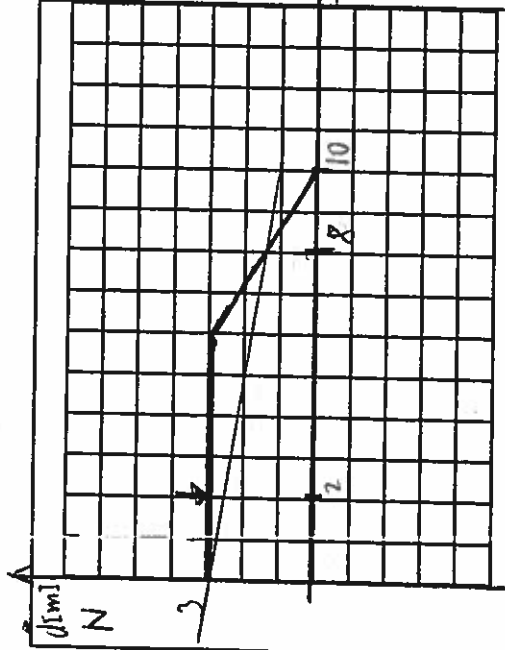
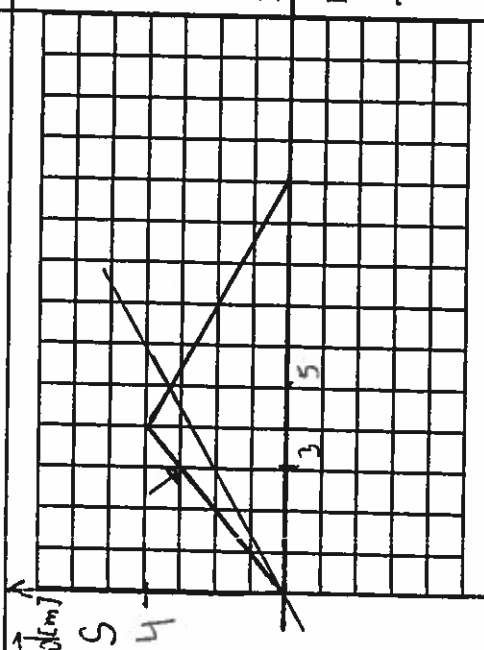


DISPLACEMENT-TIME GRAPHS



Initial displacement: $\vec{d}_i = 3 \text{ m [N]}$
 Final displacement: $\vec{d}_f = 0 \text{ m [N]}$
 Length of the time interval: 10 s
 Initial velocity: $\vec{v}_i = 0 \frac{\text{m}}{\text{s}} \text{ [N]}$
 Final velocity: $\vec{v}_f = 0.75 \frac{\text{m}}{\text{s}} \text{ [S]} = -0.75 \frac{\text{m}}{\text{s}} \text{ [N]}$
 Total distance traveled: $d = 3 \text{ m}$
 $\Delta \vec{d} = \vec{d}_f - \vec{d}_i = 0 - 3 = -3 \text{ m [N]}$
 $\Delta t = 10 \text{ s}$

Average velocity during the first 8 seconds:
 $\vec{v}_{avg} = \frac{1}{8} \frac{\text{m}}{\text{s}} \text{ [S]} = -0.2 \frac{\text{m}}{\text{s}} \text{ [N]}$
 Uniform OR non-uniform? (circle the correct one)
 Instantaneous velocity at $t=2\text{s}$:
 $\vec{v}_{inst} = 0 \frac{\text{m}}{\text{s}} \text{ [N]}$
 Average velocity \neq instantaneous velocity

