

Science KS4: Blended Learning Booklet

B5 Coordination and control

Name:

Form:


Aim to complete four lessons each week. Watch the videos and follow the four part lesson plan

All video clips are online using the ClassCharts link. Upload all work onto ClassCharts for feedback.

The online textbook has all the key information and vocabulary to help you with this unit

To log on to the online textbook:

- <https://connect.collins.co.uk/school/portal.aspx>
- Type in “stewards” and select Stewards Academy
- Login using your date of birth, initial of your surname and your academic year



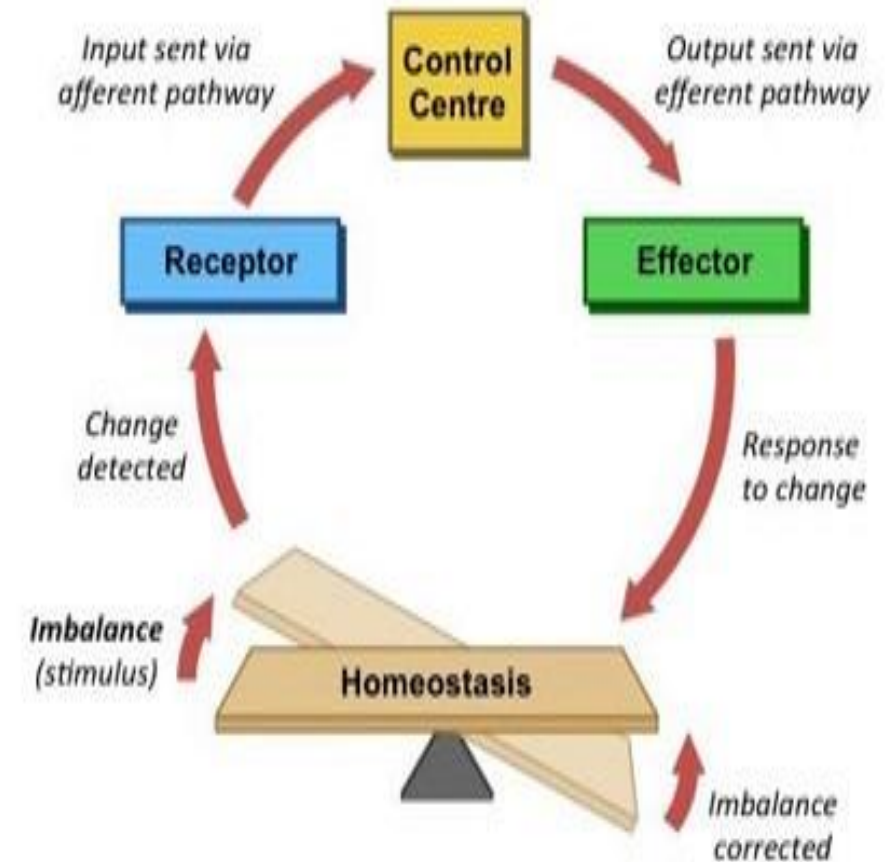
Student

School name: Stewards Academy - CM18 7NQ(CM18 7NQ) : [Not your school?](#)

