

Applied Science Summer homework 2026

Biology

1. Create a key word glossary using the following words:
 - Enzyme
 - Substrate
 - Active site
 - Product
 - Catalyst
 - Digestion
 - Hydrolysis reaction
 - Condensation reaction
 - Specificity
 - Denaturation
 - Optimum temperature
2. Draw a set of diagrams to show how the Lock and Key Theory explains enzyme action. You must label the enzyme, substrate, active site, enzyme-substrate complex and products.
3. Copy and complete the table about digestive enzymes.

Enzyme	Substrate	Product	Site of production
Amylase		Maltose	
Maltase	Maltose		Small intestine
Lipase	Lipids		Small intestine, pancreas
	Protein		Stomach, pancreas and small intestine

Chemistry

1. Make a poster about hydrocarbons (please do this by hand so you have practice in drawing structures). You will need to do some revision of GCSE work and some additional research. Your poster must include the following:
 - Definition of a hydrocarbon
 - The general formula for alkanes
 - Names, molecular and displayed (structural) formulae of alkanes with 1-6 carbon atoms
 - Annotations of your formulae with uses for these alkanes
 - Names, molecular and displayed (structural) formulae of alkenes with 2-5 carbons
 - Why is there not an alkene with only 1 carbon?
2. Answer the following questions:
 - a. Compare complete and incomplete combustion of a hydrocarbon. Compare the products formed, efficiency and dangers of these processes
 - b. The table shows the amount of energy that is released when 1 mole of an alkane is completely burned in oxygen. Plot a line graph of this data and state a conclusion about what happens to the energy released as the number of carbons increases

Number of carbons in alkane	Energy released when 1 mole is completely burned in oxygen (kJ)
1	890
2	1560
3	2219
4	2877
5	3509
6	4163
7	4817
8	5470

Physics

1. What is Newton's second law of motion?
2. Write definitions for the following key terms:
 - Vector quantity
 - Scalar quantity
 - Magnitude
 - Velocity
 - Displacement
 - Acceleration
3. The relationship between velocity and acceleration is shown by:

$$\text{Acceleration} = \frac{\text{change in velocity}}{\text{time taken}}$$

$$a = \Delta v / t$$

- a) A car starts from rest and accelerates uniformly at 3.0 m s^{-2} for 8.0 s.
 - i. Calculate its final velocity.
 - ii. Calculate the distance travelled.
 - b) A cyclist travelling at 12 m s^{-1} brakes uniformly and stops in 4.0 s.
 - i. Calculate the acceleration.
 - ii. State whether the acceleration is positive or negative and explain why.
 - c) A 5.0 kg trolley experiences a resultant force of 15 N.
 - i. Calculate its acceleration. (2 marks)
 - ii. If the force is doubled, what will happen to the acceleration?
4. A student investigates the acceleration of a trolley using two light gates and a data logger.

Discuss:

- How light gates measure velocity.
- How acceleration can be determined.
- Sources of uncertainty.
- Improvements to increase reliability.