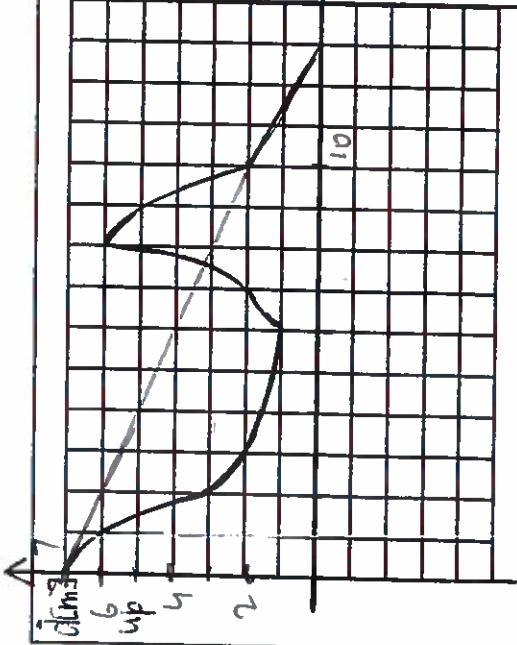


Initial displacement: $\vec{d}_i = 0 \text{ m [S]}$
 Final displacement: $\vec{d}_f = 0 \text{ m [S]}$
 Length of the time interval: 10 s
 Initial velocity: $\vec{v}_i = 1 \frac{\text{m}}{\text{s}} \text{ [S]}$
 Final velocity: $\vec{v}_f = -\frac{4}{6} = -\frac{2}{3} \frac{\text{m}}{\text{s}} \text{ [S]} = \frac{2}{3} \frac{\text{m}}{\text{s}} \text{ [N]}$
 Total distance traveled: $d = 8 \text{ m}$
 $\Delta \vec{d} = \vec{d}_f - \vec{d}_i = 0 - 0 = 0 \text{ m [S]}$

Average velocity during the first 5 seconds:
 $\vec{v}_{avg} = \frac{2}{3} \frac{\text{m}}{\text{s}} \text{ [S]}$
 Uniform OR non-uniform? (circle the correct one)
 Instantaneous velocity at $t=3\text{s}$:
 $\vec{v}_{inst} = 1 \frac{\text{m}}{\text{s}} \text{ [S]}$
 Average velocity \neq instantaneous velocity

Notes:

$$\Delta \vec{d} = \vec{d}_f - \vec{d}_i$$



Initial displacement: $\vec{d}_i = 7\text{ m [up]}$
 Final displacement: $\vec{d}_f = 0\text{ m [up]}$
 Length of the time interval: 1 s
 Initial velocity: $\vec{v}_i = -\frac{1}{2}\text{ m/s [down]}$
 Final velocity: $\vec{v}_f = -\frac{2}{3}\text{ m/s [down]}$
 Total distance traveled: $d = 17\text{ m}$
 $\Delta\vec{d} = 0 - 7 = -7\text{ m [up]} = 7\text{ m [down]}$

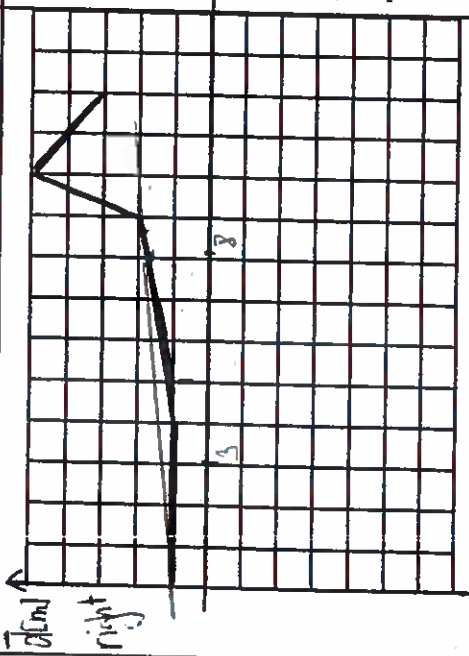
Average velocity during the first 10 seconds:

Uniform OR non-uniform? (circle the correct one)

Instantaneous velocity at $t=10\text{ s}$:

unknown
(corner)

Average velocity \neq instantaneous velocity



Initial displacement: $\vec{d}_i = 1\text{ m [right]}$
 Final displacement: $\vec{d}_f = 3\text{ m [right]}$
 Length of the time interval: 1 s
 Initial velocity: $\vec{v}_i = 0\text{ m/s [right]}$
 Final velocity: $\vec{v}_f = -1\text{ m/s [right]} = 1\text{ m/s [left]}$
 Total distance traveled: $d = 2$
 $\Delta\vec{d} = 3 - 1 = 2\text{ m [right]}$

Average velocity during the first 8 seconds:

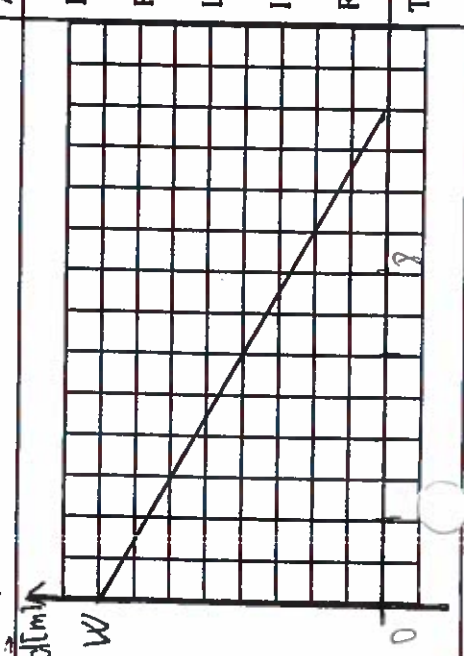
$\vec{v}_{avg} = \frac{1}{10}\text{ m/s [right]}$

