Physics 20 - Lesson 2
Displacement – Answer Key

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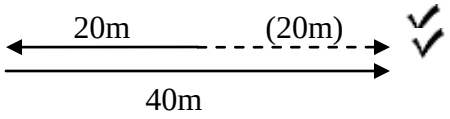
a) $\Delta d = 20m + 40m = \boxed{60m}$ ✓

$\Delta \vec{d} = -20m + 40m = \boxed{20m(east)}$ ✓



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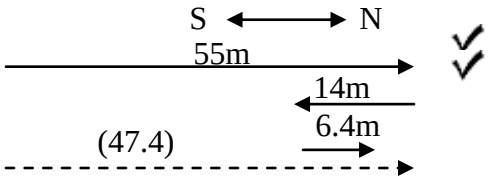
b) $\Delta d = 55m + 14m + 6.4m$ ✓

$\boxed{\Delta d = 75.4m}$ ✓

$\Delta \vec{d} = 55m - 14m + 6.4m$ ✓

$\boxed{\Delta \vec{d} = 47.4m(south)}$ ✓



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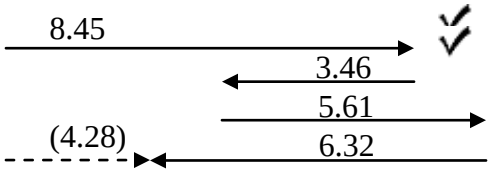
c) $\Delta d = 8.45cm + 3.46cm + 0.0561cm + 6.32cm$ ✓

$\boxed{\Delta d = 23.84cm}$ ✓

$\Delta \vec{d} = 8.45cm - 3.46cm + 0.0561cm - 6.32cm$ ✓

$\boxed{\Delta \vec{d} = 4.28cm(up)}$ ✓



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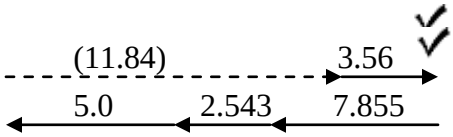
d) $\Delta d = 3.56km + 7.855km + 2.543km + 5.00km$ ✓

$\boxed{\Delta d = 18.96km}$ ✓

$\Delta \vec{d} = 3.56km - 7.855km - 2.543km - 5.00km$ ✓

$\boxed{\Delta \vec{d} = 11.84km(west)}$ ✓



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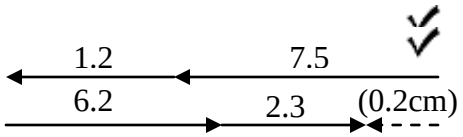
e) $\Delta d = 7.5cm + 6.2cm + 1.2cm + 2.3cm$ ✓

$\boxed{\Delta d = 17.2cm}$ ✓

$\Delta \vec{d} = -7.5cm + 6.2cm - 1.2cm + 2.3cm$ ✓

$\boxed{\Delta \vec{d} = 0.2cm(west)}$ ✓



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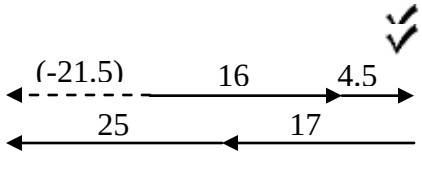
f) $\Delta d = 16km + 17km + 4.5km + 25km$ ✓

$\boxed{\Delta d = 62.5km}$ ✓

$\Delta \vec{d} = 16km - 17km + 4.5km - 25km$ ✓

$\boxed{\Delta \vec{d} = 21.5km(west)}$ ✓



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3) $\Delta\vec{d}_1 = \vec{v}_1\Delta t_1$ $\quad\quad$ $\Delta\vec{d}_2 = \vec{v}_2\Delta t_2$

$\Delta\vec{d}_1 = (5.0m/s)(30s)$ $\quad\quad$ $\Delta\vec{d}_2 = (8.0m/s)(45s)$

$\Delta\vec{d}_1 = 150m$ north $\quad\quad$ $\Delta\vec{d}_2 = 360m$ south

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a) $\Delta d = 150m + 360m$

$\boxed{\Delta d = 510m}$

b) $\Delta\vec{d} = +150m + (-360m)$

$\boxed{\Delta\vec{d} = 210m(south)}$

c) $V_{avg} = \dfrac{\Delta d}{\Delta t} = \dfrac{510m}{30s + 45s} = \boxed{6.8\,m/s}$

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4) $\Delta t_{total} = \Delta t_1 + \Delta t_2 = \dfrac{\Delta d_1}{v_1} + \dfrac{\Delta d_2}{v_2} = \dfrac{500m}{25m/s} + \dfrac{800m}{16m/s} = \boxed{70s}$

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a) $\Delta d = 500m + 800m$

$\Delta d = \boxed{1300m}$

b) $\Delta\vec{d} = \Delta\vec{d}_1 + \Delta\vec{d}_2$

$\Delta\vec{d} = 500m + (-800m)$

$\Delta\vec{d} = \boxed{300m(west)}$

c) $V_{avg} = \dfrac{\Delta d}{\Delta t} = \dfrac{1300m}{70s} = \boxed{18.6\,m/s}$

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5) $V_{avg} = \dfrac{\Delta d}{\Delta t} = \dfrac{400m}{44.0s} = 9.1\,m/s$

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$\Delta\vec{d} = 0\,m$ since the runner starts and ends in the same spot