What do the letters d, v and t stand for and what are the units?

d - distance in metres (m)

v – average speed in metres per second (m/s)

t – time in seconds (s)

Name an equation that uses the symbols d, v and t and describe situations you would could use the equation.

This equation can find the distance traveled when there is constant speed (no acceleration). Useful for horizontal motion of a projectile.

Name an equation that uses the symbol s, u, t and a, when is this useful and what are some of the key things to remember.

Great for any situation an object is accelerating. The displacement and acceleration are vectors and may not act in the same direction. For projectiles on earth magnitude of a is 9.8 m/s2.

What do the letters s, u, t and a stand for and what are the units?

u – initial speed in metres per second (m/s)

s - displacement in metres (m), direction also required

a – acceleration in metres per second squared (m/s2)

t – time in seconds (s)

What do the letters s, v and t stand for and what are the units?

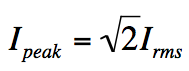
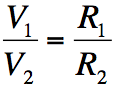
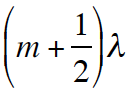
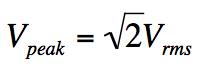
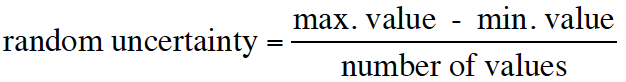
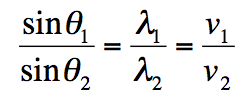
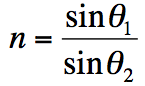
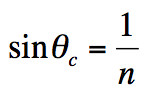
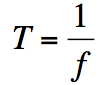
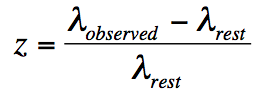
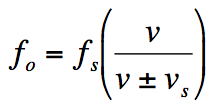
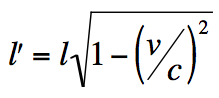
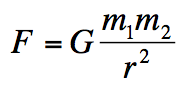
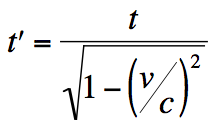
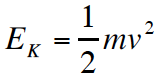
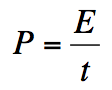
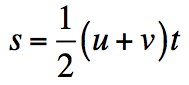
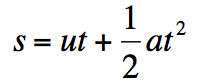
s - displacement in metres (m), direction also required

v – average velocity in metres per second (m/s) also requires a direction.

t – time in seconds (s)

Name an equation that uses the symbols s, t and v d and describe situations you would could use the equation.

The velocity of an object is the displacement divided by time, the velocity will have the same direction as the displacement. The displacement will usually need found from a scale diagram or by trigonometry.



What do the letters v, u, a and t stand for and what are the units?

u – initial speed in metres per second (m/s)

v – final speed in metres per second (m/s)

t – time in seconds (s)

a – acceleration in metres per second squared (m/s2)

Name an equation that uses v, u, a and t, when it is very useful?

This equation allows you to find the acceleration of an objects whose velocity is changing. Useful in situations where there is **constant acceleration.**

What is the equation that represents Newton’s second law and describe good problem solving technique when applying it.

This gives the **unbalanced force** and is the resultant of all forces acting on the object. A free body diagram is **essential** for all force questions. Trigonometry or scale diagram may be required to find the Fun force.

What do the letters s, v, a and u stand for and what are the units?

s - displacement in metres (m), needs direction

u – initial velocity in metres per second (m/s), direction is required

v – final velocity in metres per second (m/s) also requires a direction.

a – acceleration in metres per second squared (m/s2)

Given the Weight force, which equation allows you to find the gravitational field strength of the planet?

Note that g depends on the square of the distance away from the planet.

What do the letters W, m and g stand for and what are the units?

W – Weight force in Newtons (N)

m – mass in kilograms (kg)

g – gravitational field strength in Newtons per kilogram or metres per second squared (N/kg or m/s2)

What do the letters F, m and a stand for and what are the units?

F – Resultant Force in Newtons (N)

m – mass in kilograms (kg)

a – acceleration in metres per second squared (m/s2)

What do the letters u, v, s and t stand for and what are the units?

s - displacement in metres (m), needs direction

u – initial velocity in metres per second (m/s), direction is required

v – final velocity in metres per second (m/s) also requires a direction.

t – time in seconds (s)

What equation allows you to find initial speed if you know v, a and s ?

