Answers to  
The Genomics Game (quiz)

These notes are for educators using [The Genomics Game (quiz)](https://www.genomicseducation.hee.nhs.uk/education/teaching-resources/the-genomics-game-quiz/), which was created by NHS England’s Genomics Education Programme.

## Section: ‘About DNA’

Question: In biology, what does DNA stand for?  
Answer: **b**) Deoxyribonucleic acid

Question: What does the molecule ‘DNA’ do?  
Answer: **a**) holds our genetic material AND **c**) passes on inherited traits

Question: In humans, where is DNA found?   
Answer: **b**) In most of our cells

Question: Genetics is the study of all an individual’s DNA   
Answer: **False**

## Section: ‘Chromosomes’

Question: What is a chromosome?   
Answer: **a**) Compact form of DNA

Question: How many chromosomes do most human cells contain?   
Answer: **c**) 46

## Section: ‘Genes vs genomes’

Question: What are genes?   
Answer: **a**) Specific parts of DNA

Question: What is a genome (gee-nome)?   
Answer: **b**) A cell’s entire genetic material

Question: How much of your genome is the same as everyone else’s?  
Answer: **d**) 99.8%

## Section: ‘Genomes to proteins’

Question: What does the ‘central dogma’ of biology explain?   
Answer: **b**) How proteins code for genes

Question: Approximately how many protein-coding genes does the human genome have?

Answer: **b**) 20,000

Question: How much of your genome contains the instructions to make proteins?   
Answer: **a**) 2%

## Section: ‘Inheritance and variation’

Question: Which word describes passing down genetic information?   
Answer: **a**) Inherited

Question: In medicine, what word is preferably used to indicate that a gene is different than expected?

Answer: **a**) Variant

Question: The size of a change in our genome is directly linked to the potential impact it has on our health.

Answer: **False**

Question: It is certain that two patients, with the same genomic variants, will present with the same symptoms.

Answer: **False**

Question: Which are genetically inherited conditions?   
Answer: **a**) Cystic fibrosis AND **b**) Huntington disease

Question: Some people have a perfect genome.   
Answer: **False**

## Section: ‘Research and techniques’

Question: Genomic sequencing is:   
Answer: **b**) reading a genome

Question: Why do people want to study the genome?

Answer: All four correct - **a**) Scientific research AND **b**) Health reasons AND **c**) To trace ancestry AND **d**) Lifestyle reasons

Question: The variation in our genome can tell us:

Answer: All four correct - **a**) if you will develop a condition AND **b**) if you may develop a condition AND **c**) how you may react to a drug AND **d**) your ancestry

Question: Now that we’ve ‘read’ the human genome, we know everything about it.   
Answer: **False**

## Section: ‘Diagnostics’

Question: To investigate an individual’s genome, we need a sample of their DNA. What biological samples will give us DNA?

Answer: Multiple correct answers including: **bile**, **blood** (though not mature red blood cells or platelets by themselves), **bone marrow**, **breast milk**, **hair roots** (though not hair fibres), **cerebral spinal fluid**, **faeces** (stool or poo), **saliva** (spit), **skin cells** (though not fingernails or toenails), **sputum** (phlegm), **tumour** cells, **urine** and any cells derived from taking **tissue samples** or **swab samples**. Tears are not expected to have DNA due as it has enzymes that act to break it down.

Question: Genomic tests are available through the NHS, only.   
Answer: **False**

## Section: ‘Infections and genomics’

Question: Only humans have a genome.   
Answer: **False**

Question: Genomics is used in infectious disease outbreaks.   
Answer: **True**

Question: Antibiotic resistance comes from mutations in bacteria’s DNA.   
Answer: **True**

Question: In an outbreak, we sequence the pathogen’s genome to:

Answer: **b**) identify the outbreak’s source AND **c**) identify the drug to use AND **d**) identify the type of pathogen

## Section: ‘Cancer genomics’

Question: Cancer is a disease of the genome.   
Answer: **True**

Question: A cancer cell’s genome looks the same as a healthy cell’s genome.   
Answer: **False**

Question: Sequencing a tumour’s genome tells us:

Answer: **b**) The type of cancer AND **c**) Suitable treatment options AND **d**) The stage the cancer is at

## Section: ‘Family history’

Question: The word ‘familial’ in familial disease means the disease:   
Answer: **b**) is related to family

Question: In a clinical context, what is a family history?   
Answer: **a**) Health details of an individual and their close relatives

Question: A patient is worried about an inherited condition. Do you:   
Answer: **a**) draw a family history

Question: In a family history, which has the least clinical value?   
Answer: **c**) Relatives’ names

Question: Which clinical clues may hint at a genetic condition?

Answer: **a**) An unusual presentation, for instance multiple symptoms AND **b**) Young person with a condition that usually presents later in life AND **d**) A condition that ‘runs’ in families

## Section: ‘Results are far reaching’

Question: Results from a genetic test will have clinical implications for the patient, only.   
Answer: **False**

Question: Angelina Jolie chose to have a double mastectomy based on a genetic diagnosis.

Answer: **True**

Question: A patient’s genomic information should always be handled sensitively. How can sensitive data be protected?

Answer: Multiple correct answers including: **Firewalls** and **encryption**, **storing data away from personal identifiers**, **restricting access** and **monitoring access** to data, robust **consent process** and others.

## Section: ‘Precision medicine’

Question: Which best defines the word ‘pharmacogenomics’?   
Answer: **d**) Using genomics to tailor drug treatment for individuals

Question: A patient’s genomic information is the only factor considered for precision medicine.

Answer: **False**