

Max's Aquatic Maths and Mechanics

Learning objective: To understand the principles of buoyancy, water safety, and the mechanical efficiency of different swimming strokes, while applying mathematical reasoning to pool-side scenarios.

Read each scenario carefully. Use your scientific understanding of water resistance and your mathematical skills to solve these challenges. Show your working out clearly.

Word bank: buoyancy · hydrodynamics · resistance · propulsion · acceleration · displacement · aerobic · safety

1. Max is observing the pool. He notices that when a swimmer enters the water, the water level rises. Explain the scientific principle of 'displacement' and why this occurs when a body enters a full swimming pool. (2 marks)

2. To improve his hydrodynamics, Max wants to reduce drag. Compare and contrast the 'streamline' body position with a 'splayed' position. Explain why the streamline position allows for greater acceleration. (3 marks)

3. A swimming club session costs £4.50 per child. If a group of 12 children from Year 5 attend, calculate the total cost. If the club has a budget of £60.00 for new floats, how much change will they have left after paying for the session? (3 marks)

4. Justify why it is essential to follow the 'no running on the poolside' rule. Refer to the properties of water and surface friction in your explanation. (2 marks)

5. If a swimmer completes one length of a 25-metre pool in 20 seconds, calculate their average speed in metres per second (m/s). Show your calculation. (2 marks)

6. What might happen to a swimmer's efficiency if they attempt to swim with their head held high above the water line? Explain the impact on their body position and energy expenditure. (3 marks)

Draw: Draw a diagram of a swimmer in a perfect 'streamline' position. Use arrows to label the direction of movement (propulsion) and the forces of water resistance acting against the swimmer.



Extension challenge: Design a 'Water Safety Poster' for the local leisure centre. Your poster must include three clear rules and an explanation for each rule, using sophisticated vocabulary such as 'friction', 'momentum', and 'hazard'. You may include a persuasive slogan at the bottom.