rightarrow 720 + 18f = 704 + 20f \Rightarrow f = 8$