Uniform OR non-uniform? (circle the correct one)

Instantaneous velocity at $t=3\text{ s}$:

$\vec{v}_{ind} = 0\text{ m/s [right]}$

Average velocity \neq instantaneous velocity



Initial displacement: $\vec{d}_i = 8\text{ m [W]}$
 Final displacement: $\vec{d}_f = 0\text{ m [W]}$
 Length of the time interval: 1 s
 Initial velocity: $\vec{v}_i = \frac{2}{3}\text{ m/s [W]} = \frac{2}{3}\text{ m/s [E]}$
 Final velocity: $\vec{v}_f = \vec{v}_i$
 Total distance traveled: $d = 8\text{ m}$

Average velocity during the first 8 seconds:

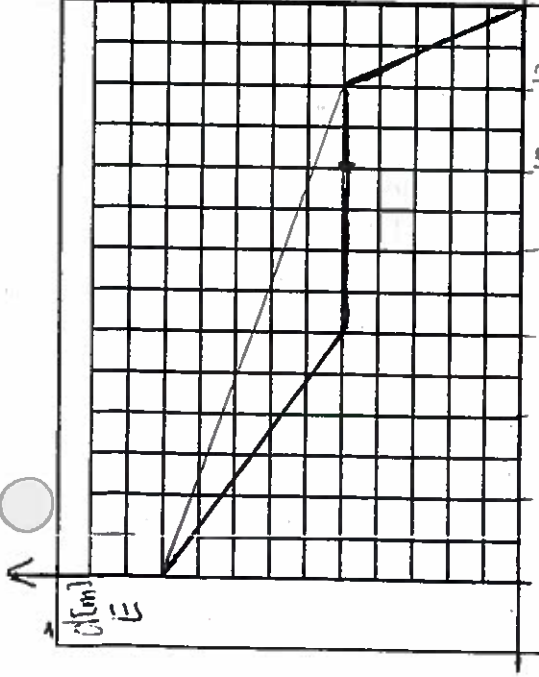
$\vec{v}_{avg} = \frac{2}{3}\text{ m/s [E]}$

Uniform OR non-uniform? (circle the correct one)

Instantaneous velocity at $t=2\text{ s}$:

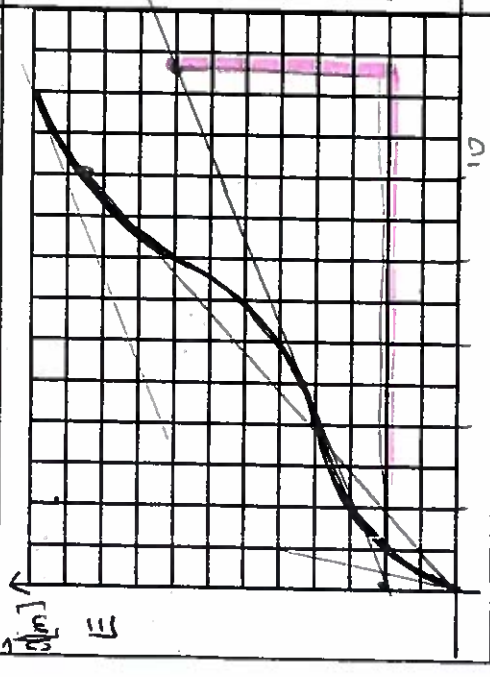
$\vec{v}_{ind} = \frac{2}{3}\text{ m/s [E]}$

