2	Problèmes typiques de MRU

Le Châtelard

Exercise 7

A hare moves away from a hunter in a straight line at a velocity of 36 km/h. When the hare is at 98 m from him, the hunter fires a ball whose velocity is 500 m/s. How far can the hare go before it is touched?

Exercise 8

A tiger runs against a hunter at a velocity of 72 km/h. While the tiger is 92 m from him, the hunter fires a ball whose velocity is 900 m/s.

a) Choose a repository and express the position $\overrightarrow{x_B}(t)$ of a rifle bullet.

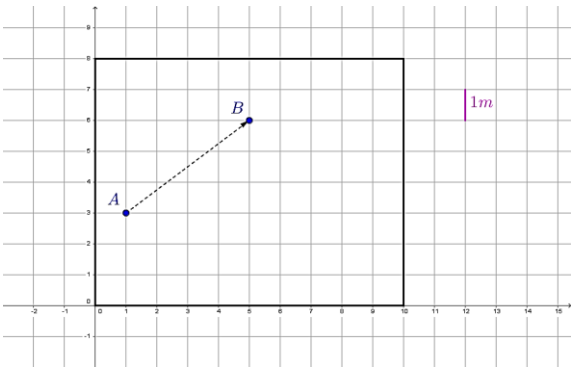
b) In the same repository, express the position $\overrightarrow{x_T}(t)$ of the tiger.

c) Which equation will be verified when the ball reaches the tiger?

d) How long after the start of the shot will the ball reach the tiger?

Exercise 9

A fly flies horizontally with a straight path and a constant velocity in the classroom shown below. It travels from point A to point B in 2 seconds.



a) What is the velocity of the fly ?

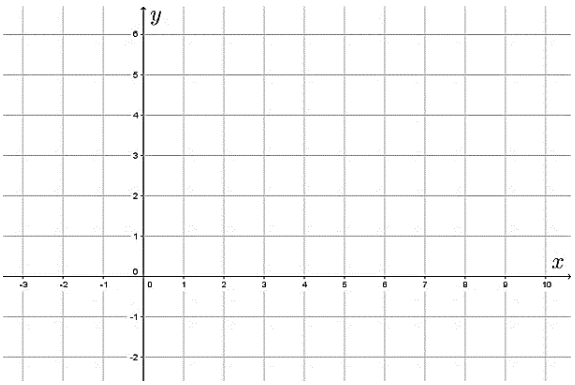
b) Where is it 0.7 seconds after leaving point A ?

c) How long after leaving point A will it strike the wall?

Exercise 10

A bumblebee steals in a straight line at constant velocity and connects point A to point B in 1 second:

$$\overrightarrow{x_A} = \begin{pmatrix} 8 \\ 2 \end{pmatrix} m \qquad \overrightarrow{x_B} = \begin{pmatrix} 2 \\ 3 \end{pmatrix} m$$



a) Draw point A in the specified repository.

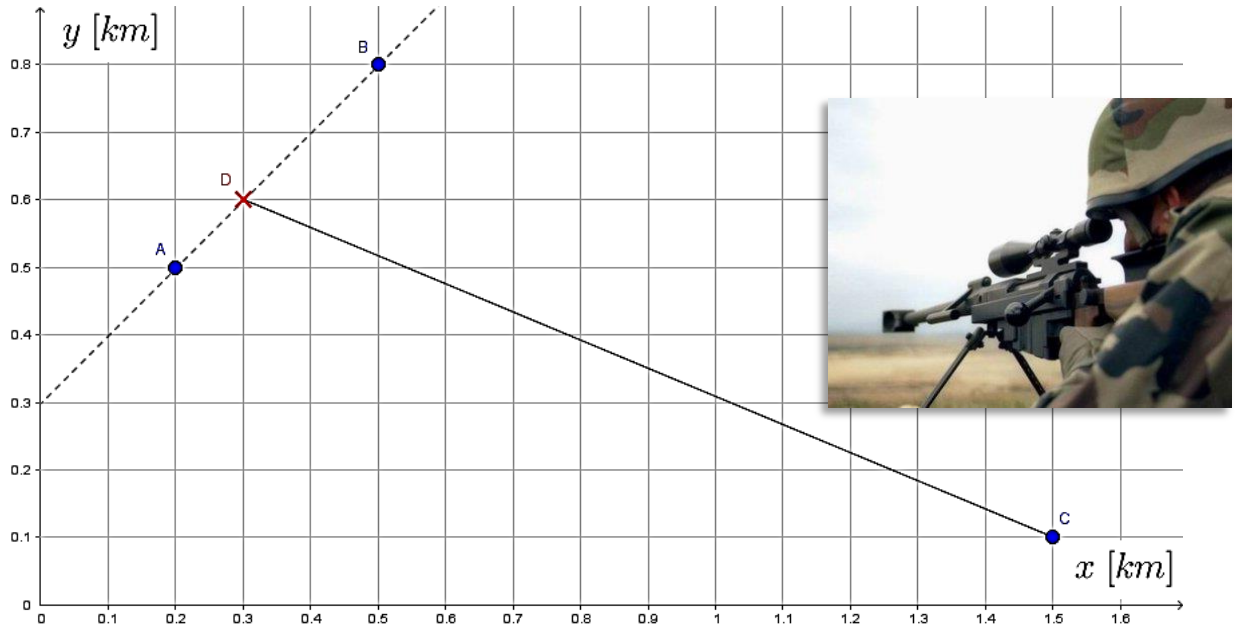
b) Draw point B in the specified repository.

c) Draw the bumblebee path in the specified repository.

d) Where will the bumblebee be after 2 seconds?

Exercise 11

A sniper's mission is to shoot down an enemy helicopter. At the start, the helicopter is at A and flies at a constant rectilinear velocity in the direction of point B. The shot starts from C and the impact is expected at point D as shown in the following diagram:



a) Explicit the position vectors $\overrightarrow{x_A}$, $\overrightarrow{x_B}$, $\overrightarrow{x_C}$ and $\overrightarrow{x_D}$.

b) Explain the displacement vectors $\overrightarrow{\Delta x_h}$ of the helicopter and $\overrightarrow{\Delta x_b}$ of the rifle bullet.

c) Explain the velocity $\vec{v}_h$ of the helicopter knowing that its average velocity is 100 m/s.

d) Express the average velocity of the helicopter in km/h.

e) How long does it take the helicopter to reach point D?

f) What is the distance between C and D?

g) How long does it take for the rifle bullet to reach point D, knowing that it takes 1 second to cover 900 m?

h) Did the sniper succeed in his mission? Justify your answer.

Exercise 12

In 1962, José Meiffret pulverized the bike velocity record thanks to the gear shown opposite. The large pinion has 130 teeths and the small pinion 15 teeths. The diameter of the rear tire is 557 mm.

What is the velocity reached by José Meiffret knowing that he manages to perform a maximum of 15 pedal strokes in 4 seconds?