

# Fluid Density, Viscosity & Drag

## Question Paper

|                   |                                 |
|-------------------|---------------------------------|
| <b>Level</b>      | A Level                         |
| <b>Subject</b>    | Physics                         |
| <b>Exam Board</b> | Edexcel                         |
| <b>Topic</b>      | Materials                       |
| <b>Sub Topic</b>  | Fluid Density, Viscosity & Drag |
| <b>Booklet</b>    | Question Paper                  |
| <b>Paper Type</b> | Multiple Choice                 |

**Time Allowed:** 9 minutes

**Score:** /7

**Percentage:** /100

**Grade Boundaries:**

| A*   | A      | B   | C     | D     | E   | U    |
|------|--------|-----|-------|-------|-----|------|
| >85% | '77.5% | 70% | 62.5% | 57.5% | 45% | <45% |

- 1 The surface of a golf ball is covered in small dimples. These dimples enable the ball to travel a greater distance when struck by a golf club.

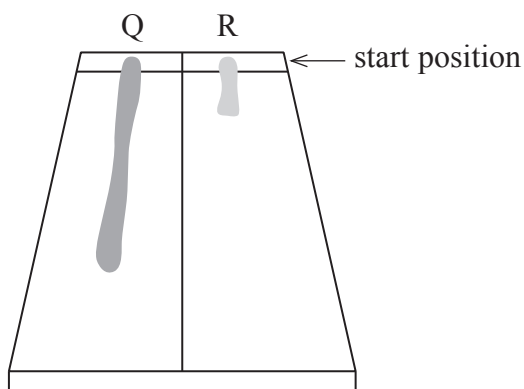
Which of these statements is true?

- A The dimples result in only turbulent flow.
- B The dimples result in only laminar flow.
- C The dimples reduce drag.
- D The dimples increase drag.

(Total for Question = 1 mark)

- 2 Q and R are drops of two different fluids which have been placed on one end of a tile. The tile is then tilted.

The diagram shows how the drops spread down the tile.

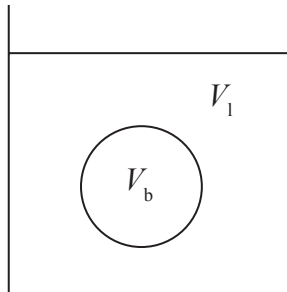


Which could be a correct explanation for the different lengths shown?

- A R has a greater viscosity than Q.
- B R has a greater density than Q.
- C R has a greater temperature than Q.
- D All of the above.

(Total for Question = 1 mark)

- 3 A ball of volume  $V_b$  and density  $\rho_b$  is released in a volume  $V_1$  of liquid with density  $\rho_1$ .

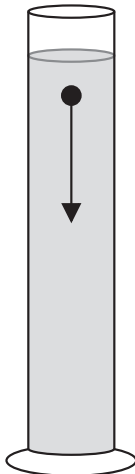


The upthrust on the ball is given by

- A  $V_b \rho_b g$
- B  $V_b \rho_1 g$
- C  $V_1 \rho_b g$
- D  $V_1 \rho_1 g$

(Total for Question = 1 mark)

- 4 In an experiment a small metal ball is dropped into a cylinder of oil. The time taken for the ball to fall to the bottom of the cylinder is recorded.



The experiment is repeated. Which changes to the ball would result in the greatest decrease in the time it takes to reach the bottom of the cylinder?

- A smaller mass and smaller diameter
- B smaller mass and greater diameter
- C greater mass and smaller diameter
- D greater mass and greater diameter

(Total for Question = 1 mark)

- 5 In the expression  $F = 6\pi\eta r v$

- A  $\eta$  represents density and  $v$  represents viscosity.
- B  $r$  represents radius and  $\eta$  represents density.
- C  $r$  represents radius and  $v$  represents viscosity.
- D  $\eta$  represents viscosity and  $v$  represents velocity.

(Total for Question = 1 mark)

6 A ball bearing is released in a measuring cylinder filled with oil. To increase the time taken for the ball bearing to reach the bottom, which one of the following would have to increase?

- A the temperature of the oil
- B the viscosity of the oil
- C the gravitational field strength
- D the density of the ball bearing

(Total for Question = 1 mark)

7 A ball bearing is dropped through a liquid and its terminal velocity measured. The experiment is repeated at a different temperature.

Which row could correctly describe this second experiment?

|                          |   | Temperature | Viscosity | Terminal velocity |
|--------------------------|---|-------------|-----------|-------------------|
| <input type="checkbox"/> | A | lower       | greater   | faster            |
| <input type="checkbox"/> | B | lower       | greater   | slower            |
| <input type="checkbox"/> | C | higher      | greater   | slower            |
| <input type="checkbox"/> | D | higher      | smaller   | slower            |

(Total for Question = 1 mark)