



Do you want to know a secret?

Students receive a sealed secret box that contains a chance card. Students have to decide at the beginning and at the end of the activity whether they would want to open the box. Opening the box represents taking a genetic test.

Students work in research groups to explore the issues surrounding genetic testing to help them make an informed choice about whether or not to open their box at the end of the activity.

Age group: KS3 and KS4

Type of activity: 'Marketplace' discussion

Timing of activity: Approx. 70 minutes

Group size: 3–5 students (equal-sized groups)

You will need:

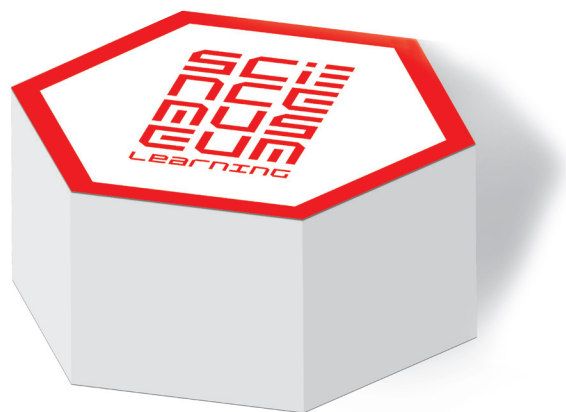
- Secret box templates (one per group)
- Genetic testing – science background for teachers x2

Learning outcomes:

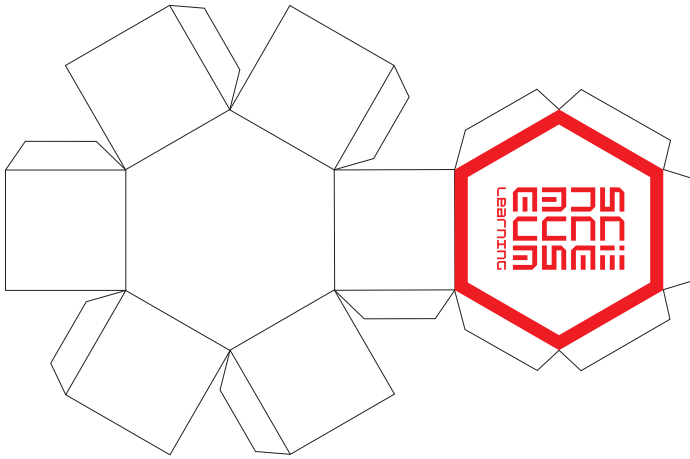
- To understand the scientific and ethical issues involved in genetic testing.
- To critically evaluate arguments for and against genetic testing.
- To provide students with the opportunity to express informed opinions on scientific issues.

Advance preparation

- Make up a secret box for each group. Fill each box randomly with a chance card (e.g. no homework tonight, recite the alphabet backwards) then seal the boxes with tape.
- Set up a voting line with the message 'open the box' at one end and 'keep the box closed' at the other.
- Print out articles for students to use in step 2 (see suggestions on the science background sheet).



Secret box template

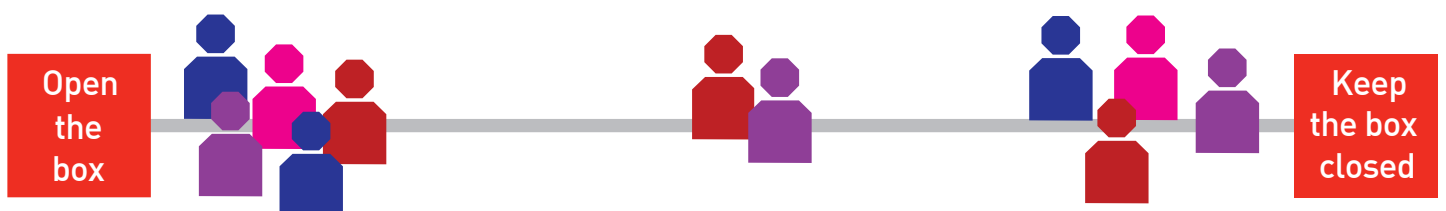


Step 1

Introduction: approx. 15 mins

- Divide the class into groups. Pass a sealed secret box to every group and ask your students what they think the box represents or what could be inside the box. The boxes must be kept closed.
- Explain that the content of the box represents all the genetic information someone inherits and could potentially pass on to his or her children. Opening the box represents taking a genetic test, which would allow you to 'see' every detail about yourself. This information could be something good that you'd potentially be pleased to find out, or it could be something undesirable that you wouldn't want to know.
- Take a 'human barometer' as to whether each student would choose to open his or her secret box. At one end state 'open the box', at the other 'keep the box closed'. Take a picture of where everyone is standing or place named Post-it notes along the voting line.

Human barometer



Step 2

Marketplace discussion: approx. 35 mins

(More time can be taken on this section if you have it.)

- Students get back to their groups. They get a few minutes to discuss with the other group members how they just voted and why.
- Run a 'marketplace' discussion (see page 3) where each group now becomes an 'expert' in one area or angle of genetic testing by researching one of the following instructions/questions:

Name 3–5 genetically inherited diseases and their effects.

What other aspects of our health and wellbeing may be inherited?

