

Delegate Booklet
Course Title: Getting ready to teach
International GCSE Biology 2019
4BI1/19IF01

About this event

Course Title: Getting ready to teach International GCSE Biology 2019
Course Code: 4BI1/19IF01

Aims and Objectives of the event

1. Recognise the structure, content and assessment of the qualification
2. Identify possible teaching and delivery strategies for the qualification
3. Recognise the support Pearson offers for the qualification
4. Gain insight into the general differences between the Pearson Edexcel and other specifications
5. Gain an insight into typical student mistakes and misconceptions in the exam

Agenda

Time	Item
9.30	Welcome Tea & Coffee
10.00	Agenda & Introductions
10.15	International GCSE Features / Introduction to the new Edexcel International GCSE in Biology
11.00	Changes in content and assessment
11.30	Data analysis student responses
12.00	New style questions student responses
13.00	Lunch
13.45	Practical requirements experiment design and student responses
14.30	Mathematical skills and student responses
15.15	Tea
15.30	Lessons from the examinations
16.00	Final questions

Activity 1

- Consider how the reformed papers were different from those from the previous specification.
 - Write down four observations from your centre or from your students.
-

-
- Compare your observations with other delegates on your table.
-



Pearson

Activity 2

- Look at the samples of Question 8a(ii) paper 1B
- Before looking at the Mark scheme
- Place the responses in rank order
- Compare your order with other delegates on your table
- Now use Mark scheme to mark each response
- Compare this order with your original ranking
- Compare your order with other delegates on your table

Sample 1

(ii) Explain the change in breathing rate during exercise.

(3)

Breathing rate increases because blood is flowing quicker to the muscles and there needs to be enough oxygen for the muscles to respire aerobically rather than anaerobically which produces lactic acid. Therefore more oxygen is required through diffusion from the alveoli ~~to form oxyhaemoglobin~~ to form oxyhaemoglobin. ~~The more~~ This is all because exercise causes contractions in the muscles which require them to respire more often.



Pearson

Sample 2

(ii) Explain the change in breathing rate during exercise.

(3)

As somebody exercises their breathing rate increases because the muscles need more oxygen so they can respire. ~~The added energy the muscles require means they need to respire more and hence the breathing rates rose to 25 breaths per minute for person P in the experiment. At 20 minutes the breathing rate did not immediately fall back down as they needed to repay their oxygen debt but eventually it fell to 12 breaths per minute for person P.~~

Sample 3

(ii) Explain the change in breathing rate during exercise.

(3)

At the start both people have a steady breathing rate. As they exercise they need to breathe in more oxygen to create energy. Once they stop exercising their breathing returns to normal.



Pearson

Sample 4

(ii) Explain the change in breathing rate during exercise.

(3)

Breathing rate increases ~~becs~~ during exercise because muscles respire more, so they produce more CO_2 , which needs to be removed, and they need more oxygen, so the person breaths in more to circulate more oxygen around the body.



Pearson

Activity 3

- Look at the samples of Paper 1 Question 2 c (ii) Discuss
- Before looking at the Mark scheme
- Place the responses in rank order
- Compare your order with other delegates on your table
- Now use Mark scheme to mark each response
- Compare this order with your original ranking
- Compare your order with other delegates on your table

Sample 1

- (ii) The student concludes that his results show that genetically modified (GM) salmon are useful in providing a balanced diet.

Discuss the student's conclusion.

(6)

the genetically modified Salmon is longer ~~the~~ and weighs more than the regular Salmon and therefore will contain more protein. A person that eats the Salmon will receive higher levels of protein in their diet. The GM Salmon would be helpful for providing more protein but not for providing a balanced diet as the human body ~~is~~ also needs other foods such as carbohydrates and vitamins A, C and D. The person's diet would only be balanced if they ate the Salmon along with other foods such as bread, eggs, fruit and vegetables. The GM Salmon would provide higher levels of protein but not necessarily help a person eating it maintain a balanced diet.



Sample 2

- (ii) The student concludes that his results show that genetically modified (GM) salmon are useful in providing a balanced diet.

Discuss the student's conclusion.