Average velocity $=$ instantaneous velocity



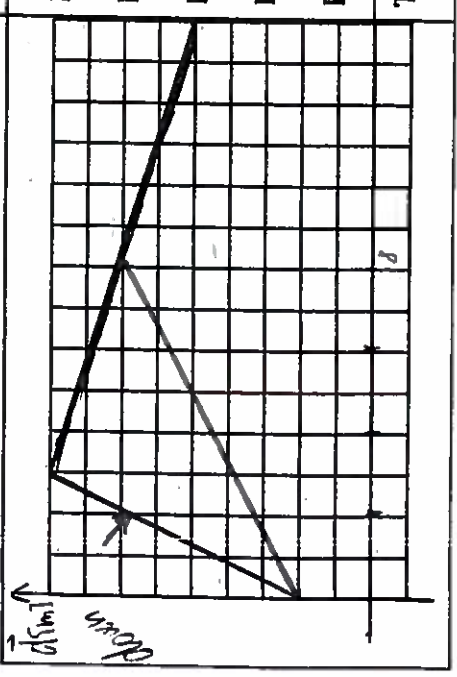
Initial displacement: $d_i = 0 \text{ m [E]}$
 Final displacement: $d_f = 0 \text{ m [E]}$
 Length of the time interval: 14 s
 Initial velocity: $\vec{v}_i = \frac{-5}{6} \text{ m/s [E]} = \frac{5}{6} \text{ m/s [W]}$
 Final velocity: $\vec{v}_f = \frac{-5}{2} \text{ m/s [E]} = \frac{5}{2} \text{ m/s [W]}$
 Total distance traveled: $d = 10 \text{ m}$
 $\Delta \vec{d} = -10 \text{ m [E]} = 10 \text{ m [W]}$

Average velocity during the first 12 seconds:
 $\vec{v}_{avg} = \frac{-5}{12} \text{ m/s [E]} = \frac{5}{12} \text{ m/s [W]}$
 Uniform OR non-uniform? (circle the correct one)
 Instantaneous velocity at $t=10\text{s}$:
 $\vec{v}_{inst} = 0 \frac{\text{m}}{\text{s}} \text{ [E]}$
 Average velocity \neq instantaneous velocity



Initial displacement: $d_i = 0 \text{ m [E]}$
 Final displacement: $d_f = 12 \text{ m [E]}$
 Length of the time interval: 12 s
 Initial velocity: $\vec{v}_i = \sim 5 \frac{\text{m}}{\text{s}} \text{ [E]}$
 Final velocity: $\vec{v}_f = \sim 2 \frac{\text{m}}{\text{s}} \text{ [E]}$
 Total distance traveled: $d = 12 \text{ m}$
 $\Delta \vec{d} = 12 - 0 = 12 \text{ m [E]}$

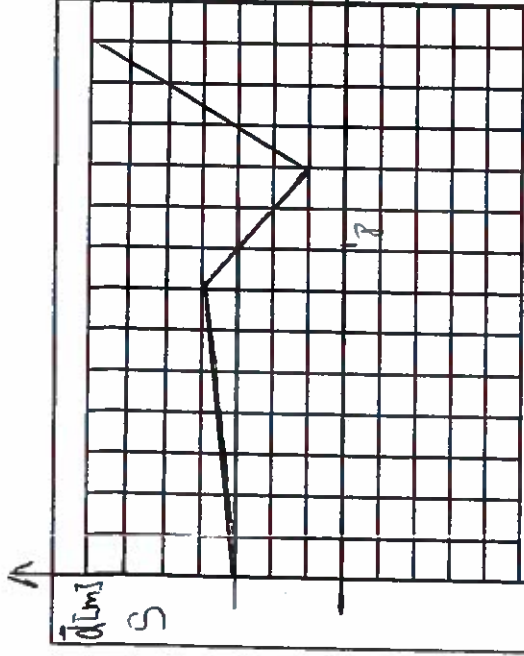
Average velocity during the first 10 seconds:
 $\vec{v}_{avg} = \frac{10.5}{10} \text{ m/s [E]} = \sim 1.1 \frac{\text{m}}{\text{s}} \text{ [E]}$
 Uniform OR non-uniform? (circle the correct one)
 Instantaneous velocity at $t=5\text{s}$:
 $\vec{v}_{inst} = \frac{6}{12.5} \text{ m/s [E]} = \underline{0.48} \frac{\text{m}}{\text{s}} \text{ [E]}$
 Average velocity \neq instantaneous velocity



Initial displacement: $d_i = 0 \text{ m [down]}$
 Final displacement: $d_f = 5 \text{ m [down]}$
 Length of the time interval: $\Delta t = 14 \text{ s}$
 Initial velocity: $\vec{v}_i = \frac{2}{3} \text{ m/s [down]}$
 Final velocity: $\vec{v}_f = \frac{4}{11} \text{ m/s [up]} = -\frac{4}{11} \text{ m/s [down]}$
 Total distance traveled: $d = 11 \text{ m}$

