

getting the physics straight

machines: connecting forces, lengths and distances to do tasks

machines are energy-conserving devices, linking input and output

the engineering is about choosing the correct materials to make this

levers and hydraulic machines are very similar

forces are vectors: pressure is a scalar

representing the topic effectively

translate the machine to its essential components

respect the difference between pressure in a fluid and the forces

consistent and helpful conventions for drawing machines

keeping it simple by avoiding situations where pressure varies

particular teaching challenges

a complex machine is reduced to its essence

how to manage the transition to a radically simplified representation

a sensible introduction to pressure as a property of fluids

establishing reasoned drawing conventions

identifying forces' lines of action and lengths from pivot to that line

compensated quantities are hard for pupils to deal with

pressure and stress are different

dealing with existing ideas

appearing to get something for nothing

'suction' is not a force, or an anti-pressure

focussing on either force or length from pivot

pressure pushes

forces travel

selected teaching principles

pressure, force, area, hydraulics and energy

line of action, length, pivot, force, levers, distance and energy

separating pressure and force

respecting physical differences and representing those in the

conservation of energy as the fundamental principle