EZY SCIENCE

REQUIRED PRACTICALS PRACTICE QUESTIONS

- MARCH EDITION -

This monthly document contains one exam-style question per science surrounding the required practical activities that need to be carried out as part of the AQA/Edexcel specifications.

We have created these questions and mark schemes based on the content of the exam board's specification(s), sample assessment materials and other published material. Therefore, EzyEducation Ltd. takes no responsibility for the relevance of this document to actual examinations set.

Inside this Month's Edition

Question 1 – Biology Required Practical

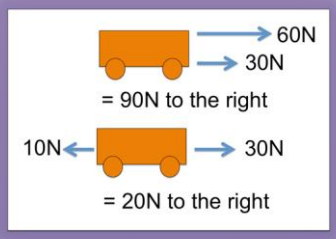
In this question requires students to apply standard biology knowledge to an unfamiliar situation and then apply knowledge of basic experimental procedures to the same situation.

Question 2 – Chemistry Required Practical

In this question students are required to use recalled knowledge of chromatography to compare two sets of results.

Question 3 – Physics Required Practical

In this question students are required to evaluate a set of results, the method used to obtain them, and a conclusion based on them.



Disclaimer

The questions in this document are in a similar style to what you would typically see in an exam paper. There can be no guarantee of the extent to which these questions will reflect the actual examination questions students will sit.

The mark schemes have been presented in a format that allows students to mark their own responses to the questions in this document. The mark schemes contain more detail than would normally be found in a mark scheme. Any comments reflect our opinions and not those of the exam board.

We are providing opportunities for students to apply skills that will be required to achieve a Grade 5 or above. Therefore, this content is suitable for both Foundation and Higher Tier students.

Email: info@ezyeducation.co.uk | **Telephone:** 01329 285415 |

Question 1 – Investigating Photosynthesis

When a freshly picked leaf is torn up, the individual sections will continue to carry out photosynthesis for some time.

A student used this fact to investigate the effect of light on photosynthesis. She followed the steps listed below.

1. Use a hole punch to remove 20 discs from the dark green part of a leaf.
2. Make a solution of sodium bicarbonate by mixing a pinch of baking soda with 200 ml water.
3. Remove the plunger from a 10 ml syringe, place 10 leaf-discs in the syringe, replace the plunger, and then pull a small volume of sodium bicarbonate solution into the syringe.
4. Place a finger over the tip of the syringe and draw back the plunger to create a vacuum.
5. Release the vacuum so that solution enters the discs. Repeat this several times until the discs sink – the air in the discs has now been replaced by sodium bicarbonate solution.
6. Once the discs have all sank, transfer them from the syringe to 100 ml sodium bicarbonate solution in a beaker. Place the beaker in a dark cupboard.
7. Repeat steps 1 – 6 with the remaining ten discs and a new 10 ml syringe.
8. Remove one of the beakers from the cupboard and place it next to a well-lit window.
9. Observe both beakers after 30 minutes.

At the end of 30 minutes the student observed that 8 leaf-discs in the beaker by the window had floated to the surface, while none of the leaf-discs in the beaker in the cupboard floated to the surface in 30 minutes.

1. Explain the student's observation.

.....

.....

.....

.....

.....

.....

[2 marks]

2. Describe how the student could adapt the experiment described above to investigate how the rate of photosynthesis depends on light intensity.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

[6 marks]

Question 1 – Mark Scheme				
	Answers	**Extra Guidance**	**Mark**	**AO/Spec. Ref**
1	Photosynthesis has taken place in the discs near the window (in the light), but not in those in the cupboard (in the dark)		**1**	**AO1/2 AQA: B4.4.1.2**
	The gas (oxygen) produced in photosynthesis (in the discs by the window) is trapped in the discs and / or makes them float		**1**	
	Level 1 – describes two steps that could be part of a valid method	Allow a specific number – five or six, for example	**1 - 2**	**AO1/2 AQA: B4.4.1.2**
	Level 2 - describes most of the steps that could be part of a valid method and puts them in a sensible order	Allow any sensible time up to 10 seconds.	**3 - 4**	
	Level 3 – describes all of the steps of a valid experiment and identifies at least two control variables and describes how to control them	Allow any volume of Benedict's solution up to 10 cm3 or mention of a fixed volume.	**5 - 6**	
	Steps in the experiment: • Set up 10 or 12 beakers containing sodium bicarbonate solution and 10 discs • Place them in the cupboard • Place one beaker at a measured distance from a light source • Time how long it takes for a stated number of discs to float to the surface (at least five) • Repeat the experiment with another beaker at the same distance from the light source AND then calculate the average time • Carry out the experiment several times with the beaker at different distances from the light source No marks are			

