Definitions and Concepts for AQA Physics A Level

Topic 11: Engineering Physics (Option Topic)

Adiabatic: A reaction is described as being adiabatic if no heat passes to or from the gas. When no heat enters or leaves, the total work done on the system must be equal to the negative change of internal energy.

Angular Acceleration: The rate of change of an object's angular velocity. Angular acceleration is a vector quantity.

Angular Displacement: The angle in radians, that a rotating object has travelled through.

Angular Impulse: Equal to the product of the resultant torque acting, and the time period over which it acts. It equals the change of angular momentum that occurs in that time.

Angular Momentum: The product of an object's moment of inertia and angular velocity.

Angular Speed: The rate of change of an object's angular distance. Angular speed is a scalar quantity.

Angular Velocity: The rate of change of an object's angular displacement. Angular velocity is a vector quantity.

Brake Power: The power present at the output shaft of an engine. It is equal to the indicated power minus any power lost to friction.

Coefficient of Performance: A measure of how good a device at converting work into a heat transfer. Note that this value can sometimes be greater than one.

Conservation of Angular Momentum: The angular momentum before an event is equal to the angular momentum after an event, as long as no external torque acts.

Constant Volume Reaction: When the volume doesn't change in a reaction, the boundary cannot move and so no work can be done. This means that for constant volume reactions, the heat supplied must be equal to the change of internal energy.

First Law of Thermodynamics: A form of the conservation of energy. It states that the total energy supplied or removed from a system is equal to the sum of the change in internal energy and the work done on it.

Flywheel: Devices that accumulate and store energy. They can also be used to even out fluctuations in an object's rotational speed.

Four-Stroke Engine: A type of engine cycle in which fuel is burned once every four strokes. The four stages are induction, compression, expansion and exhaustion.

Indicated Power: The power developed within the cylinders of an engine.

Indicator Diagrams: The name given to the p-V diagram for an engine cycle. They give an indication of an engine's performance.

Isothermal: A reaction is described as being isothermal if it occurs at a constant temperature. When temperature doesn't change, the internal energy must remain constant.

Isotherms: Lines of constant temperature, drawn onto p-V diagrams. Isotherms of higher temperature are found further away from the origin.

Mechanical Efficiency: The ratio of the brake or output power, over the indicated power.

Moment of Inertia: The product of the mass and the square of the radius (from the axis of rotation) for a rotating body. For extended objects, the moments of inertia for each element can be summed.

Overall Efficiency: The ratio of the brake or output power over the total power inputted.

Reversed Heat Engine: A form of heat engine in which work is inputted. Energy passes from a cold reservoir into a hot reservoir.

Rotational Kinetic Energy: Equal to half the product of the moment of inertia and the square of the angular velocity of a rotating body. For extended objects, the rotational kinetic energies for each element can be summed.

Second Law of Thermodynamics: A law that all engines must obey, and which states that any process that converts heat into work, cannot have an efficiency that approaches 100%.

Sink: The sink of an engine is where some energy from the engine is rejected. It is at a lower temperature than the source. If the sink were to be at absolute zero, the engine would have 100% efficiency.

Source: The source of an engine provides heat to the engine. It is at a higher temperature than the sink. In general, the higher the temperature of the source, the higher the efficiency.

Theoretical Diesel Engine: An engine cycle consisting of adiabatic compression, the supply of heat at constant pressure, adiabatic expansion and then finally constant volume energy rejection.

Theoretical Otto Cycle: A cycle involving air undergoing adiabatic compression, heat being supplied under constant volume, adiabatic expansion and then finally constant volume energy rejection.

Thermal Efficiency: The ratio of indicated power over the power inputted.

Torque: A force that produces rotation. It is equal to the product of force and rotational radius.