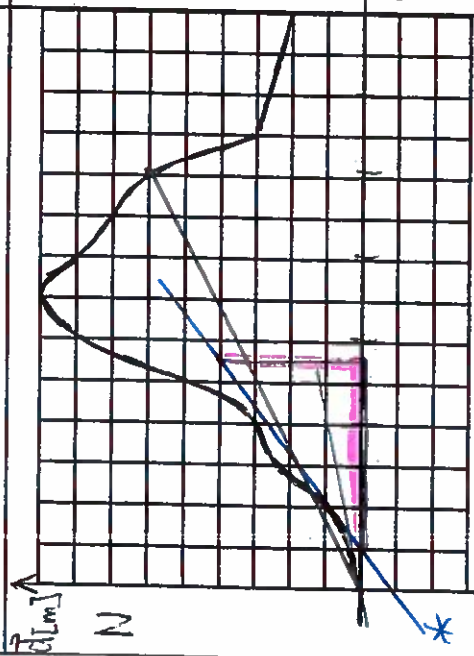
Average velocity during the first 8 seconds:
 $\vec{v}_{avg} = \frac{5}{8} \text{ m/s [down]}$
 Uniform OR non-uniform? (circle the correct one)
 Instantaneous velocity at $t=2\text{s}$:
 $\vec{v}_{inst} = \frac{2}{3} \frac{\text{m}}{\text{s}} \text{ [down]}$
 Average velocity \neq instantaneous velocity

$\Delta \vec{d} =$



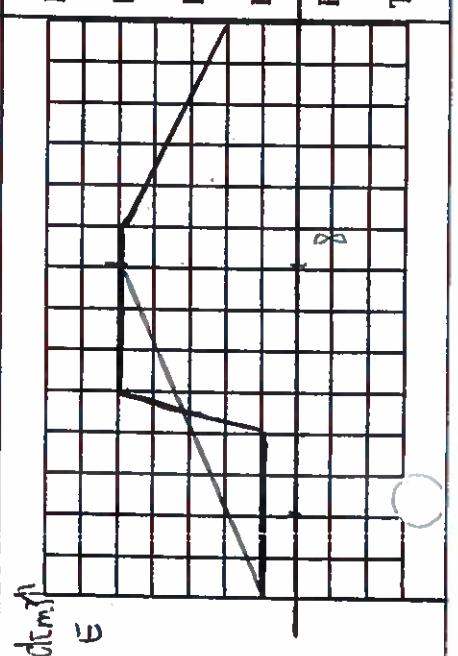
Initial displacement: $\vec{d}_i = 3\text{ m [S]}$
 Final displacement: $\vec{d}_f = 13\text{ m [S]}$
 Length of the time interval: $\Delta t = 13\text{ s}$
 Initial velocity: $\vec{v}_i = \frac{1}{7}\text{ m/s [S]}$
 Final velocity: $\vec{v}_f = 2\text{ m/s [S]}$
 Total distance traveled: $d = 10\text{ m}$
 $\Delta \vec{d} = 7 - 3 = 4\text{ m [S]}$

Average velocity during the first 8 seconds:
 $\vec{v}_{avg} = 0\text{ m/s [S]}$
 Uniform OR non-uniform? (circle the correct one)
 Instantaneous velocity at $t=2\text{ s}$:
 $\vec{v}_{inst} = \frac{1}{7}\text{ m/s [S]}$
 Average velocity \neq instantaneous velocity



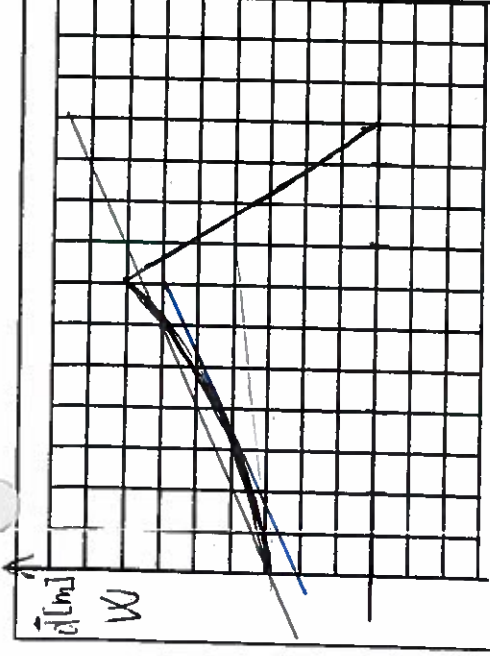
Initial displacement: $\vec{d}_i = 0\text{ m [N]}$
 Final displacement: $\vec{d}_f = 2\text{ m [N]}$
 Length of the time interval: $\Delta t = 14\text{ s}$
 Initial velocity: $\vec{v}_i = \frac{1}{4}\text{ m/s [N]}$
 Final velocity: $\vec{v}_f = \frac{1}{3}\text{ m/s [S]} = -\frac{1}{3}\text{ m/s [N]}$
 Total distance traveled: $d = 16\text{ m}$
 $\Delta \vec{d} = 2 - 0 = 2\text{ m [N]}$

