# Vector Practice

1.) Find the components of the following vectors

a.) $10.\,m\ at\ 30.^\circ\ N\ of\ E$

b.) $20.\,N\ at\ 45^\circ\ W\ of\ N$

c.) $40.\frac{m}{s}\ at\ 60.^\circ\ S\ of\ W$

d.) $15\ kg \times \frac{m}{s}\ at\ 17^\circ\ W\ of\ S$

e.) $17\ m\ due\ west$

f.) $10.\,N\ at\ 40.^\circ\ S\ of\ E$

2.) Adding parallel vectors:

a.) $10\ N\ [E]\ +\ 2.0\ N\ [E]$

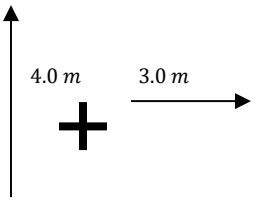
b.) $6.0\ m\ [W]\ +\ 3.0\ m\ [E]$

c.) $7.0\frac{m}{s}[N] +\ 6.3\frac{m}{s}\ [S]$

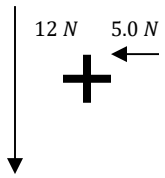
d.) $9.2\ N\ [E]\ +\ 7.4\ N\ [W]\ +\ 3.2\ N\ [E]$

3.) Adding perpendicular vectors, express appropriate angles in your answer:

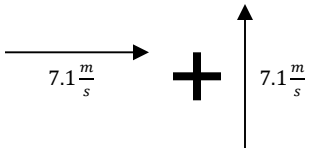
a.)



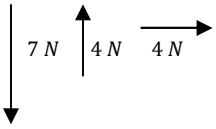

b.)



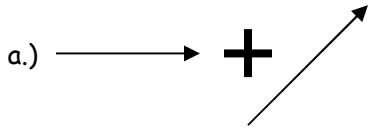

c.)

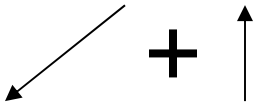



d.)



4.) Sketch an appropriate answer for the following:

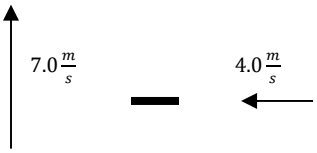
a.) 

b.) 

5.) When subtracting vectors what should you do?

6.) Subtract the following vectors:

a.) 

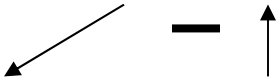

b.) 


c.) $5.0\ m\ [N] - 12.0\ m\ [E]$

d.) $4.0\ N\ [S] - 3.0\ N\ [E]$

7.) Sketch an appropriate resultant:

a.) 

b.) 

8.) Add the following vectors, you will have to use components for this…

a.) $60.\ N\ at\ 40.^\circ\ E\ of\ N\ and\ 45\ N\ at\ 12^\circ\ S\ of\ E$

b.) $48\frac{m}{s}\ at\ 53^\circ\ N\ of\ W\ and\ 25\frac{m}{s}\ at\ 80.^\circ\ N\ of\ E$

c.) $6.0\ m\ at\ 16^\circ\ W\ of\ S\ and\ 4.0\ m\ due\ south$

9.) Subtract the vectors below:

a.) $10.\frac{m}{s}\ at\ 45°\ E\ of\ N\ minus\ 6.0\frac{m}{s}\ due\ west$

b.) $15\ N\ at\ 30.°\ W\ of\ N\ minus\ 8.0\ N\ at\ 40°\ S\ of\ W$

10.) Vector applications:

a.) A plane flies at $70.\frac{m}{s}$ at $60.°\ N\ of\ E$ and is blown by a wind of velocity $20.\frac{m}{s}$ due north, find the ground speed.

b.) A boat can achieve a velocity of $8.0\frac{m}{s}$ and heads due north across a $56\ m$ wide river which flows west at $6.0\frac{m}{s}$.

i.) Find the velocity of the boat as viewed from shore.

ii.) How long does it take to cross the river?

iii.) How far downstream is the boat when it reaches the far bank?

iv.) What bearing should the boat make if it wants to arrive directly across the river?

v.) What is the magnitude of the resultant in (iv) above?

Answers -

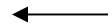
1a.) $x-comp\ 8.7\ m\ [E], y-comp\ 5.0\ m\ [N]$ 1b.) $x-comp\ 14.1\ N\ [W], y-comp\ 14.1\ N\ [N]$

1c.) $x = 20.\frac{m}{s}\ [W], y = 34.6\frac{m}{s}\ [S]$ 1d.) $x = 4.4\ kg \times \frac{m}{s}\ [W], y = 14.3\ kg \times \frac{m}{s}\ [S]$

1e.) $x = 17\ m\ [W], y = 0$ 1f.) $x = 7.7\ N\ [E], y = 6.4\ N\ [S]$

2a.) $12\ N\ [E]$ 2b.) $3.0\ m\ [W]$ 2c.) $0.70\frac{m}{s}\ [N]$, $5.0\ N\ [E]$,

3a.) $5.0\ m$ at $53°\ N\ of\ E$ 3b.) $13\ N$ at $67°\ S\ of\ W$ 3c.) $10.\frac{m}{s}$ at $45°\ N\ of\ E$ 3d.) $5.0\ m$ at $53°\ E\ of\ S$

4a.)  4b.)  5.) add the opposite

6a.) $4.0\ m\ [E]$ 6b.) $8.1\ m$ at $29.7°\ E\ of\ N$, 6c.) $13\frac{m}{s}$ at $67°\ W\ of\ N$ 6d.) $5.0\ N$ at $53°\ S\ of\ W$

7a.)  7b.)  8a.) $90.N$ at $66°\ E\ of\ N$ 8b.) $67.5\frac{m}{s}$ at $69°\ N\ of\ W$

8c.) $9.9\ m$ at $10°\ W\ of\ S$ 9a.) $14.9\frac{m}{s}$ at $28°\ N\ of\ E$ 9b.) $18.2\ N$ at $86°\ N\ of\ W$

10a.) $88\frac{m}{s}$ at $67°\ N\ of\ E$ 10bi.) $10.\frac{m}{s}$ at $37°\ W\ of\ N$ ii.) $7.0\ s$ iii.) $42\ m$ iv.) $41°\ N\ of\ E$ v.) $5.3\frac{m}{s}$