	available for repeating any of the steps in preparing the leaf-discs			
	Control variables • Temperature – place the beaker in a larger beaker of water / behind a tank of water (to act as a heat shield) or use a LED light source • Concentration of sodium bicarbonate solution – make a single batch of the solution • Volume of solution – measure it out with a measuring cylinder • Power of light source – use the same light source throughout			
Total marks			**9**	

Feedback:

This question requires you to apply your knowledge to an unfamiliar situation. Although the answer may seem obvious it is important that it is expressed clearly and in detail.

(a) This experiment, although valid, is not one that is carried out widely in schools. However, familiarity with this method is not essential as it is really about identifying the independent variable, the dependent variable and the control variables.

Question 2 - Chromatography

Two students carried out a chromatography experiment with the same sample of ink.

In each experiment a dot of the ink was placed near the bottom of a strip of filter paper. The lower end of each strip was then dipped in water until the water reached the top of the strip. The students used different lengths of filter paper.

Figure 1 shows their results.

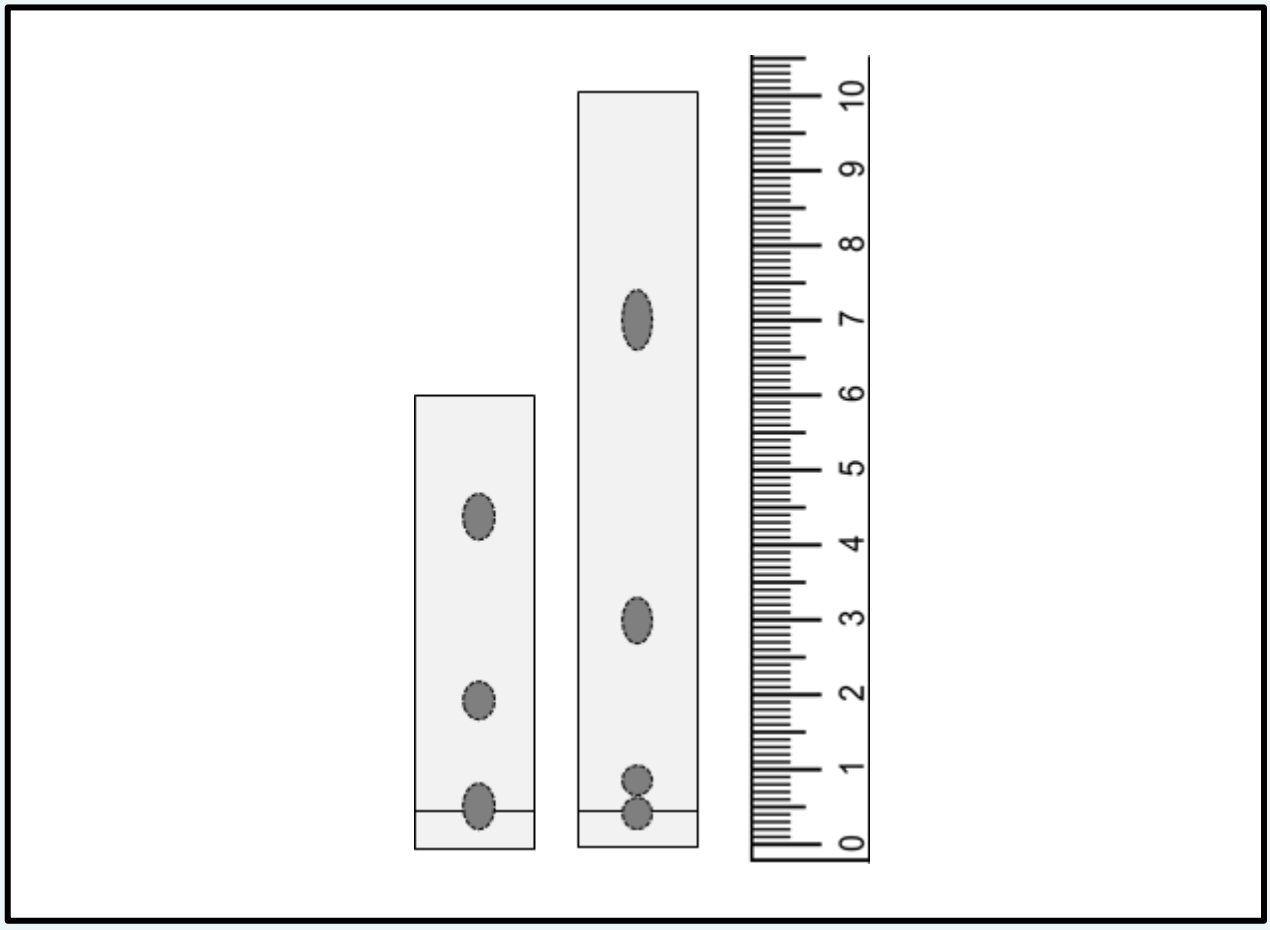


Figure 1

Do the two sets of results agree?

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

[10 marks]

Question 2 – Mark Scheme				
	Answers	**Extra Guidance**	**Mark**	**AO/Spec. Ref**
	The longer strip shows three components / pigments / different inks, but the shorter strip only shows two		**1**	**AO2/3/ AQA: 4.8.1.3**
	This may be because on the shorter strip the third component has not had room to travel / separate from the original dot		**1**	
	The Rf values for the two dots on the shorter strip are (1.5/6 =) 0.25 and (4/6 =) 0.67		**1**	
	The Rf values for the corresponding two dots on the longer strip are (3.0/10 =) 0.3 and (7/10 =) 0.7	All stated values with no calculation of 0.25 or 0.3 for the first component and 0.67 (or any number that rounds to 0.67) or 0.7 for the second component.	**1**	
	The Rf values for the corresponding dots on the two strips are (approximately) the same	Ignore any Rf value for the lowest component on the longer strip.	**1**	
Total marks			**5**	

Feedback

This question is about extracting information from a diagram and using it to support an argument or conclusion. The obvious point to make is that one strip shows three components while the other shows only two but given that both students are using the same ink there should be a plausible explanation for this, which needs to be stated or suggested. The presence of the ruler in Figure 1 should provide a strong hint that measurements need to be made and processed to obtain all five marks here.