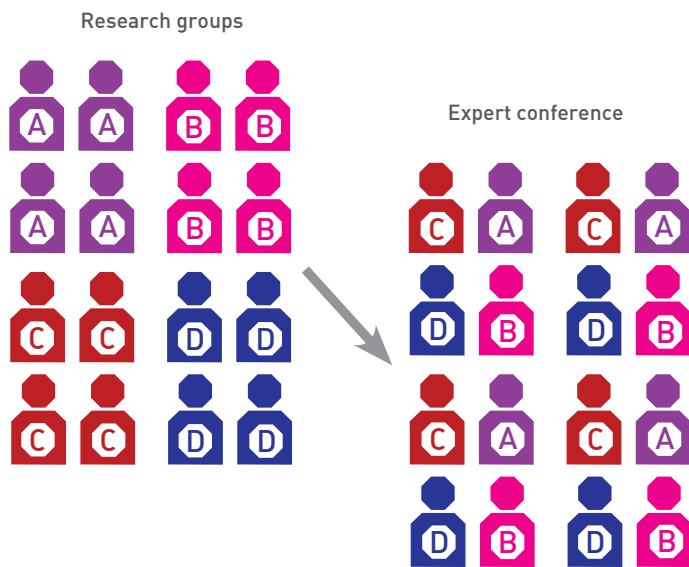
What are the potential advantages of taking a genetic test?

What are the potential disadvantages of taking a genetic test? What could be the consequences?

What is the Human Genome Project? Why did scientists want to decode the human genome?

- a. Give groups 20 minutes to answer their question (some useful web links are given in the science background for teachers). Each group should prepare three key points to share.
- b. Create 'expert conference' groups made up of at least one representative from each of the research groups.
- c. Give students ten minutes to share and discuss three key points from their research work with the 'expert conference' group. By the end of the marketplace discussion everyone has heard from all the other groups.

Marketplace discussion



Suggested facilitation questions

- Has your opinion changed from your first vote? If so, why?
- What do you think makes you, you? (Is it your genes/ your personality/your interests/what you wear?)
- How valuable is your genetic information to you?
- What would you want to know about yourself?
- What would you prefer not to know about yourself?
- How could findings from a genetic test affect your lifestyle choices?
- What are the ethical implications of having your genetic information on record?
- Should there be a restriction on how old you have to be to decide to take a genetic test? Who gets to decide? You or your parents?

Step 3

Final decision and discussion about results:
approx. 20 mins

- Take a human barometer or line vote again and compare if any opinions have changed from the original vote. As a whole class or in the original groups discuss the reasons behind the decisions made for the first and second vote.
- Now, give each group a few minutes to discuss and come to a consensus as to whether they want to open their secret box, i.e. to take a genetic test.
- Get the groups who decide to open their secret boxes to reveal the content of their box to the rest of the class. Ask your students how they feel about what they find inside their boxes. How do other students who chose not to open their boxes feel now? Draw out the analogy.

Optional

Use the secret boxes to introduce the terminologies 'phenotype' and 'genotype'.

Let students personalise their box with drawings or pictures which reflect something of themselves. The outside of the box represents the characteristics that we can see and we know about a person such as hair colour – **phenotype**. The content of the box represents genetic information which cannot be seen – **genotype**.

Next step

Whole-classroom discussion

Explore some of the wider issues around genetic testing, considering the following issues.

Privacy/confidentiality

Once the 'box' is opened and you access your genetic information, you cannot close it again. Who might be interested in looking at your genes and why (e.g. family, insurance companies, etc.)? Who should/shouldn't be allowed to look at your information and why? How could you store your DNA information in a safe way?

Responsibility

Once you knew your genetic make-up, how would you feel/act? For example, if you knew you had a cancer gene, would you take steps to reduce any risks? Would you avoid having children so as not to pass on a dangerous gene? Or would it be better not to know, and avoid the worry?

Personalised medicine

Risk of disease and response to treatment vary from person to person. Genetic testing will soon allow doctors to diagnose illness much more accurately and prescribe the correct drug at the correct dosage. But what happens to people for whom there is no effective drug? And how about drugs that are highly effective but only for a small part of the population – should they be available free on the NHS paid for by the state? Should people have the right to receive personalised medicine as long as they pay for it? Is this a form of discrimination?

National Curriculum links

KS4 Science QCA (2007):

4 a–b; 5 c, e

KS3/KS4 Citizenship QCA (2007):

1.1 a; 2.1 b–d; 2.2 a–c; 2.3 b–d; 4 a–e

KS3/KS4 QCA: Personal, Learning & Thinking Skills (PLTS)

Extensions

Please refer to the science background sheet for teachers for further information.

Play the *Who am I? Thingdom* game at:

sciencemuseum.org.uk/WhoAml/Thingdom.aspx

The game shows how genetic traits are inherited by different generations. Use the *Thingdom* student sheet to help focus the activity. Watch the film to see how *Thingdom* can support your teaching.



Science Museum link

This activity is inspired by the artwork *Disclosure Case* by Revital Cohen in the Science Museum's *Who am I?* gallery. The work is an imaginary 'Pandora's box', the contents of which could tell you everything you could have inherited from your parents and what your children could potentially inherit from you. Would opening such a box be a valuable insight or reveal information that could change your life forever? This work was part of a bigger project called 'Genetic Heirloom Project Series' which explored the implications of increased knowledge of genetic information and perceptions of identity.



Disclosure Case by Revital Cohen.

For this activity and many more, visit sciencemuseum.org.uk/educators

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