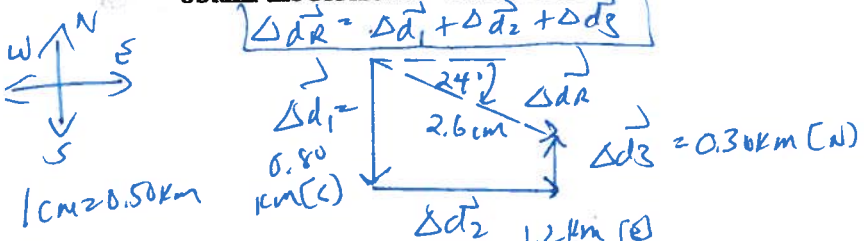
Textbook hw Day 3

3.2 Check and Reflect

5. A camper left her tent to go to the lake. She walked 0.80 km [S], then 1.20 km [E], and 0.30 km [N].

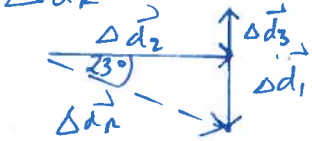
(a) Find her resultant displacement.

(b) Add the vectors in two different orders and obtain the ~~resultant for each case.~~



$\Delta\vec{d}_R$ = 1.3 km [E 24° S]

$\Delta\vec{d}_R = \Delta\vec{d}_2 + \Delta\vec{d}_3 + \Delta\vec{d}_1$



$\Delta\vec{d}_R$ = 1.3 km [E 23° S]

8. Determine the distance travelled and the displacement for each of the following.

(a) In-line skating through a park takes you 5.0 km [W], 3.0 km [N], 2.0 km [E], and 1.5 km [S].

(b) A swimmer travels in a northerly direction across a 500-m-wide lake. Once across, the swimmer notices that she is 150 m east of her original starting position.

(c) After leaving her cabin, a camper snowshoes 750 m [N] and then 2.20 km [S].

8a) $\Delta\vec{d}_1$ = 5.0 km [W]

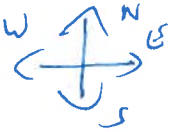
$\Delta\vec{d}_2$ = 3.0 km [N]

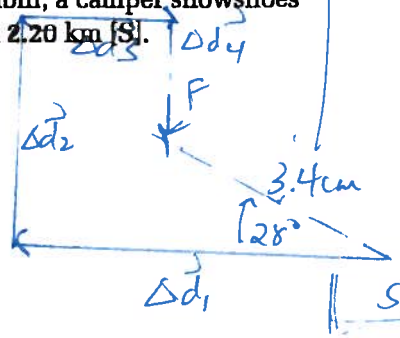
$\Delta\vec{d}_3$ = 2.0 km [E]

$\Delta\vec{d}_4$ = 1.5 km [S]

$\Delta\vec{d}_R$ = ?

1 cm = 1 km





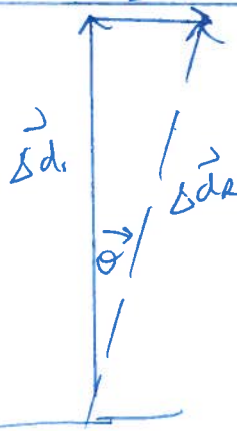
$\Delta\vec{d}_R$ = 3.4 km [W 28° N]

8b) $\Delta\vec{d}_1$ = 500.0 m

$\Delta\vec{d}_2$ = 150 m (E)

$\Delta\vec{d}_R$ = ?

Scale 1 cm = 100 m



$\Delta d_R = \sqrt{500.0^2 + 150.0^2}$

= 522 m

$\theta = \tan^{-1}\left(\frac{150}{500}\right) = 16.699°$

$\therefore \Delta\vec{d}_R$ = 522 m [N 16.7° E]

8c) $\Delta\vec{d}$ = 750 m (N)

$\Delta\vec{d}_2$ = 2.20 km

= 2200 m [S]

$\Delta\vec{d}_R = \Delta\vec{d}_1 + \Delta\vec{d}_2$

= 750 m + (−2200 m)

= −1450 m

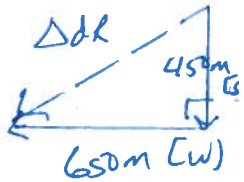
10. How much time can you save travelling diagonally instead of running 450 m [S] and then 650 m [W] if your running speed is 5.0 m/s?

$\Delta\vec{d}_1$ = 450 m [S]

$\Delta\vec{d}_2$ = 650 m (W)

$\Delta\vec{d}_R$ = ? V = 5.0 m/s

Δt = ?



$\Delta d_R = \sqrt{450^2 + 650^2}$

= 790.6 m

$\Delta t_{full\,distance} = \frac{\Delta d_1 + \Delta d_2}{V} = \frac{450 + 650\ m}{5.0\ m/s}$ = 220 s

Δt_{saved} = 220 s − 158 s = 62 s

$\Delta t_{resultant} = \frac{\Delta d_R}{V} = \frac{790.6\ m}{5.0\ m/s}$ = 158 s