3 An object of density ρ_o, and volume V_o, is placed in a fluid of density ρ_f, as shown in Fig 3.1. The acceleration of free fall is g.

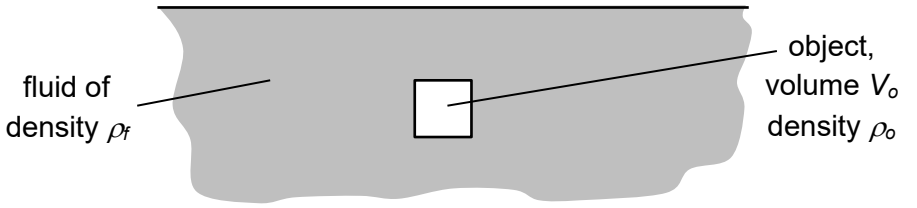

Fig. 3.1

(a) State the origin of upthrust.

……

…… [1]

(b) State an expression, in terms of ρ_o, V_o, ρ_f and g where appropriate, for

(i) weight of the object, W

…… [1]

(ii) upthrust acting on the object, U

…… [1]

(c) The object starts to sink from rest in the fluid.
With suitable working, show whether ρ_o is greater, lesser, or equal to ρ_f.

[2]

(d) The object sinks for a long time.

Describe and explain how the motion of the object changes until it reaches terminal velocity.

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…… [3]