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THENI DT. - MATHEMATICS

# MOCK TEST - 1

## 2 mark questions

1) If $A = \{1, 3, 5\}$ and $B = \{2, 3\}$ then find $A \times B$ and $B \times A$.

2) 'a' and 'b' are two positive integers such that $a^b \times b^a = 800$. Find 'a' and 'b'.

3) Simplify: $\frac{x^3}{x-y} + \frac{y^3}{y-x}$.

4) If $A = \begin{pmatrix} 0 & 4 & 9 \\ 8 & 3 & 7 \end{pmatrix}$, $B = \begin{pmatrix} 7 & 3 & 8 \\ 1 & 4 & 9 \end{pmatrix}$ find the value of $3A - 2B$.

5) If $\triangle ABC$ is similar to $\triangle DEF$ such that $BC = 2$ cm, $EF = 4$ cm and area of $\triangle ABC = 54$ cm$^2$. Find area of $\triangle DEF$.

6) Find the slope of a line joining the points $(5, \sqrt{5})$ with the origin.

7) Prove that,
$\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \operatorname{cosec}\theta + \cot\theta$.

8) A cylindrical drum has a height of 20 cm and base radius of 14 cm. Find its curved surface area and the total surface area.

9) Find the range and coefficient of range of the following data:
25, 67, 48, 53, 18, 39, 44.

10) Two coins are tossed together. What is the probability of getting different faces on the coins?

11) A bag contains 5 blue balls and 4 green balls. A ball is drawn at random from the bag. Find the probability that the ball drawn is (i) blue (ii) not blue.

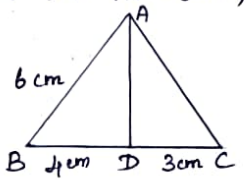
12) A Relation R is given by the set $\{(x, y) \mid y = x + 3, x \in \{0, 1, 2, 3, 4, 5\}\}$. Determine its domain and range.

13) Find the 19th term of an A.P. $-11, -15, -19, \ldots$

14) Find the square root of $\frac{400\, x^4 y^{12} z^{16}}{100\, x^8 y^4 z^4}$.

15) If $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$, prove that $AA^T = I$.

16) In the figure, AD is the bisector of $\angle A$. If BD = 4 cm, DC = 3 cm and AB = 6 cm, find AC.




17) Show that the points P(−1·5, 3), Q(6, −2), R(−3, 4) are collinear.

18) Find the angle of elevation of the top of a tower from a point on the ground, which is 30 m away from the foot of a tower of height $10\sqrt{3}$ m.

19) If the total surface area of a cone of radius 7 cm is 704 cm$^2$, then find its slant height.

20) Find the standard deviation of first 21 natural numbers.

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21) What is the probability that a leap year selected at random will contain 53 saturdays.

22) Let $A = \{1, 2, 3, 4, \ldots, 45\}$ and R be the relation defined as "is square of a number" on A. Write R as a subset of AXA. Also find domain and range of R.

23) If $3+K, 18-K, 5K+1$ are in A.P. then find K.

24) Determine the quadratic equation, whose sum and product of roots are $-9$ and 20.

25) Find the equation of a straight line which has slope $\frac{-5}{4}$ and Passing through the point $(-1, 2)$.

26) Prove that $\sec\theta - \cos\theta = \tan\theta \sin\theta$

27) Find the diameter of a Sphere whose surface area is $154\ m^2$.

28) Find the equation of a straight line passing through $(5, -3)$ and $(7, -4)$

29) If the mean and coefficient of Variation of a data are 15 and 48 respectively, then find the Value of Standard deviation.

30) check whether the given lines are parallel or perpendicular $5x + 23y + 14 = 0$ and $23x - 5y + 9 = 0$

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# MOCK TEST - 2

## 2 mark questions

1. If $A = \{1, 3, 5\}$ and $B = \{2, 3\}$ then show that $n(A \times B) = n(B \times A) = n(A) \times n(B)$.

2. If $P^2 \times q^1 \times r^4 \times s^3 = 3,15,000$ then find P, q, r, and s.

3. Simplify: $\frac{5t^3}{4t-8} \times \frac{6t+12}{10t}$

4. If $A = \begin{bmatrix} 0 & 4 & 2 \\ 8 & 5 & 7 \end{bmatrix}$, $B = \begin{bmatrix} 7 & 3 & 8 \\ 1 & 4 & 9 \end{bmatrix}$ find the value of $B - 5A$.

5. In $\Delta ABC$, D and E are points on the sides AB and AC respectively. Show that $DE \parallel BC$. $AB = 12$ cm, $AD = 8$ cm, $AE = 12$ cm and $AC = 18$ cm.

6. The line 'p' passes through the points $(3, -2)$, $(12, 4)$ and the line 'q' passes through the points $(6, -2)$ and $(12, 2)$. Is 'p' Parallel to 'q'?

7. prove the identity:
$$\sqrt{\frac{1+\sin\theta}{1-\sin\theta}} = \sec\theta + \tan\theta$$

8. Find the volume of a cylinder whose height is 2m and whose base area is $250\,m^2$.

9. If the range and the smallest value of a set of data are 36.8 and 13.4 respectively, then find the largest value.

10. Write the sample space for tossing three coins using tree diagram.

11. A cat is located at the point $(-6, -4)$ in xy plane. A bottle of milk is kept at $(5, 11)$. The cat wishes to consume the milk travelling through shortest possible distance. Find the equation of the path it needs to take the milk.

12. If the base area of a hemispherical solid is 1386 sq. metres then find its total surface area?

13. Show that the function $f: N \to N$ defined by $f(m) = m^2 + m + 3$ is one-one function.

14. Find the least number that is divisible by the first ten natural numbers.

15. Find the sum and product of the roots of the quadratic equation $2x^2 + 5x + 7 = 0$.

16. Find the equation of a line whose intercepts on the x and y axes are 4 and -6.

17. Prove the identity:
$$\frac{\cos\theta}{1+\sin\theta} = \sec\theta - \tan\theta$$

18. Find the Volume of the iron used to make a hollow cylinder of height 9cm and whose internal and external radii are 3cm and 5cm respectively.

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19. A die is rolled and a coin is tossed simultaneously. Find the probability that the die shows an odd number and the coin shows a head.

20. prove that $\frac{\sin A}{1+\cos A} = \frac{1-\cos A}{\sin A}$

21. If A is an event of a random experiment such that $P(A) : P(\bar{A}) = 17 : 15$ and $n(S) = 640$ then find (i) $P(\bar{A})$ (ii) $n(A)$

22. If the standard deviation of a data is 3.6 and each value of the data is divided by 3, then find the new variance and new standard deviation.

23. The radius of a sphere increases by 25%. Find the Percentage increase in its surface area.

24. Find K if $fof(k) = 5$ where $f(K) = 2K - 1$.

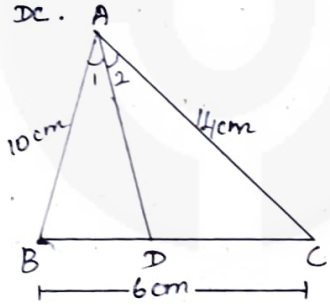
25. Find the sum $3 + 1 + \frac{1}{3} + \ldots \infty$

26. Determine the nature of roots for the quadratic equation $x^2 - x - 20 = 0$.

27. Find the values of x, y and z from the following equation.

$$\begin{bmatrix} 12 & 3 \\ x & 5 \end{bmatrix} = \begin{bmatrix} y & z \\ 3 & 5 \end{bmatrix}$$

28. In the figure ; AD is the bisector of $\angle BAC$, if AB = 10cm, AC = 14cm and BC = 6cm. Find BD and DC.




29. Find the equation of a straight line which is parallel to the line $3x - 7y = 12$ and passing through the Point (6, 4).

30. A kite is flying at a height of 75m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is 60°. Find the length of the string, assuming that there is no slack in the string.

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# MOCK TEST - 3

## 2 mark questions

1. Let $A = \{1, 2, 3\}$ and $B = \{x \mid x$ is a prime number less than $10\}$. Find $A \times B$ and $B \times A$.

2. If $13824 = 2^a \times 3^b$, then find a and b.

3. Find $\frac{x^2-16}{x+4} \div \frac{x-4}{x+4}$.

4. If a matrix has 18 elements, What are the possible orders it can have? What if it has 6 elements?

5. D and E are respectively the points on the sides AB and AC of a $\triangle ABC$ such that AB = 5.6 cm, AD = 1.4 cm, AC = 7.2 cm and AE = 1.8 cm, Show that DE // BC.

6. Find the slope of a line joining the points $(\sin\theta, -\cos\theta)$ and $(-\sin\theta, \cos\theta)$.

7. A tower stands vertically on the ground. From a point on the ground, which is 48m away from the foot of the tower, the angle of elevation of the top of the tower is 30°. Find the height of the tower.

8. The Volume of a solid right circular cone is 11088 $cm^3$. If its height is 24cm then find the radius of the cone.

9. Find the range and coefficient of range of the following data.
43.5, 13.6, 18.9, 38.4, 61.4, 29.8

10. A coin is tossed thrice. What is the probability of getting two consecutive tails?

11. The mean of a data is 25.6 and its coefficient of Variation is 18.75. Find the standard deviation.

12. The radius of a spherical balloon increases from 12cm to 16 cm as air being pumped into it. Find the ratio of the surface area of the balloons in the two cases.

13. prove that $\frac{\sec\theta}{\sin\theta} - \frac{\sin\theta}{\cos\theta} = \cot\theta$

14. Find the equation of a straight line whose slope is 5 and y intercept is -9.

15. A man goes 18m due east and then 24m due north. Find the distance of his current Position from the starting point?

16. If $A = \begin{bmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & 5/2 \\ 8 & 3 & 1 \end{bmatrix}$

then verify $(A^T)^T = A$.

17. Determine the nature of roots for the following quadratic equation.

18. Let $f(x) = 2x + 5$. If $x \neq 0$ then find $\frac{f(x+2) - f(2)}{x}$

19. In a theatre, there are 20 seats in the front row and 30 rows were allotted. Each successive row contains two additional seats than its front row. How many seats are there in the last row?

20. Find the sum of first 15 terms of the A.P. $8, 7\frac{1}{4}, 6\frac{1}{2}, 5\frac{3}{4}, \ldots$

21. Given $f(x) = 2x - x^2$, find (i) $f(1)$ (ii) $f(x+1)$ (iii) $f(x) + f(1)$.

22. Write down the quadratic equation in general form for which sum and product of the roots are 9 and 14 respectively.

23. construct a $3 \times 3$ matrix whose elements are given by $a_{ij} = |i - 2j|$.

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24. Check whether AD is bisector of $\angle A$ of $\Delta ABC$ for $AB = 5cm$, $AC = 10cm$, $BD = 1.5cm$ and $CD = 3.5cm$.

25. The line 'r' passes through the points $(-2, 2)$ and $(5, 8)$ and the line 's' passes through the points $(-8, 7)$ and $(-2, 0)$. Is the line 'r' perpendicular to 's'?

26. A player sitting on the top of a tower of height 20m observes the angle of depression of a ball lying on the ground as $60°$. Find the distance between the foot of the tower and the ball. ($\sqrt{3} = 1.732$)

27. If the ratio of radii of two spheres is 4:7, find the ratio of their volumes.

28. If $P(A) = \frac{2}{3}$, $P(B) = \frac{2}{5}$, $P(A \cup B) = \frac{1}{3}$ then find $P(A \cap B)$.

29. A wall clock strikes the bell once at 1 0' clock, 2 times at 2 0' clock, 3 times at 3 0' clock and so on. How many times will it strike in a Particular day. Find the standard deviation of the number of strikes the bell make a day.

30. If A and B are two mutually exclusive events of a random experiment and $P(\text{not } A) = 0.45$, $P(A \cup B) = 0.65$, then find $P(B)$.

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# MOCK TEST - 4

## 2 mark questions

1) A and B are two events such that, $P(B) = 0.48$, and $P(A) = 0.42$, and $P(A \cap B) = 0.16$. Find (i) P(not A) (ii) P(not B) (iii) P(A or B).

2) The standard deviation and coefficient of variation of a data are 1.2 and 25.6 respectively. Find the value of mean.

3) If the circumference of a conical wooden piece is 484 cm then find its volume when its height is 105 cm.

4) The horizontal distance between two buildings is 140m. The angle of depression of the top of the first building when seen from the top of the second building is 30°. If the height of the first building is 60m, find the height of the second building. ($\sqrt{3} = 1.732$)

5) Show that the straight lines $x - 2y + 3 = 0$ and $6x + 3y + 8 = 0$ are perpendicular.

6) If $\Delta ABC \sim \Delta DEF$ such that area of $\Delta ABC$ is $9\,cm^2$ and the area of $\Delta DEF$ is $16\,cm^2$ and $BC = 2.1\,cm$. Find the length of EF.

7) Verify that $A^2 = I$ when $A = \begin{bmatrix} 5 & -4 \\ 6 & -5 \end{bmatrix}$

8) Simplify: $\frac{P^2 - 10P + 21}{P - 7} \times \frac{P^2 + P - 12}{(P-3)^2}$

9) Find the number of terms in the A.P. 3, 6, 9, 12, ..., 111.

10. Let $f(x) = x^2 - 1$. Find (i) fof (ii) fofof.

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11) Find the indicated terms of the sequences whose $n^{th}$ terms are given by $a_n = \frac{5n}{n+2}$; $a_6$ and $a_{13}$.

12) Find $A \times B$, $A \times A$ and $B \times A$, if $A = \{2, -2, 3\}$ and $B = \{1, -4\}$

13) Find the sum of 8 terms of the G.P. 1, -3, 9, -27...

14) Find the sum and product of the roots of the quadratic equation $x^2 + 3x = 0$.

15) Find the value of k for which the equation $9x^2 + 3kx + 4 = 0$ has real and equal roots.

16) If $A = \begin{bmatrix} \sqrt{7} & -3 \\ -\sqrt{5} & 2 \\ \sqrt{3} & -5 \end{bmatrix}$ then find the transpose of $-A$.

