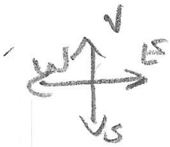
Day 1 1.3 pg 22-25 #1-3 pg 25 S #1, 10 pg 29



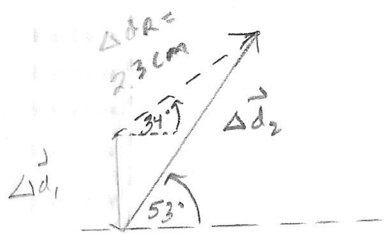
1. $\Delta \vec{d}_1 = 1.2$ km [S]

$\Delta \vec{d}_2 = 3.1$ km [E 53° N]

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

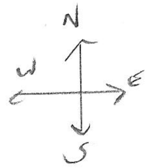
analysis: $\Delta \vec{d}_R = \Delta \vec{d}_1 + \Delta \vec{d}_2$

Scale: 1 cm = 1 km

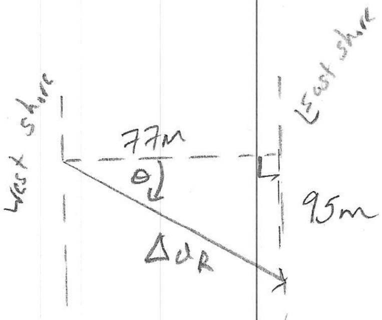


$\therefore \Delta \vec{d}_R = 2.3$ km [E 34° N]

2.



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



$\Delta d_R = \sqrt{77^2 + 95^2} = 122.3$ km

$\theta = \tan^{-1}\left(\frac{95}{77}\right) = 50.97°$

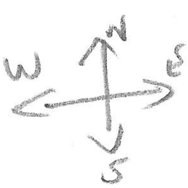
$\therefore \Delta \vec{d}_R = 122$ km [E 51° S]

3. $\Delta \vec{d}_1 = 65$ km [N 32° E]

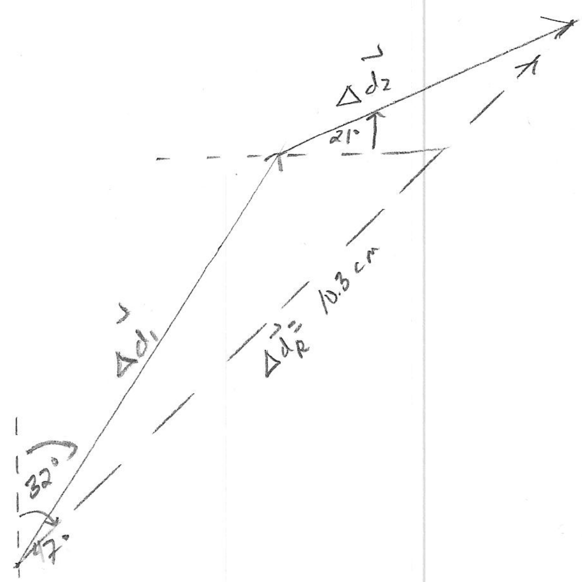
$\Delta \vec{d}_2 = 42$ km [E 21° N]

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

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



Scale: 1 cm = 10 km



$\therefore \Delta \vec{d}_R = 103$ km [N 47° E]

or $\approx 1.0 \times 10^2$ km [N 47° E] (to 2 sig digs)

Day 1 - Section Questions S1, 10 pg 29

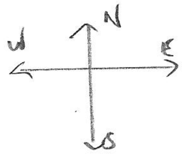
1. $\Delta\vec{d}_1 = 7.81\text{ km [E } 50^\circ \text{ N]}$

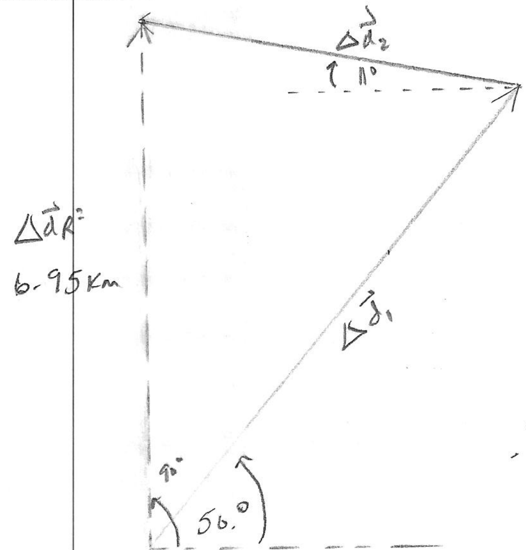
$\Delta\vec{d}_2 = 5.10\text{ km [W } 11^\circ \text{ N]}$