Date of birth First letter of surname

Year group

Login



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Lesson – Revision

Knowledge organiser

SAL

(T) = Triple scientists only

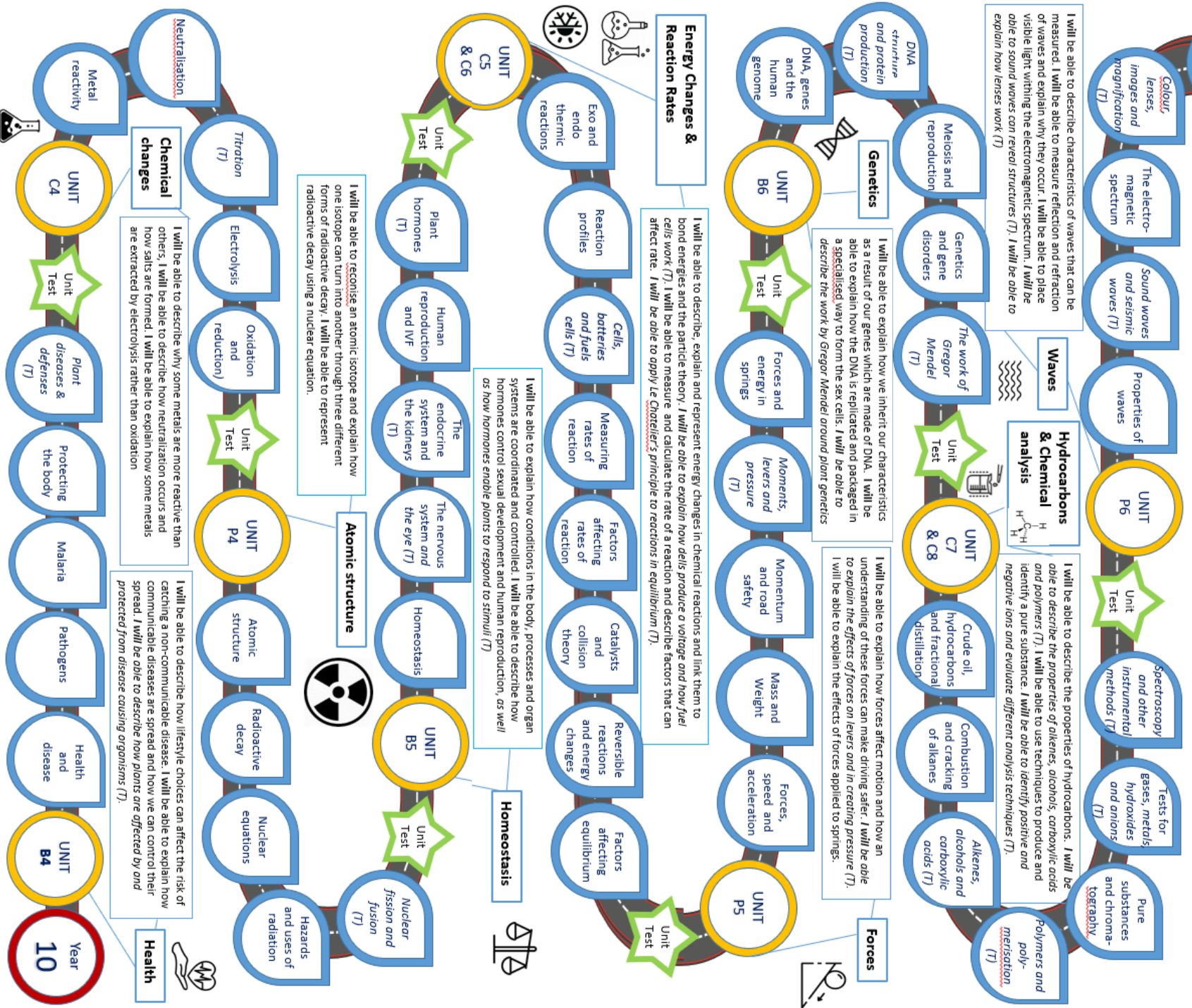


Big Picture – Year 10 Overview

Science



Unit Test
End of Year Exams
Next Year



ZOOM IN...

MY LEARNING JOURNEY:

Subject: Coordination & Control Year: 10 Unit: B5

AIMS

Students will learn about the structure of different neurones, explaining how they work within different reflex actions. They will learn about the endocrine system, how this is controlled, and the functions of the main hormones involved. The role of hormones in maintaining the balance of water, glucose and temperature in the body will be examined. Students will explain the process of negative feedback explaining how this helps to maintain balance. They will compare and contrast hormonal and nervous responses. In developing ideas about the role of hormones in the reproductive system, students will learn to evaluate the use of IVF to promote fertility and the use of contraceptives to control fertility.

DEVELOPING COURAGE

- C Our body continually monitors and adjusts many processes to keep us healthy
- O To understand how contraception works
- U Understand how the nervous and endocrine system work together
- R Learn how the different hormones work in combination
- A How our reflex action protects us from harm
- G Be mindful of the needs of people with diabetes and undergoing infertility treatment
- E Debating personal opinions on IVF

PREVIOUS LEARNING

Pupils will have some knowledge of how organs work together as organ systems. That metabolism involves chemical synthesis and breakdown of substances. They will have covered the basics of how humans reproduce. They will also know that life on earth is dependent on the life processes of plants.

