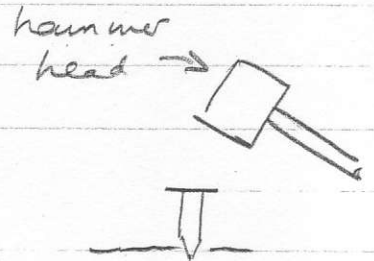


Exploring events with Momentum

1. If you drop an egg (B) on to hard ground, the shell will break. But you can drop the same egg in a box and it won't break - why?
(are the words "momentum" and "pressure" any help here?)



2. Why is a metal hammer head more effective than a rubber hammer head of the same mass?



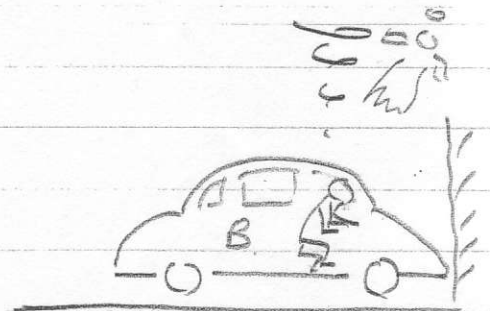
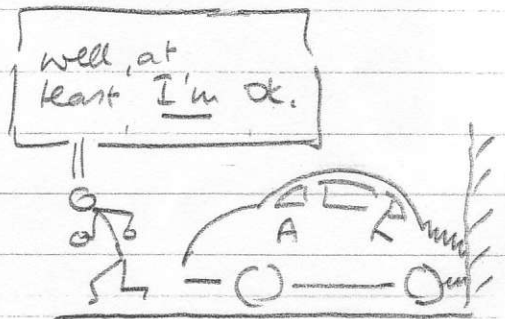
3. Two cars crashed at the same speed into solid walls.

Car A was designed to crumple in a crash. Car B was designed not to crumple.

Driver A walked away unharmed.

Driver B died

How can car A be safer if it suffers more damage in a crash?



Exploring events with Momentum



A2
Phys. in

1. Both eggs experience the same change in momentum (Δp).
We know $F \times t = \Delta p$, so if time t is increased then force F must decrease to compensate ^① (compared to egg B)
Egg A in the box is brought to rest in a longer time ^①, so the force is less and it doesn't break.
Also we know Pressure $P = F/A$ (People Fall over Ants.)
so if the area A is increased, then pressure is less ^①
The box "spreads out" the force on egg A ^①, so there is less pressure on it + it doesn't break
Momentum part 1/2
pressure part 1/2

2. Both hammer heads have the same momentum change (Δp)
When they are brought to rest, Rubber can be compressed more than steel (it is more "squishy") so it takes a longer time ^① to come to rest. This means it exerts a smaller force on the nail ^① - so the nail isn't driven in so far.
The metal hammer comes to rest in a very short time (but not instantly) so it exerts a big force on the nail.
All this comes from $Ft = \Delta p$, so if $t \uparrow$ then F decreases 1/2

3. Both cars have the same change in momentum Δp ^①
Car A comes to rest in a longer time ^①, so the force on the car - and driver - is less ^① - survival.
Car B comes to rest in a short time, so the force on the driver is large $\rightarrow$ death
Again link this to $Ft = \Delta p$, so if $t \uparrow$ then $F \downarrow$
Talking about car A - crumpling and "absorbing" the kinetic energy of the car may get a mark but probably not more.

There's repetition of the idea of $Ft = \Delta p$ - 'cos this is practice, but you'll only get 1 question on this in the exam. So make the most of it!

(92N)

lock