J3 *Vectors* Activities

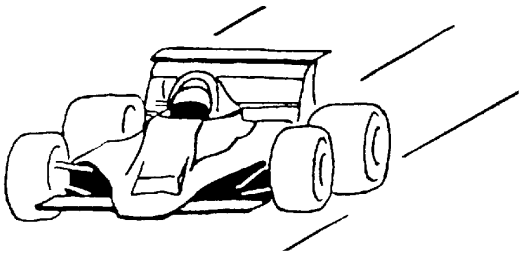
Activities

J3.1 Vectorace

Notes and Solutions (1 page)

© CIMT, Plymouth University

ACTIVITY J3.1 *Vectorace*



This is a game for up to four players, using the grid below and one counter each to represent their car.

Each player starts their car on a grid point on the starting line and moves each time interval by giving their VELOCITY VECTOR in the form $\begin{pmatrix} a \\ b \end{pmatrix}$.

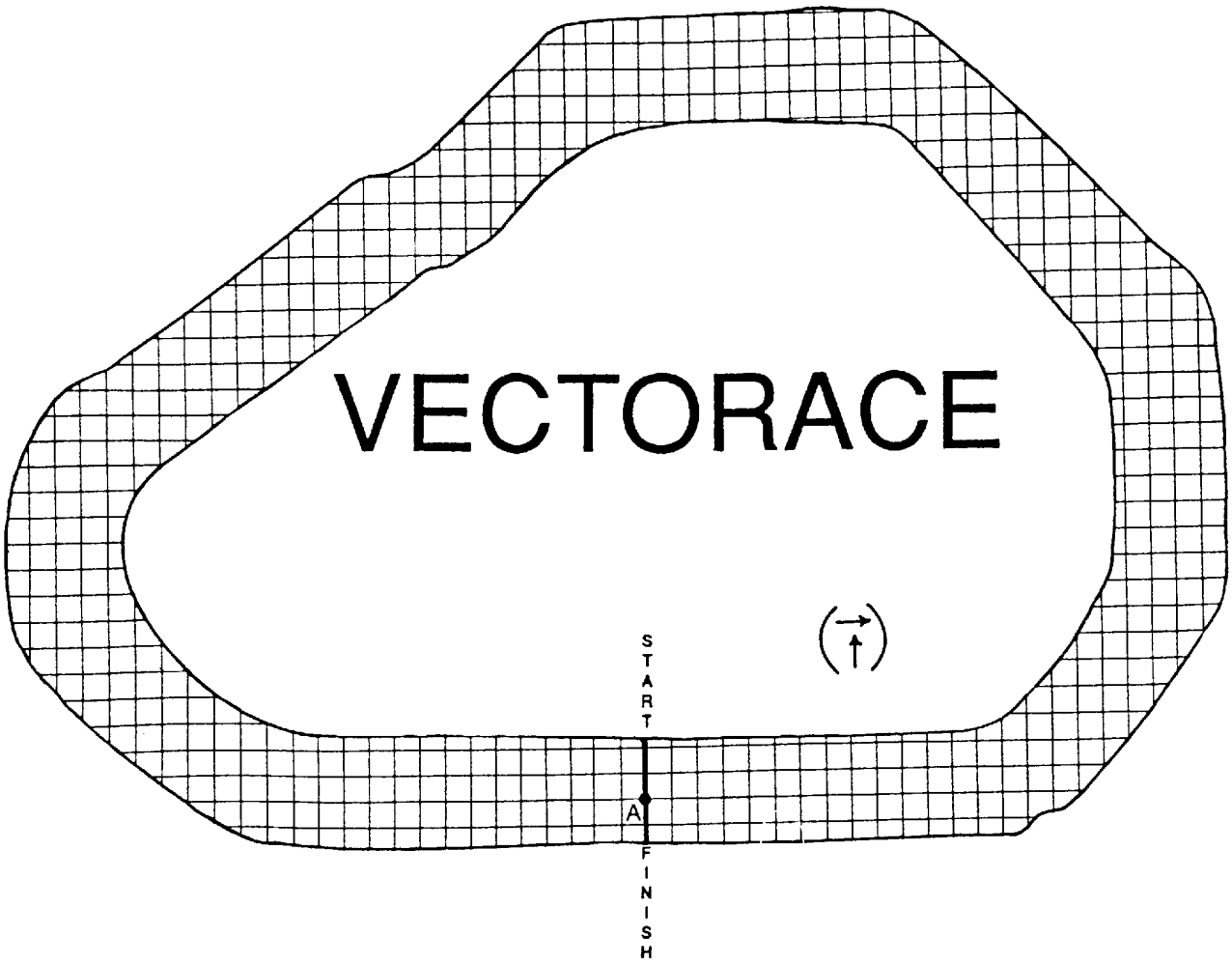
This means that the car moves

a units horizontally and b units vertically

Players take it in turn to play, and can vary each of the components of their velocity vector by at most one.

Each player starts with initial velocity vector $\begin{pmatrix} 0 \\ 0 \end{pmatrix}$.

Grid points on the boundaries are allowed, but if your car crosses the boundary, it crashes and is out of the race. The first car to complete a circuit is the winner.



© CIMT, Plymouth University

ACTIVITY J3.1 *Notes and Solutions*

Notes and solutions given only where appropriate.

J3.1 The objective of this game is to introduce vectors and their use to describe velocities. It also provides practice in the use of negative numbers in vectors.

You can readily modify the game. For example,

- allow greater increases/decreases in the components