17) In $\Delta ABC$, D and E are points on the sides AB and AC respectively such that $DE \parallel BC$. If $\frac{AD}{DB} = \frac{3}{4}$ and $AC = 15\,cm$. Find AE.

18) Determine whether the sets of points are collinear?
$(a, b+c)$, $(b, c+a)$, $(c, a+b)$

19) Prove the Identity :
$\cot\theta + \tan\theta = \sec\theta \cdot \operatorname{cosec}\theta$.

20) The radius and height of a cylinder are in the ratio 5:7 and its curved surface area is 5500 sq.cm. Find its radius and height.

21) Express the sample space for rolling two dice using tree diagram.

22) The range of a set of data is 13.67 and the largest value is 70.08. Find the smallest value.

23) If the radii of the circular ends of a frustum which is 45 cm high are 28 cm and 7 cm, find the volume of the frustum.

24) The horizontal distance between two buildings is 70 m. The angle of depression of the top of the first building when seen from the top of the second building is 45°. If the height of the second building is 120 m, find the height of the first building.

25) Calculate the slope and y intercept of the straight line $8x - 7y + 6 = 0$.

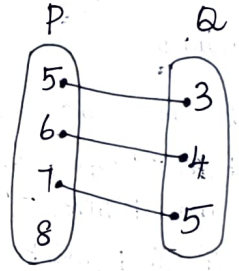
26) The perimeters of two similar triangles ABC and PQR are respectively 36 cm and 24 cm. If PQ = 10 cm, find AB.

27) Find the values of x, y and z from the following equations.

$$\begin{bmatrix} x+y & 2 \\ 5+z & xy \end{bmatrix} = \begin{bmatrix} 6 & 2 \\ 5 & 8 \end{bmatrix}$$

28) Write an A.P. whose first term is 20 and common difference is 8.

29) The arrow diagram shows a relationship between the sets P and Q. Write the relation in (i) Set builder form (ii) Roster form.




30) Let $A = \{1, 2, 3, 4\}$ and $B = N$. Let $f : A \to B$ be defined by $f(x) = x^3$ then, (i) find the range of f. (ii) identify the type of function.

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# MOCK TEST - 5

## 2 mark questions

1. The product of Kumaran's age (in years) two years ago and his age four years from now is one more than twice his present age. What is his Present age?

2. $1^3+2^3+3^3+\dots+K^3 = 16900$ then find $1+2+3+\dots+K$.

3. A cone of height 24cm is made up of mudding clay. A child reshapes it in the form of a cylinder of same radius as cone. Find the height of the cylinder.

4. check whether $fog = gof$ if $f(x) = x-6$, $g(x) = x^2$.

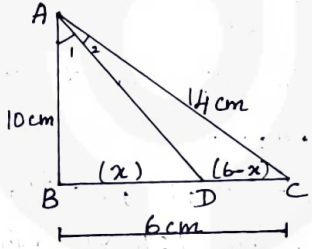
5. Prove that $\tan^2\theta - \sin^2\theta = [\tan^2\theta \cdot \sin^2\theta]$

6. Determine the nature of the roots for the quadratic equation $15x^2+11x+2=0$.

7. The curved surface area of a right circular cylinder of height 14cm is $88cm^2$. Find the diameter of the cylinder.

8. Simplify : $\frac{x+2}{4y} \div \frac{x^2-x-6}{12y^2}$

9. In the figure AD is bisector of $\angle BAC$. If AB = 10cm, AC = 14cm and BC = 6cm. Find BD and DC.




10. The radius of a conical tent is 7m, and height is 24m. calculate the length of the canvase used to make the tent if the width of the rectangular canvase is 4m.

11. A and B are two candidates seeking admission to IIT. The Probability that A getting selected is 0.5 and the probability that both A and B getting selected is 0.3. Prove that probability of B being selected is at the most 0.8.

12. If $A=\{5,6\}$, $B=\{4,5,6\}$, $C=\{5,6,7\}$. Show that $(A\times A) = (B\times B) \cap (C\times C)$.

13. Find the Value of $x$, if in $x^2-4x-12$.

14. A bag contain 5 red balls, 6 white balls, 7 green balls, 8 black balls. One ball is drawn at random from the bag. Find the probability that the ball drawn is (i) White (ii) Black or Red.

15. Which term of an A.P 16, 11, 6, 1, ... is -54?

16. Find the excluded values of the following expressions.

$$\frac{7P+2}{8P^2+13P+5}$$

17. The Volumes of two cones of a same base radius are 3600 $cm^3$ and 5040 $cm^3$. Find the ratio of heights.

18. Determine the nature of the roots for the quadratic equation $15x^2+11x+2=0$.

19. Show that the points $(-3,-4)$, $(7,2)$ and $(12,5)$ are collinear.

20. Find the intercepts made by the line $3x-2y-6=0$ on the co-ordinate axes.

21. The height of two right circular cones are in the ratio 1:2 and the perimeters of their bases are in the ratio 3:4. Find the ratio of their Volumes.

22. The Standard deviation and Mean of data 6.5 and 12.5. Find the coefficient of Variation.

23. A relation 'f' is defined by $f(x)=x^2-2$ where $x \in \{-2,-1,0,3\}$ (i) list the element of 'f'. (ii) is 'f' a function.

24. Find the intercept made by the line $4x-9y+36=0$ on the co-ordinate axes.

25. Find the 8th term of G.P $\frac{1}{2}, 1, 2, 4, \ldots$

26. Let $A=\{-1,1\}$, $B=\{0,2\}$. If the function $f: A \to B$ defined by $f(x)=ax+b$ is an onto function? find 'a' and 'b'.

27. Find the domain and range of the following $R=\{(-2,4), (-1,1), (2,4), (1,1), (-3,9)\}$

28. Let $f=\{(x,y) \mid x,y \in N$ and $y=2x\}$ be a relation on N. Find the domain and co-domain and range. Is the relation a function?

29. Two buildings of different heights are located at opposite sides of each other. If a heavy rod is attached joining the terrace of the buildings from (6,10) to (14,12). Find the equation of the rod joining the buildings?

30. calculate the range,

| Income | 400–450 | 450–500 | 500–550 | 550–600 | 600–650 |
|---|---|---|---|---|---|
| No. of Workers | 8 | 12 | 30 | 21 | 6 |

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# MOCK TEST - 6

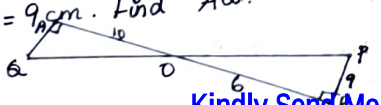
## 2 mark questions.

1) Find the domain of function $f(x) = \sqrt{1+\sqrt{1-\sqrt{1-x^2}}}$.

2) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 2 & -3 \\ -4 & -5 \end{bmatrix}$. find AB, BA and check AB=BA?

3) The slant height of a frustum of a cone is 5cm and the radii of its ends are 4cm and 1cm. Find its curved surface area.

4) In the figure, QA and PB are perpendicular to AB. If AO = 10 cm, BO = 6cm and PB = 9cm. Find AQ.




5) Multiply: $\frac{a^3b^2}{a-1}$ by $\frac{a^2-1}{a^2b^3}$.

6) Represent the function $f(x) = \sqrt{2x^2-5x+3}$ as a composition of two functions

7) Prove that $\frac{\sin A}{1+\cos A} + \frac{\sin A}{1-\cos A} = 2\operatorname{cosec} A$.

8) The probability that atleast one of A and B occur is 0.6. If A and B occur simultaneously with probability 0.2, then find $P(\bar{A}) + P(\bar{B})$.

9) Let f be a function from R to R defined by $f(x) = 3x-5$. find the values of 'a' and 'b' given that (a, 4) and (1, b) belongs to 'f'.

10) Construct a 3×3 matrix whose elements are $a_{ij} = i^2 j^2$.

11) Find the equation of a straight line whose inclination is 60° and y-intercept is '9'.

12) Find the value of 'a' if the line through (-2, 3) and (8, 5) is perpendicular to $y = ax + 2$.

13) A function 'f' is defined by $f(x) = 3-2x$. Find x such that $f(x^2) = (f(x))^2$.

14) Find the equation of a straight line passing through (5, 7) and is (i) parallel to x-axis (ii) parallel to y-axis.

15) Find the sum to infinity of $9+3+1+\ldots$

16) A garden roller whose length is 3m long and whose diameter is 2.8m is rolled to level a garden. How much area will it cover in 8 revolutions?

17) find LCM and GCD:
$(x^2y+xy^2)$, $(x^2+xy)$

18) If $A = \begin{pmatrix} \cos\theta & 0 \\ 0 & \cos\theta \end{pmatrix}$,

$B = \begin{pmatrix} \sin\theta & 0 \\ 0 & \sin\theta \end{pmatrix}$

19) How many terms of the series $1^3+2^3+3^3+\ldots$ should be taken to get the sum 14400?

20) If $A = \begin{pmatrix} 5 & 4 & 3 \\ 1 & -7 & 9 \\ 3 & 8 & 2 \end{pmatrix}$ then find the transpose of A.

21) Find the length of the tangent drawn from a point whose distance from the centre of a circle is 5cm and radius of the circle is 3m.

22) Find the value of K for which the equation $9x^2+3Kx+4=0$ has real and equal roots.

23) Find the sum and product of the roots for the quadratic equation $x^2+8x-65=0$.

24) If the points A(-3,9) B(a,b) and C(4,-5) are collinear and if $a+b=1$ then find 'a' and 'b'.

25) Write an A.P whose first terms is 20 and common difference is 8.

26) The perimeters of two similar triangles ABC and PQR are respectively 36cm and 24cm. If PQ = 10cm, find AB.

27) Find the intercepts made by the line $4x-9y+36=0$ on the coordinate axes.

28) Reduce the rational expressions to its lowest form.

$$\frac{9x^2+81x}{x^3+8x^2-9x}$$

29) If $A = \begin{bmatrix} 7 & 8 & 6 \\ 1 & 3 & 9 \\ -4 & 3 & -1 \end{bmatrix}$,

$B = \begin{bmatrix} 4 & 11 & -3 \\ -1 & 2 & 4 \\ 7 & 5 & 0 \end{bmatrix}$ then find $2A+B$.

30) Find the equation of a line whose intercepts on the x and y axes are (4,-6).

MAY SUCCESS BE WITH YOU ALWAYS

Wishing You GOOD LUCK...

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MATHEMATICS

# MOCK TEST - 7

## 2 mark questions

1) Let $f = \{(1,3), (0,-1), (2,-9)\}$ be a linear function from Z into Z. Find $f(x)$.

2) find $a_8$ and $a_{15}$ whose $n^{th}$ term is $a_n = \begin{cases} \frac{n^2-1}{n+3}, & n \text{ is even}, n \in N \\ \frac{n^2}{2n+1}, & n \text{ is odd}, n \in N \end{cases}$

3) find the square root of $\frac{121(a+b)^8(x+y)^8(b-c)^8}{81(b^2-c)^4(a-b)^{12}(b-c)^4}$

4) Find the area of the triangle formed by the points $(1,-1), (-4,6)$, and $(-3,-5)$.

5) Find the range and co-efficient of range of the following data
63, 89, 98, 125, 79, 108, 117, 68.

6) Find the 8th term of G.P.
$9, 3, 1, \ldots$

7) Find the equation of a straight line which is parallel to the line $3x - 7y = 12$ and passing through the point $(6,4)$.

8) find $x$, so that $x+6$, $x+12$ and $x+15$ are consecutive terms of a G.P.

9) If the straight line $12y = -(p+3)x + 12$, $12x - 7y = 16$ are Perpendicular, then find 'p'.

10) $A \times B = \{(3,2), (3,4), (5,2), (5,4)\}$. then find A and B.

11) If area of triangle formed by the vertices $A(-1,2)$, $B(k,-2)$ and $C(7,4)$ is 22 sq. units. Find the value of K.

12) From the top of a rock $150\sqrt{3}$ m high the angle of depression of a car on the ground is observed to be 30°. find the distance of the car from the rock.

13) If $A = \{1,3,5\}$ and $B = \{2,3\}$ then show that $n(A \times B) = n(A) \times n(B)$.

14) Determine the quadratic equation whose sum and product of roots are $-9$ and 20.

15) find the number of terms in the following G.P 4, 8, 16, ... 8192?

16) If $1+2+3+\ldots+n = 666$ then find 'n'.

17) Solve $\frac{3}{x} + \frac{2}{y} = 12$ ;
$\frac{2}{x} + \frac{3}{y} = 13$.

18) Find the equation of a line passing through the point $(3,-4)$ and having slope $-5/7$.

19) find fog and gof when $f(x) = 2x+1$ and $g(x) = x^2 - 2$

20). In a G.P, 729, 243, 81, .... find $t_7$.

21) find slope and y-intercept of a straight line $5x + 7y + 13 = 0$.

22) If $P(A) = 0.37$, $P(B) = 0.42$, $P(A \cap B) = 0.09$. then find $P(A \cup B)$

23) If $A = \begin{pmatrix} 1 & 9 \\ 3 & 4 \\ 8 & -3 \end{pmatrix}$, $B = \begin{pmatrix} 5 & 7 \\ 3 & -3 \\ 1 & 0 \end{pmatrix}$

Verify $A + B = B + A$.

24) Find the equation of a line whose intercepts on the $x$ and $y$ axes are $-5$, $3/4$.

25) The father's age is six times his son's age. Six years hence the age of father will be four times his son's age. find the present ages (in years) of the son and father.

26) Find the first term of a G.P in which $S_6 = 4095$ and $r = 4$.

27) Find the slope of the line which is perpendicular to $2x - 3y + 8 = 0$.

28) Find the Volume of a cylinder whose height is 3m and whose base area is $350\ m^2$.

29) S.T. the function $f : N \to N$ defined by $f(x) = 2x - 1$ is one-one but not onto.

30) find the equation of the line through $(3, 2)$ and Perpendicular to the line joining $(4, 5)$ and $(1, 2)$.

