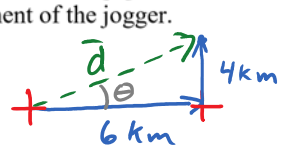
Vectors III

Thursday, February 22, 2018 1:56 PM

Name: _____

Chapter 6 – Vectors

1. A jogger runs 6 km [E] then turns north and runs another 4 km. Determine the distance and displacement of the jogger.



distance = 10km

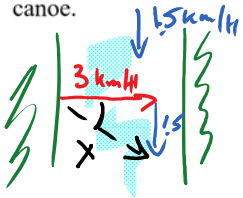
$\vec{d} = 6^2 + 4^2 = x^2$ → x = 7.2km @ 34° [NofE]

$\tan^{-1}\left(\frac{4}{6}\right) = 34°$

2. If the jogger in #1 takes 45 mins to complete her run, what is her speed and velocity?

$\text{Speed} = \frac{\text{dist}}{\text{time}} = \frac{10\text{km}}{.75\text{H}} = 13.3\text{km/H}$, $\text{Velocity} = \frac{\text{disp}}{\text{time}} = \frac{7.2}{.75} = 9.6\text{km/H @ 34° [NofE]}$

3. A canoe with a forward velocity of 3 km/h is traveling directly eastward across a river. At the same time, a current of 1.5 km/h [S] carries the canoe down the river. Determine the resultant velocity of the canoe.

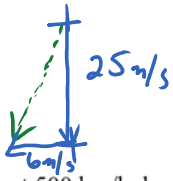


$X^2 = 3^2 + 1.5^2$

X = 3.35km/H @ 27° [S of E]

$\tan^{-1}\left(\frac{1.5}{3}\right) = 27°$

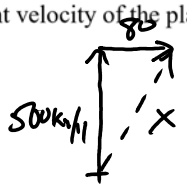
4. A golfer hits a golf ball with an initial velocity of 25 m/s due south. A crosswind blows at 6 m/s due west. Find the resultant velocity of the golf ball immediately after it has been hit.



$X^2 = 6^2 + 25^2$, X = 25.7m/s @ 13° [WofS]

$\tan^{-1}\left(\frac{6}{25}\right) = 13°$

5. A plane is traveling at 500 km/h due north. It encounters a wind that blows from the west at 80 km/h. Find the resultant velocity of the plane.

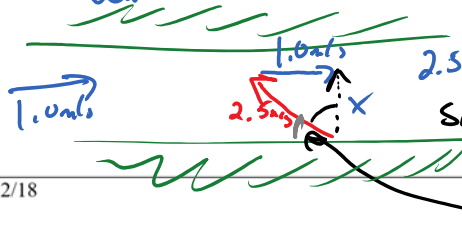


$X^2 = 500^2 + 80^2$ $\tan^{-1}\left(\frac{80}{500}\right)$ east

X = 506 km/H @ 9° [E of N]

6. A swimmer wishes to swim directly across a river. The swimmer can swim at 2.5 m/s in still water. If the current in the river is 1.0 m/s, determine the angle (relative to the shore) that the swimmer must swim.

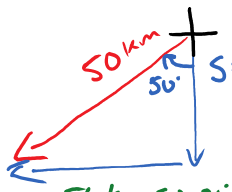
wants ... refers to the resultant



$2.5^2 - 1.0^2 = x^2$ X = 2.29 m/s

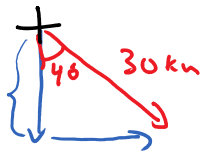
$\sin^{-1}\left(\frac{1}{2.5}\right) = 24°$, θ = 66°

7. A cyclist rides 50 km @ 50° [W of S]. He then rides 30 km @ 40° [E of S]. Find the resultant displacement of the cyclist.



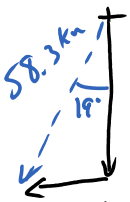
S = 50km cos 50°
= 32.1 km

50 km sin 50°
= 38.3km



30 cos 40°
= 23.0km

30 sin 40°
= 19.3km



55.1 km [S]

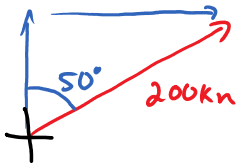
19.0km [W]

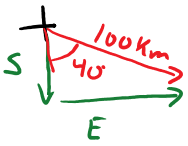
$\tan^{-1}\left(\frac{19}{55.1}\right) = 19°$

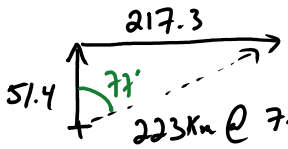
$x^2 = 19^2 + 55.1^2$

X = 58.3 km @ 19° [W of S]

8. A ship starts its journey at point A and travels for 200 km on a bearing of 50° [E of N] to a point B. The ship then changes direction and travels for 100 km on a bearing of 40° [E of S] to a point C. Calculate the resultant displacement vector.







223km @ 77° [E of N]
13° [N of E]

N: 200 cos 50° = 128 km

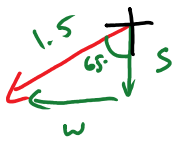
E: 200 sin 50° = 153 km

+

S: 100 cos 40° = 76.6 km = 51.4 [N]

E: 100 sin 40° = 64.3km = 217.3 [E]

9. Annie and Emily are kayaking. The kayak is paddled at 5 km/h toward 25° [W of N] while an ocean current carries the kayak at 1.5 km/h toward 65° [W of S]. What is the resultant velocity of the kayak?

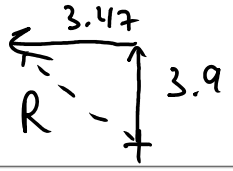


N = 5 cos 25 = 4.53 km/H

W = 5 sin 25 = 2.11 km/H

S = 1.5 cos 65° = .63 km/H

W = 1.5 sin 65 = 1.36 km/H



R = 5.22 km/H @ 42° [W of N]

1) P. 4 # 7-9
2) Show Sloan #1
3) Pick up and start a review package