WHAT WE KNOW/ REMEMBER

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-
-
-
-

UP NEXT

Genetics

- DNA & genes
- Human genome
- Proteins & mutations
- Meiosis and reproduction
- Genetic crosses
- Genetic diseases
- Gregor Mendel

CAREERS

- Doctor GP
- Personal Trainer
- IVF practitioner
- Caterer



PERSONAL OBJECTIVES

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RECOMMENDED READING

1. The Nervous System by Christine Taylor-But
2. The Underachieving Ovary by J T Lawrence,
3. The Simple Guide To Diabetes: A Helpful Companion To Understanding Diabetes And It's Complications by Barbara Trisler

Connection

Have a look at the topic overview and the B5 zoom in.

Populate what you know and your personal objectives.



Lesson 1: B5.1 - Homeostasis

Activation

LI: Explain the importance of homeostasis in regulating internal conditions in the body

<https://www.youtube.com/watch?v=XMsJ-3qRVJM>

1. Make a note of the title and the LI
2. Read pages 172-173
3. Make a list of the key words and define those you don't know
4. Copy flow diagram fig 5.3
5. Copy table on page 173



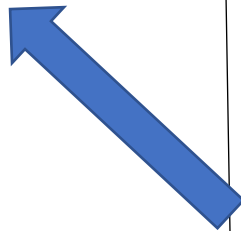
Consolidation

Complete and self assess the relevant past paper question for this topic -
From the B5 DIP file



Extension

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher



Demonstration

Attempt questions 1-6.

In 15 mins answer as many questions as you can.

Self mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Green questions to GCSE Level 3

Blue questions to GCSE Level 6

Purple questions to GCSE Level 9

Answers: B5.1 - Homeostasis

Connection

1 NA

2 NA

3 NA

Demonstration

1 it is the optimum temperature for enzyme action (and other cell functions). Organs such as the brain are sensitive to changes in temperature.

2 water; blood glucose concentration.

3 regulation of internal conditions within the body, to keep them as constant as possible.

4 nervous; endocrine.

5 receptors. Sometimes, these are grouped together in sense organs.

6

	Nervous system
Response	Rapid and precise
Nature of message	Nerve impulse – electrical
Action	Carried in nerves to specific location, e.g. muscle

	Endocrine system
Response	Slower but acts for longer
Nature of message	A hormone – chemical
Action	Carried in blood to all organs, but has an effect on the target organ only

1. Connection

Q1. Why is homeostasis important?

Q2. Compare the nervous and the endocrine system (Hint copy the table on page 173 if you don't have it already)

Q3. What detects changes in the environment?

4. Consolidation

Complete and self assess the relevant past paper question for this topic -
From the B5 DIP file

5. Extension

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Lesson 2: B5.2 – The Nervous System

2. Activation

LI: Describe the structure and function of the nervous system

<https://www.youtube.com/watch?v=n0Zc01e1Frw>

1. Read pages 174-175
2. Make a note of the title and the LI
3. Make a list of the key words and define those you don't know
4. Draw fig 5.4 to show the central and peripheral nervous system
5. Draw figure 5.6 to show the difference between sensory and motor neurons

3. Demonstration

Attempt questions 1, 3 + 4.

In 10 mins answer as many questions as you can.

Self mark the questions you have done making any necessary corrections in **blue pen**

Challenge yourself to answer as many as you can:

Green questions to GCSE Level 3

Blue questions to GCSE Level 6

Purple questions to GCSE Level 9

Answers: B5.2 - The Nervous System

Connection

1 maintain a constant internal environment

2 nervous system: fast/ short acting/ electrical/ carried by nerves

Endocrine system slow/ long acting/ chemical/ carried by blood

3 receptors

Demonstration

1 it enables us to detect our surroundings, and respond to stimuli, and coordinate our bodies and behaviour.

2 central nervous system; peripheral nervous system/nerves.

3 neurone.

4 (stimulus) → receptor → sensory neuron → coordinator → motor neuron → effector → (response)

Lesson 3: B5.3 – Reflex actions

Connection

Q1. Name the 2 parts of the nervous system

Q2. Describe the pathway from stimulus to response

Q3. How is a sensory neuron different to a motor neuron?

