DAV BORL PUBLIC SCHOOL, BINA

Revision Work sheet For H.Y. SESSION

Class : XI Subject: Mathematics

Q1. If $A = \{1, 2, 3, 4, 5\}$, $B = \{4, 5, 6, 7, 8\}$, $C = \{7, 8, 9, 10, 11\}$ and $D = \{10, 11, 12, 13, 14\}$. Find (i) $A \cup B$ (ii) $B \cup C$ (iii) $A \cap C$ (iv) $A \cap D$ (v) $A \cap B$

Verify the following

(i) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

(ii) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

(iii) $A \cap (B \quad C) - (A \cap B) \quad (A \cap C)$

Q2. Let $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $A = \{2, 4, 6, 8\}$ and $B = \{2, 3, 5, 7, 8\}$. Find (i) A' (ii) $(A')'$ (iii) $(A \cup B)'$ (iv) $(A \cap B)'$

Verify the following

(i) $(A \cup B)' = A' \cap B'$ (ii) $(A \cap B)' = A' \cup B'$ (III) $B - A = B \cap A'$

Q3 Let A and B be two sets such that $n(A) = 24$, $n(A \cup B) = 45$ and $n(A \cap B) = 8$. Find (i) $n(B)$ (ii) $n(A - B)$ (iii) $n(B - A)$

Q4. What is the number of subsets and proper sub sets of a set containing n-elements.

Q5. In a survey of 800 students in a school 200 were listed as taking apple juice, 250 taking orange juice and 125 were taking both apple as well as orange juice. Find how many students were taking neither apple juice nor orange juice.

Q6. There 40 students in a chemistry class and 60 students in physics class. Find the number of students which are either in Physics class or Chemistry class in the cases.

(i) the two classes meet at the same hour.

(ii) the two classes meet at different hours and 20 students are enrolled in both the subjects.

Q7. In a class of 35 students, 17 have taken mathematics 10 have taken mathematics but not economics. Find the number of students who have taken both mathematics and economics and the number of students who have taken economics but not mathematics, if it is given that each student has taken either mathematics or economics or both.

Q8 If A $\{x : x = 2n + 1, n \leq 4, n \in N\}$ and $B = \{y : 2 < y < 7, y \in N\}$, find (i) $A \cap B$ (ii) $A \cup B$

Q9. Using laws of algebra of sets, show that (i) $(A \cup B) \cap (A \cup B') = A$ (ii) $A \cup (B - A) = A \cup B$

Q10. Of the members of three athletic teams in a certain school, 21 are in the basket ball team, 26 in hockey team and 29 in the football team. 14 play hockey and basket ball, 15 play hockey and football, 12 play football and basket ball and 8 play all the three games. How many members are there in all?

Q11 If A $\{a, b, c\}$ write subsets of set A. Also mention the proper subsets of A

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1. If $P=\{a,b,c\}$ and $Q=\{d\}$, form the sets $P\times Q$ and $Q\times P$ are these two Cartesian products equal?
2. If A and B are finite sets such that $n(A)=m$ and $n(B)=k$ find the number of relations from A to B
3. Let $f=\{(1,1),(2,3),(0,-1),(-1,3),......\}$ be a function from z to z defined by $f(x)=ax+b$, for same integers a and b determine a and b.
4. Express $\{(x,y): y+2x=5, xy\in w\}$ as the set of ordered pairs
5. Let a relation $R-\{(0,0),(2,4),(-1,2),(3,6),(1,2)\}$ then
   (i) write domain of R (ii) write range of R
   (iii) write R the set builder form (iv) represent R by an arrow diagram
6. Let $A=\{1,2,3\}$, $B=\{1,2,3,4\}$ and $R=\{(x,y):(x,y)\in A\times B, y=x+1\}$
   (i) find $A\times B$ (ii) write R in roster form
   (iii) write domain & range of R (iv) represent R by an arrow diagram
7. The cartesian product $A\times A$ has a elements among which are found $(-1,0)$ and $(0,1)$. find the set and the remaining elements of $A\times A$
8. Find the domain and the range of the following functions $f(x)-\dfrac{1}{\sqrt{5-x}}$
9. Let $f(x)=x+1$ and $g(x)=2x-3$ be two real functions. Find the following functions $(i)\ f+g$ $(ii)\ f-g$ $(iii)\ fg$ $(iv)\ \dfrac{f}{g}$ $(v)\ f^2-3g$
10. Find the domain and the range of the following functions
    $(i)\ f(x)=\dfrac{x-3}{2x+1}$ $(ii)\ f(x)=\dfrac{x^2}{1+x^2}$ $(iii)\ f(x)=\dfrac{1}{1-x^2}$
11. Draw the graphs of the following real functions and hence find their range
    $(i)\ f(x)=2x-1$ $(ii)\ f(x)=\dfrac{x^2-1}{x-1}$
12. Let f be a function defined by $F: x\to 5x^2+2, x\in R$
    (i) find the image of 3 under f (ii) find $f(3)+f(2)$
    (iii) find x such that $f(x)=22$

Q1. Find the real values of x and y, if

(i) $(x + y)(2 - 3i) = 4 + i$

(ii) $\dfrac{(1+i)x - 2i}{3+i} + \dfrac{(2-3i)y + i}{3-i} = i$

(iii) $(x - iy)(3 + 5i)$ is the conjugate of $6 + 24i$.

