Aerodynamics of sports balls

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An Aerodynamic Analysis of Recent FIFA World Cup Balls

Arlene A. Kwiatkowski and Derek R. Lomatsch*

Special Research Center for the Industry Sciences of Future, Department of Physics, The University of Adelaide, SA, 5005, Australia

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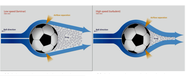
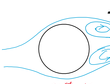
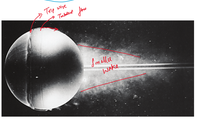
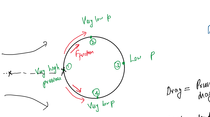
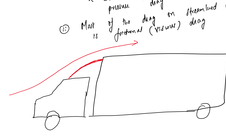




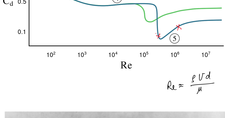




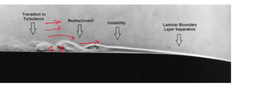
Lift = 0
Drag = ΔP × A
Drag = Pressure drag + Frictional drag
Rule of Thumb: (a) Aerodynamic objects tend to have low pressure drag & blunt objects will have a large pressure drag
(b) Most of the drag on streamlined objects is frictional (viscous) drag



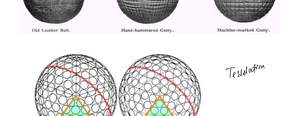
$$Re = \frac{\rho V d}{\mu}$$

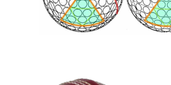


Golf balls have dimples on them to permit formation of turbulent flow

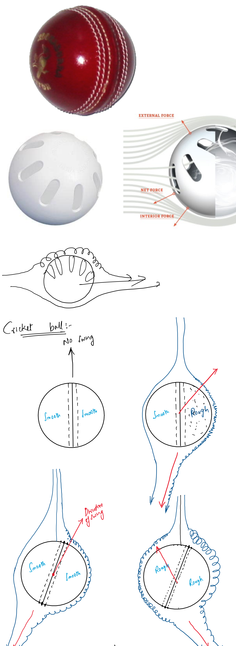


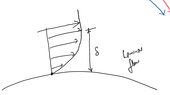
Tessellation

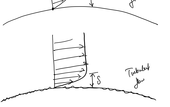


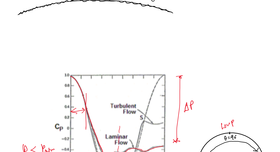


Cricket ball:-









$$P + \frac{1}{2}\rho V^2 = P_0$$