AQA Combined Science Additional Question Answers

Abiotic and biotic factors

a The birds eat the insects that have been killed by DDT.

b The hawks are further up the food chain/top predators; DDT accumulates in the organisms as it moves up the food chain.

Limiting reactants

a $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

b 5.68 g

c The limiting reactant is oxygen; because in the balanced equation the ratio is 1:5 (0.3:1.5), but the engine only has 0.3:0.1; They could make the engine more efficient by increasing the amount of oxygen.

National and global energy resources

Advantages: Wind is renewable, doesn't emit greenhouse gases.

Disadvantages: Wind is unreliable, requires a huge amount of land, is considered an eyesore.

Electrical charge and current

$\text{Time} = \frac{\text{charge flow}}{\text{current}}$;

$= \frac{1800}{6}$

= 300 s; or 5 minutes

Current, resistance and potential difference and resistors

A2 = 0.5 A, A3 = 1 A, V2 = 5 V, V3 = 5 V

Series and parallel circuits

In a series circuit, current is the **same** throughout the circuit and **potential difference** splits across the components. In a parallel circuit, **potential difference** is the same across each branch of the circuit and current splits through the parallel branches. An ammeter must be connected in **series** to work correctly. A voltmeter must be connected in **parallel** to work correctly.

Hazards and uses of radioactive emissions

a 1 lead-210 for every 7 bismuth-210 means $\frac{1}{8}$th lead remains in sample

$1 \rightarrow \frac{1}{2} \rightarrow \frac{1}{4} \rightarrow \frac{1}{8}$

This means 3 half-lives have elapsed

b $3 \times 22 = 66$ years

Acceleration

a Acceleration

b Constant speed

c Deceleration

Newton's laws of motion

a Zero

b Resultant force = mass × acceleration: rearrangement:

$\text{acceleration} = \frac{\text{resultant force}}{\text{mass}}$

$\text{acceleration} = \frac{8000}{800}$; $= 10\,\text{m/s}^2$

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

rearrangement:

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

$\text{time taken} = \frac{30}{10}$; = 3 s

Properties of waves

$v = f \times \lambda$;

$\lambda = v/f$; $= \frac{300\,000\,000}{603\,000}$

= 497.5; m