Activation

LI: Explain how a reflex arc works and why it is important

<https://www.youtube.com/watch?v=Nn2RHLWST-k>

1. Make a note of the title and the LI
2. Read pages 176-177
3. Make a list of key words and define those you don't know
4. Make a list of 4x examples of reflex actions (bullet points green section)
5. Draw fig 5.8 (page 176)
6. Draw fig 5.9 (page 177)

Consolidation

Complete and self assess the relevant past paper question for this topic -
From the B5 DIP file

Extension

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Demonstration

Attempt questions 1-6.

In 10 mins answer as many questions as you can.

Self mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Green questions to GCSE Level 3

Blue questions to GCSE Level 6

Purple questions to GCSE Level 9

Answers: B5.3 - Reflex actions

Connection

1 central nervous system,
peripheral nervous system
2 stimulus>receptor>
coordinator>effector>response
3 sensory neuron takes
information to a coordination
centre and has the cell body
on the side. Motor neuron
takes information from the
coordination centre to the
effector and has the cell body
at one end.

Demonstration

1 a rapid, automatic response to a stimulus spinal reflexes that do not rely on the brain to produce the action.

2 they prevent us from getting hurt.

3 reflex arc.

4

- the receptor detects the stimulus;
- the sensory neurone carries the impulse to the central nervous system (spinal cord);
- the short relay neurone, in the CNS, connects the sensory and the motor neurone;
- the long motor neurone connects the CNS with a muscle and brings about the response;
- the communication of neurones through synapses and not physical connections enables the neurones to connect with other nerves, so the brain, for instance, is aware of what happened to cause the reflex action.

5 synapse.

6 chemical transmitter (neurotransmitter) molecules.

7 Flow diagram to include:

1. Stimulus 2. receptor 3. sensory neuron 4. relay neuron 5. motor neuron 6. effector 7. response

Lesson 4: B5.4 – The brain (Triple)

Connection

Q1. What are the key features of a reflex arc?

Q2. Why is a reflex arc important?

Q3. List 7 key words to describe a reflex arc?

Activation

LI: Explain how the brain controls behaviour and identify different parts of the brain

<https://www.youtube.com/watch?v=jvIr7b0roYI>

1. Make a note of the title and the LI
2. Read pages 178-179
3. Make a list of key words and define those you don't know
4. Draw fig 5.10



Consolidation

Complete and self assess the relevant past paper question for this topic -
From the B5 DIP file



Extension

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Demonstration

Attempt questions 1-7.

In 10 mins answer as many questions as you can.

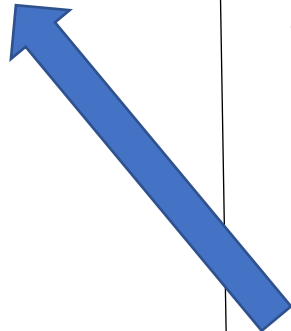
Self mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Green questions to GCSE Level 3

Blue questions to GCSE Level 6

Purple questions to GCSE Level 9



Answers: B5.4 – The brain (Triple)

Connection

1 rapid, automatic without conscious thought

2 for protection

3

- Stimulus
- Receptor
- Sensory neurone
- Relay neurone
- Motor neurone
- Effector
- Response

Demonstration

1 cerebral cortex.

2 cerebral cortex – concerned with consciousness, intelligence, memory and language.

cerebellum – coordination of muscular activity.

medulla – unconscious actions such as the heart rate and breathing

3 observing the effect of damage to certain areas of the brain; electrically stimulating regions of an exposed brain (for instance, before or during an operation).

4 (MRI scanners) produce very detailed images of the brain (and other regions of the human body); they're often used in preference to other techniques as they're non-invasive and don't use ionising radiation. *Functional MRI (fMRI) is used to measure brain activity (by detecting changes associated with blood flow) and not just brain structure.*

5 removing a tumour; draining excess fluid; adding an implant to modify brain function, e.g. to help to control Parkinson's disease.

6 student answer should include ideas about: sometimes treatment is not possible, e.g. if the nervous system is damaged, or it might cause further damage, owing to the delicate nature of nervous tissue and complex arrangement of neurones;

surgery may be necessary in the case of a tumour to save/prolong life;

implants can help brain function; but risks brain damage; destruction of tumours or cancer cells by radio- or chemotherapy can, again, save or prolong life, but these techniques damage normal cells also; modern techniques such as monoclonal antibodies and gene therapy offer hope in the treatment of cancer/tumour treatment, while stem cell therapies offer help in repairing damaged nervous systems.

