PiXL Independence:

GCSE Biology – Student Booklet

KS4

Topic: Health, disease and medicines

Contents:

I. Level 1- Multiple Choice Quiz – 20 credits

II. Level 2 - 5 questions, 5 sentences, 5 words – 10 credits each

III. Level 3 - Science in The News – 100 credits

IV. Level 4 - Scientific Poster – 100 credits

V. Level 5 - Video summaries – 50 credits each

PiXL Independence – Level 1
Multiple Choice Questions
GCSE Biology – Health, disease and medicines

INSTRUCTIONS **Score: /20**

- **Read the question carefully.**
- **Circle the correct letter.**
- **Answer all questions.**

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1. What is a pathogen?
   a. A disease.
   b. A microorganism.
   c. A disease-causing microorganism.
   d. A disease caused by a microorganism.

2. Which of the following invades cells before multiplying?
   a. Bacteria
   b. Viruses
   c. Fungi
   d. Protists

3. Which statement best describes vaccination?
   a. A virus is injected or swallowed.
   b. A bacterium is injected or swallowed.
   c. A dead or weakened form of a pathogen is injected or swallowed.
   d. A disease is injected or swallowed to stimulate the production of antibodies.

4. What is in an antigen?
   a. Molecules of dead or inactive pathogens.
   b. A medicine that treats bacterial infections.
   c. A microorganism that causes a disease.
   d. Molecules on the surface of a pathogen.

5. What is meant by the word vector?
   a. An organism that transmits a pathogen.
   b. A bacterium that causes a disease.
   c. A single celled eukaryote.
   d. A pathogen that reproduces on the surface of cells.

6. Which of the following is not a viral infection?
   a. Measles
   b. Mumps
   c. Malaria
   d. Influenza

7. Which virus causes discoloured leaves and prevents photosynthesis?
    a. Rose black spot
    b. Tomato Mosaic
    c. Tobacco Mosaic
    d. Nectaria canker

8. How is Malaria spread?
    a. By direct contact with a malaria sufferer e.g. holding hands.
    b. By an infected person coughing on you and you breathing it in.
    c. By mosquitos biting an infected person and then an uninfected person.
    d. By eating food contaminated with malaria that has not been cooked properly.

9. What is Alexander Fleming famous for?
    a. Discovering how hand washing helps prevent the spread of infection.
    b. Discovered anaesthetic.
    c. Discovering how a vaccine works.
    d. Discovered penicillin

10. What is MRSA?
    a. Methicillin Restorative Strain Ampicillin
    b. Measles Resistant Staphylococcus Aureus
    c. Methicillin Resistant Staphylococcus Aureus
    d. Measles Rubella Salmonella AIDS

11. In clinical trials, why are healthy volunteers used to test new drugs?
    a. To work out the optimum dose to give patients.
    b. To see if there are any harmful side effects.
    c. To see if the disease can be treated.
    d. To determine the efficacy of new drug.

12. What do antibiotics do in the body? (Pick 2)
    a. Attack white blood cells
    b. Destroy/slow growth of bacteria
    c. Nothing
    d. Interfere with cell wall/ contents of pathogens

13. Which of the follow treats the symptoms of an infection only?
    a. Antivirals
    b. Antitoxins
    c. Aspirin
    d. Antibiotics

14. Which of the following is a non-communicable disease?
    a. Measles
    b. Cancer
    c. Mumps
    d. Influenza

15. What is the name of a tumour that divides slowly and does not spread to other tissues and organs?
    a. Benign
    b. Cancer
    c. Malignant
    d. Growth

16. Which cells produce antibodies?
    a. T Cells
    b. K Cells
    c. Z Cells
    d. B Cells

17. What do antibodies do?
    a. Neutralise pathogens.
    b. Bind to specific antigens.
    c. Kill the pathogen.
    d. Cause pathogen to multiply.

18. What is a placebo?
    a. A substance that looks like the drug but is a mild version.
    b. A substance that looks like the drug but is a high dose.
    c. A substance that looks like the drug contains a different medicine.
    d. A substance that looks like the drug but does not contain any medicine.