Note this equation is very useful for problems where the initial of final velocity is zero. Eg at the maximum height of a projectile v = 0 m/s, or when starting from a maximum height u = 0 m/s.

If an object has initial speed u, accelerates constantly to a final speed v in time t, how do you find displacement?

This equation can be used with either constant acceleration or constant speed as is effectively finding the area under the velocity time graph.

What do the letters F, d and Ew represent and what are the units?

F – Resultant Force in Newtons (N)

Ew – Work done in joules (J)

d - distance in metres (m)

What is the equation for kinetic energy, and give an exam hint when tackling problems?

Take care after substituting numbers into this equation that you keep the squared symbol above the velocity!

What do the letters Ek, m, and v stand for and what are the units?

Ek – Kinetic energy in joules (J)

m – mass in kilograms (kg)

v – velocity in metres per second (m/s)

How are power, energy and time linked? How is this term often described in exam papers?

In exam questions you are often asked to find the rate of energy transfer, this is just the same as finding the power.

What do the letters P, t and E stand for and what are the units?

E – Energy in joules (J)

t – time in seconds (t)

P – Power in watts (W) or Joules per second (J/s)

What do the letters Ep, m, g and h stand for and what are the units?

Ep – Gravitational potential energy in joules (J)

h - height in metres (m)

m – mass in kilograms (kg)

g – gravitational field strength in Newtons per kilogram or metres per second squared (N/kg or m/s2)

What equation links Force, distance and energy and when might you need to use this equation?

If a constant Force is applied over a distance, this gives the energy transferred. Often asked in connection with work done against Friction, or in connection with lifting objects at **constant speed (Weight Force is the applied force in this case)**.

How do you calculate the gravitational potential energy gained by an object being lifted?

The mass must be in kilograms and on earth g will be 9.8 m/s2.

How do you find the Impulse in a collision and what are the units?

Impulse = Ft

The impulse has units of **Ns** or **kgm/s**.

How do you calculate momentum and in what form are you more likely to use the equation?

**Total momentum before = Total momentum after** - m1u1 + m2u2 = m1v1 + m2v2

Always remember to state the fact in bold at the start of these questions. The velocities are vectors, take care with directions.

How are impulse and momentum connected and how would you find these quantities from a graph?

This equation can be used to calculate the average force exerted during a collision. Increasing time of contact reduces average force. The impulse (or change in momentum) is the area **under a Force time graph**.

What do the letters *p*, m and v represent and what are the units?

*p* – momentum in kilogram metres per second (kgm/s)

m – mass in kilograms (kg)

v – velocity in metres per second (m/s)

How can you find the Force between two masses and how could you use this equation to find g?

Equate this force to Weight force and then cancel the small mass, allowing calculation of g.

What do the letters F, G, m and r stand for and what are the units?

F – Resultant Force in Newtons (N)

m – mass in kilograms (kg)

r – distance between centre of masses in metres (m)

G – Universal gravitational constant in Nm2/kg2

What equation allows you to find the dilated time when travelling at high velocities?

t' is the dilated time, this is the time experienced by the moving object as recorded in the non moving frame of reference.

What do the letters t’, t, v and c stand for and what are the units?

t' – time in seconds (s)

t – time in seconds (s)

v – velocity in metres per second (m/s)

c – speed of light – 3 x 108 metres per second

What do the letters f0, fs, v and vs represent and what are the units?

f0 – Frequency recorded by observer in Hertz (Hz)

fs – Frequency of source when stationary in Hertz (Hz)

v – velocity of wave (usually sound) (m/s)

vs – velocity of source

How do you find the recession velocity of a galaxy and what can you do with this number?

In many questions after you have calculated the recession velocity, you are asked to find the distance the galaxy is away using Hubble’s constant.

What do the letters z, v and c stand for and what are the units?

z – The red shift, just a number, it has no unit.

v – velocity of galaxy in metres per second (m/s)

c – speed of light

What equation allows you to find the contracted length when travelling at high velocities?

l' is the contracted length, this is the length of the object as measured by the non moving frame of reference.

What do the letters l’, l, v and c stand for and what are the units?

l' – relativistic length (m)

l – rest length (m)

v – velocity in metres per second (m/s)

c – speed of light – 3 x 108 metres per second (m/s)

What do the letters λ and z stand for and what are the units?