Average velocity during the first 8 seconds:
 $\vec{v}_{avg} = \frac{6}{8} = \frac{3}{4}\text{ m/s [N]}$
 Uniform OR non-uniform? (circle the correct one)
 Instantaneous velocity at $t=2\text{ s}$:
 $\vec{v}_{inst} = \frac{1}{4}\text{ m/s [N]}$
 $\vec{v}_{inst} = \frac{1}{4}\text{ m/s [N]}$
 Average velocity \neq instantaneous velocity



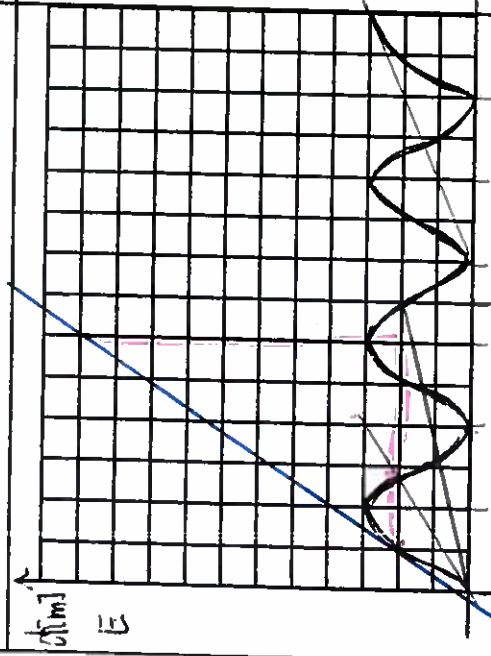
Initial displacement: $\vec{d}_i = 1\text{ m [E]}$
 Final displacement: $\vec{d}_f = 2\text{ m [E]}$
 Length of the time interval: $\Delta t = 14\text{ s}$
 Initial velocity: $\vec{v}_i = 0\text{ m/s [E]}$
 Final velocity: $\vec{v}_f = -\frac{2}{3}\text{ m/s [E]}$
 Total distance traveled: $d = 7\text{ m}$

Average velocity during the first 8 seconds:
 $\vec{v}_{avg} = \frac{1}{8} = \frac{1}{8}\text{ m/s [E]}$
 Uniform OR non-uniform? (circle the correct one)
 Instantaneous velocity at $t=2\text{ s}$:
 $\vec{v}_{inst} = 0\text{ m/s [E]}$
 Average velocity \neq instantaneous velocity



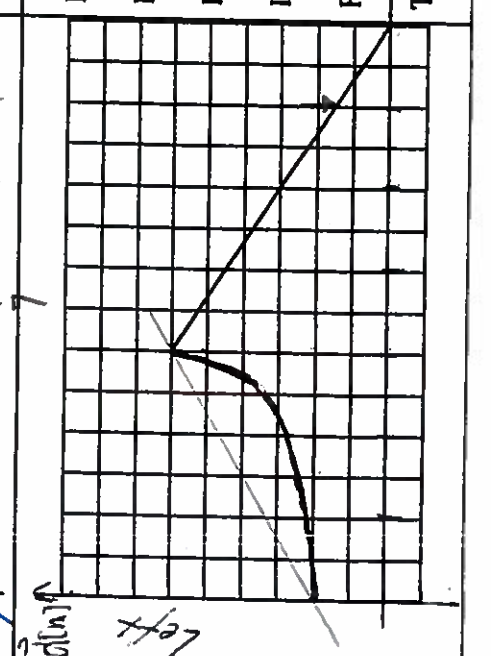
Initial displacement: $\vec{d}_i = 3\text{ m [W]}$
 Final displacement: $\vec{d}_f = 0\text{ m [W]}$
 Length of the time interval: $\Delta t = 11\text{ s}$
 Initial velocity: $\vec{v}_i = \frac{1}{8}\text{ m/s [W]}$
 Final velocity: $\vec{v}_f = \frac{7}{3}\text{ m/s [E]} = \frac{7}{3}\text{ m/s [W]}$
 Total distance traveled: $d = 11\text{ m}$
 $\Delta \vec{d} = 0 - 3 = -3\text{ m [W]} = 3\text{ m [E]}$