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MATHEMATICS

# MOCK TEST - 8

## 2 mark question

1) A garden roller whose length is 3m long and whose diameter is 2.8m is rolled to level a garden. How much area will it cover in 8 revolutions?

2) Multiply (i) $\frac{x^3}{9y^2}$ by $\frac{27y}{x^5}$

(ii) $\frac{x^4b^2}{x-1}$ by $\frac{x^2-1}{a^4b^3}$

3) The Standard deviation and mean of a data are 6.5 and 12.5. find the co-efficient of Variation.

4) In a $\triangle ABC$, AD is the internal bisector of $\angle A$, meeting BC at D. If AB = 5.6cm, AC = 6cm, and DC = 3cm. find BC.

5) find the slope of a line joining the points (14, 10) and (14, -6).

6) find the range and co-efficient of range of the data 63, 89, 98, 125, 79, 108, 117, 68.

7) If $f(x) = 3x - 2$, $g(x) = 2x + k$ and $fog = gof$ then find 'k'.

8) Find LCM of $9a^3b^2$, $12a^2b^2c$

9) Find the slope of the Straight line $6x + 8y + 7 = 0$.

10) Prove that $\frac{1 - \tan^2\theta}{\cot^2\theta - 1} = \tan^2\theta$.

11) If $f(x) = 3 + x$, $g(x) = x - 4$. find fog and gof. check whether $fog = gof$.

12) If $\alpha$ and $\beta$ are the roots of the equation $3x^2 + 7x - 2 = 0$, find the values of (i) $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$ (ii) $\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha}$

13) Find the sum of first 28 terms of an A.P whose $n^{th}$ term is $4n - 3$.

14) In a G.P. 729, 243, 81, .... find $t_7$.

15) If A is of order $P \times Q$ and B is of order $Q \times R$. what is the order of AB and BA?

16) If the standard deviation of a data is 4.5 and if each value of the data is decreased by 5, then find the new standard deviation.

17) If $1 + 2 + 3 + .... + K = 325$, then find $1^3 + 2^3 + 3^3 + .... + K^3$.

18) Find the Value of $16 + 17 + 18 + ... + 75$

19) Find the square root of $\frac{121(a+b)^8(x+y)^8(b-c)^8}{81(b-c)^4(a-b)^{12}(b-c)^4}$.

20) Three fair coins are tossed together. Find the Probability of getting atmost one head?

21) Find the sum of 6+13+20+...+97.

22) Find the sum of 1+4+9+16+...+225.

23) The cartesian product A×A has 9 elements among which (-1,0) and (0,1) are found. Find the set A and the remaining elements of A×A.

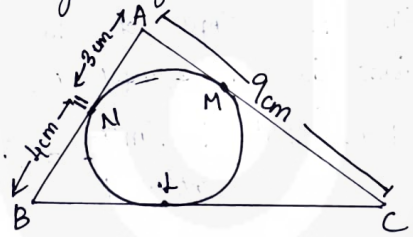
24) Find the sum of 2+4+6+...+80.

25) Find the G.P in which the 2nd term is $\sqrt{6}$ and the 6th term is $9\sqrt{6}$.

26) A has 'a' rows and 'a+3' columns. B has 'b' rows and '17-b' columns, and if both Products AB and BA exist, find a, b?

27) Find the values of x, y, z if $\begin{bmatrix} x-3 & 3x-z \\ x+y+7 & x+y+z \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 1 & 6 \end{bmatrix}$

28) In the figure, △ABC is circumscribing a circle. Find the length of BC.




29) Find the maximum volume of a cone that can be carved out of a solid hemisphere of radius r units.

30) In a two children family, find the probability that there is at least one girl in a family.

MAY YOU ACHIEVE EVERYTHING YOU ASPIRE TO....

ALL THE BEST...

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# MOCK TEST - 1

## Solutions for 2 mark questions

1) $A \times B = \{(1,2), (1,3), (3,2), (3,3), (5,2), (5,3)\}$

$B \times A = \{(2,1), (2,3), (2,5), (3,1), (3,3), (3,5)\}$

2) $800 = 2^5 \times 5^2 = a^b \times b^a$

$\Rightarrow a = 2, b = 5$ (or)

$a = 5, b = 2.$

3) $\frac{x^3}{x-y} + \frac{y^3}{y-x} = \frac{x^3}{x-y} - \frac{y^3}{x-y}$

$= \frac{x^3 - y^3}{x-y}$

$= \frac{(x-y)(x^2+xy+y^2)}{x-y}$

$= x^2 + xy + y^2.$

4) $3A - 9B = \begin{bmatrix} 0 & 12 & 27 \\ 24 & 9 & 21 \end{bmatrix} - \begin{bmatrix} 63 & 27 & 72 \\ 9 & 36 & 81 \end{bmatrix}$

$= \begin{bmatrix} -63 & -15 & -45 \\ 15 & -27 & -60 \end{bmatrix}$

5) $\frac{\text{Area of } \Delta ABC}{\text{Area of } \Delta DEF} = \frac{BC^2}{EF^2}$

Area of $\Delta DEF = 54 \times \frac{4^2}{3^2} = 54 \times \frac{16}{9}$

$= 96 \text{ cm}^2.$

6) Slope $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - \sqrt{5}}{0 - 5}$

$\Rightarrow \frac{-\sqrt{5}}{-5} = \frac{\sqrt{5}}{\sqrt{5}\sqrt{5}} = \frac{1}{\sqrt{5}}.$

7) $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \sqrt{\frac{1+\cos\theta}{1-\cos\theta} \times \frac{1+\cos\theta}{1+\cos\theta}}$

$\Rightarrow \sqrt{\frac{(1+\cos\theta)^2}{1-\cos^2\theta}} = \sqrt{\frac{(1+\cos\theta)^2}{\sin^2\theta}} = \frac{1+\cos\theta}{\sin\theta}$

$\Rightarrow \frac{1}{\sin\theta} + \frac{\cos\theta}{\sin\theta} = \operatorname{cosec}\theta + \cot\theta.$

8) CSA $= 2\pi r h$ sq. units

$= 2 \times \frac{22}{7} \times 14 \times 20 = 1760 \text{ cm}^2$

TSA $= 2\pi r (h + r)$

$= 2 \times \frac{22}{7} \times 14 (20 + 14)$

$= 2 \times \frac{22}{7} \times 14 \times 34 = 2992 \text{ cm}^2.$

9) Range $= L - S$

$= 67 - 18 = 49.$

Coefficient of Range $= \frac{L-S}{L+S} = \frac{49}{85}$

$= 0.58$

10) $S = \{HH, HT, TH, TT\}$

$n(S) = 4$

$A = \{HT, TH\}$

$n(A) = 2 \Rightarrow P(A) = \frac{n(A)}{n(S)} = \frac{2}{4} = \frac{1}{2}$

11) $n(S) = 9$

(i) $n(A) = 5 \Rightarrow P(A) = \frac{5}{9}$

(ii) $n(B) = 4 \Rightarrow P(B) = \frac{4}{9}$

12) Domain $= \{0, 1, 2, 3, 4, 5\}$

Range $= \{3, 4, 5, 6, 7, 8\}$

13) $t_n = a + (n-1)d$

$t_{19} = -11 + 18(-4)$

$= -11 - 72$

$t_{19} = -83$

$a = -11$

$d = -15 - (-11)$

$d = -4$

$n = 19$

14) $2 \left| \frac{y^4 z^6}{x^2} \right|$

15) $\frac{BD}{DC} = \frac{AB}{AC} \Rightarrow \frac{4}{3} = \frac{6}{AC}$

$\Rightarrow AC = 18/4 = 4.5 \text{ cm}.$

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15) $AA^T = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$

$= \begin{bmatrix} \cos^2\theta + \sin^2\theta & -\cos\theta\sin\theta + \sin\theta\cos\theta \\ -\sin\theta\cos\theta + \cos\theta\sin\theta & \sin^2\theta + \cos^2\theta \end{bmatrix}$

$= \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

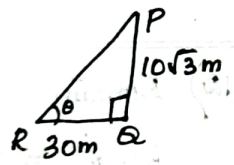
$AA^T = I$

17) $\Rightarrow \frac{1}{2}\begin{vmatrix} -1.5 & 3 \\ 6 & -2 \\ -3 & 4 \\ -1.5 & 3 \end{vmatrix} = 0$

$\Rightarrow \frac{1}{2}\left[(3+24-9)-(18+6-6)\right] = \frac{1}{2}[18-18]$

$= 0$. $\therefore$ The points are collinear.

18) $\tan\theta = \frac{PQ}{QR}$.




$\tan\theta = \frac{10\sqrt{3}}{30} = \frac{\sqrt{3}}{3}$

$= \frac{\sqrt{3}}{\sqrt{3}\cdot\sqrt{3}} = \frac{1}{\sqrt{3}}$

$\boxed{\theta = 30^\circ}$

19) TSA $= 704\ cm^2$

$\pi r(l+r) = 704$

$l + 7 = \frac{704 \times 7}{22 \times 7} = 32$

$l = 32 - 7 = \underline{25\ cm}$

20) $n = 21$

$\sigma = \sqrt{\frac{n^2-1}{12}} = \sqrt{\frac{21^2-1}{12}} = \sqrt{\frac{440}{12}}$

$= \sqrt{36.67} \simeq 6.06$.

21) Leap year = 366 days $\Rightarrow$ 52 weeks + 2 days

$S = \{$Sun-Mon, Mon-Tue, Tue-Wed, Wed-Thu, Thu-Fri, Fri-Sat, Sat-Sun$\}$

$n(S) = 7$.

$n(A) = 2$

$P(A) = \frac{n(A)}{n(S)} = \underline{\frac{2}{7}}$.

22) $R = \{(1,1), (2,4), (3,9), (4,16), (5,25), (6,36)\}$

Domain $= \{1,2,3,4,5,6\}$

Range $= \{1,4,9,16,25,36\}$.

23) $2b = a + c \Rightarrow 2(18-k) = 3+k+5k+1$

$\Rightarrow 36 - 2k = 6k + 4$

$\Rightarrow 36 - 4 = 6k + 2k \Rightarrow 8k = 32$

$\Rightarrow \underline{k = 4}$.

24) $\alpha + \beta = -9$, $\alpha\beta = 20$

$\Rightarrow x^2 - (-9x) + 20 = 0$

$\Rightarrow x^2 + 9x + 20 = 0$.

25) $y - y_1 = m(x - x_1) \Rightarrow y - 2 = \frac{-5}{4}(x+1)$

$\Rightarrow 4(y-2) = -5(x+1) \Rightarrow 4y - 8 = -5x - 5$

$\Rightarrow 5x + 4y - 8 + 5 = 0 \Rightarrow 5x + 4y - 3 = 0$.

26) $\sec\theta - \cos\theta = \frac{1}{\cos\theta} - \cos\theta$

$\Rightarrow \frac{1-\cos^2\theta}{\cos\theta} = \frac{\sin^2\theta}{\cos\theta} = \frac{\sin\theta}{\cos\theta} \times \sin\theta$

$= \tan\theta \cdot \sin\theta$.

27) CSA $= 4\pi r^2$ sq. units $= 154$ sq.m.

$\Rightarrow 4 \times \frac{22}{7} \times r^2 = 154$

$\Rightarrow r^2 = \frac{154 \times 7}{4 \times 22} \Rightarrow \frac{7 \times 7}{4} = \frac{7}{2}$

$\therefore d = 7m$

28) $\frac{y-y_1}{y_2-y_1} = \frac{x-x_1}{x_2-x_1} \Rightarrow \frac{y+3}{-4-(-3)} = \frac{x-5}{7-5}$

$\Rightarrow \frac{y+3}{-4+3} = \frac{x-5}{2} \Rightarrow 2y + 6 = -x + 5$

$x + 2y + 6 - 5 = 0 \Rightarrow \underline{x + 2y + 1 = 0}$

29) $C.V = \frac{\sigma}{\bar{x}} \times 100\% \Rightarrow 48 = \frac{\sigma}{15} \times 100\%$

$\therefore \sigma = \frac{48 \times 15}{100} = \underline{7.2}$

30) $l_1 : 5x + 23y + 14 = 0 \Rightarrow m_1 = \frac{-5}{23}$

$l_2 : 23x - 5y + 9 = 0 \Rightarrow m_2 = \frac{-23}{-5} = \frac{23}{5}$

$m_1 m_2 = \frac{-5}{23}\left(\frac{23}{5}\right) = -1 \Rightarrow \underline{l_1 \perp l_2}$

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MATHEMATICS

# MOCK TEST - 2

## Solutions for 2 mark questions

**1)** $A \times B = \{(1,2), (1,3), (3,2), (3,3), (5,2), (5,3)\}$

$n(A \times B) = 6$

$B \times A = \{(2,1), (2,3), (2,5), (3,1), (3,3), (3,5)\}$

$n(B \times A) = 6$

$n(A) \times n(B) = 3 \times 2 = 6$

$\therefore n(A \times B) = n(B \times A) = n(A) \times n(B)$.

**2)** $315000 = 2^3 \times 3^2 \times 5^4 \times 7^1$

$P^2 q^1 r^4 s^3 = 3^2 \times 7^1 \times 5^4 \times 2^3$

$\therefore P = 3 ; q = 7 ; r = 5 ; s = 2$.