λ - wavelength in metres (m)

z – The red shift, just a number, it has no unit.

When is a Doppler shift observed and what equation links f0 to fs where fs is the frequency of a stationary source. ?

A Doppler shift is observed if a sound source is moving with respect to the observer.

What is the equation that links observed and rest wavelengths and when is this equation useful?

This equation is used to find the redshift of moving galaxies. The redshift can then be used to find the recession velocity of the galaxy.

What do the letters E, m and c stand for and what are the units?

E – energy measured in joules (J)

c – speed of light – 3 x 108 metres per second (m/s)

m – mass in kilograms (kg)

What do the letters EW, Q and V represent and what are the units?

EW – The work done in moving charge through an electric field in joules (J)

Q – Charge in coulombs (C)

V – Potential difference in volts (V)

How can you find the distance to a Galaxy and how can you find the age of the Universe?

To find the age of the Universe calculate 1/H0.

What do the letters v, d and H0 stand for and what are the units?

d – distance in metres (m)

v – velocity of galaxy in metres per second (m/s)

H0 – Hubble’s constant in seconds to the minus 1 (s-1)

Electromagnetic waves have photons. How do you calculate the Energy of a photon from the frequency?

Note: in exams you will may be given the wavelength of the photon, in which case you must convert this to frequency first. The energy of one photon is very small.

What do the letters E, h, and f stand for and what are the units?

E – energy measured in joules (J)

h – Planck’s constant in Joule seconds (Js)

F – frequency measured in Hertz (Hz)

How do you find the work done by an electric field on a charge and what is the charge of an electron?

Often electrons or protons are accelerated using electric fields, the charge on an electron is – 1.6 x 10-19 C. (This is on the front cover of the exam)

How do you link energy and mass and in what situations will you encounter this equation?

In either Fusion or Fission nuclear reactions there is a mass loss, this mass is converted to energy according to the above equation.

How do you find the kinetic energy of an electron that has undergone photoemission, how could you then find the velocity of the electron?

This energy is the kinetic energy of the electron so just use Ek = ½ mv2. (Use the mass of the electron from the exam front cover)

How can you find the frequency of a light source from the wavelength?

For light waves v is 3 x 108 m/s

What do the letters v, f and λ stand for and what are the units?

f – frequency measured in hertz (Hz)

v – velocity of galaxy in metres per second (m/s)

λ - wavelength in metres (m) – for light these will be in nano metres.

What is the gratings equation and how do you find m in this equation?

M is the number of maxima that have occurred. eg for the third bright spot m = 3

What do the letters d, λ and θ stand for and what are the units?

θ – angle between maxima in degrees

λ - wavelength in metres (m) – for light these will be in nano metres.

d – slit separation in metres (m)

What do the letters T and f stand for and what are the units?

T – Period of oscillation (or time for one wave to pass a point) measured in seconds (s)

f – frequency measured in hertz (Hz)

In what situation would you apply the following formula?

An electron can occupy discreet energy levels within an atom. An incident photon can excite an electron to a higher energy state if the energy of the photon exactly matches the energy gap between levels. This equation links the energy gap to photon frequency.

What equation links T and f and how would you use an oscilloscope to find frequency?

Count the number of squares on the oscilloscope that make one wave. Then multiply this by the time base value (usually in ms).

What do the letters n, θ1, and θ2 stand for and what are the units?

θ1 – angle between the incident ray and the normal in degrees

θ2 – angle between the incident ray and the normal in degrees

n – the refractive index is just a number

What equation links Irradiance and distance for a point source of light, how can you use the equation to find Irradiance at a different distance?

Equate I1d12 to I2d22. Remember to always use metres for distance.

What do the symbols I, P and A stand for and what are the units?

I – Irradiance in Watts per metre squared. (W/m2)

P – Power in Watts (W)

A – Area in square metres (m2)

How are P, I and A related?

This gives the irradiance of a light source covering an area, A. For a beam of light this area remains constant as distance increases, for a point source as distance increases the area is proportional to square of distance.

Interference occurs if waves are coherent (constant phase relationship) and the same f, λ, and v. What equation gives the rules for constructive interference?

where m=0,1,2,3….

How are speed, wavelength and angle linked when light passes from one medium to another?