19. Which one of the following is NOT carried out in preclinical trials?
    a. Testing on animals.
    b. Double blind testing.
    c. Testing on human cells.
    d. Testing on human tissues.

20. Phagocytosis is when…
    a. White blood cells release antibodies.
    b. White blood cells engulf the pathogen.
    c. White blood cells neutralise toxins.
    d. White blood cells do nothing.

PiXL Independence – Level 2
5 questions, 5 sentences, 5 words
GCSE Biology – Health, disease and medicines

INSTRUCTIONS

- **For each statement, use either the suggested website or your own text book to write a 5-point summary. In examinations, answers frequently require more than 1 key word for the mark, so aim to include a few key words.**
- **It is important to stick to 5 sentences. It is the process of selecting the most relevant information and summarising it, that will help you remember it.**
- **Write concisely and do not elaborate unnecessarily, it is harder to remember and revise facts from a long paragraph.**
- **Finally, identify 5 key words that you may have difficulty remembering and include a brief definition. You might like to include a clip art style picture to help you remember it.**

Example:

QUESTION:	What is the difference between communicable and non-communicable diseases?
Sources:	**Website –** http://filestore.aqa.org.uk/textbooks/sample/gcse-biology/AQA-8461-OXFORD-SAMPLE.PDF **Interactive -**

1. Pathogens are microorganisms such as viruses and bacteria that cause infectious diseases in animals and plants.
2. They depend on their host to provide the conditions and nutrients that they need to grow and reproduce. They frequently produce toxins that damage tissues and make us feel ill.
3. Communicable (infectious) diseases (e.g., tuberculosis and flu) are caused by pathogens such as bacteria and viruses that can be passed from one person to another
4. Non-communicable diseases cannot be transmitted from one person to another (e.g., heart disease and arthritis).
5. Both communicable and non-communicable diseases are major causes of ill health, but other factors can also affect health.

Pathogen	**Communicable**	**Non-communicable**	**Virus**	**Bacteria**
Disease causing microorganism.	Can be passed on from one person to the next.	Cannot be passed on to another person.	Smallest pathogen that invades the cell.	Pathogen that releases toxins into the blood.

QUESTION 1:	Explain how vaccination will prevent illness in an individual and how the spread of disease can be reduced by immunising a large proportion of the population.
Sources:	**Website –** http://www.nhs.uk/Conditions/vaccinations/Pages/How-vaccines-work.aspx **Interactive -** https://www.youtube.com/watch?v=3aNhzLUL2ys

QUESTION 2:	Explain the use of antibiotics and other medicines in treating disease.
Sources:	**Website –** http://www.nhs.uk/conditions/Antibiotics-penicillins/Pages/Introduction.aspx **Interactive -** https://www.youtube.com/watch?v=uTh4tqRD5mM

QUESTION 3:	Describe the process of discovery and development of potential new medicines, including preclinical and clinical testing.
Sources:	**Website –** https://getrevising.co.uk/revision-notes/drug-trials-source-bitesize **Interactive -** http://www.bbc.co.uk/education/clips/z6xcd2p

QUESTION 4:	Describe how viruses infect the body and cause disease. Give specific examples.
Sources:	**Website –** http://science.howstuffworks.com/life/cellular-microscopic/virus-human2.htm **Interactive -** https://www.my-gcsescience.com/aqa/biology/viral-bacterial-fungal-and-protist-diseases/

QUESTION 5:	Describe how bacteria infect the body and cause disease. Give specific examples.
Sources:	**Website –** **Interactive - https://www.my-gcsescience.com/aqa/biology/viral-bacterial-fungal-and-protist-diseases/**

PiXL Independence – Level 3
Science in the News
GCSE Biology – Health, disease and medicines

Fake news

Sensationalized news stories have been around for some time, but with the mass growth of social media, the problem seems to have grown in recent years. At the very least, the US Presidential election has certainly highlighted the impact that misleading information can have. www.tiny.cc/fakenews2

At home, the Brexit vote also suffered from the circulation of misleading news stories www.tiny.cc/fakenews3

Therefore, the ability to identify real information, track it back to the source article and make your own judgement is a very important skill. This activity will help you develop that skill.