- allow cars to continue when they crash but starting again with velocity $\begin{pmatrix}0\\0\end{pmatrix}$, provided that at the time of the crash the velocity vector is $\begin{pmatrix}a\\b\end{pmatrix}$ and $|a|+|b|\le 4$, say.

The following velocity vectors take A from start to finish.

$\begin{pmatrix}1\\0\end{pmatrix}$ $\begin{pmatrix}2\\0\end{pmatrix}$ $\begin{pmatrix}3\\0\end{pmatrix}$ $\begin{pmatrix}4\\0\end{pmatrix}$ $\begin{pmatrix}4\\1\end{pmatrix}$ $\begin{pmatrix}3\\2\end{pmatrix}$ $\begin{pmatrix}2\\3\end{pmatrix}$ $\begin{pmatrix}1\\4\end{pmatrix}$ $\begin{pmatrix}0\\5\end{pmatrix}$ $\begin{pmatrix}-1\\4\end{pmatrix}$ $\begin{pmatrix}-2\\3\end{pmatrix}$

$\begin{pmatrix}-3\\2\end{pmatrix}$ $\begin{pmatrix}-4\\2\end{pmatrix}$ $\begin{pmatrix}-5\\1\end{pmatrix}$ $\begin{pmatrix}-4\\0\end{pmatrix}$ $\begin{pmatrix}-3\\-1\end{pmatrix}$ $\begin{pmatrix}-3\\-2\end{pmatrix}$ $\begin{pmatrix}-3\\-3\end{pmatrix}$ $\begin{pmatrix}-3\\-3\end{pmatrix}$ $\begin{pmatrix}-3\\2\end{pmatrix}$ $\begin{pmatrix}-4\\-3\end{pmatrix}$ $\begin{pmatrix}-3\\-3\end{pmatrix}$

$\begin{pmatrix}-2\\-2\end{pmatrix}$ $\begin{pmatrix}-1\\-1\end{pmatrix}$ $\begin{pmatrix}0\\-1\end{pmatrix}$ $\begin{pmatrix}-1\\-2\end{pmatrix}$ $\begin{pmatrix}2\\-2\end{pmatrix}$ $\begin{pmatrix}3\\-2\end{pmatrix}$ $\begin{pmatrix}4\\-1\end{pmatrix}$ $\begin{pmatrix}5\\0\end{pmatrix}$ $\begin{pmatrix}6\\0\end{pmatrix}$ $\begin{pmatrix}7\\0\end{pmatrix}$

© CIMT, Plymouth University