(6)

GM salmon are useful for increasing the amount of protein ingested by humans, which is one component of a balanced diet. GM salmon ~~are~~ have a larger mass, so will have more protein in them. However, a balanced diet needs other molecules such as lipids and carbohydrates. Therefore, this conclusion cannot be made without testing the salmon for other such food molecules. Also, the ~~an~~ investigation was not repeated, and so his results are unreliable. ~~and~~ The investigation needs to be carried out for a large group of salmon to prove that these results are not anomalous. Also, other conditions need to be controlled such as temperature and water quality, so that the growth of both salmon is not affected by different conditions. ~~the~~ Therefore, this conclusion is invalid until other food molecules are tested for, and until the reliability of the investigation is improved.



Pearson

Sample 3

- (ii) The student concludes that his results show that genetically modified (GM) salmon are useful in providing a balanced diet.

Discuss the student's conclusion.

(6)

Genetically modified fish are useful in providing a balanced diet because you are able to give more people the 50g of protein they need per day from just one fish. This is shown in the table where the mass of the fish is ~~at~~ over double that of the normal salmon. This shows that there is more protein contained in a single fish. However GM fish are obviously not natural unlike the normal salmon. Therefore it is probably better for you to have normal fish to obtain the best diet. Despite this, you can still have a balanced diet from a GM fish ~~and~~ therefore making it useful.



Pearson

Sample 4

- (ii) The student concludes that his results show that genetically modified (GM) salmon are useful in providing a balanced diet.

Discuss the student's conclusion.

(6)

The Genetically modified salmon is larger, and so will hold protein. The benefits of this being that ~~there~~ one salmon can now serve more people their recommended daily allowance. This means it's cheaper for families to buy and also easier to cook. However if someone is not told, they may eat the whole salmon, which could mean consuming a lot more than the ~~new~~ recommended daily allowance. It could also ~~be~~ mean that once the salmon was cooked it would have to be eaten, unless cold, resulting again in people having more than their recommended allowance



Pearson

Activity 4

- Look at the samples of Paper 1 Question 6 b(ii)
- Before looking at the Mark scheme
- Place the responses in rank order
- Compare your order with other delegates on your table
- Now use Mark scheme to mark each response
- Compare this order with your original ranking
- Compare your order with other delegates on your table

Sample 1

(ii) The scientist concludes that cigarette smoking could make male humans infertile.

Discuss this conclusion.

(5)

From this experiment we see that a large number of sperm cells are damaged by nicotine however, there is still a large number left which means there could still be a possibility for fertilisation to take place. Also, nicotine could affect humans differently to how it affects rats. However, there is an increase in possibility for the male humans to be infertile and it would be more difficult for fertilisation to actually take place.



Pearson

Sample 2



Pearson

(ii) The scientist concludes that cigarette smoking could make male humans infertile.

Discuss this conclusion.

(5)

It could make male humans infertile because the ^{percentage} ~~number~~ of damaged ~~cells~~ sperm cells increased from 6.4% to 24.8% with just 1mg of nicotine per kg of blood.* In this way there are fewer healthy sperm for fertilisation. However, the experiment was carried out on rats rather than humans so the results could be ~~in~~ inaccurate and different for men. The scientist did not repeat his conclusion so his results may not be reliable. He also carried out experiment with a very small range. His results did not indicate that the ~~male~~ rat became completely infertile as the ~~results~~ percentage of undamaged sperm is still 75.2% even with 1mg of ~~nicotine~~ nicotine per kg. Therefore there are still healthy sperm to fertilise egg cell. The scientist used different rats which might ~~have~~ ^{due to health/age} have a different ^{original} ~~natural~~ percentage of damaged sperm. He did not state ^{Total for Question 6 = 12 marks} that any variables were controlled, making experiment less valid.

* He also used a control making the ~~test~~ results more valid.

Sample 3



Pearson

(ii) The scientist concludes that cigarette smoking could make male humans infertile.

Discuss this conclusion.

(5)

From this experiment, it is easy to deduce that as the ~~percentage~~ concentration of nicotine in mg per kg increases so ~~the~~ does the percentage of damaged sperm cells. Therefore, I agree with the scientist's statement.

In cigarettes there are high amounts of nicotine that can enter your blood stream, therefore with more cigarette smoking the chances of increasing the concentration of nicotine ~~also~~ also increases. Damaged sperm cells will not be able to fertilise the egg cell therefore if the percentage of your sperm cells that are damaged increases you are more likely to be infertile.

Sample 4



Pearson

(ii) The scientist concludes that cigarette smoking could make male humans infertile.