Malaria free- Is this a possibility?

News article: https://www.theguardian.com/society/2016/sep/05/sri-lanka-malaria-free-world-health-organisation

NHS article: http://www.nhs.uk/Conditions/malaria/Pages/Introduction.aspx

Discussion article: https://www.nhs.uk/news/medication/new-malaria-vaccine-could-save-millions-of-lives/

Real article: https://www.bupa.co.uk/health-information/directory/m/malaria-disease

Task 1:

You need to produce a 1-page essay discussing how action and understanding of how a disease is transmitted can lead to eradication of a disease.

Essay section	Activity
Introduction	Why is Sri Lanka claiming that they are now malaria free?
Describe	Describe what malaria is and how it is spread.
Explore	Explain the symptoms and treatments of malaria.
Evaluate	Evaluate new methods of treating malaria- write down your own opinions about the new vaccine.

The drug trial- emergency at the hospital.

News article: http://www.bbc.co.uk/mediacentre/proginfo/2017/08/the-drug-trial

Discussion article: https://www.fda.gov/ForPatients/Approvals/Drugs/default.htm

NHS: https://www.nhlbi.nih.gov/studies/clinicaltrials

Real article: https://labiotech.eu/medical-biotechnology-clinical-success-2016/

Task 2:

You need to produce a 1-page essay discussing the steps involved in the creation of a new drug.

Essay section	Activity
Introduction	Describe what a drug trial is and why they are important in the world of medicine.
Describe	Describe the stages involved in drug development.
Explore	Compare and contrast the benefits and problems that could occur in a drugs trial.
Evaluate	Evaluate the impact of drug trialing.

PiXL Independence – Level 4
Scientific Posters
GCSE Biology – Health, disease and medicines

INSTRUCTIONS

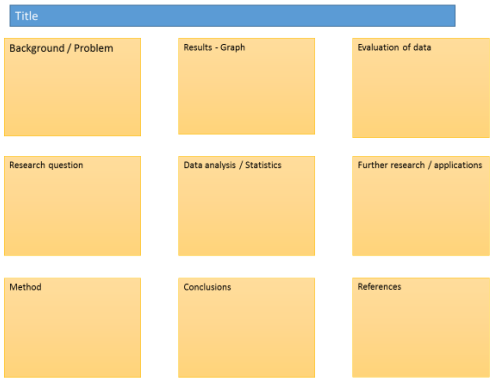
Scientific Posters

Scientists communicate research findings in three main ways. Primarily, they write journal articles much like an experiment write up. These are very concise, appraise the current literature on the problem and present findings. Scientists then share findings at conferences through talks and scientific posters. During a science degree, you would practise all three of these skills.

Scientific posters are a fine balance between being graphically interesting and attracting attention and sharing just the right amount of text to convey a detailed scientific message. They are more detailed than a talk and less detailed than a paper.
Use this information to help structure your poster – www.tiny.cc/posterskills (that's Poster Skills not Posters Kill!) More detailed guidance is available at: www.tiny.cc/posterskills2

Creating your poster

It is easiest to create a poster in PowerPoint; however, you need to add custom text boxes rather than using the standard templates.



Posters need to be eye catching, but readable from a distance. If you use PowerPoint, start with a 4:3 slide (for easier printing, it can then be printed on A3) and use a 14-16 pt font. The first box could be larger to draw people in. You can use a background image, but pick a simple one that is of high quality. Select text box fill and select change the transparency to maintain the contrast and partially show the picture.
You can experiment with different layouts and you should include images. Avoid a chaotic layout, posters are read from top left column downwards.
Remember to include the authors and references.
Finally, look at the examples given on the University of Texas website which also offers an evaluation of each www.tinyurl.com/postereg

Non - communicable diseases

Background

Most pathogens have to get inside our body to spread infection. Once they are inside, the body provides ideal living conditions, including plenty of food, water and warmth. Standing in their way is our body's immune system - the body's coordinated response to the invading pathogens.