**3)** $\frac{5t^3}{4t-8} \times \frac{6t-12}{10t} = \frac{5t^3}{4(t-2)} \times \frac{6(t-2)}{10t}$

$= \frac{3t^2}{4}$

**4)** $B - 5A = \begin{bmatrix} 7 & 3 & 8 \\ 1 & 4 & 9 \end{bmatrix} - 5\begin{bmatrix} 0 & 4 & 7 \\ 8 & 3 & 7 \end{bmatrix}$

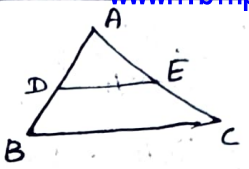
$\Rightarrow \begin{bmatrix} 7 & 3 & 8 \\ 1 & 4 & 9 \end{bmatrix} - \begin{bmatrix} 0 & 20 & 35 \\ 40 & 15 & 35 \end{bmatrix} = \begin{bmatrix} 7 & -17 & -27 \\ -39 & -11 & -26 \end{bmatrix}$

**5)** $AB = 12cm$, $AD = 8cm$

$\Rightarrow DB = AB - AD = 4cm$

$AE = 12cm$, $AC = 18cm$

$\Rightarrow EC = AC - AE = 6cm$




$\frac{AD}{DB} = \frac{8}{4} = 2$ ; $\frac{AE}{EC} = \frac{12}{6} = 2$

$\frac{AD}{DB} = \frac{AE}{EC} \Rightarrow DE \| BC$ [By converse of BPT]

**6)** Slope $m = \frac{y_2 - y_1}{x_2 - x_1}$

$P \to (3,-2), (12,4) \Rightarrow m_1 = \frac{4-(-2)}{12-3} = \frac{6}{9} = \frac{2}{3}$

$Q \to (6,-2), (12,2) \Rightarrow m_2 = \frac{2-(-2)}{12-6} = \frac{4}{6} = \frac{2}{3}$

$m_1 = m_2 = \frac{2}{3} \Rightarrow P \| Q$.

**7)** $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}} = \sqrt{\frac{1+\sin\theta}{1-\sin\theta} \times \frac{1+\sin\theta}{1+\sin\theta}}$

$\Rightarrow \sqrt{\frac{(1+\sin\theta)^2}{1-\sin^2\theta}} = \sqrt{\frac{(1+\sin\theta)^2}{\cos^2\theta}}$

$\Rightarrow \frac{1+\sin\theta}{\cos\theta} = \frac{1}{\cos\theta} + \frac{\sin\theta}{\cos\theta}$

$\Rightarrow \sec\theta + \tan\theta$ $\therefore$ LHS = RHS.

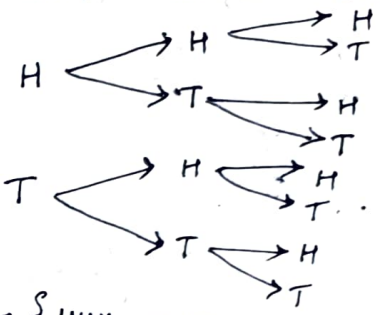
**8)** $h = 2(m)$ ; $\pi r^2 = 250$ sq.m

$V = \pi r^2 h$ cu.units $= 250 \times 2 = 500$ cu.m

**9)** $R = L - S$.

$\Rightarrow 36.8 = L - 13.4 \Rightarrow L = 36.8 + 13.4 = 50.2$

**10)** Coin 1 coin 2 coin 3




$S = \{HHH, HHT, HTH, HTT, THH, THT, TTH, TTT\}$

**11)** $\frac{y+4}{11+4} = \frac{x+6}{5+6} \Rightarrow \frac{y+4}{15} = \frac{x+6}{11}$

$15(x+6) = 11(y+4) \Rightarrow 15x + 90 = 11y + 44$

$15x - 11y + 90 - 44 = 0$

$\therefore 15x - 11y + 46 = 0$.

**12)** $\pi r^2 = 1386$ Sq.m

$TSA = 3\pi r^2 \Rightarrow 3(1386) = 4158$ sq.m

**13)** $f(1) = 1^2 + 1 + 3 = 5$

$f(2) = 2^2 + 2 + 3 = 9$

$f(3) = 3^2 + 3 + 3 = 15$

$\therefore$ Distinct elements $\Rightarrow$ Distinct images

$f$ is one-one function.

**14)** $1 = 1^1$ ; $2 = 2^1$ ; $3 = 3^1$ ; $4 = 2^2$ ; $5 = 5^1$ ;

$6 = 2^1 \times 3^1$ ; $7 = 7^1$ ; $8 = 2^3$ ; $9 = 3^2$ ;

$10 = 2^1 \times 5^1$ ; L.C.M of $1, 2, \ldots, 10$

$= 1^1 \times 2^3 \times 3^2 \times 5^1 \times 7^1 = 2520$

15) $a = 2$ ; $b = 5$ ; $c = 7$

$\alpha + \beta = -\frac{b}{a} = -\frac{5}{2}$

$\alpha\beta = \frac{c}{a} = \frac{7}{2}$

16) $\frac{x}{4} + \frac{y}{-6} = 1 \Rightarrow \frac{x}{4} - \frac{y}{6} = 1$

$\frac{6x - 4y}{24} = 1 \Rightarrow 6x - 4y = 24$

$\therefore 6x - 4y - 24 = 0$

17) R.H.S $= \sec\theta - \tan\theta$

$\Rightarrow \frac{1}{\cos\theta} - \frac{\sin\theta}{\cos\theta} \Rightarrow \frac{1-\sin\theta}{\cos\theta} \times \frac{1+\sin\theta}{1+\sin\theta}$

$\Rightarrow \frac{1-\sin^2\theta}{\cos\theta(1+\sin\theta)} = \frac{\cos\theta}{1+\sin\theta}$.

18) $V = \pi(R^2 - r^2)h$ cu. units

$= \frac{22}{7}(5^2 - 3^2).9 \Rightarrow \frac{22}{7} \times (25-9) \times 9$

$= \frac{22}{7} \times 16 \times 9 \Rightarrow \underline{144\pi \text{ cu. cm}}$

19) $S = \{1H, 1T, 2H, 2T, 3H, 3T, 4H, 4T, 5H, 5T, 6H, 6T\}$

$n(S) = 12$.

$A = \{1H, 3H, 5H\} \Rightarrow n(A) = 3$

$P(A) = \frac{n(A)}{n(S)} = \frac{3}{12} = \frac{1}{4}$.

20) $\frac{\sin A}{1+\cos A} \times \frac{1-\cos A}{1-\cos A} \Rightarrow \frac{\sin A(1-\cos A)}{1-\cos^2 A}$

$\Rightarrow \frac{\sin A(1-\cos A)}{\sin^2 A} = \frac{1-\cos A}{\sin A}$.

21) (i) $P(A) : P(\bar{A}) = 17 : 15$

$\Rightarrow \frac{P(A)}{P(\bar{A})} = \frac{17}{15} \Rightarrow 15P(A) = 17P(\bar{A})$

$\Rightarrow 15[1 - P(\bar{A})] = 17P(\bar{A})$

$\Rightarrow 15 - 15P(\bar{A}) = 17P(\bar{A}) \Rightarrow 15 = 17P(\bar{A}) + 15P(\bar{A})$

$\Rightarrow 15 = 32P(\bar{A}) \Rightarrow P(\bar{A}) = 15/32$.

(ii) $P(A) = 1 - P(\bar{A}) = 1 - \frac{15}{32} \Rightarrow P(A) = \frac{17}{32}$

$n(A) = \frac{17}{32} \times n(S) \Rightarrow n(A) = \frac{17}{32} \times 640$

$\therefore P(\bar{A}) = \frac{15}{32}$ ; $n(A) = 340$.

22) $\sigma = 3.6$ ; divided by 3

$\therefore$ New $\sigma = 1.2$ $\left[\because \sigma = \frac{3.6}{3}\right]$

$\sigma^2 = (1.2)^2 = 1.44$.

23) CSA $= 4\pi r^2$ sq. unit

$R = r + \frac{25r}{100} = \frac{125r}{100} = 1.25r$

C.S.A $= 4\pi R^2 \Rightarrow 4\pi(1.25r)^2$

C.S.A increase $= 4\pi(1.25r)^2 - 4\pi r^2$

C.S.A increase % $= \frac{4\pi r^2(0.5625)}{4\pi r^2} \times 100$

$= 56.25\%$

24) $f(k) = 2k - 1 \Rightarrow fof(k) = f(f(k))$

$\Rightarrow 4k - 3$ ; $fof(k) = 5 \Rightarrow 4k - 3 = 5$

$\Rightarrow 4k = 5 + 3 = 8 \Rightarrow k = \frac{8}{4} = 2$

$\therefore \underline{k = 2}$

25) $S_\infty = \frac{a}{1-r} \Rightarrow \frac{3}{1-\frac{1}{3}} = 3 \div \frac{2}{3}$

$= 3 \times \frac{3}{2} \Rightarrow \frac{9}{2}$ $\therefore S_\infty = \frac{9}{2}$

26) $\Delta = b^2 - 4ac \Rightarrow (-1)^2 - 4(1)(-20)$

$\Rightarrow 1 + 80 = 81 > 0$

$\Rightarrow$ Roots are real and unequal.

27) $x = 3$ ; $y = 12$ ; $z = 3$.

28) $\frac{AB}{AC} = \frac{BD}{DC}$ (by ABT) $\Rightarrow \frac{10}{14} = \frac{BD}{DC}$

$\Rightarrow 10DC = 14BD \Rightarrow 10(BC - BD) = 14BD$

$\Rightarrow 10(6 - BD) = 14BD \Rightarrow 60 - 10BD = 14BD$

$\Rightarrow BD = \frac{60}{24} = 2.5$ cm. $\Rightarrow DC = 6 - 2.5 = 3.5$ cm

$\therefore BD = 2.5$ cm ; $DC = 3.5$ cm.

29) $y - y_1 = m(x - x_1) \Rightarrow y - 1 = \frac{3}{7}(x - 6)$

$\Rightarrow 7y - 28 = 3x - 18 \Rightarrow 3x - 7y + 18 + 28 = 0$

$\Rightarrow 3x - 7y + 10 = 0$

30) $\sin 60^\circ = \frac{PQ}{PR} \Rightarrow \frac{\sqrt{3}}{2} = \frac{75}{PR}$

$PR = 75 \times \frac{2}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{150\sqrt{3}}{3} = \underline{50\sqrt{3}\text{ m}}$

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# MOCK TEST - 3

## Solutions for 2 mark questions

1) $A = \{1, 2, 3\}$ ; $B = \{2, 3, 5, 7\}$

$A \times B = \{(1,2), (1,3), (1,5), (1,7), (2,2), (2,3), (2,5), (2,7), (3,2), (3,3), (3,5), (3,7)\}$

$B \times A = \{(2,1), (2,2), (2,3), (3,1), (3,2), (3,3), (5,1), (5,2), (5,3), (7,1), (7,2), (7,3)\}$

2) $13824 = 2^9 \times 3^6 \Rightarrow 2^9 \times 3^3$

$\Rightarrow a = 9$ ; $b = 3$

3) $\frac{x^2-16}{x+4} \div \frac{x-4}{x+4} = \frac{(x+4)(x-4)}{x+4} \times \frac{x+4}{x-4}$

$= x+4$

4) 18 elements $\Rightarrow$ 1x18, 18x1, 2x9, 9x2, 3x6, 6x3

6 elements $\Rightarrow$ 1x6, 6x1, 2x3, 3x2.

5) $AB = 5.6$, $AD = 1.4 \Rightarrow DB = AB - AD = 4.2$

$AC = 7.2$, $AE = 1.8 \Rightarrow EC = AC - AE = 5.4$

$\frac{AD}{DB} = \frac{1.4}{4.2} = \frac{1}{3}$ ; $\frac{AE}{EC} = \frac{1.8}{5.4} = \frac{1}{3}$

$\Rightarrow DE \parallel BC$.

6) Slope $m = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{\cos\theta - (-\cos\theta)}{-\sin\theta - \sin\theta}$

$\Rightarrow \frac{2\cos\theta}{-2\sin\theta} = -\cot\theta$.

7) $\tan\theta = \frac{\text{opp. side}}{\text{adj. side}} \Rightarrow \tan 30^\circ = \frac{PQ}{QR}$

$\Rightarrow \frac{1}{\sqrt{3}} = \frac{h}{48} \Rightarrow \frac{48}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} \Rightarrow \frac{48\sqrt{3}}{3}$

$= 16\sqrt{3}$

8) $V = \frac{1}{3}\pi r^2 h = 11088$ cu.cm.

$\Rightarrow \frac{1}{3} \times \frac{22}{7} \times r^2 \times 24 = 11088$

$\Rightarrow r^2 = \frac{11088 \times 3 \times 7}{22 \times 24} = 441 \Rightarrow r = 21$ cm

9) $R = L - S \Rightarrow 61.4 - 13.6 = 47.8$

Coefficient of Range $= \frac{61.4 - 13.6}{61.4 + 13.6} = \frac{47.8}{75.0}$

$= 0.64$

10) $S = \{HHH, HHT, HTH, HTT, THH, TTH, THT, TTT\}$

$n(S) = 8 \Rightarrow n(A) = 3$

$P(A) = \frac{n(A)}{n(S)} = \frac{3}{8}$.

11) $C.V = \frac{\sigma}{\bar{x}} \times 100\% \Rightarrow 18.75 = \frac{\sigma}{25.6} \times 100\%$

$\boxed{\sigma = 4.8}$

12) $r_1 = 12$cm ; $r_2 = 16$cm.

Ratio $= \frac{4\pi r_1^2}{4\pi r_2^2} = \frac{r_1^2}{r_2^2} = \frac{12^2}{16^2} = \frac{144}{256}$

$= \frac{9}{16} = 9:16$

13) $\frac{\sec\theta}{\sin\theta} - \frac{\sin\theta}{\cos\theta} = \frac{\frac{1}{\cos\theta}}{\sin\theta} - \frac{\sin\theta}{\cos\theta}$

$= \frac{1}{\cos\theta}(\cos\theta) - \sin\theta(\sin\theta) = \frac{1 - \sin^2\theta}{\sin\theta\cos\theta}$

$= \frac{\cos^2\theta}{\sin\theta\cos\theta} = \frac{\cos\theta}{\sin\theta} = \cot\theta$

14) $m = 5$ ; $c = -9$

$y = mx + c \Rightarrow y = 5x - 9$

$\Rightarrow 5x - y - 9 = 0$.