Discuss this conclusion.

(5)

This is an appropriate conclusion as the relation between ^{what can be absorbed from smoking} nicotine and a higher percentage of sperm cells is clearly portrayed by these rats. If humans receive higher damage sperm cell counts they are more likely to not be able to carry genetic information from the male to the female gamete of the egg. This will result in humans becoming infertile as their semen will not contain enough normal sperm cells to be able to fertilise the egg correctly making humans infertile. However, this correlation may also be incorrect as it is only expressed on ~~rat~~ ^{nicotine} rats and the absorption of nicotine for humans might have a different effect on humans. Furthermore, the fact that humans are smoking to absorb nicotine may too change the results in themselves. This makes a few more experiments being necessary to ensure this conclusion is accurate. The scientist may need to repeat the experiments to ensure reliability as well.

(Total for Question 6 = 12 marks)

Activity 5



Pearson

- Look at the samples of Paper 1 Question 10 c
- Before looking at the Mark scheme
- Place the responses in rank order
- Compare your order with other delegates on your table
- Now use Mark scheme to mark each response
- Compare this order with your original ranking
- Compare your order with other delegates on your table

Sample 1

(c) Plant growth substances stimulate root growth from a cut stem.

Describe an investigation to find the best concentration of plant growth substance to stimulate root growth.

You should include experimental details in your answer and write in full sentences. (6)

1) Get 30 plants from plants of the same cut stems of the same type of plant and of the same length.

2) Plant the 10 of the 30 stems at various concentrations all 30 stems to be in the same area. There should be 10 different concentrations, varying from ~~low~~ low to high, and for each 3 stems should be planted for each different concentration (so there are 3 stems planted at each concentration of plant growth substance). This is to find an average and discover anomalies.

3) Leave the 30 stems for a certain length of time (e.g. 1 month). The stems must all be planted for the exact same length of time.

4) Keep the same type of stem the plant is from, the length of the stem, the area of plantation, the soil pH, the soil type, the soil moisture, the volume of sunlight the stems receive the SAME.

5) After the month, compare the results and decide which conc. of growth substance has worked best (the largest roots will have the best conc.)

(Total for Question 10 = 11 marks)

Sample 2



Pearson

IV - conc DV - RG (Output) - stem
(c) Plant growth substances stimulate root growth from a cut stem.

Describe an investigation to find the best concentration of plant growth substance to stimulate root growth.

You should include experimental details in your answer and write in full sentences.

Can ✓
Or ✓
R ✓
M ✓
S ✓

(6)

In order to carry this experiment out the independent variable is the concentration of plant growth substance (P.G.S). A control should also be done without any (P.G.S). The organism should all be the same size stem cut from from the same original stem to ensure ^{its} genetically identical. The values of P.G.S should be 0.25, 0.5 and 1.0 cm³. The chemical should be inserted into soil where the cut stem is placed. The stem should receive water at regular intervals, all of the experiments should be kept the same. After a week the plants should be dug up and the roots should be measured. The experiment should maintain that abiotic variables are kept identical throughout the experiment. Finally the ~~test~~ ^{experiment} should be repeated at least three times and an average should be taken. This will validate results.

(Total for Question 10 = 11 marks)

Sample 3



Pearson

(c) Plant growth substances stimulate root growth from a cut stem.

Describe an investigation to find the best concentration of plant growth substance to stimulate root growth. ^{diff. species}

You should include experimental details in your answer and write in full sentences.

(6)

Take ten identical plants of the same age and species and place them in the same amount of soil and ensure they all receive equal amount of light, ^{water} and carbon dioxide (for photosynthesis) and are kept at the same temperature. Cut a length of 3cm of the stem and dip each ^{cut} stem in a different concentration of plant growth substance solution (from 0% to 100% concentration in 10% increments). Plant each stem which has been put in the growth substances back into the soil which contains all the nutrients needed for plant growth (and the same level of all in each pot). Record the ~~gross~~ ^{length} length of roots grown at the first ^{three} days, then record again every five days after that but for the next month - ensure all conditions are kept identical for the entire duration of the experiment. The best concentration of plant growth substance will ^{mean the} produce the longest roots. Repeat the experiment using different plant species to ensure the trend is the same. For each experiment have a control or ^a plant grown without growth substances - record this plant's root growth as well along with all the other plants.