Source articles:

http://www.bbc.co.uk/schools/gcsebitesize/science/21c_pre_2011/disease/diseaseresistancerev2.shtml
https://www.khanacademy.org/test-prep/mcat/cells/transport-across-a-cell-membrane/a/phagocytosis
https://www.thoughtco.com/antibodies-373557
https://revisionworld.com/gcse-revision/biology/human-body/immunisation-vaccination
http://www.who.int/mediacentre/factsheets/antibiotic-resistance/en/

Use other sources as necessary.

Task:

Produce a scientific poster on the causes communicable diseases, the immune systems response to infection and the treatment of disease.

Recall	State the non-specific defence systems of the human body against pathogens.
Describe	Describe and explain the role of the immune system in the defence against disease.
Compare	Compare the actions of the body's immune system when a pathogen enters the body. You should include phagocytosis, antibody production and antitoxin production.
Evaluate	Evaluate the overuse of antibiotics.

PiXL Independence – Level 5
Video summaries
GCSE Biology – Health, disease and medicines

Cornell Notes

At A level and University, you will make large amounts of notes, but those notes are only of use if you record them in a sensible way. One system for recording notes is known as the Cornell notes system. This method encourages you to select relevant information, rather than trying to write a transcript of everything said. More importantly, it forces you to spend a few minutes reviewing what you have written, which has been scientifically proven to aid learning and memory retention.
The ideal is to write everything on one page, but some students may prefer to type and others will handwrite their notes. Whichever option you use, remember the aim is to summarise and condense the content with a focus on the objectives that you are trying to learn and understand.

There are three main sections to the Cornell notes:

1. **Cue/ Objectives** – This can be done before or after the lecture. You may have been provided with the objectives or you may need to decide what they were. You may want to make the link to your learning if this is an additional task or lecture you are viewing, such as this video.
2. **Notes** – In this space you record concisely, simply the things you are LESS likely remember - **The NEW knowledge.**
3. **Summary** – The most important step that is carried out after the lecture or video. This helps to reinforce learning.

Background

The following short videos present two topics that link to your learning. The first video is where Seth Berkley explains how smart advances in vaccine design, production and distribution are bringing us closer than ever to eliminating a host of global threats -- from AIDS to malaria to flu pandemics. The second video hosted by Maryn McKenna discusses how penicillin changed everything. Infections that had previously killed were suddenly quickly curable. Yet as Maryn McKenna shares in this sobering talk, we've squandered the advantages afforded us by that and later antibiotics.

Source article:
Video 1 – HIV and the flu- a vaccine strategy
Ted Ed: https://www.ted.com/talks/seth_berkley_hiv_and_flu_the_vaccine_strategy

Video 2 – What do we do when antibiotics don't work anymore?
Ted Ed:
https://www.ted.com/talks/maryn_mckenna_what_do_we_do_when_antibiotics_don_t_work_any_more

Task:

You need to produce a set of Cornell notes for the video given above.
Use the following objective to guide your note taking, this links to your learning.

1 Discuss the importance of vaccine development.
2 Discuss how common diseases and simple surgical procedures may, in the future, become 'high risk' due to the emergence of antibiotic resistant bacteria.

Objectives What are the main learning outcomes that have been shared with you? This will help guide you to taking the RIGHT notes during the video.	Title Date Sketch down note and key words Do not write in full sentences whilst you listen, put quick sketches, single words, mind maps, short hand etc. To help train you for university, try not to pause the video because you could not pause a live lecture (However, a lecture may give more natural pauses for you to catch up).

Summary (after the video)
What are your main points of learning from this video.
This is your chance to make sense of your notes.
Make clear connections to the things you need to know

Objectives:	**Title:** **Date:**
Summary:	

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