



Pair Tasks

The pair tasks are designed to give students a chance to explore one of the topics of nanotechnology more deeply. The facilitator moves between the groups, assisting with each of the tasks. Each task is design to fill the time period, but students that complete their task early may take on another task, or join the group doing *Cartoon Opinions*.

1. Sensor City

Objective: To examine the ethical issue of nanotechnology and civil liberties.

Resources: Sensor City Resource Cards

Description: Students completing this task have been given the job cleaning up the crime in Sensor City. They are given a series of resource cards that explain the capabilities of generic nanotechnology applications (i.e. sensors, light detectors, etc.) The pair then uses these cards to come up with a list of creative ideas and a city technology plan.

Facilitation: This is a highly creative exercise and students may need initial guidance to understand the type of possible answers and how the applications can be combined. If needed, students should be encouraged to come up with a list of types of crime (without getting too distracted and graphic: focus on crime other than violence)

2. Splash the Cash

Objective: To examine the issues in financial allocation of resources to nanotechnology research.

Resources: Splash Resource cards, Splash Report Worksheet

Description: Students completing this task have been given the job of spending the Nanotechnology Research Group's annual budget of £300,000.00. They are given a series of resource cards that are written as short "grant applications". Each card has a description of the application, both benefits and risks, and the requested amount. The sum of the application requests are more than the students are given in sciZmic chips, and students must justify their choices on the Splash the Cash worksheet.

3. Cartoon Opinions

Objectives: To express through visual art the viewpoints of different stakeholders in the nanotechnology debate.

Resources: Art materials

Description: Students completing this task create a series of cartoons showing the viewpoints of different people with nanotechnology.

4. More about Medicine



Objectives: To explore the possibilities of nanotechnology applications for medicine.

Resources: Internet access, More about Medicine Worksheet

Description: Students completing this task use the internet and are given a series of websites to visit. Using the More about Medicine worksheet, students compile a list of medical applications of nanotechnology. They then rate the application as “generally positive” or “generally negative” based on the information that they find, and classify them as present, future or fiction.

5. Nanocubes

Objectives: To explore the relationship between surface area and volume, in order to gain a better understanding of the effects of increased surface area.

Resources: Nanocubes worksheet

Description: Students completing this task use the Nanocubes worksheet students construct one large cube and a series of smaller cubes to demonstrate the relationship between surface area and volume. After constructing the large cube, they should be able to find that all 8 of the small cubes fit within the larger cube (same volume). From here, they can calculate the surface area of the large cube, and compare it with the combined surface of the large cube.

6. Manufacturing

Objectives: To learn about the two types of manufacturing to simulate them with a modelling exercise.

Resources: Clay/plasticine/modelling material; bar of soap; wooden stick

Description: Students completing this task need to be given a simple shape to work from (i.e. a car, the letter X, an animal) and create two copies of it. One is modelled (“bottom-up” manufacturing) and one is carved (“top-down” manufacturing). The facilitator can offer additional examples in real life to ensure the students appreciate the terms and where and when they are used in nanotechnology research.