(Total for Question 10 = 11 marks)

Sample 4



Pearson

(c) Plant growth substances stimulate root growth from a cut stem.

Describe an investigation to find the best concentration of plant growth substance to stimulate root growth.

You should include experimental details in your answer and write in full sentences.

(6)

~~Measure~~ ^{measure} the ~~plant growth~~ using
the ~~different~~ substance by adding the substance to
the ~~plants~~ ~~that~~ The ~~same~~ Take Get the ^{multiple} ~~same~~
copies at the ~~same~~ Copies of the same plant with
the same size. Add the different ^{concentrations of growth} ~~growth~~ substances to
each of them. ~~Make~~ Make sure that the plants receive
the same amount ^{of water,} ^{oxygen} of light, ~~oxygen~~ and temperature ~~at the same~~
at so respiration and photosynthesis can be the same ^{with} ~~for~~ ^{plants}
all the plants. Set ~~wait~~ and set a time for the plants to
grow and ^{wait} ~~wait~~. Write results down and repeat the
experiment. The plant that has grown the ^{the most has} ~~most~~ ^{the} ~~most~~
best concentration of plant growth substance added to them.

Activity 6



Pearson

CORMS items unfamiliar context

Activity 6

- Look at 1BR Paper 1 Question 11

11 The diagram shows an insect called a wasp.

Wasps kill their prey by injecting a poison called venom through a small tube called a stinger.

Some scientists believe that the smell of venom attracts other wasps.

Design an investigation to find out if the smell of venom attracts other wasps.

Include experimental details in your answer and write in full sentences.



(6)

- How is this different to 1B question 10 c?
- What additional skills do students need to answer this item?

Activity 7

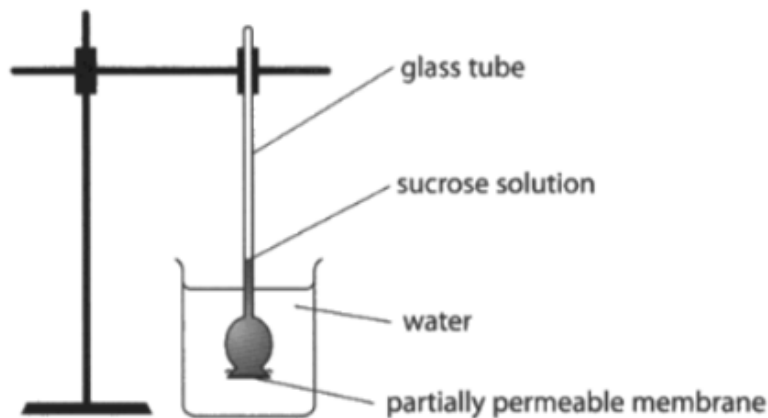


Pearson

- Look at the samples of Paper 1 Question 4a
- Before looking at the Mark scheme
- Place the responses in rank order
- Compare your order with other delegates on your table
- Now use Mark scheme to mark each response
- Compare this order with your original ranking
- Compare your order with other delegates on your table

Sample 1

4 This apparatus can be used to show osmosis.



(a) Explain what happens to the level of the sucrose solution in the glass tube.

(3)

~~The level will decrease as the sucrose enters~~
~~the water via osmosis across the partially permeable membrane.~~ The
level will rise as water enters the solution to make it more
dilute. The water is moving from an area of high
concentration of water to an area of low concentration
across a ~~partially permeable~~ membrane down a concentration
gradient.

Sample 2

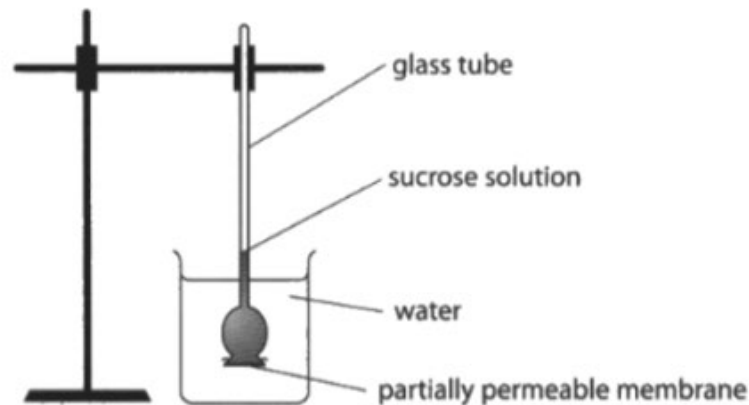


Pearson



Add a pre-defined annotation

4 This apparatus can be used to show osmosis.



(a) Explain what happens to the level of the sucrose solution in the glass tube.