7 Investigations and treatment of the brain is very risky due to the intricate nature of the brain tissue and risk of infection or stroke

Connection: B5.5 – Required Practical: Investigating reaction time

Connection – questions (Triple only)

Q1. List the 3 main regions of the brain

Q2. Describe the function of these regions

Q3. What is the link between the hypothalamus and the pituitary gland?

Connection: B5.5 – Required Practical: Investigating reaction time

Connection – answers Triple only

A1 cerebral cortex, cerebellum, medulla

A2

Cerebral cortex – consciousness thought, intelligence, memory, language

Cerebellum – muscle coordination

Medulla – unconscious activities, heartbeat, breathing

A3

The hypothalamus and the pituitary gland are where the nervous system and the endocrine system are linked/coordinated

Lesson 5: B5.5 – Required Practical: Investigating reaction time

Connection

Q1. What are the key features of a reflex arc?

Q2. Why is a reflex arc important?

Q3. List 7 key words to describe a reflex arc?

Activation

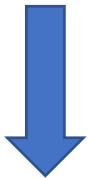
LI: Carry out an experiment to investigate reaction time

1. <https://www.youtube.com/watch?v=Ws5qVXYHRnQ&list=PLAd0MSIZBSsHv1pioWRdg-pZCWTo84cdP&index=10>
2. Make a note of the title and the LI
3. Read pages 180-181
4. Make a list of key words define those you don't know
5. Carry out the practical and record your results.



Consolidation

Complete and self assess the relevant past paper question for this topic -
From the B5 DIP file



Extension

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Demonstration

Attempt questions 1-8

In 15 mins answer as many questions as you can.

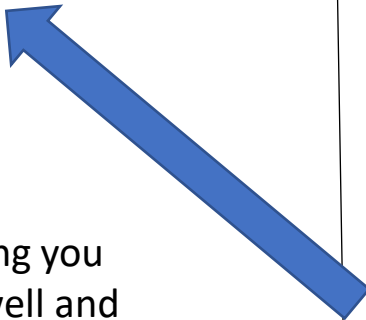
Self mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Green questions to GCSE Level 3

Blue questions to GCSE Level 6

Purple questions to GCSE Level 9



Answers: B5.5 - Required Practical: Investigating reaction time

Connection

1 rapid, automatic without conscious thought

2 for protection

3

- Stimulus
- Receptor
- Sensory neurone
- Relay neurone
- Motor neurone
- Effector
- Response

Calculations:

Before drinking coffee:

$$t = \sqrt{\frac{2d}{a}} = \sqrt{\frac{2 \times 116}{9.81}} = \sqrt{\frac{232}{9.81}} = \sqrt{23.6} = 4 \text{ s}$$

Ignoring the anomalous result:

$$t = \sqrt{\frac{2d}{a}} = \sqrt{\frac{2 \times 112}{9.81}} = \sqrt{\frac{224}{9.81}} = \sqrt{22.8} = 4 \text{ s}$$

After drinking coffee:

$$t = \sqrt{\frac{2d}{a}} = \sqrt{\frac{2 \times 93}{9.81}} = \sqrt{\frac{186}{9.81}} = \sqrt{19} = 4.36 \text{ s}$$

Demonstration

1 A model Risk assessment proforma could include the following:

- Name of hazard, e.g. chemical, material, biological material or activity
- Type of hazard; risks associated with hazard;
- Steps taken to minimise risks; (optional) emergency procedure

The hazards listed in the Risk Assessment could include the following:

- Handling/carrying/catching metre rulers.
- Caffeine. The caffeine is likely to be in coffee, so care must be taken with hot drinks. The hazard for caffeine is indicated with a warning label.
- It should not be drunk in a laboratory where there is risk of contamination with chemicals or microorganisms.
- Caffeine may have adverse effects on some students and intake must be limited for all students.



2 Test 5 for Experiment 1.

3 before drinking coffee: 116 mm; 112 mm with the anomalous result removed after drinking coffee: 93 mm.

4 before drinking coffee: 4.86 s/ 4.77 s ignoring the anomalous result. After drinking coffee: 0.26 s

5 If taking in caffeine through a drink of coffee, the intake of caffeine needs to be standardised, i.e. the caffeine must be of the same concentration and the volume drunk must be the same for each student. A further improved way of administering the caffeine would be for a set mass (e.g. 1-3 mg) per kilogram of student body mass. If the caffeine intake were not standardised, the results obtained from different students could not be compared.