15) $\angle B = 90^\circ \Rightarrow AC^2 = AB^2 + BC^2$

$\Rightarrow 18^2 + 24^2 \Rightarrow 324 + 576 = 900$

$\Rightarrow AC = 30$m

16) $A^T = \begin{bmatrix} 5 & -\sqrt{17} & 8 \\ 2 & 0.7 & 3 \\ 2 & 5/2 & 1 \end{bmatrix}$

$(A^T)^T = \begin{bmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & 5/2 \\ 8 & 3 & 1 \end{bmatrix} = A$

17) $2x^2 - x - 1 = 0 \Rightarrow \Delta = b^2 - 4ac$

$= (-1)^2 - 4(2)(-1) = 1 + 8 = 9 > 0$

$\therefore$ Roots are real and unequal.

18) $\frac{f(x+2)-f(2)}{x} = \frac{[2(x+2)+5]-[2(2)+5]}{x}$

$= \frac{2x+4+5-4-5}{x} = \frac{2x}{x} = 2$

19) A.P : 20, 22, 24, ... 30 terms

$a = 20 \Rightarrow d = 22-20 = 2$

$n = 30$

$t_n = a + (n-1)d \Rightarrow t_{30} = 20 + 29(2)$

$= 20 + 58 = 78.$

20) $S_n = \frac{n}{2}[2a + (n-1)d]$

$S_{15} = \frac{15}{2}\left[2(8) + 14\left(\frac{-3}{4}\right)\right]$

$= \frac{15}{2}\left[16 - \frac{21}{2}\right] \Rightarrow \frac{15}{2}\left[\frac{11}{2}\right] = \frac{165}{4}.$

21) $f(x) = 2x - x^2$

(i) $f(1) = 2(1) - (1)^2 = 2 - 1 = 1$

(ii) $f(x+1) = 2x + 2 - x^2 - 2x - 1 = -x^2 + 1$

(iii) $f(x) + f(1) = 2x - x^2 + 1 = -x^2 + 2x + 1.$

22) $\alpha + \beta = 9 \quad ; \quad \alpha\beta = 14$

$\Rightarrow x^2 - (9x) + 14 = 0 \Rightarrow x^2 - 9x + 14 = 0.$

23) $A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$

$= \begin{bmatrix} |1-2(1)| & |1-2(2)| & |1-2(3)| \\ |2-2(1)| & |2-2(2)| & |2-2(3)| \\ |3-2(1)| & |3-2(2)| & |3-2(3)| \end{bmatrix}$

$= \begin{bmatrix} |1-2| & |1-4| & |1-6| \\ |2-2| & |2-4| & |2-6| \\ |3-2| & |3-4| & |3-6| \end{bmatrix} = \begin{bmatrix} 1 & 3 & 5 \\ 0 & 2 & 4 \\ 1 & 1 & 3 \end{bmatrix}$

24) $\frac{BD}{DC} = \frac{1.5}{3.5} = \frac{3}{7}$

$\frac{AB}{AC} = \frac{5}{10} = \frac{1}{2} \Rightarrow \frac{BD}{DC} \neq \frac{AB}{AC}$

$\Rightarrow AD$ is not the bisector of $\angle A$.

25) $m_1 = \frac{8-2}{5-(-2)} = \frac{6}{7}$

$m_2 = \frac{0-7}{-2-(-8)} = \frac{-7}{6}.$

$m_1 m_2 = \frac{6}{7}\left(\frac{-7}{6}\right) = -1 \Rightarrow r \perp s.$

26) $\tan 60^\circ = \frac{20}{BC} \Rightarrow \sqrt{3} = \frac{20}{BC}$

$BC = \frac{20}{\sqrt{3}} \Rightarrow BC = \frac{20\sqrt{3}}{3}$

$\therefore BC = 11.55$ cm

27) $\frac{V_1}{V_2} = \frac{\frac{4}{3}\pi r_1^3}{\frac{4}{3}\pi r_2^3} = \frac{r_1^3}{r_2^3} = \frac{4^3}{7^3} = \frac{64}{343}$

$\therefore V_1 : V_2 = 64 : 343.$

28) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$\Rightarrow \frac{1}{3} = \frac{2}{3} + \frac{2}{5} - P(A \cap B)$

$\Rightarrow P(A \cap B) = \frac{2}{3} + \frac{2}{5} - \frac{1}{3}$

$= \frac{11}{15}$

29) Calculation for 12 hrs.

$n = 12 \Rightarrow \sigma = \sqrt{\frac{n^2-1}{12}} = \sqrt{\frac{12^2-1}{12}} = \sqrt{\frac{143}{12}}$

$= 3.45.$

No. of bells strikes $= 1 + 2 + 3 + \ldots + 12$

$= \frac{12 \times 13}{2} = 78.$

Calculation for 24 hrs

No. of bells strikes $= 78 \times 2 = 156$

S.D $= 3.45 \times 2 = 6.9$

30) $P(\bar{A}) = 0.45 \Rightarrow P(A) = 1 - P(\bar{A})$

$\Rightarrow 1 - 0.45 = 0.55$

$P(A \cup B) = 0.65.$

$P(A \cap B) = 0$ ($\because A, B \rightarrow$ mutually exclusive)

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$\Rightarrow 0.65 = 0.55 + P(B) - 0$

$\Rightarrow P(B) = 0.65 - 0.55 = 0.10$

$P(B) = 0.1$

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# MOCK TEST - 4

## Solution for 2 mark questions

1) $P(\text{not } A) = P(\bar{A}) \Rightarrow 1 - P(A)$

(i) $\Rightarrow 1 - 0.42 \Rightarrow 0.58$.

(ii) $P(\text{not } B) = P(\bar{B}) \Rightarrow 1 - P(B)$

$\Rightarrow 1 - 0.48 \Rightarrow 0.52$

(iii) $P(A \text{ or } B) \Rightarrow P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$\Rightarrow 0.42 + 0.48 - 0.16 \Rightarrow 0.90 - 0.16$

$= 0.74$.

2) $C.V = \frac{\sigma}{\bar{x}} \times 100\% \Rightarrow 25.6 = \frac{1.2}{\bar{x}} \times 100\%$

$\bar{x} = \frac{1.2 \times 100}{25.6} = 4.69$.

3) $2\pi r = 484 \text{ cm} \Rightarrow 2 \times \frac{22}{7} \times r = 484$

$r = \frac{484 \times 7}{2 \times 22} = 77$.

$V = \frac{1}{3}\pi r^2 h$ cu. units

$= \frac{1}{3} \times \frac{22}{7} \times 77^2 \times 105$

$= 6,52,190$ cu. cm.

4) $\tan 30^\circ = \frac{PT}{ST} \Rightarrow \frac{1}{\sqrt{3}} = \frac{h-60}{140}$

$h - 60 = \frac{140}{\sqrt{3}} = 80.83$

$h = 80.83 + 60 = 140.83$m

5) $m_1 = -\left(\frac{a}{b}\right) = -\left(\frac{1}{-2}\right) = \frac{1}{2}$

$m_2 = -\left(\frac{a}{b}\right) = -\left(\frac{6}{3}\right) = -2$

$m_1 \times m_2 = \frac{1}{2} \times (-2) = -1$.

Hence, the two straight lines are perpendicular

6) Area $(\triangle ABC) = 9 cm^2$ ; Area $(\triangle DEF) = 16 cm^2$

$BC = 2.1$ cm. ; $EF = ?$

$\triangle ABC \sim \triangle DEF$

$\Rightarrow \frac{\text{Area } (\triangle ABC)}{\text{Area } (\triangle DEF)} = \frac{BC^2}{EF^2}$

$\Rightarrow \frac{9}{16} = \frac{(2.1)^2}{EF^2} \Rightarrow EF^2 = 2.1^2 \times \frac{16}{9}$

$\Rightarrow EF = 2.1 \times \frac{4}{3} \Rightarrow 0.7 \times 4 = 2.8$cm

7) $A^2 = I$.

$A^2 = \begin{bmatrix} 5 & -4 \\ 6 & -5 \end{bmatrix}\begin{bmatrix} 5 & -4 \\ 6 & -5 \end{bmatrix} = \begin{bmatrix} 25-24 & -20+20 \\ 36-30 & -24+25 \end{bmatrix}$

$A^2 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = I$.

8) $\frac{P^2 - 10P + 21}{P-7} \times \frac{P^2 + P - 12}{(P-3)^2}$

$= \frac{(P-3)(P-7)}{P-7} \times \frac{(P+4)(P-3)}{(P-3)^2} = P + 4$

9) $n = \left(\frac{l-a}{d}\right) + 1 \Rightarrow \left(\frac{111-3}{3}\right) + 1$

$= \left[\frac{108}{3}\right] + 1 = 36 + 1 = 37$

10) (i) $fof(x) = f(f(x)) \Rightarrow f(x^2 - 1)$

$\Rightarrow (x^2-1)^2 - 1 \Rightarrow x^4 - 2x^2 + 1 - 1 \Rightarrow x^4 - 2x^2$,

(ii) $fofof(x) = f[fof(x)] \Rightarrow f(x^4 - 2x^2)$

$\Rightarrow [x^4 - 2x^2)^2 - 1 = x^8 - 4x^6 + 4x^4 - 1$.

11) $a_6 = \frac{5(6)}{6+2} = \frac{30}{8} = \frac{15}{4}$

$a_{13} = \frac{5(13)}{13+2} = \frac{65}{15} = \frac{13}{3}$.

12) $A \times B = \{(2,1), (2,-4), (-2,1), (-2,-4), (3,1), (3,-4)\}$

$A \times A = \{(2,2), (2,-2), (2,3), (-2,2), (-2,-2), (-2,3), (3,2), (3,-2), (3,3)\}$

$B \times A = \{(1,2), (1,-2), (1,3), (-4,2), (-4,-2), (-4,3)\}$

13) $S_n = \frac{a(r^n - 1)}{r - 1} \Rightarrow S_8 = \frac{1[(-3)^8 - 1]}{-3 - 1}$

$\Rightarrow \frac{6561 - 1}{-4} \Rightarrow \frac{6560}{-4} = -1640$

14) $\alpha + \beta = -\frac{b}{a} = \frac{-3}{1} = -3$

$\alpha\beta = \frac{c}{a} = \frac{0}{1} = 0$.

15) $b^2-4ac=0 \Rightarrow (3k)^2-4(9)(4)=0$

$\Rightarrow 9k^2-9(16)=0 \Rightarrow k^2-16=0$

$\Rightarrow k^2=16 \Rightarrow k=\pm 4$.

16) $-A=\begin{bmatrix}-\sqrt{7} & 3\\ \sqrt{5} & -2\\ -\sqrt{3} & 5\end{bmatrix} \Rightarrow -A^T=\begin{bmatrix}-\sqrt{7} & \sqrt{5} & -\sqrt{3}\\ 3 & -2 & 5\end{bmatrix}$

17) $\frac{AD}{DB}=\frac{AE}{EC}$ (By BPT)

$\Rightarrow \frac{3}{4}=\frac{x}{15-x} \Rightarrow 45-3x=4x$

$\Rightarrow 7x=45 \Rightarrow x=\frac{45}{7}=\underline{6.43\text{ cm}}$

18) Slope of $AB=\frac{c+a-b-c}{b-a}=\frac{a-b}{b-a}=-1$

Slope of $BC=\frac{a+b-c-a}{c-b}=\frac{b-c}{c-b}=-1$

Slope of AB = Slope of BC.

$\therefore$ A, B, C are collinear.

19) $\cot\theta+\tan\theta=\frac{\cos\theta}{\sin\theta}+\frac{\sin\theta}{\cos\theta}$

$=\frac{\cos^2\theta+\sin^2\theta}{\sin\theta\cos\theta}$

$\Rightarrow \frac{1}{\sin\theta\cdot\cos\theta}=\frac{1}{\cos\theta}\cdot\frac{1}{\sin\theta}$

$\Rightarrow \sec\theta\cdot\operatorname{cosec}\theta$

$\therefore$ LHS = RHS.

20) $r=5x$ ; $h=7x$ ;

CSA $=5500 \Rightarrow 2\pi rh=5500$

$2\times\frac{22}{7}\times 5x\times 7x=5500$

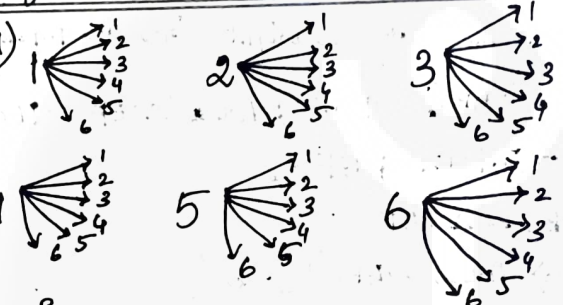
$220x^2=5500 \Rightarrow x^2=\frac{5500}{220}=\frac{50}{2}$

$x=\sqrt{25}=5\text{cm}$.

radius $=5x=5\times5=25\text{cm}$

height $=7x=7\times5=35\text{cm}$.

21)



$S=\{(1,1),(1,2),(1,3),(1,4),(1,5),(1,6),$
$(2,1),\ldots\ldots\ldots\ldots\ldots,(2,6)$
$\vdots$
$(6,1),(6,2),(6,3),(6,4),(6,5),(6,6)\}$

22) $R=L-S \Rightarrow 70.08-S=13.67$

$\Rightarrow S=70.08-13.67=\underline{56.41}$

23) $V=\frac{\pi h}{3}(R^2+Rr+r^2)$ cu.units

$=\frac{22}{7}\times\frac{45}{3}(28^2+28\times7+7^2)=48510\text{ cu.cm}$

24) $\tan 45^\circ=\frac{PT}{ST} \Rightarrow 1=\frac{120-h}{70}$

$\Rightarrow 70=120-h \Rightarrow h=\underline{50\text{m}}$

25) $y=mx+c \Rightarrow y=\frac{8}{7}x+\frac{6}{7}$

Slope $m=\frac{8}{7}$ and y intercept $c=\frac{6}{7}$.