(3)

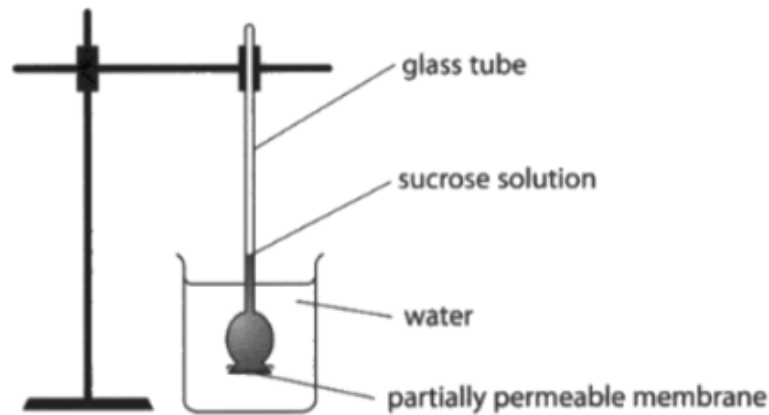
The level of the sucrose solution will rise, despite becoming more dilute. This is because the sucrose solution has a lower water potential than the water around, meaning that the water molecules, in the water around, will ~~move~~ move from an area of high water potential to low water potential, down the water potential gradient, across the partially permeable membrane.

Sample 3



Pearson

4 This apparatus can be used to show osmosis.



(a) Explain what happens to the level of the sucrose solution in the glass tube.

(3)

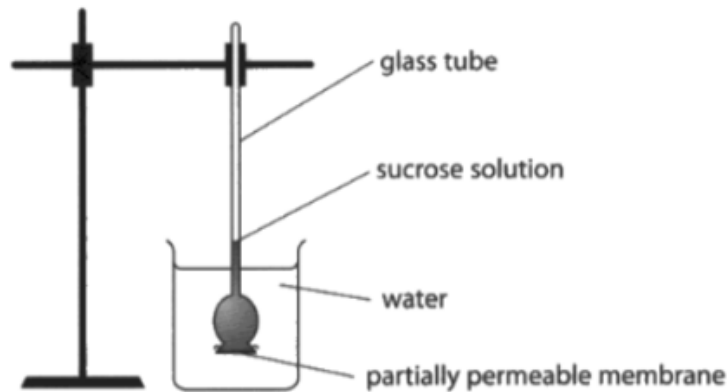
The level of sucrose solution would increase because the sucrose solution has a lower water potential than the surrounding ~~more~~ water and so water would move into the sucrose solution by osmosis, across the partially permeable membrane.

Sample 4



Pearson

4 This apparatus can be used to show osmosis.



(a) Explain what happens to the level of the sucrose solution in the glass tube.

(3)

The level of sucrose solution would increase because the sucrose solution has a lower water potential than the surrounding ~~membrane~~ water and so water would move into the sucrose solution by osmosis, across the partially permeable membrane.

Activity 8



Pearson

- Look at the samples of Paper 1 Question 4b
- Before looking at the Mark scheme
- Place the responses in rank order
- Compare your order with other delegates on your table
- Now use Mark scheme to mark each response
- Compare this order with your original ranking
- Compare your order with other delegates on your table

Sample 1

Two water and solution would be mixed.
(b) Describe how this apparatus could be modified to measure the rate of osmosis at different temperatures. (3)

the beaker could all have the same amount of water but at different temps. so you'd add a thermometer. and place the beakers in a bath warm water baths all set to different temperatures then time how long for the water to become the colour of the solution ~~there's~~ at or there's no solution left in the glass ~~glass~~ tube. then osmosis would have occurred

(Total for Question 4 = 6 marks)

Sample 2



Pearson

(b) Describe how this apparatus could be modified to measure the rate of osmosis at different temperatures.