Average velocity during the first 6 seconds:
 $\vec{v}_{avg} = \frac{3}{6} = \frac{1}{2}\text{ m/s [W]}$
 Uniform OR non-uniform? (circle the correct one)
 Instantaneous velocity at $t=4\text{ s}$:
 $\vec{v}_{inst} = \frac{4}{7}\text{ m/s [W]}$
 Average velocity \neq instantaneous velocity
 3 m [E]



Initial displacement: $\vec{d}_i = 0\text{ m [E]}$
 Final displacement: $\vec{d}_f = 3\text{ m [E]}$
 Length of the time interval: $\Delta t = 14\text{ s}$
 Initial velocity: $\vec{v}_i = \frac{2}{5}\text{ m/s [E]}$
 Final velocity: $\vec{v}_f = \frac{3}{6} = \frac{1}{2}\text{ m/s [E]}$
 Total distance traveled: $d = 21\text{ m}$
 $\Delta \vec{d} = 3 - 0 = 3\text{ m [E]}$

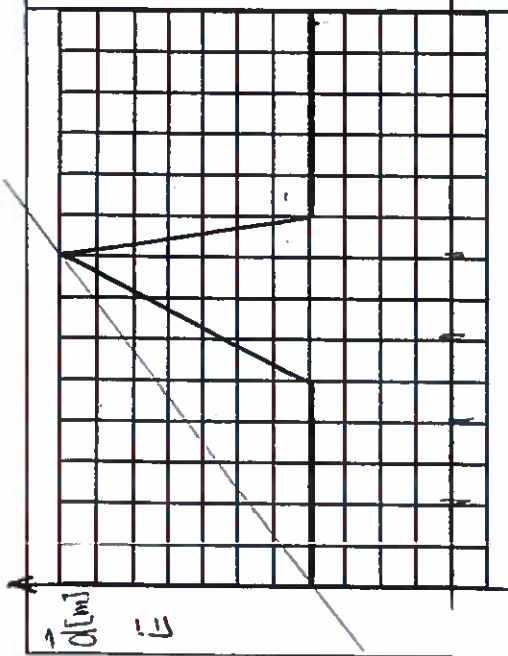
Average velocity during the first 7 seconds:
 $\vec{v}_{avg} = \frac{2}{7}\text{ m/s [E]}$
 Uniform OR non-uniform? (circle the correct one)
 Instantaneous velocity at $t=2\text{ s}$:
 $\vec{v}_{inst} = \frac{9}{5}\text{ m/s [E]}$
 Average velocity $=$ instantaneous velocity



Initial displacement: $\vec{d}_i = 2\text{ m [left]}$
 Final displacement: $\vec{d}_f = 0\text{ m [left]}$
 Length of the time interval: $\Delta t = 14\text{ s}$
 Initial velocity: $\vec{v}_i = 0\text{ m/s [left]}$
 Final velocity: $\vec{v}_f = \frac{-6}{8} = \frac{-3}{4}\text{ m/s [left]}$
 Total distance traveled: $d = 10\text{ m}$

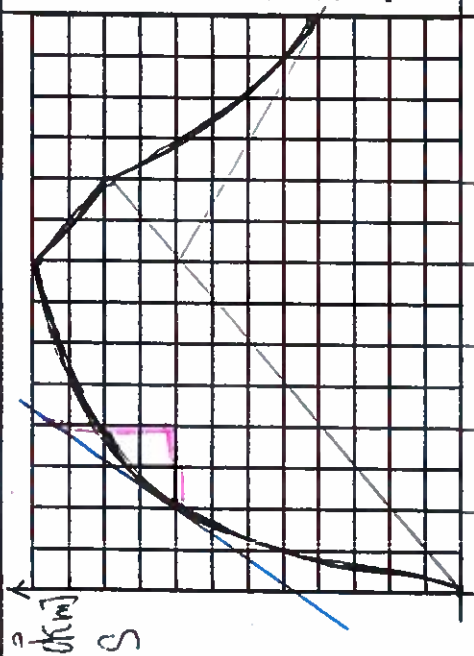
Average velocity during the first 6 seconds:
 $\vec{v}_{avg} = \frac{4}{6} = \frac{2}{3}\text{ m/s [left]}$
 Uniform OR non-uniform? (circle the correct one)
 Instantaneous velocity at $t=12\text{ s}$:
 $\vec{v}_{inst} = \frac{-6}{8} = \frac{-3}{4}\text{ m/s [left]}$
 Average velocity \neq instantaneous velocity
 $\frac{2}{3}\text{ m/s [right]}$ $\vec{v}_{inst} = \frac{-6}{8} = \frac{-3}{4}\text{ m/s [left]}$ $\rightarrow \frac{3}{4}\text{ m/s [right]}$

