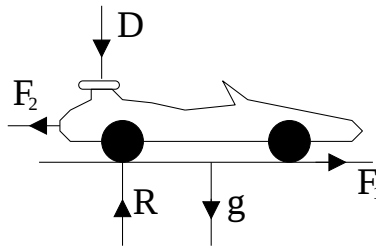


Question

Describe the nature and direction of forces acting on (i) a Formula 1 racing car during a race, (ii) a swan taking off from a river and landing on an island, (iii) a diver during his fall and immersion in the swimming pool.

Answer

(i)



Forces:

D downforce from aerofoil;

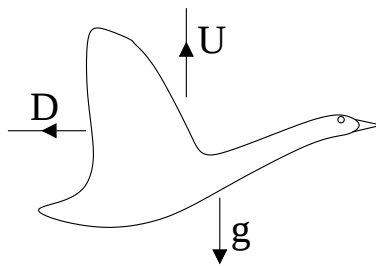
F_1 friction of track on tyres;

F_2 air resistance (drag);

g gravity;

R reaction of track on tyres.

(ii)



Forces:

D air resistance (drag);

U uplift of air on the wings;

g gravity.

On landing and takeoff there is a retarding force from grass/water as well.

(iii) During the dive the forces are gravity and air resistance.

While in the pool the forces are gravity, upward buoyancy forces, drag by water and hydrodynamic forces due to his swimming motion.