Q2. Find the modulus and arguments of each of the following and represent it in the argand plane (i) $z = -1 - i\sqrt{3}$ (ii) $z = -\sqrt{3} + i$ (iii) $1 - i$ (iv) $\dfrac{1+2i}{1-2i}$

Q3. Express the following complex numbers in polar form :-s

(i) $\sin 50^0 + i \cos 50^0$ (ii) $\text{Cos} 70^0 + i \text{ Cos } 20^0$

Q4. Solve each of the following equations:-

(i) $\sqrt{3}x^2 - \sqrt{2}x + 2\sqrt{3} = 0$ (iv) $x^2 - \sqrt{2}\, xi + 12 = 0$

(ii) $x^2 + \dfrac{x}{\sqrt{2}} + 1 = 0$ (v) $3x^2 - 7xi + 6 = 0$

(iii) $3x^2 - 4x + \dfrac{20}{3} = 0$

Q5. Find the conjugate the following;-

(i) $\dfrac{1}{3+4i}$ (ii) $7 + 5i$ (iii) $\dfrac{1}{(2-5i)^2}$ (iv) $\dfrac{(3-2i)(2+3i)}{(1+2i)(2-i)}$

Q6. Find the multiplicative inverse of the following complex number:-

(i) $(2 + \sqrt{3}\, i)^2$ (ii) $\dfrac{5+\sqrt{2}i}{5-\sqrt{2}i}$

Q7. Express the following complex number in form a + ib

(i) $\left(\dfrac{1}{3} + 3i\right)^{3}$ (ii) $(1 - i)^4$ (iii) $\dfrac{6+3i}{2-i}$

(iv) $\left(\dfrac{1}{3} + \dfrac{7}{3}i\right) + \left(4 + \dfrac{1}{3}i\right) - \left(\dfrac{-4}{3} + i\right)$ (iv) $i^{26} + i^5$

Q8. If $z = x + iy$ and $w = \frac{1 - iz}{z - i}$, show that $|w| = 1 \Rightarrow z$ purely real.

Q9. Convert the complex number $z = \dfrac{i - 1}{\cos\frac{\pi}{3} + i\sin\frac{\pi}{3}}$ in the polar form

Q10. Show that the images of the complex numbers 3 + 2i, 5i, -3 + 2i and – i form a square.

Q11. For a complex number z, what is the value of Arg z + Arg $\bar{z}$ $(z \neq 0)$?

Q12. Show that $\left|\dfrac{z - 3}{z + 3}\right| = 2$ represent a circle

Q13 Find the squareroot of the following complex number:
i) 3+4i (ii) 12-5i

1. For every integer n, prove that $7^n - 3^n$ *is* divisible by 4.

2. Prove that $n(n+1)(n+5)$ is multiple of 3.

3. Prove that $10^{2n-1}+1$ is divisible by 11

4. Prove $\left(1+\frac{1}{1}\right)\left(1+\frac{1}{2}\right)\left(1+\frac{1}{3}\right)\ldots\left(1+\frac{1}{n}\right)=(n+1)$

5. Prove $1.2+2.3+3.4+\text{--}+n(n+1)=\frac{n(n+1)(n+2)}{3}$

6. Prove $(2n+7)<(n+3)^2$

7. Prove $\frac{1}{1.4}+\frac{1}{4.7}+\frac{1}{7.10}+..+\frac{1}{(3n-2)(3n+1)}=\frac{n}{(3n+1)}$

8. Prove $1.2+2.2^2+3.2^3+\ldots+n.2^n = (n-1)2^{n+1}+2$

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1. Prove that $3^{2n+2} - 8n - 9$ is divisible by 8

2. Prove by PMI.

   $x^n - y^n$ is divisible by $(x-y)$ whenever $x-y \neq 0$

3. Prove $(x^{2n}-1)$ is divisible by $(x-1)$.

4. Prove $1+\frac{1}{(1+2)}+\frac{1}{(1+2+3)}+--+\frac{1}{(1+2+--+n)}=\frac{2n}{(n+1)}$

5. Prove $1.3 + 3.5 + 5.7 + -- + (2n-1)(2n+1) = \frac{n\left(4n^2+6n-1\right)}{3}$

6. Prove by PMI

   $3.2^2 + 3^2.2^3 + 3^3.2^4 + -- + 3^n.2^{n+1} = \frac{12}{5}\left(6^n-1\right) n \in N.$

7. Prove $1.3 + 2.3^2 + 3.3^3 + --- + n.3^n = \frac{(2n-1)3^{n+1}+3}{4}$

8. Prove $\frac{1}{3.5}+\frac{1}{5.7}+\frac{1}{7.9}+--+\frac{1}{(2n+1)(2n+3)}=\frac{n}{3(2n+3)}$

Q1. The difference between two acute angles of a right triangle is $\frac{\pi}{9}$. Find the angles in degree.

