UNIT-5

Mathematics Worksheet for grade-11

1). Find the position vector, the direction and the magnitude of $\vec{AB}$. $\vec{B} - \vec{A}$

a) $A = (2, -3)$, $B = (4, 1)$ (x_1, y_1 and x_2, y_2)

b). $A = (1, 2)$ $B = (-2, -3)$

c) $A = (3, 4)$ $B = (4, -3)$

d) $A = (3, 1)$ $B = (5, 3)$

2) Let $\vec{U} = (1, -2)$ and $\vec{V} = (-2, 4)$, then find

a) $U + V$

b) $U - V$

c). $2U + 3V$

d) $|U + V|$

e) $|3V|$

f) $|2V - U|$

3). If the magnitude of vector U is 4 unit then find the norm of

a) $2U$ B. $-3U$ C. $\frac{-2}{3}U$ D. $7/5\,U$

4). Find a unit vector.

i) in the direction of vector V.

ii) in the opposite direction of vector V. if

given that a) $V = (3, 4)$

b) $V = (2, 7)$

c). $V = (5, 12)$

d) $V = (5, 9)$

5). If $A = (1, 3)$ and $B = (3, 6)$ be two points, find the unit vector along

a) $\vec{AB}$ b) $\vec{BA}$

6) Find the inner product of the vector $\vec{a}$ and $\vec{b}$ and state, angle b/n acute, obtuse and orthogonal

a). $\vec{a} = (3, 5)$ $\vec{b} = (7, 3)$

b) $\vec{a} = (-1, 2)$ $\vec{b} = (2, 1)$

c) $\vec{a} = (3\hat{i} - 4\hat{j})$, $\vec{b} = (\hat{i} + 3\hat{j})$

d) $\vec{a} = (2\hat{i} + 3\hat{j})$ $\vec{b} = (6\hat{i} + 4\hat{j})$

7) Find the cosine of the angle b/n vectors U and V if

a) $U = (-1, -2)$ $V = (1, 2)$

b) $U = (0, 0)$ $V = (1, 1)$

c) $U = (4, 3)$, $V = (1, 7)$

d) $U = (2, 1)$, $V = (0, 0)$

8). Determine the value of m such that the two vectors are orthogonal and parallel.

a). $V = 2m\hat{i} - \hat{j}$ $U = (2\hat{i} + 4\hat{j})$

b) $V = 8\hat{i} + 2\hat{j}$ $U = 2\hat{i} - m\hat{j}$

9). If $\vec{a} = \hat{i} + 2\hat{j}$, $\vec{b} = -\hat{i} + 2\hat{j}$ and $c = 3\hat{i} - 2\hat{j}$. Find t such that $\vec{a} - t\vec{b}$ is perpendicular to c.

10). Vectors U and V makes angle of $\theta = \pi/4$ if $|U| = 4$ and $|V| = 3$, then find

a) $U \cdot V$
b) $|a+b|$
c) $|b-a|$
d) $|a-b|$
e). $|2U - 3V|$
f). $|2U + 5V|$

11). Let $|\vec{a}| = 1$ and $|\vec{b}| = 1$ and angle b/n $\vec{a}$ and $\vec{b}$ is $\pi/3$, then find

a) $|\vec{a} + \vec{b}|$
b) angle b/n $\vec{a}$ and $\vec{a} + \vec{b}$
c) angle b/n b and $\vec{a} - \vec{b}$

13). Let $\vec{U} = 4\hat{i} + 3\hat{j}$ and $\vec{V} = m\hat{i} + 7\hat{j}$ and angle b/n U and V is $\frac{3\pi}{4}$, then find m.

14). Find the vector, parametric and standard equation of the line l passing through the points

a). $A = (3,2)$ $B = (4,6)$
b) $P = (2,5)$ $Q = (7,4)$
c) $L = (8,4)$ $M = (-2,-3)$
d) $A = (-2,-4)$ $B = (2,4)$
e) $L = (4,8)$ $X = (9,10)$
f) $U = (0,0)$ $V = (-4,5)$

15). Find parametric equation of the line L

a) $L: 3x + 4y = 10$
b) $\frac{x+1}{5} = \frac{y+6}{6}$

16). Find the equation of the circle with diameter with end points $A(2,4)$ and $B = (6,8)$

17). Find the equation of a tangent line to the circle at a given point P.

a). $x^2 + 2x + y^2 = 4$ at a point $(3,1)$
b) $(x-2)^2 + (y+2)^2 = 3$ at point $P(2,3)$
c). $x^2 - 4x + y^2 + 4y + 18 = 0$ at point $(1,1)$
d). $x^2 + y^2 = 8$ at point $P(2,4)$

18) If $A = (1, 2, 3)$ and $B = (-2, 1, 3)$ are two points. Find a unit vector in the direction of

a) $\overrightarrow{AB}$ b) $\overrightarrow{BA}$

19). Find scalar/dot product of each of the following pair of vector

a). $U = (1, 2, 3)$ $V = (-1, 2, -3)$

b) $U = (-1, -2, 4)$ $V = (1, 4, 3)$

20). Find the angle b/n the vector

a). $\vec{V} = (1, 0, 4)$, $U = (3, 1, 0)$

b) $\vec{V} = (2, 2, 2)$ $U = (3, 3, 3)$

c) $V = (2\hat{i} + 3\hat{j} - k)$, $U = (-2\hat{i} + 2\hat{j} + 4k)$

21) Find the cross product of the following vectors

a) $\vec{U} = (2\hat{i} + 3\hat{j} + 4k$, $V = 2\hat{i} + 7\hat{j} - 4k$

b) $U = (2, 3, 4)$ $V = (-2, -3, 2)$

c) $U = (4, 3, 0)$ $V = (1, 2, 3)$

22). If $U = \hat{i} - \hat{j} + 2k$ and $V = 2\hat{i} + 3\hat{j} - 3k$, then find the the following

a). $U \times V$.

b) $|U \times V|$

c) $-V \times U$

d). $U \cdot V$

e) $U \cdot (U \times V)$

f) $U \times U$

g) $U \cdot U$

h) $V \cdot (V \times U)$

23) Given a vector $w = (\hat{i} + 3\hat{j} - 2k) \times (\hat{i} + 3k)$, the find a magnitude of w.

24) Find the area of the parallelogram formed by the vectors $U = 3i + 5$ and $V = 2i + 3j$ that spanned between them.

25) Find the area of the triangle with vertices $(-1, 2), (4, -1)$ and $(8, 7)$

26) Find angle b/n U and V if $0 \leq \theta \leq \pi$ and

$U = 2i + j - 3k$ and $V = 6i + j + 2k$

a) $U \times V$. b. $U \cdot V$ c. $V \times U$ d $V \cdot U$

27). Find the area of the triangle whose vertices $(3, -1, 2), (1, -1, -3)$ and $(4, -3, 1)$

28) Find the vector, the parameteric equations of the line which rectangular equation is $6x + 3y = 10$.

29). Find the vector, parametric and standard equation of a line that passes through a vector $(3, 2)$.

30). Find a vector and a standard equation of the line and the parametric equation is $\frac{4-x}{5} = \frac{y+2}{3}$

31) Find equation of tangent line to the circle $x^2 + y^2 = 29$ of the point

a) $R(-2, 5)$

b) $R(-1, -2)$

c) $R(3, -4)$

d) $R(2, 3)$