NAME: _____

Vector Wrap Up

1) List 4 scalar quantities and 4 vector quantities. How are vectors different from scalars?

2) Find the resulting displacement (magnitude and direction) of the following movements: 12.0 m [N], 5.0 m [E], 3.0 m [S], 6.0 m [E], and 9.0 m [W].

Magnitude: _____

Direction: _____

3) Two forces pull on a mass one 12 N due east, the other 5 N due south. Find the resultant.

Magnitude: _____

Direction: _____

4) A boat *wants* to go directly East across a river flowing at 7.0 m/s to the North. If the boat engine can produce a speed of 15.0 m/s what angle should it travel, and what will be its speed?

Magnitude: _____

Direction: _____

5) Find the resultant velocity of a plane which flies at 50.0 m/s at 30.0^{o} N of E and a wind which blows at 20.0 m/s toward 55.0^{o} S of E.

Magnitude: _____

Direction: _____

6) A plane is seen from the ground to be flying at 100 m/s at 60^{o} S of E. If the wind is known to be 20 m/s at 30^{o} N of E then what is the plane's speed and heading through the air?

Magnitude: _____

Direction: _____

7) Find the components of the following vectors

a) 10 m at 30 º N of E

b) 20 N at 45 º W of N

c) 40 m/s at 60 º S of W

d) 15 kgm/s at 17 º W of S

e) 17 m due West

f) 10 N at 40 º S of E

8) Adding parallel vectors:

a) 10 N [E] + 2.0 N [E]

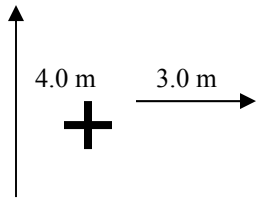
b) 6.0 m [W] + 3.0 m [E]

c) 7.0 m/s [N] + 6.3 m/s [S]

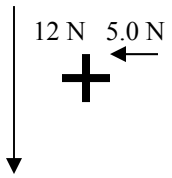
d) 9.2 N [E] + 7.4 N [W] + 3.2 N [E]

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

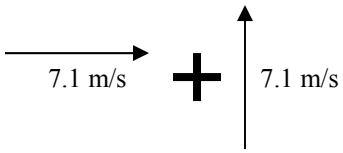
a)



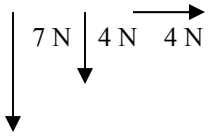
b)



c)

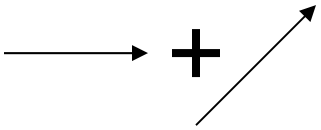


d)

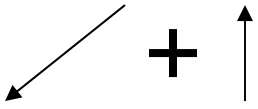


10) Sketch an appropriate answer for the following:

a)



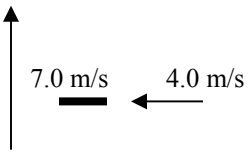
b)



11) When subtracting vectors what should you do?

12) Subtract the following vectors:

a) 

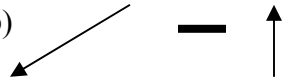
b) 

c) 5.0 m [N] — 12.0 m [E]

d) 4.0 n [S] — 3.0 N [S]

13) Sketch an appropriate resultant:

a) 

b) 

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

a) 60 N at 40 º E of N and 45 N at 12 º S of E

b) 48 m/s at 53 º N of W and 25 m/s at 80 º N of E

c) 6.0 m at 16 º W of S and 4.0 m due south

15) Subtract the vectors below:

a) 10 m/s at 45 º E of N minus 6.0 m/s due west

b) 15 N at 30º W of N minus 8.0 N at 40 º S of W

16) Vector applications:

a) A plane flies at 70 m/s at 60º N of E and is blown by a wind of velocity 20 m/s due north, find the ground speed.

b) A boat can achieve a velocity of 8.0 m/s and heads due north across a 56 m wide river which flows west at 6.0 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?

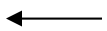
iv) What bearing should the boat make if it wants to arrive directly across the river?

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

17) An airplane with an airspeed of 420 km/h is heading due north. If there is a wind blowing due east with a speed of 120 km/h, what is the direction of the plane relative to the ground?

Answers:

1) S: time, distance, speed, mass, temperature etc. V: displacement, velocity, acc., weight, force, V: mag. and dir., S: mag. only
2) 9.2 m @ 13 º [EofN], 3) 13 N @ 23 º [SofE], 4) 13.3m/s @ 28 º [SofE], 5) 55.4 m/s @ 9 º [NofE] 6) 102 m/s @ 49 º [SofE]
7a) x-comp 8.7 m [E], y-comp 5.0 m [N] 7b) x-comp 14.1 N [W], y-comp 14.1 N [N]
7c) x = 20 m/s [W], y = 34.6 m/s [S] 7d) x = 4.4 kgm/s [W], y = 14.3 kgm/s [S]
7e) x = 17 m [W], y = 0 7f) x = 7.7 N [E], y = 6.4 N [S]
8a) 12 N[E], 8b) 3.0 m/s [W], 8c) 0.70 ,/s [N], 5.0 N [E],
9a) 5.0 m at 53º N of E, 9b) 13 N at 67 º S of W, 9c) 10 m/s at 45 º N of E 9d) 5.0 m at 53 º E of N

10a)  10b)  11) add the opposite

12a) 4.0 m [E], 12b) 8.1 m at 28º E of N, 12c) 13 m/s at 67 º W of N, 12d) 5.0 N at 53 º S of W

13a)  b)  14a) 90 N at 66 º E of N, 14b) 67.5 m/s at 69 º N of W

14c) 9.9 m at 10 º W of S 15a) 14.9 m/s at 28º N of E 15b) 18.2 N at 86º N of W
16a) 88 m/s at 67 º N of E 16b)i) 10 m/s at 37º E of N ii) 7.0 s iii) 42 m iv) 48.6 º W of N v) 5.3 m/s
17) 16º [E of N]