(3)

Use a water bath to heat the water at different temperatures (Water temperature is independent variable), then at different water temperatures measure how long it takes (using a stopwatch) for the sucrose solution to rise to a desired point (use a ruler to measure the change in height), then repeat at different temperatures and make sure to keep same concentration and volume of sucrose solution in the tube.

(Total for Question 4 = 6 marks)

Sample 3

Solution.

(b) Describe how this apparatus could be modified to measure the rate of osmosis at different temperatures.

(3)

You could use a ~~measuring~~ glass tube with a scale scale is easier to see the level ^{of sucrose solution} ~~water~~ at different temperatures. You could use a measuring beaker as you can easily record the level of water. You should use a bunsen burner to heat the water and have a thermometer to look to see whether you have got the exact temperatures you need.

(Total for Question 4 = 6 marks)

Activity 9



Pearson

- Look at the samples of Paper 1 Question 5 b (iii)
- Which maths skills is this item testing?
- Use Mark scheme to mark each response
- Compare your order with other delegates on your table

Sample 1

(iii) The student measures the distance moved by the coloured liquid and converts this to volume of oxygen absorbed.

The volume of oxygen absorbed can be calculated using the formula

$$\text{volume} = \pi \times \text{radius}^2 \times \text{distance}$$

Calculate the volume of oxygen absorbed when the coloured liquid moves a distance of 6.0 mm.

[diameter of tube = 1.0 mm]

Handwritten work:

$$V = \pi \times 0.5^2 \times 6$$
$$= 4.6$$
$$0.5^2 = 0.25$$
$$0.25 \times 6 = 1.5$$
$$1.5 \times 3.14 = 4.7$$

(3)

volume = 4.6 cm³

Sample 2

(iii) The student measures the distance moved by the coloured liquid and converts this to volume of oxygen absorbed.

The volume of oxygen absorbed can be calculated using the formula

$$\text{volume} = \pi \times \text{radius}^2 \times \text{distance}$$

Calculate the volume of oxygen absorbed when the coloured liquid moves a distance of 6.0 mm.

[diameter of tube = 1.0 mm]

~~$$V = \pi \times 0.5^2 \times$$~~

$$V = \pi \times 0.05^2 \times 0.6$$

$$6 \text{ mm} = 0.006 \text{ cm}$$

$$0.5 \text{ mm} = 0.05 \text{ cm}$$

$$V = 0.00471 \text{ cm}^3$$

volume = 0.00471 cm³

(3)

Sample 3



Pearson

(iii) The student measures the distance moved by the coloured liquid and converts this to volume of oxygen absorbed.

The volume of oxygen absorbed can be calculated using the formula

$$\text{volume} = \pi \times \text{radius}^2 \times \text{distance}$$

Calculate the volume of oxygen absorbed when the coloured liquid moves a distance of 6.0 mm.

[diameter of tube = 1.0 mm]

(3)

$$6.0 \div 10 = 0.6$$

$$1.0 \div 10 = 0.1$$

$$\text{Volume} = \pi \times 0.1 \times 0.6 = 0.1884956$$

$$\text{volume} = 0.1885 \text{ cm}^3$$

Sample 4

(iii) The student measures the distance moved by the coloured liquid and converts this to volume of oxygen absorbed.

The volume of oxygen absorbed can be calculated using the formula

$$\text{volume} = \pi \times \text{radius}^2 \times \text{distance}$$

Calculate the volume of oxygen absorbed when the coloured liquid moves a distance of 6.0 mm.

0.6 cm

[diameter of tube = 1.0 mm]

0.1 cm

(3)

$$\pi \times 0.05^2 \times 0.6$$

$$\pi \times 0.05^2 \times 0.6 =$$

$$\text{volume} = 4.71 \times 10^{-3} \text{ cm}^3$$

Sample 5



Pearson

- (iii) The student measures the distance moved by the coloured liquid and converts this to volume of oxygen absorbed.

The volume of oxygen absorbed can be calculated using the formula

$$\text{volume} = \pi \times \text{radius}^2 \times \text{distance}$$

Calculate the volume of oxygen absorbed when the coloured liquid moves a distance of 6.0 mm.

