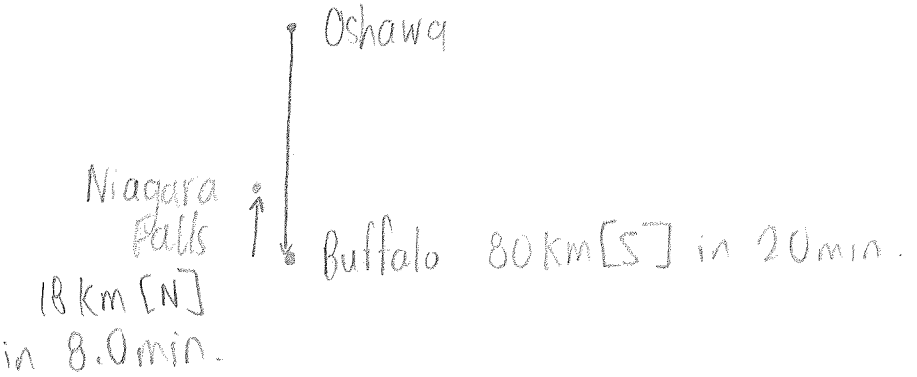
# Speed and Velocity - Extra Practice - Answers

1.




a) $\Delta d = 80\,km + 18\,km$
$= 98\,km$
$= 9.8 \times 10^4\,m$

b) $\Delta \vec{d} = 80\,km\,[S] + 18\,km\,[N]$
$= 80\,km\,[S] - 18\,km\,[S]$
$= 62\,km\,[S]$

c) i) $\Delta \vec{d} = 80000\,m\,[S]$
$\Delta t = 20\,min$
$= 1200\,s$
$\vec{v} = ?$

$\vec{v} = \frac{\Delta \vec{d}}{\Delta t}$
$= \frac{80000\,m\,[S]}{1200\,s}$
$= 66.6\,m/s\,[S]$
$= 67\,m/s\,[S]$

$\therefore$ the velocity is $67\,m/s\,[S]$

ii) $\Delta \vec{d} = 18000\,m\,[N]$
$\Delta t = 8.0\,min$
$= 480\,s$
$\vec{v} = ?$

$\vec{v} = \frac{\Delta \vec{d}}{\Delta t}$
$= \frac{18000\,m\,[N]}{480\,s}$
$= 37.5\,m/s\,[N]$

$\therefore$ the velocity is $37.5\,m/s\,[N]$

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c ii) $\Delta \vec{d} = 62.000\text{m [S]}$
$\Delta t = 28.0\text{min}$
$= 1680\text{s}$
$\vec{v} = ?$

$\vec{v} = \frac{\Delta \vec{d}}{\Delta t}$

$= \frac{62000\text{m [S]}}{1680\text{s}}$

$= 36.9\text{ m/s [S]}$
$= 37\text{ m/s [S]}$

∴ the velocity is 37 m/s [S].

d) $\Delta d = 9.8 \times 10^4\text{m}$
$\Delta t = 1680\text{s}$
$v = ?$

$v = \frac{\Delta d}{\Delta t}$

$= \frac{9.8 \times 10^4\text{m}}{1680\text{s}}$

$= 58.\dot{3}\text{ m/s}$
$= 58\text{ m/s}$

∴ the speed is 58 m/s.

2. $\Delta d = 1.49 \times 10^{11}\text{ m}$
$v = 3.00 \times 10^8\text{ m/s}$
$\Delta t = ?$

$v = \frac{\Delta d}{\Delta t}$

$v\Delta t = \Delta d$

$\Delta t = \frac{\Delta d}{v}$

$= \frac{1.49 \times 10^{11}\text{m}}{3.00 \times 10^8\text{m/s}}$

$= 497\text{s}$

∴ it takes 497s to get from the Sun to Earth

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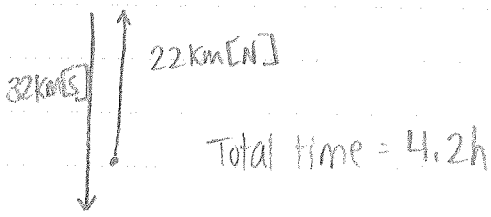
3.




a) $\Delta\vec{d} = 22\text{ km[N]} + 32\text{ km[S]}$
$= -22\text{ km[S]} + 32\text{ km[N]}$
$= 10\text{ km[S]}$

b) $\Delta\vec{d} = 10\text{ km[S]}$
$= 10\,000\text{ m[S]}$
$\Delta t = 4.2\text{ h}$
$= 15120\text{ s}$
$\vec{v} = ?$

$\vec{v} = \dfrac{\Delta\vec{d}}{\Delta t}$

$= \dfrac{10\,000\text{ m[S]}}{15120\text{ s}}$

$= 0.66\text{ m/s [S]}$

∴ the runner's velocity was $0.66\text{ m/s[S]}$.

c) $\Delta d = 32\text{ km} + 22\text{ km}$
$= 54\text{ km}$
$= 54\,000\text{ m}$

d) $v = ?$
$\Delta d = 54\,000\text{ m}$
$\Delta t = 15120\text{ s}$

$v = \dfrac{\Delta d}{\Delta t}$

$= \dfrac{54\,000\text{ m}}{15120\text{ s}}$
$= 3.57\text{ m/s}$
$= 3.6\text{ m/s}$

∴ the runner's speed was $3.6\text{ m/s}$.

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4. $\Delta t = 15\text{ min}$
$= 900\text{s}$
$v = 24\text{ m/s}$
$\Delta d = ?$

$v = \frac{\Delta d}{\Delta t}$

$\Delta d = v\,\Delta t$
$= (24\text{ m/s})(900\text{s})$
$= 21600\text{ m}$

∴ the car will travel 21600m.

5 $\Delta t = 0.40\text{s}$
$v = 25\text{ m/s}$
$\Delta d = ?$

$v = \frac{\Delta d}{\Delta t}$

$\Delta d = v\,\Delta t$
$= (25\text{ m/s})(0.40\text{s})$
$= 10\text{ m}$

∴ it must be at least 10m from the goalie.