6 student histogram. Note that bars should not be separated, and the bars are not all the same width.

7 Median – occurs most often: 301-325 Modal – mid range of ranked data): 301-325

8 the student will have no indication of when the computer screen might change, e.g. change colour, whereas the student may be able to tell when his/her partner is about to drop the ruler; The measurement of time is more accurate; The resolution of the computer timer is higher.

Lesson 6: B5.6 – The eye (Triple)

Connection

Q1. What happens to your reaction time with practise?

Q2. How do stimulants such as caffeine affect your reaction time?

Q3. Why is a computer better than a ruler for measuring reaction time?



Activation

LI: Relate the structure of the eye to its function and Explain how we see in colour

<https://www.youtube.com/watch?v=9SGAicn9rXY>

1. Make a note of the title and the LI
2. Read pages 182-183
3. Make a list of the key words define those you don't know
4. Draw figure 5.15 and 5.7



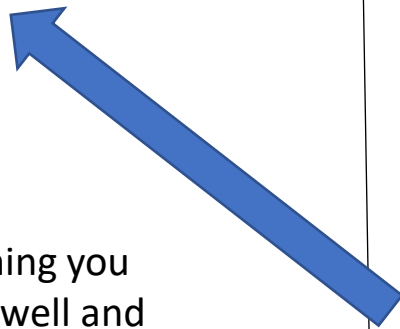
Consolidation

Complete and self assess the relevant past paper question for this topic -
From the B5 DIP file



Extension

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher



Demonstration

Attempt questions 1-6

In 10 mins answer as many questions as you can.

Self mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Green questions to GCSE Level 3

Blue questions to GCSE Level 6

Purple questions to GCSE Level 9

Answers: B5.6 – The eye (Triple)

Connection

- 1 reaction time decreases
- 2 stimulants reduce your reaction time
- 3 The measurement of time is more accurate as the resolution of time by the computer is greater (fractions of a second)

Demonstration

- 1 retina.
- 2 iris – regulates the amount of light entering the eye.
ciliary muscles and suspensory ligaments – control the size of the pupil and therefore regulate the amount of light reaching the retina.
optic nerve – carries impulses from the retina to the brain.
- 3 cones.
- 4 each cone connects with a neurone; there is a high concentration on the visual axis of the eye.
- 5 (in low light intensities,) radial muscles in the iris contract, and the pupil becomes larger.
- 6 rods are very sensitive to low light intensity (1000 times more sensitive than cones).

Lesson 7 B5.7 – Seeing in focus (Triple)

Connection

Q1. List the 9x key parts of the eye

Q2. Why can we see in colour and in fine detail?

Q3. What happens to the pupil in dim light? Why?

Activation

LI: Relates the structure of the eye to its function and to viewing near and distant objects

<https://www.youtube.com/watch?v=-BqvOucCTYg>

1. Make a note of the title and the LI
2. Read pages 183-184
3. Make a list of keywords – define those you don't know
4. Draw and label fig 5.18, 5.19 and 5,20



Consolidation

Complete and self assess the relevant past paper question for this topic -
From the B5 DIP file



Extension

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Demonstration

Attempt questions 1-6

In 10 mins answer as many questions as you can.

Self mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Green questions to GCSE Level 3

Blue questions to GCSE Level 6

Purple questions to GCSE Level 9



Answers: B5.7 – Seeing in focus (Triple)

Connection

- 1 cornea, iris, lens, pupil, suspensory ligaments, ciliary muscle, retina, sclera, optic nerve
- 2 pupil dilates, radial muscles contract and pupil becomes larger to let in more light
- 3 Cone cells enable us to see in colour and are attached to individual neurons which means we can see in fine detail/acute vision

Demonstration

- 1 the bending of light rays as they travel from one medium to another.
- 2 the cornea and the lens.

Note that the fluid and gel that fill the chambers –the aqueous humour and the vitreous humour –also refract light, but the question refers to *structures*.
- 3 distant object – the light rays are almost parallel near object – the light rays are diverging.
- 4 the lens is thicker/becomes fatter.
- 5 accommodation.
- 6 Table to include:
Focusing on nearby object:
Light rays diverge
Thick lens refracts light rays strongly
Light rays brought into focus on the retina.
Focusing on distant object:
Light rays are nearly parallel
Thin lens so only slight refraction of light rays needed
Light rays brought into focus on the retina.