Q2. A horse is tied to a post by a rope. If the horse moves along a circular path always keeping the rope tight and describe 88 metres when it was traced out 72^0 at the centre, find the length of the rope.

Q3. The angles of a triangle are A.P. such that the greatest is 5 times the least. Find the angles in radians.

Q4. Prove that (i) $(1 + \tan\alpha \ \tan\beta)^2 + (\tan\alpha - \tan\beta)^2 = \sec^2\alpha \ \sec^2\beta$

(ii) $\frac{\tan A}{1 - Cot A} + \frac{Cot A}{1 - \tan A} - \sec A \ \text{cosec} A + 1$

Q5. If $\sin\theta = \frac{12}{13}$ and θ lies in 2^{nd} quad, then find the value of $8\tan\theta - \sqrt{5}\sec\theta$

Q6. Prove that :-

(i) $$\frac{Cos(2\pi + \theta) Co\sec(2\pi + \theta)\tan\left(\frac{\pi}{2} + \theta\right)}{\sec\left(\frac{\pi}{2} + \theta\right) Cos\,\theta Cot(\pi + \theta)} - 1$$

(ii) $$\frac{\tan(90^0 \ \ \theta)\sec(180^0 \ \ \theta)\sin(\ \ \theta)}{\sin(180^0 + \theta) Cot(360^0 - \theta)\cos ec(90^0 - \theta)} = 1$$

(iii) $$\frac{\tan 69^0 + \tan 66^0}{1 - \tan 69^0 \tan 66^0} = -1$$

(iv) $$\frac{Cos\,11^0 + \sin 11^0}{Cos\,11^0 \ \ \sin 11^0} = \tan 56^0$$

Q7. If $\tan\alpha = \frac{m}{m+1}$, $\tan\beta = \frac{1}{2m+1}$ then prove that $\alpha + \beta = \frac{\pi}{4}$

Q8. Prove that (i) $\tan 3A \tan 2A \tan A = \tan 3A - \tan 2A - \tan A$

(ii) $(1 + \tan A)(1 + \tan B) = 2$ when $A + B = \frac{\pi}{4}$

Q9. Draw the graph of

(i) $y = 3\sin x$ (ii) $y = \text{cosec}\, x$ (iii) $y = \sec x$

(iv) $y = \sin x + \cos x$

Q10. Solve the following trigonometric equations ;-

(i) $\tan\left(\frac{2}{3}\theta\right) = \sqrt{3}$

(ii) $7Cos^2\theta + 3\sin^2\theta = 4$

Q11. If $\tan A = x \tan B$ then prove that $\frac{\sin(A - B)}{\sin(A + B)} = \frac{x - 1}{x + 1}$

Q12. If $\sin A = \frac{3}{5}$, $0 < A < \frac{\pi}{2}$, $Cos\,B = \frac{-12}{13}$, $\pi < B < 3\frac{\pi}{2}$ find $\sin(A+B)$

Q13. Prove that (i) $\cos 20^0 \cos 40^0 \cos 60^0 \cos 80^0 = \frac{1}{16}$

(ii) $\cos 5A = 16\cos^5 A - 20\cos^3 A + 5\cos A$

Q14. Find the value of (i) $\cos 15^0$ (ii) $\sin 75^0$ (iii) $\tan 75^0$

Q15. Find the general solution of the following trigonometric equations ;-

(i) $\cot^2\theta + \frac{3}{\sin\theta} + 3 = 0$

(ii) $\tan\theta + \tan 2\theta + \tan\theta \tan 2\theta = 1$

(iii) $\tan\theta + \tan 2\theta + \sqrt{3}\tan\theta\tan 2\theta = \sqrt{3}$

(iv) $\sec^2 2x = 1 - \tan 2x$

(v) $\tan\theta + \tan\left(\theta + \frac{\pi}{3}\right) + \tan\left(\theta + \frac{2\pi}{3}\right) = 3$

Q16 In any triangle ABC, if a=16, b=12, c=25 find

(i) Cos A, Cos B, Cos C

(ii) Sin A, Sin B, Sin C

Q17 For any triangle ABC prove that

(i) $\frac{\sin(B - C)}{\sin(B + C)} = \frac{b^2 - c^2}{a^2}$

(ii) $\frac{b^2 - c^2}{a^2}\sin 2A + \frac{c^2 - a^2}{b^2}\sin 2B + \frac{a^2 - b^2}{c^2}\sin 2C = 0$

(iii) $a(\cos C - \cos B) = 2(b - c)\cos^2(A/2)$