26) $\Rightarrow \frac{AB}{PQ}=\frac{BC}{QR}=\frac{AC}{PR}=\frac{AB+BC+CA}{PQ+QR+RP}=\frac{26}{24}$

$\Rightarrow \frac{AB}{PQ}=\frac{36}{24} \Rightarrow \frac{AB}{10}=\frac{36}{24}$

$\Rightarrow AB=\frac{36}{24}\times10=\underline{15\text{cm}}$

27) $\begin{pmatrix}x+y & 2\\ 5+z & xy\end{pmatrix}=\begin{pmatrix}6 & 2\\ 5 & 8\end{pmatrix}$

$x+y=6$, $xy=8$ $\Rightarrow x=2, y=4$ (or) $x=4, y=2$

$5+z=5 \Rightarrow z=0$

$\therefore x=2, y=4, z=0$ (or)

$x=4, y=2, z=0$.

28) A.P : $a, a+d, a+2d, a+3d, \ldots$

: $20, 20+8, 20+16, 20+24, \ldots$

: $20, 28, 36, 44, \ldots$

29) (i) $\{(x,y)/y=x-2, x\in P, y\in Q\}$

(ii) $\{(5,3),(6,4),(7,5)\}$

30) $f(x)=x^3 \Rightarrow f(1)=1^3=1$ ; $f(2)=2^3=8$.

$f(3)=3^3=27$ ; $f(4)=4^3=64$.

(i) Range $=\{1,8,27,64\}$

(ii) f is one-one and into.

[$\because$ Distinct elements $\Rightarrow$ distinct images; Range $\subset$ co-domain.]

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# MOCK TEST - 5

## Solution for 2 mark questions

1) Let Kumaran's age = $x$
Two years ago = $(x-2)$ yrs.
Four years from now = $(x+4)$ yrs.
$\therefore (x-2)(x+4) = 1+2x$
$x^2+4x-2x-8-1-2x = 0 \Rightarrow x^2-9=0$
$x = \pm 3 \Rightarrow x = 3$ years

2) $\left[\frac{k(k+1)}{2}\right]^2 = 16900 = (130)^2$
$\frac{k(k+1)}{2} = 130$
$\Rightarrow 1+2+3+\ldots+k = 130.$

3) Volume of cylinder = Volume of cone
$\pi r^2 h_2 = \frac{1}{3}\pi r^2 h_1$
$\Rightarrow h_2 = \frac{1}{3} \times 24 = 8$ cm

4) $fog = f[g(x)] \Rightarrow f[x^2] = (x^2) - 6$
$gof = g[f(x)] = g[x-6] = (x-6)^2$
$= x^2 + 36 - 12x.$
$\therefore fog \neq gof$

5) $\tan^2\theta - \sin^2\theta = \tan^2\theta - \frac{\sin^2\theta}{\cos^2\theta}\cdot\cos^2\theta$
$\Rightarrow \tan^2\theta - \tan^2\theta \cdot \cos^2\theta$
$\Rightarrow \tan^2\theta\left[1-\cos^2\theta\right] = \tan^2\theta \cdot \sin^2\theta.$
LHS = RHS

6) $a = 15$ ; $b = 11$ ; $c = 2$
$b^2 - 4ac = (11)^2 - 4(15)(2) = 121 - 120$
$= 1 > 0$ $\therefore$ The roots are real and unequal.

7) CSA = 88 Sq.cm ; $h = 14$cm
$2\pi rh = 88 \Rightarrow 2 \times \frac{22}{7} \times r \times 14 = 88$
$r = 88 \times \frac{1}{2} \times \frac{7}{22} \times \frac{1}{14} = 1$
$\therefore d = 2$cm.

8) $\frac{x+2}{4y} \times \frac{12y^2}{x^2-x-6} = \frac{x+2}{4y} \times \frac{12y^2}{(x-3)(x+2)}$
$= \frac{3y}{x-3}$

9) $\frac{AB}{AC} = \frac{BD}{DC} \Rightarrow \frac{10}{14} = \frac{x}{6-x}$
$\frac{5}{7} = \frac{x}{6-x} \Rightarrow 5(6-x) = 7x$
$\Rightarrow 30 - 5x = 7x \Rightarrow 30 = 12x$
$\Rightarrow x = 2.5$cm and $DC = 6 - 2.5 = 3.5$cm

10) $l = \sqrt{r^2+h^2} = \sqrt{49+576} = \sqrt{625}.$
$l = 25$m
C.S.A = $\pi rl$ sq. units
$\Rightarrow \frac{22}{7} \times 7 \times 25 = 550 m^2.$
$\therefore$ length of the Canvase = $\frac{550}{4} = 137.5$m

11) $P(A) = 0.5$ ; $P(A \cap B) = 0.3$ ; $P(A \cup B) \leq 1$
$\Rightarrow P(A) + P(B) - P(A \cap B) \leq 1$
$\Rightarrow 0.5 + P(B) - 0.3 \leq 1$
$0.2 + P(B) \leq 1$
$P(B) \leq 1 - 0.2 \Rightarrow \leq 0.8$

12) LHS: $A \times A = \{(5,5),(5,6),(6,5),(6,6)\}$
LHS: $B \times B = \{(4,4),(4,5),(4,6),(5,4),(5,5),(5,6),(6,4),(6,5),(6,6)\}$
$C \times C = \{(5,5),(5,6),(5,7),(6,5),(6,6),(6,7),(7,5),(7,6),(7,7)\}$
RHS: $\therefore (B \times B) \cap (C \times C) = \{(5,5),(5,6),(6,5),(6,6)\}$
$\therefore$ LHS = RHS.

13) $x^2 - 4x - 12 = 0$
$(x-6)(x+2) = 0$
$x = 6$ ; $x = -2$
$\therefore$ The Value of $x = -2$ (or) $6$.

14) $S = \{5R, 6W, 7G, 8B\}$
$n(S) = 26.$
(i) Let A = Getting White balls
$n(A) = 6 \Rightarrow P(A) = 6/26 = 3/13.$
(ii) Let B = Getting Black or Red
$n(B) = 13 \Rightarrow P(B) = 13/26 = 1/2.$

15) $t_n = a+(n-1)d$

$-54 = 16+(n-1)(-5) \Rightarrow$ ~~$-54+$~~

$\Rightarrow -54-16 = (n-1)(-5)$

$\frac{-70}{-5} = n-1 \Rightarrow \boxed{n = 15}$

16) $\frac{7p+2}{8p^2+13p+5} \Rightarrow 8p^2+13p+5 = 0$

$(8p+5)(p+1) = 0 \Rightarrow p = -5/8 \; ; \; p = -1.$

∴ The excluded values are $-5/8$ and $-1$.

17) Ratio of their volumes = 3600 : 5040

$\frac{1}{3}\pi r^2 h_1 : \frac{1}{3}\pi r^2 h_2 = 360 : 504$

$\Rightarrow 90 : 126 \Rightarrow 30 : 42 \Rightarrow 10 : 14$

$h_1 : h_2 = 5 : 7.$

18) $b^2-4ac = 11^2-4(15)(2) = 121-120$

$= 1 > 0.$

∴ The roots are real and unequal.

19) Area of the triangle $= 0.$

$= \begin{vmatrix} x_1 & x_2 & x_3 & x_1 \\ y_1 & y_2 & y_3 & y_1 \end{vmatrix} \Rightarrow \begin{vmatrix} -3 & 7 & 12 & -3 \\ -4 & 2 & 5 & -4 \end{vmatrix}$

$= [-6+35-48]-[-28+24-15] = -19-(-19)$

$= -19+19 = 0.$ ∴ collinear.

20) $3x-2y = 6 \Rightarrow \div 6$

$\Rightarrow \frac{3x}{6} - \frac{2y}{6} = \frac{6}{6} \Rightarrow \frac{x}{2} - \frac{y}{3} = 1$

$\frac{x}{2} + \frac{y}{(-3)} = 1$

∴ x intercept $a = 2$

y intercept $b = -3$

21) $1:2 \mid 3:4$

$h_1 : h_2 \mid 2\pi r_1 : 2\pi r_2$

$\therefore V_1 : V_2 = \frac{1}{3}\pi r_1^2 h_1 : \frac{1}{3}\pi r_2^2 h_2$

$= 3^2 \times 1 : 4^2 \times 2 \Rightarrow 9 : 32.$

22) $\sigma = 6.5 \; ; \; \bar{x} = 12.5$

co-efficient of variation $= \frac{\sigma}{\bar{x}} \times 100\%.$

$= \frac{6.5}{12.5} \times 100 = \underline{52\%}.$

23) $f(x) = x^2-2$

$f(-2) = 4-2 = 2$

$f(-1) = 1-2 = -1$

$f(0) = 0-2 = -2$

$f(3) = 9-2 = 7$

∴ $f = \{(-2,2), (-1,-1), (0,-2), (3,7)\}$

∴ f is a function.

24) $4x-9y = -36$

$\frac{4x}{-36} - \frac{9y}{-36} = \frac{-36}{-36} \Rightarrow \frac{x}{-9} + \frac{y}{4} = 1$

x intercept $= -9$ & y intercept $= 4.$

25) $a = 1/2 \; ; \; r = \frac{1}{1/2} = 2.$

$t_n = ar^{n-1} \Rightarrow t_8 = \frac{1}{2}(2)^7 = 2^6 = \underline{64}.$

26) $f(x) = ax+b$

$f(-1) = a(-1)+b$

$0 = -a+b$

$-a+b = 0 \rightarrow (1)$

$f(1) = a(1)+b$

$2 = a+b$

$a+b = 2 \rightarrow (2)$

Solve (1) & (2) $\Rightarrow$

$-a+b = 0$

$a+b = 2$

$2b = 2$

$\therefore b = 1 \Rightarrow a+b = 2$

$a+1 = 2$

$a = 2-1 = \underline{1}.$

27) $x = \{1,2,3,\ldots\} \quad y = \{2,4,6,\ldots\}$

$f = \{(1,2), (2,4), (3,6), \ldots\}$

Domain $= \{1,2,3,\ldots\}$

Co-domain $= \{1,2,3,\ldots\}$

Range $= \{2,4,6,\ldots\}$

∴ It is a function.

28) Domain $= \{-2,-1,2,1,-3\}$

Range $= \{4,1,9\}.$

29) $\frac{y-y_1}{y_2-y_1} = \frac{x-x_1}{x_2-x_1}$

$\Rightarrow \frac{y-10}{12-10} = \frac{x-6}{14-6} \Rightarrow \frac{y-10}{2} = \frac{x-6}{8}$

$\Rightarrow 4(y-10) = 1(x-6) \Rightarrow 4y-40 = x-6$

$\Rightarrow x-6-4y+40 = 0 \Rightarrow x-4y+34 = 0$

30) $S = 400 \; ; \; L = 650$

$R = L-S \Rightarrow 650-400$

$= \underline{250}.$

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# MOCK TEST - 6

## Solution for 2 mark questions

1) $f(x) = \sqrt{1+\sqrt{1-\sqrt{1-x^2}}}$

$\sqrt{1-x^2} = \sqrt{(1+x)(1-x)} \Rightarrow x = -1 \mid x = 1$

$= -1 \le x \le 1$

$\therefore$ Domain $= \{-1, 0, 1\}$

2) $AB = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}\begin{pmatrix} 2 & -3 \\ -4 & -5 \end{pmatrix}$

$\Rightarrow \begin{pmatrix} 2-8 & -3-10 \\ 6-16 & -9-20 \end{pmatrix} = \begin{pmatrix} -6 & -13 \\ -10 & -29 \end{pmatrix}$

$BA = \begin{pmatrix} 2 & -3 \\ -4 & -5 \end{pmatrix}\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} \Rightarrow \begin{pmatrix} 2-9 & 4-12 \\ -4-15 & -8-20 \end{pmatrix}$

$= \begin{pmatrix} -7 & -8 \\ -19 & -28 \end{pmatrix} \Rightarrow AB \neq BA.$

3) $CSA = \pi(R+r)l$

$\Rightarrow \frac{22}{7}(4+1)5 \Rightarrow \frac{22}{7} \times 5 \times 5$

$\Rightarrow \frac{550}{7} = 78.57\ cm^2$

4) $\frac{AO}{BO} = \frac{OQ}{OP} = \frac{AQ}{BP}$

$\frac{10}{6} = \frac{AQ}{9} \Rightarrow AQ = \frac{10}{6} \times 9 = 15\ cm$

5) $= \frac{a^3 b^2}{a-1} \times \frac{a^2-1}{a^2 b^3}$

$\Rightarrow \frac{a(a+1)(a-1)}{(a-1)\,b} = \frac{a(a+1)}{b}.$

6) $f_2(x) = 2x^2 - 5x + 3.\ ;\ f_1(x) = \sqrt{x}$

$f(x) = \sqrt{2x^2-5x+3} = \sqrt{f_2(x)}$

$f_1[f_2(x)] = f_1 f_2(x).$

7) $\frac{\sin A}{1+\cos A} + \frac{\sin A}{1-\cos A}$

$= \frac{\sin A(1-\cos A) + \sin A(1+\cos A)}{(1+\cos A)(1-\cos A)}$

$= \frac{\sin A - \sin A \cdot \cos A + \sin A + \sin A \cdot \cos A}{1^2 - \cos^2 A}$

$= \frac{2\sin A}{\sin^2 A} = \frac{2}{\sin A} = 2\ \mathrm{cosec}\ A.$

8) $P(A \cup B) = 0.6\ ;\ P(A \cap B) = 0.2$

$\therefore P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$0.6 = P(A) + P(B) - 0.2$

$P(A) + P(B) = 0.8.$

$P(\bar{A}) + P(\bar{B}) = 1 - P(A) + 1 - P(B)$

$= 2 - [P(A) + P(B)]$

$= 2 - 0.8$

$= 1.2$

9) $(a, 4) \Rightarrow f(a) = 3a - 5 = 4$

$\Rightarrow 3a = 4 + 5 = 9 \Rightarrow a = 9/3 = 3$

$(1, b) \Rightarrow f(1) = 3 - 5 = b$

$\Rightarrow -2 = b \Rightarrow b = -2.$

10) $A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$

$a_{11} = 1^2 \cdot 1^2 = 1$ | $a_{21} = 2^2 \cdot 1^2 = 4$

$a_{12} = 1^2 \cdot 2^2 = 4$ | $a_{22} = 2^2 \cdot 2^2 = 16$

$a_{13} = 1^2 \cdot 3^2 = 9$ | $a_{23} = 2^2 \cdot 3^2 = 36$

$a_{31} = 3^2 \cdot 1^2 = 9$

$a_{32} = 3^2 \cdot 2^2 = 36$

$a_{33} = 3^2 \cdot 3^2 = 81$

$\therefore A = \begin{bmatrix} 1 & 4 & 9 \\ 4 & 16 & 36 \\ 9 & 36 & 81 \end{bmatrix}$

11) $\theta = 60^\circ \mid C = 9$

$\therefore \tan\theta = m = \tan 60^\circ = \sqrt{3}$

$y = mx + c \Rightarrow y = \sqrt{3}x + 9$

$\Rightarrow \sqrt{3}x - y + 9 = 0$

12) 1) $m_1 = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5-3}{8+2} = \frac{2}{10} = \frac{1}{5}$

2) $y = ax + 2 \Rightarrow m_2 = a$

3) Given $m_1 \cdot m_2 = (-1) \Rightarrow a = -5$

13) $f(x) = 3 - 2x \Rightarrow f(x^2) = 3 - 2(x^2)$

$= 3 - 2x^2$

$(f(x))^2 = (3-2x)^2 = 9 + 4x^2 - 12x.$

But $f(x^2) = (f(x))^2$

$9+4x^2-12x = 3-2x^2$

$9+4x^2-12x-3+2x^2=0$

$6x^2-12x-6=0$

$\div 6 \Rightarrow x^2-2x-1=0$

$(x-1)(x+1)=0$

$x=1 \mid x=1 \Rightarrow \therefore x=1$

---

14) i) parallel to x-axis is $y=b$

(i.e) $y=7$.

