PiXL Independence:

GCSE Biology – Student Booklet

KS4

Topic: Transport systems

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

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V. Level 5 - Video summaries – 50 credits each

PiXL Independence – Level 1
Multiple Choice Questions
GCSE Biology – Transport systems

INSTRUCTIONS **Score: /20**

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

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1. What are the four main components of blood?
   a. Red blood cells, white blood cells, plasma, carbon dioxide
   b. Red blood cells, white blood cells, oxygen, sugar
   c. Plasma, red blood cells, white blood cells, platelets
   d. Oxygen, platelets, red blood cells, white blood cells

2. What is the function of red blood cells?
   a. Carry oxygen
   b. Carry carbon dioxide
   c. Carry glucose
   d. Carry water

3. Which of these statements is not an adaptation of the red blood cell?
   a. Biconcave disc shape
   b. No nucleus
   c. Contains haemoglobin
   d. Has a flagellum

4. Which blood vessels have thick walls made of muscle and elastic fibres?
   a. Veins
   b. Arteries
   c. Capillaries
   d. Venules

5. Which blood vessel has very thin walls for efficient exchange of substances?
   a. Veins
   b. Arteries
   c. Capillaries
   d. Venules

6. What are the top two chambers of the heart called?
   a. Atria
   b. Ventricles
   c. Aorta
   d. Vena Cava

7. Why does the left ventricle have thicker muscle than the right ventricle?
    a. Pumps blood to the lungs
    b. Pumps blood to the body
    c. Increases blood pressure
    d. Reduces cardiac output

8. What treatments are available for blocked coronary arteries?
    a. Heart transplant
    b. Valve transplant
    c. Pacemaker
    d. Stents

9. What are the movements of the diaphragm when breathing in?
    a. Up/relaxes
    b. Down/contracts
    c. Dome/relaxes
    d. Flattens/contracts

10. When does air enter the lungs?
    a. When pressure in the lungs is lower than atmospheric pressure.
    b. When pressure in the lungs is higher than atmospheric pressure.
    c. When pressure in the lungs is the same as atmospheric pressure.
    d. When pressure in the lungs is the same as blood pressure.

11. Which of these is not an adaptation of the alveoli for gas exchange?
    a. Thin walls
    b. Large surface area
    c. Good blood supply
    d. Large diffusion distance

12. Which cells in the leaf are adapted for photosynthesis?
    a. Guard cells
    b. Palisade cells
    c. Upper epidermal cells
    d. Lower epidermal cells

13. Which **two** substances move in the xylem?
    a. Sugar
    b. Amino acids
    c. Water
    d. Ions

14. By what process does water get into a plant?
    a. Diffusion
    b. Active transport
    c. Co-transport
    d. Osmosis

15. What **<u>two</u>** are functions of the stomata?
    a. Gas exchange
    b. Sugar production
    c. Water loss
    d. Absorb light

16. Sugar in plants is stored as starch. What chemical could you use to check for starch?
    a. Ethanol
    b. Iodine
    c. Benedict's solution
    d. Biuret reagent

17. What is transpiration?
    a. Process of making glucose.
    b. Movement of sugars through a plant
    c. Movement of H_2O through a plant.
    d. Movement of minerals through a plant.

18. What does **not** affect the rate of transpiration?
    a. CO_2
    b. Temperature
    c. Light
    d. Wind

19. Which structure in a plant has columns of hollow, dead reinforced cells?
    a. Phloem
    b. Xylem
    c. Roots
    d. Leaf

20. Translocation occurs in the…
    a. Phloem
    b. Xylem
    c. Lungs
    d. Kidneys

PiXL Independence – Level 2
5 questions, 5 sentences, 5 words
GCSE Biology – Transport systems

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:	Describe the principles of organisation.
Sources:	**Website –** http://www.bbc.co.uk/schools/gcsebitesize/science/add_aqa/tissues_organs/organs_in_animalsrev1.shtml **Interactive -** https://www.youtube.com/watch?v=gDSsQnU_q2E

1. During the development of a multicellular organism, cells **differentiate** so that they can carry out different functions. Differentiation is the process by which a cell becomes a specialised type of cell.
2. Multicellular organisms usually contain differentiated cells, adapted for specific functions. Tissues consist of groups of similar cells.
3. Organs contain different tissues, working together to carry out particular functions. Organ systems contain different organs. The different organ systems work together in an organism.
4. The stomach is one of the organs that form the digestive system. The stomach contains various tissues, and each tissue is made of a particular type of cell.
5. The digestive system is an example of an organ system in which humans and other mammals exchange substances with the environment.

Tissue	**Organ**	**System**	**Organism**	**Differentiation**
A group of specialised cells working together.	A group of tissues working together.	A group of organs working together.	A group of systems working together.	The process of a cell becoming specialised.

QUESTION 1:	Describe and explain the lock and key model using digestive enzymes as examples.
Sources:	**Website –** https://www.youtube.com/watch?v=smtCH5HX44o **Interactive -** http://www.bbc.co.uk/schools/gcsebitesize/science/add_aqa/proteins/proteinsrev4.shtml

QUESTION 2:	Describe and explain how the lungs are adapted for gas exchange.
Sources:	**Website –** https://www.youtube.com/watch?v=aPUPfzsqDgs **Interactive -** https://www.youtube.com/watch?v=mZvzl8KH6iI

QUESTION 3:	Describe the different methods of transport across a membrane?
Sources:	**Website –** http://www.biologymad.com/resources/diffusionrevision.pdf **Interactive -** https://www.youtube.com/watch?v=eDeCgTRFCbA https://www.youtube.com/watch?v=PRi6uHDKeW4

QUESTION 4:	Explain the relationship between the circulatory system and the respiratory system.
Sources:	**Website -** https://www.healthcentral.com/article/how-the-heart-and-lungs-work-together **Video -** https://www.youtube.com/watch?v=9fxm85Fy4sQ

QUESTION 5:	Explain how the structure of root hair cells, xylem and phloem are adapted to their function.
Sources:	**Website –** http://www.bbc.co.uk/schools/gcsebitesize/science/triple_aqa/transport_systems/transport_in_plants/revision/1/ **Interactive - https://www.youtube.com/watch?v=jtuX7H05tmQ**

PiXL Independence – Level 3
Science in the News
GCSE Biology – Transport systems

Fake news

Sensationalised 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.

