

Working Scientifically (KS3)

Section A – Recall (1 mark each)

Q1 (1 mark)

What is the independent variable in an investigation?

Q2 (1 mark)

What organelle is the site of aerobic respiration?

Q3 (1 mark)

What SI unit is used to measure force?

Q4 (1 mark)

What process causes particles to move from high to low concentration?

Q5 (1 mark)

What piece of equipment is used to observe cells?

Q6 (1 mark)

What type of wave is a sound wave?

Q7 (1 mark)

What is the pH of a neutral substance?

Q8 (1 mark)

What force causes objects to fall towards Earth?

Q9 (1 mark)

What unit is used to measure current?

Q10 (1 mark)

What is meant by a fair test?

Q11 (1 mark)

What graph is most suitable for continuous data?

Q12 (1 mark)

What gas is produced during photosynthesis?

Q13 (1 mark)

What piece of equipment is used to measure temperature?

Q14 (1 mark)

What is a prediction?

Q15 (1 mark)

What type of reaction transfers energy to the surroundings?

Q16 (1 mark)

What is the chemical symbol for magnesium?

Q17 (1 mark)

What unit is used to measure speed?

Q18 (1 mark)

What structure controls substances entering and leaving a cell?

Q19 (1 mark)

What is a risk assessment used for?

Q20 (1 mark)

What is the relationship between speed, distance and time?

Section B – Understanding (2–3 marks each)

Q21 (2 marks)

Explain why repeat measurements are beneficial during an investigation measuring lung volume.

Q22 (2 marks)

Explain why the same species of plant should be used in a photosynthesis investigation.

Q23 (3 marks)

Explain the difference between a physical change and a chemical change using melting and combustion as examples.

Q24 (3 marks)

Explain why scientists use peer review when developing new medicines.

Q25 (2 marks)

Explain how scientific explanations can change about inheritance and DNA.

Q26 (3 marks)

Explain why eye protection should be worn when investigating acids and alkalis.

Q27 (3 marks)

Explain why a student should control temperature when investigating how concentration gradient affects the rate of diffusion.

Q28 (3 marks)

Explain why line graphs are useful when investigating cooling in physics.

Q29 (3 marks)

Explain the difference between random errors and systematic errors in an investigation.

Q30 (3 marks)

Explain why quadrats are used when investigating biodiversity in a field.

Q31 (3 marks)

Explain why SI units are important in scientific investigations.

Q32 (3 marks)

Explain why scientists repeat readings when investigating force and extension in springs.

Section C – Application (3-4 marks each)

Q33 (4 marks)

A student investigates how light intensity affects the rate of photosynthesis in pondweed.

Identify:

- the independent variable
- the dependent variable
- two control variables

Q34 (4 marks)

A pupil investigates how exercise affects pulse rate.

Describe how the pupil could improve the reliability of the investigation.

Q35 (4 marks)

A class investigates diffusion by placing food colouring into hot and cold water.

Explain why the same volume of water should be used each time.

Q36 (4 marks)

A student investigates the extension of a spring using different masses. Explain why the same spring should be used throughout the investigation.

Q37 (3 marks)

A student investigates a neutralisation reaction. The temperature readings are 22°C, 24°C and 26°C. Calculate the mean temperature.

Q38 (4 marks)

A student investigates the effect of different surfaces on friction using a toy car and ramp. Explain why the ramp height should be kept constant.

Q39 (4 marks)

A pupil investigates the rate of evaporation of water at different temperatures. Explain why the surface area of the water should be controlled.

Q40 (4 marks)

A student uses *Learntit* to revise ecology fieldwork techniques. The lesson explains random sampling using quadrats. Describe how a student could use quadrats to investigate plant distribution in a field.

Q41 (4 marks)

A student investigates the reaction between magnesium and hydrochloric acid. Explain why the same concentration of acid should be used each time.

Q42 (4 marks)

A student investigates insulation materials by wrapping them around beakers of hot water. Describe four ways the student could improve the reliability of the investigation.

Q43 (4 marks)

A pupil investigates current in a series circuit using different resistors. Explain why the same battery should be used throughout the investigation.

Q44 (4 marks)

A student investigates how different materials absorb sound. Explain why the same sound source should be used each time.

Q45 (4 marks)

A scientist measures variation in hand span within a class.

Explain why a large sample size improves the validity of the investigation.

Q46 (4 marks)

A student investigates enzyme activity at different temperatures.

Explain why pH should be controlled carefully.

Q47 (4 marks)

A pupil investigates energy released by different foods by heating water.

Explain why the same volume of water should be heated each time.

Q48 (4 marks)

A student records the heights of plants grown in different light conditions.

Explain why a scatter graph would be more suitable than a bar chart.

Q49 (4 marks)

A student investigates how the concentration of carbon dioxide affects photosynthesis. Explain why light intensity should be controlled.

Q50 (4 marks)

During a cooling experiment, one thermometer always reads 2°C too high. Identify the type of error and explain how it affects the results.

Section D – Extended Response (6 marks each)

Q51 (6 marks)

A student investigates how temperature affects the rate of photosynthesis in pondweed. Explain how the student could plan, carry out and evaluate the investigation using his scientific skills and experimental knowledge.

Q52 (6 marks)

A class investigates how force affects the extension of a spring. Explain how observations, measurements and graphs can be used to produce valid conclusions.

Q53 (6 marks)

A scientist investigates the effect of acid rain on plant growth. Explain how scientific methods, control variables and data analysis can be used to improve the reliability of the conclusions.

Q54 (6 marks)

A student at *Learntit* investigates how different insulation materials reduce heat transfer from hot water. Explain how repeatability, reproducibility, accuracy and risk assessment should be considered during the investigation.