[diameter of tube = 1.0 mm]

$$V = \pi \times r^2 \times d$$

(3)

$$V = \pi \times (0.5)^2 \times 6$$

$$V = \pi \times (0.5 \text{ mm})^2 \times 6$$

$$= \frac{3}{2} \pi$$

$$= 4.71 \text{ mm}^3$$

355

$$= 0.471 \text{ cm}$$

$$\text{volume} = \underline{0.47} \text{ cm}^3$$

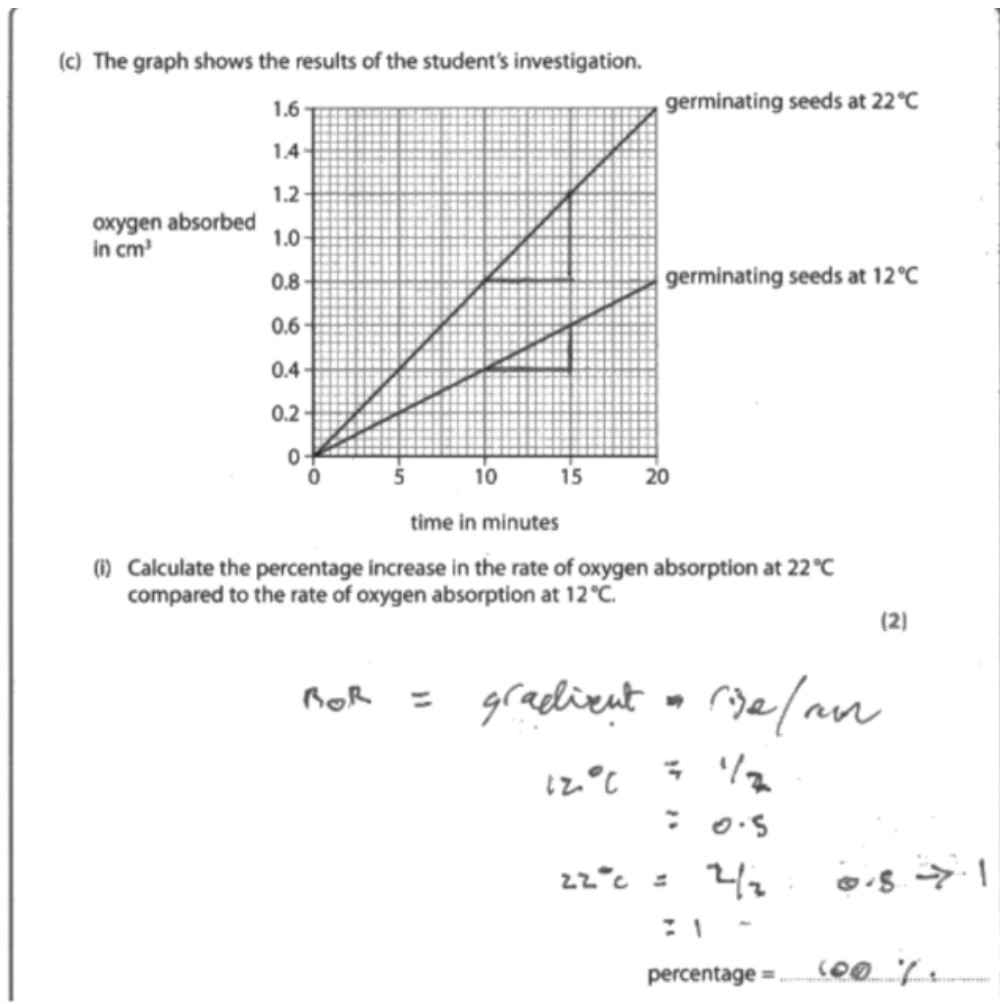
Activity 10



Pearson

- Look at the samples of Paper 1 Question 5 c (i)
- Which maths skills is this item testing?
- Use Mark scheme to mark each response
- Compare your order with other delegates on your table