(ii) parallel to y-axis is $x=c$

(i.e) $x=5$.

---

15) $a=9$, $r=\frac{3}{9}=\frac{1}{3}$.

$S_\infty = \frac{a}{1-r} = \frac{9}{1-\frac{1}{3}} = \frac{9}{2/3} = 9\times\frac{3}{2} = \frac{27}{2}$

---

16) $d = 2.8\,m \Rightarrow r = \frac{2.8}{2} = 1.4\,m$, $h = 3m$

Area covered in 1 revolution $= 2\pi rh$

$= 2\times\frac{22}{7}\times 1.4\times 3 = 26.4\,m^2$.

$\therefore$ Area covered in 8 revolutions $= 8\times 26.4$

$= 211.2\,m^2$.

---

17) $x^2y+xy^2 = xy(x+y)$

$x^2+xy = x(x+y)$

GCD $= x(x+y)$

LCM $= xy(x+y)$

---

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18) $A^2 = \begin{pmatrix}\cos^2\theta & 0\\ 0 & \cos^2\theta\end{pmatrix}$; $B^2 = \begin{pmatrix}\sin^2\theta & 0\\ 0 & \sin^2\theta\end{pmatrix}$

L.H.S $\Rightarrow A^2+B^2 = \begin{bmatrix}\sin^2\theta+\cos^2\theta & 0\\ 0 & \sin^2\theta+\cos^2\theta\end{bmatrix}$

$= \begin{pmatrix}1 & 0\\ 0 & 1\end{pmatrix} = I$ = RHS.

---

19) $1^3+2^3+\ldots+n^3 = 14400$

$\left[\frac{n(n+1)}{2}\right]^2 = (120)^2$

$\Rightarrow \frac{n(n+1)}{2} = 120 \Rightarrow n(n+1) = 120\times 2 = 240$

$\Rightarrow n^2+n-240=0 \Rightarrow (n+16)(n-15)=0$

$\Rightarrow n=-16$ ; $n=15$

$\therefore n=15$

---

20) $A = \begin{pmatrix}5 & 4 & 3\\ 1 & -7 & 9\\ 3 & 8 & 2\end{pmatrix}$ ; $\therefore A^T = \begin{pmatrix}5 & 1 & 3\\ 4 & -7 & 8\\ 3 & 9 & 2\end{pmatrix}$

---

21) $OP^2 = OT^2+PT^2 \Rightarrow 5^2 = 3^2+PT^2$

$\Rightarrow PT^2 = 25-9 = 16 \Rightarrow PT = \sqrt{16} = 4$ cm.

---

22) $b^2-4ac=0 \Rightarrow (3k)^2-4(9)(4)=0$

$9k^2-144=0 \Rightarrow 9k^2=44 \Rightarrow k^2=\frac{144}{9}$

$k^2=16 \Rightarrow k=\sqrt{16}=4$

---

23) $a=1$ ; $b=8$ ; $c=-65$

$\alpha+\beta = -b/a = -8/1 = -8$ $\quad\therefore \alpha+\beta=-8$

$\alpha\beta = c/a = -65/1 = -65$ $\quad\alpha\beta=-65$

---

24) collinear $\Delta ABC = 0$

$\begin{vmatrix}x_1 & x_2 & x_3 & x_1\\ y_1 & y_2 & y_3 & y_1\end{vmatrix}=0 \Rightarrow \begin{vmatrix}-3 & a & 4 & -3\\ 9 & b & -5 & 9\end{vmatrix}=0$

$(-3b-5a+36)-(9a+4b+15)=0$

$-3b-5a+36-9a-4b-15=0$

$-14a-7b+21=0 \Rightarrow 14a+7b=21$

$2a+b=3 \rightarrow ①$ Given $a+b=1 \rightarrow ②$

$2a+b=3$

$a+b=1$

$a=2$

$a=2 \Rightarrow a+b=1$

$2+b=1 \Rightarrow b=-1$

---

25) $a=20$ ; $d=8$

A.P $= 20, 20+8, 20+16, 20+24, \ldots$

$= 20, 28, 36, 44$.

---

26) $\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR} = \frac{AB+BC+CA}{PQ+QR+RP} = \frac{36}{24}$

$\Rightarrow \frac{AB}{PQ} = \frac{36}{24} \Rightarrow \frac{AB}{10} = \frac{36}{24}$

$\Rightarrow AB = \frac{36}{24}\times 10 = 15$cm

---

27) $4x-9y=-36 \Rightarrow \frac{4x}{-36}-\frac{9y}{-36}=1$

$\frac{x}{-9}+\frac{y}{4}=1$ $\quad\therefore$ x intercept $=-9$; $y=4$.

---

28) $\frac{9x(x+9)}{x(x^2+8x-9)} = \frac{9x(x+9)}{x(x+9)(x-1)} = \frac{9}{(x-1)}$

---

29) $\begin{pmatrix}14 & 16 & 12\\ 2 & 6 & 18\\ -8 & 6 & -2\end{pmatrix}+\begin{pmatrix}4 & 11 & -3\\ -1 & 2 & 4\\ 7 & 5 & 0\end{pmatrix} = \begin{pmatrix}18 & 27 & 9\\ 1 & 8 & 22\\ -1 & 11 & -2\end{pmatrix}$

---

30) $\frac{x}{a}+\frac{y}{b}=1 \Rightarrow \frac{x}{4}+\frac{y}{-6}=1$

$3x-2y-12=0$.

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## MOCK TEST - 7

### 2 mark questions - answers

1) linear function $f(x) = ax+b$

$\Rightarrow f(-1) = 3$ | $f(-1) = 3$ | $f(0) = -1$
$\Rightarrow f(0) = -1$ | $a(-1)+b = 3$ | $a(0)+b = -1$
$\Rightarrow f(2) = -9$ | $-a+b = 3 \rightarrow (1)$ | $\boxed{b = -1}$

$\Rightarrow -a-1 = 3 \Rightarrow -a = 3+1 = 4 \Rightarrow a = -4$

$\boxed{f(x) = -4x-1}$

2) $a_8 = \frac{n^2-1}{n+3} = \frac{8^2-1}{8+3} = \frac{64-1}{11} = \frac{63}{11}$

$a_{15} = \frac{15^2}{2(15)+3} = \frac{225}{30+3} = \frac{225}{31}$.

3) $\sqrt{\frac{121(a+b)^8(x+y)^8(b-c)^8}{81(b-c)^4(a-b)^{12}(b-c)^4}} = \frac{11}{9}\left|\frac{(a+b)^4(x+y)^4}{(a-b)^6}\right.$

4) Area of the $\Delta le = \frac{1}{2}\begin{bmatrix} x_1 & x_2 & x_3 & x_1 \\ y_1 & y_2 & y_3 & y_1 \end{bmatrix}$ sq.cm

$= \frac{1}{2}\begin{vmatrix} 1 & -4 & -3 & 1 \\ -1 & 6 & -5 & -1 \end{vmatrix} = \frac{1}{2}[29-(-15)]$

$= \frac{48}{2} = 24$ sq. cm.

5) coefficient of range $= \frac{L-S}{L+S} = \frac{62}{188} = 0.33$

6) $a = 9$ ; $r = \frac{3}{9} = \frac{1}{3}$ ; $t_n = ar^{n-1}$

$t_8 = 9\left(\frac{1}{3}\right)^7 = 3^2 \times \frac{1}{3^7} = \frac{1}{3^5} = \frac{1}{243}$

7) Equation of the st. line parallel to $3x-7y = 12$ is $3x-7y+k = 0$ at $(6,4)$

$3(6)-7(4)+k = 0 \Rightarrow 18-28+k = 0$

$-10+k = 0 \Rightarrow k = 10$.

$\therefore$ The required equation is $3x-7y+10 = 0$

8) $\frac{t_2}{t_1} = \frac{t_3}{t_2} \Rightarrow \frac{x+12}{x+6} = \frac{x+15}{x+12}$

$\Rightarrow (x+12)(x+12) = (x+6)(x+15)$

$\Rightarrow x^2+12x+12x+144 = x^2+15x+6x+90$

$3x = -54 \Rightarrow x = \frac{-54}{3} = -18$

9) $\Rightarrow (p+3)x+12y-12 = 0$ | $12x-7y-16 = 0$

$m_1 = \frac{-b}{a} = \frac{-(p+3)}{12}$ | $m_2 = \frac{-12}{-7} = \frac{12}{7}$.

$m_1 \cdot m_2 = -1 \Rightarrow \frac{(p+3)}{12} \times \frac{12}{7} = -1$

$p+3 = 7 \Rightarrow p = 7-3 = 4 \Rightarrow \boxed{p = 4}$

10) $A = \{3,5\}$ ; $B = \{2,4\}$

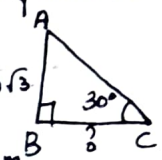
11) Area of the $\triangle ABC = 22$

$\therefore \frac{1}{2}\begin{vmatrix} x_1 & x_2 & x_3 & x_1 \\ y_1 & y_2 & y_3 & y_1 \end{vmatrix} = 22 \Rightarrow \begin{vmatrix} -1 & k & 7 & -1 \\ 2 & -2 & 4 & 2 \end{vmatrix} = 44$

$4k+16-2k+18 = 44 \Rightarrow 2k = 44-34 \Rightarrow 10$

$\therefore k = 10/2 = 5$.

12) Let BC = distance of the car from rocks




$\tan 30° = \frac{50\sqrt{3}}{BC} \Rightarrow \frac{1}{\sqrt{3}} = \frac{50\sqrt{3}}{BC}$

$\Rightarrow BC = 50\sqrt{3} \times \sqrt{3} = 50(3) = 150$ m

13) L.H.S = $n(A) = 3$, $n(B) = 2$, $n(A) \times n(B) = 6$.

R.H.S = $(A \times B) = \{(1,2),(1,3),(3,3),(3,5),(5,2),(5,3)\}$, $n(A \times B) = 6$.

$\therefore n(A) \times n(B) = n(A \times B) \Rightarrow$ Hence Verified

14) $\alpha+\beta = -9$ ; $\alpha\beta = 20$

$\therefore x^2-(\alpha+\beta)x-\alpha\beta = 0$

$\Rightarrow x^2+9x+20 = 0$.

15) $a = 4$ ; $r = \frac{8}{4} = 2$ ; $n = ?$

$t_n = ar^{n-1} = 8192 \Rightarrow 4(2)^{n-1} = 8192$

$2^{n-1} = \frac{8192}{4} = 2048 \Rightarrow 2^{n-1} = 2^{11}$

$n-1 = 11 \Rightarrow n = 12$

16) $\frac{n(n+1)}{2} = 666 \Rightarrow n(n+1) = 1332$

$n^2+n-1332 = 0 \Rightarrow (n+37)(n-36) = 0$

$n = -37$ (-ve) | $n = 36$ | $\therefore \boxed{n = 36}$

17) Let $a = \frac{1}{x}$ ; $b = 1/y$

$\Rightarrow 3a+2b = 12 \rightarrow (1)$
$2a+3b = 13 \rightarrow (2)$

$(1) \times 2 \Rightarrow 6a+4b = 24$
$(2) \times 3 \Rightarrow 6a+9b = 39$
$-5b = -15$

$b = \frac{-15}{-5} = 3$

$b = 3 \Rightarrow 3a+6 = 12$

$3a = 12-6 = 6$

$a = 6/3 = 2$

$\therefore x = 1/2$ ; $y = 1/3$.

18) $m = \frac{-5}{7}$ ; $y - y_1 = m(x - x_1)$

$y+4 = \frac{-5}{7}(x-3) \Rightarrow 7(y+4) = -5(x-3)$

$7y + 28 = -5x + 15 \Rightarrow 5x - 15 + 7y + 28 = 0$

$\therefore 5x + 7y + 13 = 0$

19) $fog = f[g(x)]$

$= f[x^2 - 2]$

$= 2(x^2-2) + 1$

$= 2x^2 - 4 + 1$

$= 2x^2 - 3$

$(gof) = g[f(x)] = g[2x+1]$

$= (2x+1)^2 - 2$

$= 4x^2 + 1 - 4x - 2$

$= 4x^2 - 4x - 1$

$\therefore fog \neq gof$.