$\Delta \vec{d} = 0 - 2 = -2\text{ m [left]} = 2\text{ m [right]}$



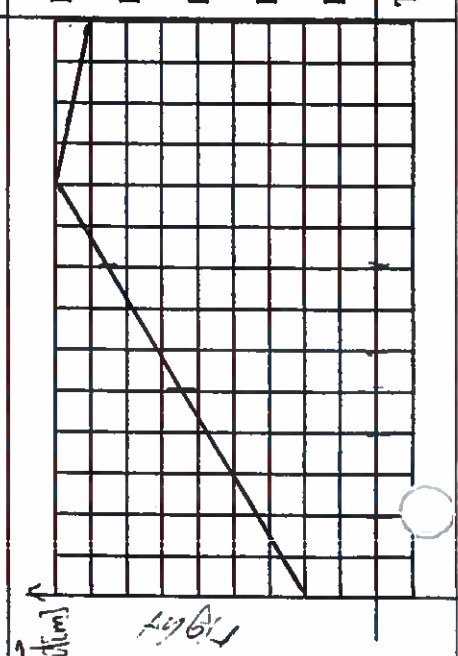
Initial displacement: $\vec{d}_i = 4\text{ m [E]}$
 Final displacement: $\vec{d}_f = 4\text{ m [E]}$
 Length of the time interval: $\Delta t = 14\text{ s}$
 Initial velocity: $\vec{v}_i = 0\text{ m/s [E]}$
 Final velocity: $\vec{v}_f = 0\text{ m/s [E]}$
 Total distance traveled: $d = 14\text{ m}$
 $\Delta \vec{d} = 4 - 4 = 0\text{ m [E]}$

Average velocity during the first 8 seconds:
 $\vec{v}_{avg} = 1\text{ m/s [E]}$
 Uniform OR non-uniform? (circle the correct one)
 Instantaneous velocity at $t=5\text{ s}$:
 $\vec{v}_{inst} = \text{Unknown} \rightarrow \text{Corner}$
 Average velocity \neq instantaneous velocity



Initial displacement: $\vec{d}_i = 0\text{ m [S]}$
 Final displacement: $\vec{d}_f = 4\text{ m [S]}$
 Length of the time interval: $\Delta t = 14\text{ s}$
 Initial velocity: $\vec{v}_i = 0\text{ m/s [S]}$
 Final velocity: $\vec{v}_f = \frac{2}{3}\text{ m/s [S]} = \frac{2}{3}\text{ m/s [S]}$
 Total distance traveled: $d = 20\text{ m}$
 $\Delta \vec{d} = 4 - 0 = 4\text{ m [S]}$

Average velocity during the first 10 seconds:
 $\vec{v}_{avg} = \frac{10}{10} = 1\text{ m/s [S]}$
 Uniform OR non-uniform? (circle the correct one)
 Instantaneous velocity at $t=2\text{ s}$:
 $\vec{v}_{inst} = \frac{3.5}{2} = 1.8\text{ m/s [S]}$
 Average velocity \neq instantaneous velocity



Initial displacement: $\vec{d}_i = 2\text{ m [Right]}$
 Final displacement: $\vec{d}_f = 8\text{ m [Right]}$
 Length of the time interval: $\Delta t = 14\text{ s}$
 Initial velocity: $\vec{v}_i = \frac{7}{10}\text{ m/s [Right]}$
 Final velocity: $\vec{v}_f = \frac{1}{4}\text{ m/s [Right]} = \frac{1}{4}\text{ m/s [Right]}$
 Total distance traveled: $d = 8\text{ m}$

Average velocity during the first 8 seconds:
 $\vec{v}_{avg} = 0.7\text{ m/s [Right]}$
 Uniform OR non-uniform? (circle the correct one)
 Instantaneous velocity at $t=5\text{ s}$:
 $\frac{1}{4}\text{ m/s [Left]} \Rightarrow \vec{v}_{inst} = \frac{1}{10} = 0.1\text{ m/s [Right]}$
 Average velocity \neq instantaneous velocity