At home, the Brexit vote also suffered from the circulation of misleading news stories.

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.

Transplants-opt in or opt out?

News article: http://www.mirror.co.uk/news/politics/sir-vince-cable-nearly-500-11209462
NHS article: http://www.nhs.uk/conditions/heart-transplant/Pages/Introduction.aspx
Discussion article: http://www.mirror.co.uk/news/politics/theresa-says-maxs-law-give-11333329
Real article: https://www.medicalhealthtests.com/articles/622/general-articles/advantages-of-heart-transplant.html

Task 1:

You need to produce a 1-page essay discussing whether the transplant list should be opt in or opt out.

Essay section	Activity
Introduction	Write about transplants and the possible transplants that can be performed.
Describe	Describe the current policy behind the transplant list.
Explore	Explain the advantages and disadvantages of transplants- use the example of the heart. Describe alternative treatments to transplants that may also be beneficial.
Evaluate	Should the transplant list be opt in or opt out? Give both sides of the argument and then your opinion.

Task 2:
You need to produce a 1-page essay on transpiration and the factors that can affect the rate of transpiration.

News article: http://www.bbc.co.uk/news/science-environment-35082422
Discussion article: http://www.the-scientist.com/?articles.view/articleNo/48072/title/19th-Century-Experiments-Explained-How-Trees-Lift-Water/
Nuffield: http://www.nuffieldfoundation.org/practical-biology/transpiration-plants

Essay section	Activity
Introduction	Describe what transpiration is.
Describe	Describe the factors that can affect transpiration.
Explore	How you could measure the rate of transpiration in a plant?
Evaluate	How can humans impact on transpiration?

PiXL Independence – Level 4
Scientific Posters
GCSE Biology – Transport systems

INSTRUCTIONS

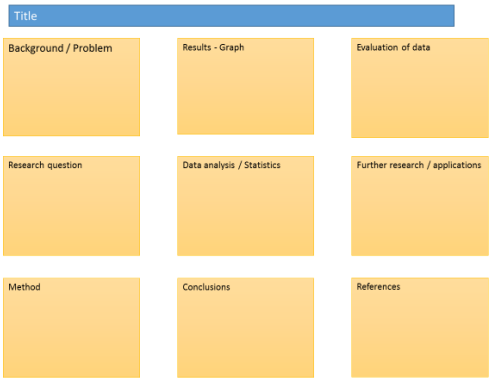
Scientific Posters

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 – https://www.wikihow.com/Make-a-Scientific-Poster
More detailed guidance is available at: https://guides.nyu.edu/posters

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 https://ugs.utexas.edu/our/poster/samples

Human Transport systems

Background
Even with specialised exchange surfaces, the size of larger organisms means that they must still have a system to transport substances between the exchange surface and the cells of the body. In humans and large animals, this is achieved through the circulatory system.

Source articles:
http://www.s-cool.co.uk/a-level/biology/transport/revise-it/the-heart
http://www.bbc.co.uk/schools/gcsebitesize/science/triple_aqa/transport_systems/blood_system/revision/4/
http://www.s-cool.co.uk/gcse/biology/heart-and-circulation/revise-it/the-blood
http://www.bbc.co.uk/schools/gcsebitesize/science/triple_aqa/transport_systems/blood_system/revision/3/

Use other sources as necessary.

Task:
Produce a scientific poster on the heart, blood vessels and components of blood.

Recall	The structure and function of the human heart.
Describe	Describe the structure and functions of the aorta, vena cava, pulmonary artery, pulmonary vein and coronary arteries.
Compare	Compare the different types of blood vessels within the circulatory system. Compare the functions of the different components of blood.
Evaluate	Evaluate the advantages and disadvantages of treating cardiovascular diseases by drugs, mechanical devices or transplant.

PiXL Independence – Level 5
Video summaries
GCSE Biology – Transport systems

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 crash course clips present two topics that link to your learning. The first video is where Hank describes the different methods of transport across the membranes. The second video concentrates on vascular plants. These plants have found tremendous success and their secret is also their defining trait: conductive tissues that can take food and water from one part of a plant to another. Though it sounds simple, the ability to move nutrients and water from one part of an organism to another was an evolutionary breakthrough for vascular plants, allowing them to grow exponentially larger, store food for lean times, and develop features that allowed them to spread farther and faster.

Source articles:

Video 1 – In da club- Membranes and transport
Crash course biology: https://www.youtube.com/watch?v=dPKvHrD1eS4

Video 2 – Vascular plants= winning!
Crash course biology: https://www.youtube.com/watch?v=h9oDTMXM7M8
Task:

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

1 Discuss why membranes do not allow some substances to pass freely across them and the different methods that can be used to overcome this problem.
2 Describe the strategies used by vascular plants to move materials around the plant and discuss the importance of this ability.

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:	

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

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