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

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

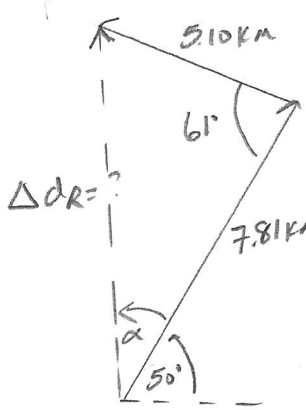
Scale: 1 cm = 1 km





$\therefore \Delta\vec{d}_R = 6.95\text{ km [N]}$

b)



$$\Delta d_R = \sqrt{7.81^2 + 5.10^2 - 2(7.81)(5.10)\cos 61}$$
$$= 6.96\text{ km}$$

$$\frac{\sin\alpha}{5.10} = \frac{\sin 61}{6.96}$$

$$\therefore \alpha = \sin^{-1}\left(\frac{(5.10)(\sin 61)}{(6.96)}\right) = 39.89^\circ \approx 39.9^\circ$$

$\therefore \Delta\vec{d}_R = 6.96\text{ km [E } 89.9^\circ \text{ N]} \approx 6.96\text{ km [N]}$

c) $$\%\,dif = \frac{|\text{calc }1 - \text{calc }2|}{\left(\frac{\text{calc1} + \text{calc }2}{2}\right)} \times 100\% = \frac{|6.95 - 6.96|}{\left(\frac{6.95 + 6.96}{2}\right)} \times 100\% = 0.14\%$$

$\therefore$ the two methods agree to within 0.14%. - This is excellent agreement; the two values are the same within reasonable measurement error.

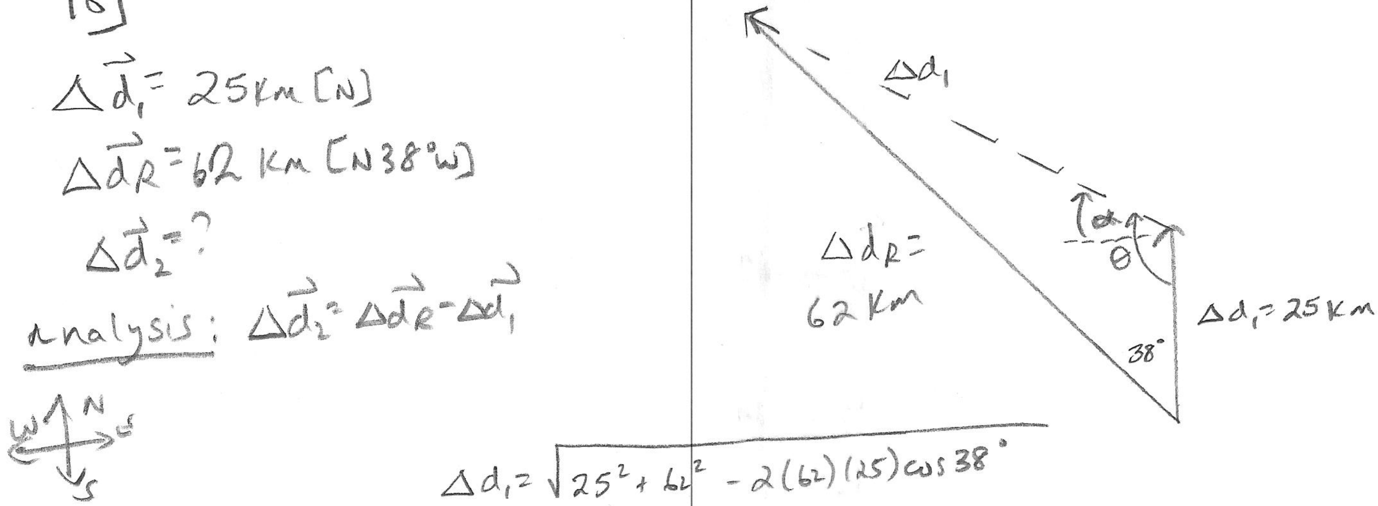
10]

$\Delta \vec{d}_1 = 25 \text{ km [N]}$

$\Delta \vec{d}_R = 62 \text{ Km [N 38° W]}$

$\Delta \vec{d}_2 = ?$

analysis: $\Delta \vec{d}_2 = \Delta \vec{d}_R - \Delta \vec{d}_1$



$\Delta d_1 = \sqrt{25^2 + 62^2 - 2(62)(25)\cos 38°}$

$= 45.0 \text{ Km}$

$\frac{\sin\theta}{62} = \frac{\sin 38}{45.0} \rightarrow \theta = \sin^{-1}\left(\frac{62(\sin 38)}{45.0}\right) = 57.99°$

But θ is obtuse, so $\theta = 180 - 57.99° = 122.0°$

Find angle α from west direction:

$\therefore \alpha = 122.0° - 90° = 32.0°$

$\therefore \boxed{\Delta \vec{d}_1 = 45 \text{ km [W 32° N]}}$