Question 3 – Force and Acceleration

A group of students investigated the relationship between force and acceleration using the equipment shown in **Figure 1**.

Figure 1

The students changed the force acting on the trolley by increasing the falling mass.

For each value of the falling mass the acceleration was measured using a pair of light gates connected to a data logger (not shown in the diagram)

The results of the experiment are shown in **Figure 2.**

Falling mass (g)	Acceleration (m/s^2)
100	1.1
200	2.0
300	2.7
400	3.3
500	3.8
600	4.3
700	4.7

Figure 2

Based on these results the students conclude that Newton's 2nd law of motion (force = mass × acceleration) is **NOT** correct.

Explain if this conclusion is correct.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

[6 marks]

Question 3 – Mark Scheme				
	Answers	**Extra Guidance**	**Mark**	**AO/Spec. Ref**
	F = ma means that the acceleration of the trolley should be proportional to the force acting on it		**1**	**AO2/3/ AQA: 4.5.1.2**
	States a way of checking proportionality	Clearly showing a lack of proportionality without an explanation scores both marks here	**1**	
	(acceleration should double when force doubles, or force/acceleration should remain constant)		**1**	
	Shows that acceleration is not proportional to falling mass (e.g – doubling falling mass from 300 g to 600 g does not double acceleration or showing two different values of force/acceleration)	The 2nd point on its own scores both the first two marks here.	**1**	
	In this experiment the total mass of the system (the trolley and falling mass) is not constant		**1**	
	Students should have stacked masses on the trolley and transferred them to the falling mass to change the pulling force		**1**	
Total marks			**6**	

Feedback

There are two sets of information that need to be considered here – the method described and the results.

The results, on the face of it, do not support Newton's 2nd law, but they are not valid, which needs to be explained.
It is easy to dismiss the students' conclusion as being too audacious, and indeed this would score one mark. But this question is about whether the results support Newton's 2nd law, and on the face of it they do not, which needs to be acknowledged. That said, there must clearly be something wrong with the experiment, and this needs to be discussed. From carrying out the experiment you should be aware of the need to keep the total mass of the system constant and should recognise that this is not happening here.