Sample 1

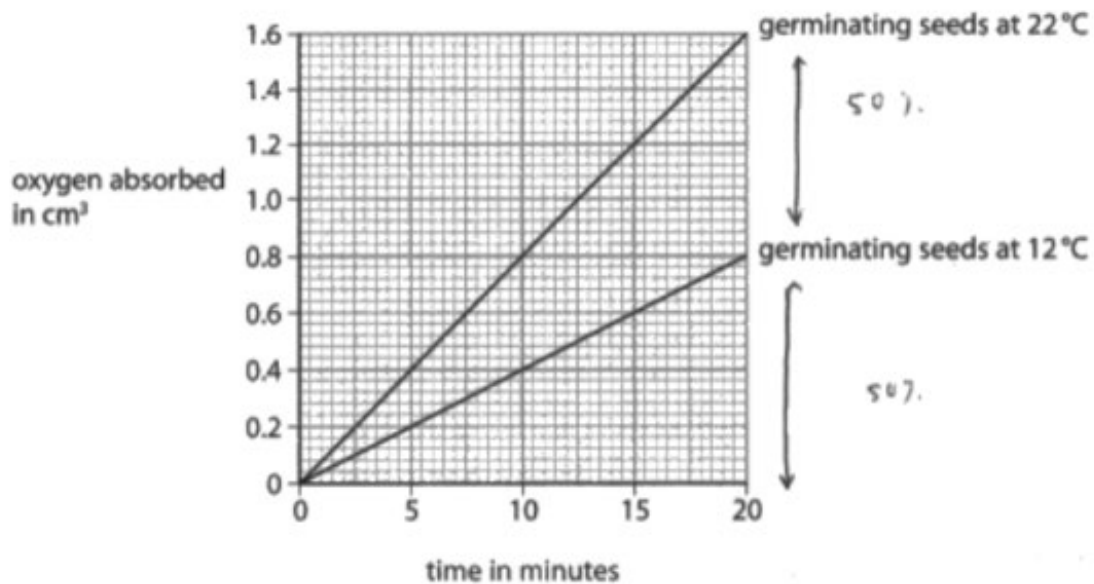


Sample 2



Pearson

(c) The graph shows the results of the student's investigation.



- (i) Calculate the percentage increase in the rate of oxygen absorption at 22°C compared to the rate of oxygen absorption at 12°C.

(2)

0.8 and 1.6.

percentage = 50%

Activity 11



Pearson

- Look at the samples of Paper 1 Question 6b (i)
- Which maths skills is this item testing?
- Use Mark scheme to mark each response
- Compare your order with other delegates on your table

Sample 1

(b) Nicotine is a chemical found in cigarettes.

A scientist investigates how nicotine affects sperm cells.

The scientist gives male rats different concentrations of nicotine.

He then calculates the percentage of damaged sperm cells in the semen produced by each rat.

The table shows his results.

Concentration of nicotine in mg per kg of rat	Percentage of damaged sperm cells (%)
0.0	6.4
0.5	16.8
1.0	24.8

- (i) The sample of semen from a rat given a nicotine concentration of 1.0 mg per kg contains 5.8×10^7 sperm cells.

Calculate the number of damaged sperm cells in this sample.

(2)

$$\frac{24.8}{100} \times 5.8 \times 10^7$$

$$= 14384000$$

$$= 1.4 \times 10^7$$

number = 1.4×10^7

Sample 2



Pearson

(b) Nicotine is a chemical found in cigarettes.

A scientist investigates how nicotine affects sperm cells.

The scientist gives male rats different concentrations of nicotine.

He then calculates the percentage of damaged sperm cells in the semen produced by each rat.

The table shows his results.

Concentration of nicotine in mg per kg of rat	Percentage of damaged sperm cells (%)
0.0	6.4
0.5	16.8
1.0	24.8

- (i) The sample of semen from a rat given a nicotine concentration of 1.0 mg per kg contains 5.8×10^7 sperm cells.

Calculate the number of damaged sperm cells in this sample.

(2)

$$5.8 \times 10^7 \times 0.248 = 14384000$$

number = 14384000 cells

Sample 3



Pearson

(b) Nicotine is a chemical found in cigarettes.

A scientist investigates how nicotine affects sperm cells.

The scientist gives male rats different concentrations of nicotine.

He then calculates the percentage of damaged sperm cells in the semen produced by each rat.

The table shows his results.

Concentration of nicotine in mg per kg of rat	Percentage of damaged sperm cells (%)
0.0	6.4
0.5	16.8
1.0	24.8

- (i) The sample of semen from a rat given a nicotine concentration of 1.0 mg per kg contains 5.8×10^7 sperm cells.

Calculate the number of damaged sperm cells in this sample.

(2)

$$\begin{aligned} 5.8 \times 10^7 &= 100\% \\ x &= 24.8\% \end{aligned}$$

$$\frac{24.8 \times 5.8 \times 10^7}{100}$$

$$\text{number} = 1.44 \times 10^7$$

$$14384000$$