Year 10 Physics Checklist
P3 Energy and Motion

Energy on the move
Use the equation:

Kinetic Energy = 1/2 mv^2

Apply the ideas of kinetic energy:
• relationship between braking distances and speed;
• everyday situations involving objects moving.

Describe and explain that car fuel consumption figures depend on:
• energy required to increase KE;
• energy required to do work against friction;
• different driving styles and speeds;
• different road conditions.

Explain that electrically powered cars do not pollute at the point of use whereas fossil fuel cars do.
Recognise that battery driven cars need to have the battery recharged:
• this uses electricity produced from a power station;
• power stations cause pollution.

Crumple Zones
Explain that forces can be reduced when stopping (eg. crumple zones, braking distances, escape lanes, crash barriers, seatbelts and air bags) by:
• increasing stopping or collision time;
• increasing stopping or collision distance;
• decreasing acceleration.

Describe using the ideas of friction why ABS brakes reduce braking distances.

State some typical passive safety features of cars:
• electric windows;
• cruise control;
• paddle shift controls - gears, stereo;
• adjustable seating.

Explain why seatbelts have to be replaced after a crash.

Describe how seatbelts, crumple zones, air bags are useful in a crash because they:
• change shape;
• reduce injuries;
• absorb energy.

Falling safely
Recognise that the shape of moving objects can influence their top speeds:
• wedge shape of sports car;
• deflectors on lorries and caravans;
• roof boxes on cars.

Recognise that falling object do not experience drag when there is no atmosphere:
• moon;
• outer space.

Explain in terms of the balance of forces why objects:
• increase speed;
• decrease speed;
• maintain steady speed.

Explain, in terms of balance of forces, why objects reach a terminal speed:
• higher speed = more drag;
• larger area = more drag;
• weight (driving force) = drag gives terminal speed.

The energy of games and theme rides
When an object falls it converts PE to KE. PE is also greater when the gravitational field strength (g) is higher.

Explain that at terminal speed:
• KE does not increase;
• PE does work against friction.

Use the equation:

Potential Energy = m x g x h.
Weight = mass x gravitational field strength.

Do not keep saying to yourself, if you can possibly avoid it, 'But how can it be like that?' because you will get 'down the drain' into a blind alley from which nobody has yet escaped. Nobody knows how it can be like that.

Richard Feynman