What equation do you use to find the refractive index of a material if you shine a ray of light into it?

Note: θ1 will usually refer to the angle in air.

If you know the refractive index, how can you find the critical angle? What happens in light is at an angle greater than the critical angle?

The light is **totally internally reflected.**

Interference occurs if waves are coherent (constant phase relationship) and the same f, λ, and v. What equation gives the rules for destructive interference?

where m=0,1,2,3….

What equation allows the calculation of total resistance in parallel?

Always remember that this equation calculates 1/RT. To find RT you must invert (find 1 over) the answer on the right hand side.

What do the letters R1,R2 and RT stand for and what are the units?

R1 – Resistance of a resistor in ohms (Ω)

R2 – Resistance of a resistor in ohms (Ω)

RT – Total resistance of a combination of resistors in ohms (Ω)

Name an equation that uses the symbols Vpeak and Vrms and explain a situation you would use the equation.

When using an ac supply the voltage alternates, the root mean square is the effective voltage received by the component. Vpeak is always larger than Vrms

What do the letters Vpeak and Vrms stand for and what are the units?

Vpeak – Peak Voltage of ac supply (V)

Vrms – Root mean square voltage (V)

Name three equations that can find the rate of energy transfer of an electrical component.

These equations can be used to find the number of Joules of energy transferred per second by an electrical component.

What do the letters P, I, V and R stand for and what are the units?

P – Power in watts (W)

V – Potential Difference in volts (V)

I – Current in amperes (A)

R – Resistance in ohms (Ω)

How do you find the random uncertainty when conducting an experiment, what two ways can it be expressed?

The error can be expressed in absolute or percentage form.

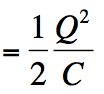
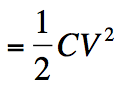
What do the symbols E, Q, V and C stand for and what are the units?

E – Energy in Joules (J)

V – Potential Difference in volts (V)

Q – Charge in Coulombs (C)

C – Capacitance in Fards (F)



What equation links the ratios of potential difference and resistance in a potential divider?

These questions can be answered using ratios as long as you state clearly in your answer that you used ratios to solve the problem.

What graph do you need to plot to find capacitance and finding the gradient leads to what equation?

Plot a graph of charge (y-axis) versus potential difference across capacitor (x-axis). A line of best fit goes through the origin. The gradient of this is defined as capacitance. This gives

Name the three equations that can find the energy stored in a capacitor.

These equations can be used to find the number of Joules of energy stored in a capacitor.

What equation would allow the calculation of total resistance in series?

If there is a combination of resistors in series, that are in also parallel with more resistors, calculate the series element first.

How are Ipeak and Irms related and explain a situation you would use the equation.

When using an ac supply the current alternates, the root mean square is the dc equivalent current received by the component. Ipeak is always larger than Irms.

What do the symbols V1, V2, R1 and R2 stand for in terms of a potential divider and what are the units?

V1 – Potential difference across resistor 1 measured in volts (V)

V2 - Potential difference across resistor 2 measured in volts (V)

R1 – Resistance of resistor 1 unit of ohms (Ω)

R2 - Resistance of resistor 2 unit of ohms (Ω)

What do the letters Ipeak and Irms stand for and what are the units?

Ipeak – Peak Current of ac supply (A)

Irms – Root mean square current (A)

If an object is on a slope that makes an angle of θ with the ground, how do you find the component of Weight down the slope?

***F = mg sinθ***

This equation can be used to find the size of the frictional force of the slope if the object is at rest or travelling down at constant speed with no engine force.

Ohm’s law states that potential difference is directly proportional to current, what equation does this lead to?

What is the rate of flow of charge called and what equation allows it to be calculated?

Rate of flow of charge is called current.

How does emf relate to t.p.d. and lost volts, and what equation allows internal resistance to be calculated from emf?

Emf = t.p.d. + lost volts

A graph of t.p.d. versus current has a gradient of –r and a y-intercept of emf.

What equation allows the calculation of the p.d. across a resistor if the supply p.d. is known.

Note: The proportion of total p.d. across a resistor is equal to its proportion of total resistance in the circuit.

What do the symbols E, V, I and r stand for in terms of electric circuits?

E – emf measured in volts (V)

I – Current (A)

V – p.d. across external components in volts (V)

r – Internal resistance measured in ohms (Ω)