

Lesson plan

Activity	Group size	Description	Time
Introduction	Whole class	Lesson outline. Remind the class that crowds do not necessarily have to involve humans.	2 min
Examples of crowding and underlying concepts	2-5 2-5 Whole class	Groups make lists of crowding examples. Groups make lists of reasons for crowd formation. List the examples of crowds and reasons for crowd formation. The class should reduce the reasons for crowd formation into more general concepts. Teacher mediates class discussion.	10 min
The physics of crowds	Whole class	Introduce the basic ideas of the physics of crowding. Refer back to the list of examples to motivate the discussion. <ul style="list-style-type: none"> • Crowds are dynamic and fluid-like. • Crowds involve multiple interactions. • Boundary conditions are important. • Crowds display interesting phenomena. • Fluctuations have a role in crowds. 	15 min
Experiment 1	Whole class	Demonstrate that crowding can be relieved by forcing the crowd into streams.	10 min
Experiment 2	Whole class	Demonstrate that traffic jams are caused by spatial constraints.	15 min
Conclusions	Whole class	Summarise key results: <ul style="list-style-type: none"> • Crowds are dynamic entities, well described by concepts from physics. • Crowding can be relieved through the application of physics principles. Optional: assign homework.	5 min

Supporting material for:

Saunders T (2011) The physics of crowds. *Science in School* **21**: 23-27.
www.scienceinschool.org/2011/issue21/crowding