20) $a = 729$ ; $r = \frac{243}{729} = \frac{1}{3}$

$t_n = ar^{n-1}$ ; $t_7 = 729\left(\frac{1}{3}\right)^6$

$= 729 \cdot \frac{1}{729} = \underline{(1)}$.

21) $7y = -5x - 13 \Rightarrow y = \left(\frac{-5}{7}\right)x - \left(\frac{13}{7}\right)$

$m = -5/7$ & $c = -13/7$.

22) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$\Rightarrow 0.37 + 0.42 - 0.9 = \underline{0.7}$

23) L.H.S $\Rightarrow A + B = \begin{pmatrix} 6 & 16 \\ 6 & 7 \\ 9 & -3 \end{pmatrix}$

$B + A = \begin{pmatrix} 6 & 16 \\ 6 & 7 \\ 9 & -3 \end{pmatrix}$ $\therefore$ LHS = RHS

$\Rightarrow A + B = B + A$ Hence Verified

24) $\frac{x}{a} + \frac{y}{b} = 1 \Rightarrow \frac{x}{-5} + \frac{y}{3/4} = 1$

$\frac{x}{-5} + \frac{4y}{3} = 1 \Rightarrow \frac{3x - 20y}{-15} = 1$

$\Rightarrow 3x - 20y = -15 \Rightarrow 3x - 20y + 15 = 0$.

25) Let father = $x$ years

Son = $y$ years

Given: $x = 6y \rightarrow (1)$

$\Rightarrow x + 6 = 4(y+6) \rightarrow (2)$

(1) in (2)

$6y + 6 = 4(y+6)$

$6y + 6 = 4y + 24$

$6y - 4y = 24 - 6 = 18$

$2y = 18 \Rightarrow y = 9$.

$\therefore$ son's age $= 9$ years.

father's age $x = 2y = 6(9) = 54$ years

26) $S_6 = 4095$ ; $a = 4$ ; $n = 6$

$S_n = \frac{a(r^n - 1)}{r - 1} = 4095$

$S_6 = \frac{a(4^6 - 1)}{4 - 1} = 4095$

$\frac{a(4096 - 1)}{3} = 4095 \Rightarrow \frac{a(4095)}{3} = 4095$

$\therefore a = 3$

27) $m = \frac{-2}{-3} = \frac{2}{3}$

$\perp^r$ slope $= \frac{-1}{m} = \frac{-1}{2/3} = \underline{-3/2}$

28) $h = 3$ ; Base area $= 350\ m^2$

$\pi r^2 = 350$ ; Vol $= \pi r^2 h$

$= 350 \times 3 = \underline{1050\ m^3}$

29) $N = \{1, 2, 3, 4, \ldots\}$

$f(1) = 2(1) - 1 = 2 - 1 = 1$

$f(2) = 2(2) - 1 = 4 - 1 = 3$

$f(3) = 2(3) - 1 = 6 - 1 = 5$

$\therefore f = \{(1,1), (2,3), (3,5) \ldots\}$

$f$ is one-one function.

and Range $\neq$ co-domain.

$\therefore$ not onto.

30) Slope $m = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{2-5}{1-4} = \frac{-3}{-3} = 1$

$\perp^r$ $m = \frac{-1}{m} = \frac{-1}{1} = -1$

Eq $\boxed{y - y_1 = m(x - x_1)}$ $\rightarrow$ pt $(3, 2)$.

$(y - 2) = -1(x - 3)$

$y - 2 = -x + 3$

$\Rightarrow x + y - 2 - 3 = 0$

$x + y - 5 = 0$.

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# MOCK TEST - 8

## Answers for 2mark questions

1) $d = 2.8\,m \Rightarrow r = \frac{2.8}{2} = 1.4\,m$.

$h = 3m$ ; Area covered in 1 revolution $= 2\pi rh$

$= 2 \times \frac{22}{7} \times 1.4 \times 3 = \underline{26.4\,m^2}$

$\therefore$ Area covered in 8 revolution $= 8 \times 26.4$

$= \underline{211.2\,m^2}$

2) (i) $\frac{x^3}{9y^2} \times \frac{27y}{x^{52}} = \frac{3}{x^2y}$

(ii) $\frac{x^4b^2}{x-1} \times \frac{(x-1)(x-1)}{a^4b^3} = \frac{x^4(x+1)}{a^4b}$

3) $\sigma = 6.5$ ; $\bar{x} = 12.5$

$C.V = \frac{\sigma}{\bar{x}} \times 100\% = \frac{6.5}{12.5} \times 100\% = \underline{52\%}$

4) $\frac{BD}{DC} = \frac{AB}{AC} \Rightarrow \frac{BD}{3} = \frac{5.6}{6}$

$BD = \frac{3 \times 5.6}{6} = 2.8$

$\therefore BC = BD + DC = 2.8 + 3$

$\therefore BC = 5.8\,cm$

5) $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-6-10}{14-14} = \frac{-16}{0}$

$= \infty$

6) Range $= L - S = 125 - 63 = 62$

coefficient of Range $= \frac{L-S}{L+S} = \frac{62}{188} = 0.33$

7) $fog(x) = f(g(x)) \Rightarrow f(2x+k) = 3(2x+k) - 2$

$\Rightarrow 6x + 3k - 2$

$gof(x) = g(f(x)) \Rightarrow g(3x-2)$

$\Rightarrow 2(3x-2) + k = 6x - 4 + k$

$fog = gof \Rightarrow 6x + 3k - 2 = 6x - 4 + k$

$3k - k = -4 + 2 \Rightarrow 2k = -2$

$\therefore k = -1$

8) $9a^3b^2 = 3 \times 3 \times a^3 \times b^2$

$12a^2b^2c = 3 \times 4 \times a^2 \times b^2 \times c$

L.C.M $= 36a^3b^2c$.

9) $m = \frac{-\text{coefficient of } x}{\text{coefficient of } y} = \frac{-6}{8} = \frac{-3}{4}$

10) $\frac{1 - \tan^2\theta}{\cot^2\theta - 1} = \frac{1 - \frac{\sin^2\theta}{\cos^2\theta}}{\frac{\cos^2\theta}{\sin^2\theta} - 1} = \frac{\frac{\cos^2\theta - \sin^2\theta}{\cos^2\theta}}{\frac{\cos^2\theta - \sin^2\theta}{\sin^2\theta}}$

$= \frac{\cos^2\theta - \sin^2\theta}{\cos^2\theta} \times \frac{\sin^2\theta}{\cos^2\theta - \sin^2\theta} = \frac{\sin^2\theta}{\cos^2\theta} = \underline{\tan^2\theta}$

11) $fog = f[g(x)] \Rightarrow f[x-4] = 3 + (x-4)$

$fog = x - 1$.

$gof = g[f(x)] = g[3+x] = [3 + x - 4]$

$gof = x - 1$. $\therefore fog = gof$.

12) (i) $\alpha + \beta = \frac{-b}{a} = \frac{-7}{3}$ ; $\alpha\beta = \frac{c}{a} = \frac{-2}{3}$

$\frac{\alpha}{\beta} + \frac{\beta}{\alpha} = \frac{\alpha^2 + \beta^2}{\alpha\beta} = \frac{(\alpha+\beta)^2 - 2\alpha\beta}{\alpha\beta}$

$= \frac{\left[\frac{-7}{3}\right]^2 - 2\left[\frac{-2}{3}\right]}{-2/3} = \frac{\frac{49}{9} + \frac{4}{3}}{-2/3}$

$= \frac{49+12}{9} \times \left(\frac{-3}{2}\right) = \frac{-61}{6} = \underline{10.16}$

(ii) $\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha} = \frac{\alpha^3 + \beta^3}{\alpha\beta} = \frac{(\alpha+\beta)^3 - 3\alpha\beta(\alpha+\beta)}{-2/3}$

$= \frac{\left(\frac{-7}{3}\right)^3 - \beta\left(\frac{-2}{3}\right)\left(\frac{-7}{3}\right)}{-2/3} = \frac{\frac{-343}{27} - \frac{14}{3}}{-2/3}$

$= \frac{-343 - 126}{27} \times \frac{-3}{2} = \frac{-469}{27_9} \times \frac{-3}{2}$

$= \frac{469}{18} = \underline{26.05}$

13) $n = 28$ ; $t_n = 4n - 3$

$t_1 = 1$ ; $t_2 = 5$ ; $t_{28} = 109$

$\therefore a = 1$ ; $d = t_2 - t_1 = 4$ ; $l = 109$

$S_n = \frac{n}{2}(2a + (n-1)d) \Rightarrow \frac{28}{2}(2 \times 1 + 27 \times 4)$

$= 14(2 + 108) = 14 \times 110 = \underline{1540}$.

14) $a = 729$; $r = \frac{243}{729} = \frac{1}{3}$

$t_n = ar^{n-1} \Rightarrow t_7 = 729\left(\frac{1}{3}\right)^6 = \frac{729}{3^6}$

$\therefore t_7 = 1.$

15) Order of AB = $p \times r$

$p \times \boxed{q = q} \times r$ (A, B)

$p \times r$

BA is not defined.

$q \times \boxed{r \neq p} \times q$ (B, A)

16) Standard deviation of the data, $\sigma = 4.5$, each value of the data decreased by 5, the new standard deviation does not change and it is also 4.5

17) $1+2+3+\ldots+k = 325$ $\left[\because \sum_{k=1}^{n} k^3 = \left[\sum_{k=1}^{n} k\right]^2\right]$

$\Rightarrow 1^3+2^3+3^3+\ldots+k^3 = 325^2 = 105625$

18) $16+17+18+\ldots+75 = (1+2+3+\ldots+75) - (1+2+3+\ldots+15)$

$= \frac{75\times76}{2} - \frac{15\times16}{2} = 75\times38 - 15\times8$

$= 2850 - 120 = 2730$ //

19) $\sqrt{\frac{121(a+b)^8(x+y)^8(b-c)^8}{81(b-c)^4(a-b)^{12}(b-c)^4}}$

$= \left|\frac{11(a+b)^4(x+y)^4(b-c)^4}{9(b-c)^2(a-b)^6(b-c)^2}\right| = \frac{11}{9}\left|\frac{(a+b)^4(x+y)^4}{(a-b)^6}\right|$

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20) $S = \{HHH, HHT, HTH, THH, HTT, THT, TTH, TTT\} \Rightarrow n(S) = 8$

Let A = getting atmost one head

$A = \{HTT, THT, TTH, TTT\} \Rightarrow n(A) = 4$

$P(A) = \frac{4}{8} = \frac{1}{2}$

21) $a = 6$; $d = 13-6 = 7$; $l = 97$.

$n = \left(\frac{l-a}{d}\right)+1 \Rightarrow \left(\frac{97-6}{7}\right)+1 = 13+1 = 14$

$S_n = \frac{n}{2}[a+l] \Rightarrow S_{14} = \frac{14}{2}[6+97] = 7(103) = 721$

22) $1+4+9+16+\ldots+225 = 1^2+2^2+3^2+\ldots+15^2$

$= \frac{15\times16\times31}{6} = 1240$ $\left[\because \sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}\right]$

24) $2[1+2+3+\ldots+40] = 2\left[\frac{n(n+1)}{2}\right]$

$= 40\times41 = 1640.$

25) $n^{th}$ term $= ar^{n-1}$; $2^{nd}$ term $= \sqrt{6}$

$\Rightarrow ar^{2-1} = \sqrt{6} \Rightarrow ar = \sqrt{6}$; $6^{th}$ term $= 9\sqrt{6} \Rightarrow ar^{6-1}$

$\Rightarrow 9\sqrt{6} \Rightarrow ar^5 = 9\sqrt{6}$; $\therefore \frac{ar^5}{ar} = \frac{9\sqrt{6}}{\sqrt{6}} \Rightarrow r^4 = 9$

$r = \sqrt{3}$; Also $ar = \sqrt{6} \Rightarrow a = \frac{\sqrt{6}}{r} = \frac{\sqrt{2}\sqrt{3}}{\sqrt{3}}$

$a = \sqrt{2}$. $\therefore$ The G.P is $a, ar, ar^2, \ldots$

$= \sqrt{2}, \sqrt{6}, 3\sqrt{2}.$

23) $A \times A = 3\times3 = 9$ elements

Eg: $(-1,0)$ & $(0,1)$; To find other 7 elements.

$\therefore A \times A = \{-1,0,1\} \times \{-1,0,1\}$

$= \{(-1,-1), (-1,0), (-1,1), (0,-1), (0,0), (0,1), (1,-1), (1,0), (1,1)\}$.

26) For AB, $a+3 = b$

For BA, $17-b = a$

$\therefore 17-(a+3) = a \Rightarrow 17-a-3 = a$

$2a = 14 \Rightarrow a = 7$; $b = a+3 = 7+3 = 10$

$\therefore a = 7$; $b = 10$.

27) $x-3 = 1 \Rightarrow \boxed{x = 4}$

$3x - z = 0 \Rightarrow 3(4) - z = 0 \Rightarrow \boxed{z = 12}$

$x+y+7 = 1 \Rightarrow 4+y+7 = 1 \Rightarrow \boxed{y = -10}$

28) $AN = AM = 3cm$

$BN = BL = 4cm$

$CL = CM = AC - AM = 9-3 = 6cm$

$BC = BL + CL = 4+6 = 10cm$

29) Maximum Volume of cone $= \frac{1}{3}\pi r^2 h$ cu.units

$\Rightarrow \frac{1}{3}\pi(r^2)r = \frac{1}{3}\pi r^3$ cu.units

[$\because$ Height of cone = Radius of Hemisphere]

30) $S = \{(g,g), (g,b), (b,g), (b,b)\}$

$n(S) = 4$

Let A = getting atleast one girl baby

$A = \{(g,g), (g,b), (b,g)\}$

$n(A) = 3$

$P(A) = \frac{n(A)}{n(S)} = \frac{3}{4}$