Lesson 8: B5.8 – Eye defects (Triple)

Connection

Q1. Where is the light focused to within the eye?

Q2. What shape is the lens to view a distant object? Why?

Q3. How does the eye accommodate to view a close object?

Activation

LI: Explain myopia and hyperopia and the techniques that can be used to correct them

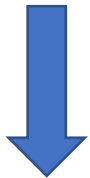
<https://www.youtube.com/watch?v=1l8fPLgalZk>

1. Make a note of the title and the LI
2. Read pages 186-187
3. Make a list of keywords – define those you don't know
4. Give 2 reasons for short-sightedness and draw/label fig 5.21
5. Give 2 reasons for long-sightedness and draw/label fig 5.23



Consolidation

Complete and self assess the relevant past paper question for this topic -
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Extension

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Demonstration

Attempt questions 1-7

In 10 mins answer as many questions as you can.

Self mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Green questions to GCSE Level 3

Blue questions to GCSE Level 6

Purple questions to GCSE Level 9



Answers: B5.8 – Eye defects (Triple)

Connection

- 1** allows for specialised function
- 2** acrosome (enzymes), nucleus (genetic information), mitochondria (energy), tail (movement)
- 3** cells > tissues > organs > organ system > organism

Demonstration

- 1** the lens is too long; eyeball is too long for the strength of the lens; the cornea is too steeply curved.
- 2** (a concave lens) causes the light rays to diverge before they reach/enter the eye.
- 3** the lens is too weak; the eyeball is too short; the cornea is not sufficiently curved.
- 4** (a convex lens) causes the light rays to converge before they reach/enter the eye.
- 5** hard lenses are more rigid and durable; soft lenses are made from a gel and therefore softer and more comfortable. They are freely permeable to gases (though note that modern hard lenses are also gas permeable).
- 6** a laser is used to change the shape of the cornea.
- 7** Advantage: If successful, sight corrected and no need for contact lenses or glasses again.
Disadvantage: Risk of surgery not being successful, risks associated with surgery such as infection or eye damage, cost.

Lesson 9: B5.9 – Controlling body temperature (Triple)

Connection

- Q1. Define myopia and give a cause
- Q2. Define hyperopia and give a cause
- Q3. explain how a lens can correct short-sightedness

Activation

LI: Explain how the body is able to maintain a constant temperature

<https://www.youtube.com/watch?v=IGsQi0JZUTw>

1. Make a note of the title and the LI
2. Read pages 188-189
3. Make a list of keywords – define those you don't know
4. Explain how the thermoregulatory centre in the brain detects change (green)
5. Explain how the body responds to hot conditions (green) and cold conditions (blue)



Consolidation

Complete and self assess the relevant past paper question for this topic -
From the B5 DIP file



Extension

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Demonstration

Attempt questions 1-

In 10 mins answer as many questions as you can.

Self mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Green questions to GCSE Level 3

Blue questions to GCSE Level 6

Purple questions to GCSE Level 9



Answers: B5.9 – Controlling body temperature (Triple)

Connection

1 myopia – short sighted: caused when the eyeball is too long or the cornea is too curved

2 hyperopia – long sighted: caused when the eyeball is too short, the cornea is not curved enough or the lens is weak/not thick enough

3 Short sightedness is corrected using a concave lens which causes the light rays to diverge before entering the eye so that the cornea and the lens then focus them on the retina rather than short of the retina.

Demonstration

1 the thermoregulatory centre in the brain.

2 blood vessels in the skin become wider (vasodilation); sweating increases.

3 when blood vessels in the skin become narrower, so that less blood flows through the skin, and less heat is lost through it.

4 shivering/(involuntary) contraction of skeletal muscles.

5 heat transfer is increased through the skin, by the (increased) evaporation of sweat and vasodilation.

6 blood flow through her skin will be reduced, so less heat energy is transferred from her body to the environment (so her skin will turn blue); she will shiver, so that heat released by respiration of her muscles will help to warm her body. Any sweating will also stop.

Connection: B5.10 – The endocrine system

Connection – questions (Triple only)

Q1. How is a change in temperature detected by the body?

Q2. 3 responses to getting too hot

Q3. 4 responses to getting too cold