IGCSE REVISION QUESTIONS

These questions are based on the EdExcel IGCSE Physics (4420) specification.

The specification is broken up into seven sections:

1.) Forces and motion
2.) Electricity
3.) Waves
4.) Energy resources and energy transfer
5.) Solids, liquids and gases
6.) Magnetism and electromagnetism
7.) Radioactivity and particle

UNITS

Complete the table below:

Quantity	Quantity symbol	Unit	Unit symbol
Distance	x	metre	m
Mass	m	kilogram	kg
Time	t	second	s
Temperature	T	kelvin	K
Electric current	I	ampere	A
Amount of substance	*none*	mole	mol
Luminous intensity	I	candela	cd
Speed	s	metres per second	m/s
Acceleration	a	metres per second^2	m/s^2
Force	F	newton	N
Energy	E	joule	J
Charge	Q	coulomb	C
Potential difference	V	volt	V
Angle	*none*	degree	°
Wavelength	λ	metre	m
Frequency	f	hertz	Hz
Refractive index	n	*none*	*not applicable*
Power	P	watt	W
Density	ρ	kilograms per metre^3	kg/m^3
Area	A	metres^2	m^2
Volume	V	metres^3	m^3
Pressure	p	pascals	Pa
Radioactive activity	A	becquerel	Bq

FORCES AND MOTION

1.) What does the gradient of a distance-time graph represent?
Speed

2.) What does the area underneath a velocity-time graph represent?
Distance travelled

3.) What does the gradient of a velocity-time graph represent?
Acceleration

4.) What equation links speed, distance and time?
Speed = distance / time

5.) What equation links acceleration, change in speed and time?
Acceleration = change in speed / time

6.) What do forces do?
Change motion or shape

7.) What types of forces exist?
Gravitational (weight), electrostatic, tension, friction (drag, air resistance), magnetic, thrust, upthrust

8.) What two things does friction do?
Friction opposes motion and causes heating

9.) What equation links force applied, mass and acceleration?
force applied = mass × acceleration

10.) What equation links weight, mass and gravitational field strength?
weight = mass × gravitational field strength

11.) Why do falling objects reach terminal velocity?
Falling objects reach terminal velocity when air resistance is equal to weight.

12.) What factors affect thinking distance of a stopping car?
Fatigue, drug or alcohol use, age etc.

13.) What factors affect braking distance of a stopping car?
Condition of tyres, mass and speed of car, weather conditions etc.

14.) What equation links the moment of a force, the force and the perpendicular distance from the pivot to the force.
Moment of force = force × distance from pivot to force

15.) What is the principle of moments?
In equilibrium the moments clockwise are equal to the moments anticlockwise.

16.) What is an object's centre of gravity?
The centre of gravity is a point through which the weight of an object can be said to act.

17.) How does the extension of a spring, wire or rubber band vary with the load placed upon it? What name is given to this principle?
Extension is proportional to load up to the elastic limit; this is known as Hooke's Law

ELECTRICITY

1.) What does electrical insulation do?
It prevents electrocution by shielding current-carrying cables

2.) How does a fuse work?
A fuse breaks a circuit when too much current flows through it, causing it to heat up and melt

3.) What two things does electrical resistance do?
Resistance opposes the flow of current and causes heating

4.) What equation links power, current and potential difference?
Power = current × potential difference

5.) What equation links energy transferred, current, potential difference and time?
Energy transferred = current × potential difference × time

6.) What is the difference between AC and DC current?
AC current oscillates between positive and negative voltage. DC current does not.

7.) Is the UK mains supply AC or DC?
AC

8.) Is the current from a battery of cells AC or DC?
DC

9.) In a parallel circuit is potential difference or current the same across all components?
Potential difference

10.) What equation links resistance, potential difference and current?
Resistance = potential difference / current

11.) What is current?
Current is a flow of charge

12.) What equation links charge, current and time?
Charge = current × time

13.) What is one volt equivalent to?
One volt is one joule per coulomb of charge

14.) How does the resistance of a thermistor vary with temperature?
As temperature rises resistance falls

15.) How does the resistance of a light-dependent resistor vary with luminance?
As luminance increases resistance decreases

16.) What is the difference between and insulator and a conductor?
An insulator does not allow current to flow; a conductor does

17.) What is triboelectricity?
The charging of an insulating body by friction (such as rubbing a plastic rod with a duster)

18.) What causes an object to become positively charged?
A loss of electrons

19.) Do unlike charges attract or repel each other?
Unlike charges attract each other

20.) How can electrostatic charges be dangerous?
A build-up of electrostatic charge can cause sparks

21.) What are electrostatic charges used for?
Inkjet printers, photocopiers, crop and paint spraying, smoke filtration etc.

WAVES

1.) What is the difference between longitudinal and transverse waves?
Longitudinal waves oscillate parallel to the direction of propagation. Transverse waves oscillate perpendicularly to the direction of propagation.

2.) What do waves transfer?
Waves transfer energy (and information)

3.) What equation links wave speed, wavelength and frequency?
Wave speed = wavelength × frequency

4.) What equation links frequency and time period?
Frequency = 1 / time period

5.) What is diffraction?
Diffraction is the spreading out of a wave as it passes through a gap

6.) When does the greatest diffraction take place?
When the gap width is equal to the wavelength of the wave

7.) What sections make up the electromagnetic spectrum?
Radio waves, microwaves, infrared, visible light, ultraviolet, X-rays, gamma rays

8.) Which waves have the longest wavelength?
Radio waves

9.) Which waves have the highest frequency?
Gamma rays

10.) What are radio waves used for?
Broadcasting, communications

11.) What are microwaves used for?
Cooking, satellite transmissions

12.) What are infrared waves used for?
Remote controls, heaters, night-vision equipment

13.) What are ultraviolet waves used for?
Tanning lamps, killing bacteria

14.) What are X-rays used for?
(Medical) imaging, astronomy

15.) What are gamma rays used for?
Sterilising food and medical equipment, cancer treatment

16.) What damage can microwaves do to humans?
Heating of tissues

17.) What damage can infrared waves do to humans?
(Skin) burns

18.) What damage can ultraviolet waves do to humans?
Blindness, skin cancer

19.) What damage can gamma rays do to humans?
Cell mutation leading to cancer

20.) Are electromagnetic waves longitudinal or transverse?
Transverse

21.) What equation links refractive index, angle of incidence and angle of reflection?
Refractive index = sin(angle of incidence) / sin(angle of reflection)

22.) What role does total internal reflection play in the transmission of information?
It allows light to be sent along optical fibres

23.) What occurs at angles of incidence beyond the critical angle?
Total internal reflection

24.) What equation links critical angle and refractive index?
sin(critical angle) = 1 / refractive index

25.) What is the difference between analogue and digital signals?
Digital signals can be reproduced perfectly; the reproduction of analogue signals unavoidably involves some loss of information

26.) What is frequency range of human hearing?
20Hz to 20,000Hz

27.) What does the pitch of a sound wave depend on?
The frequency of the wave

28.) What does the volume of a sound wave depend on?
The amplitude of the wave

ENERGY RESOURCES AND ENERGY TRANSFER

1.) What types of energy exist?
Nuclear potential, chemical potential, gravitational potential, elastic potential, thermal, sound, light, kinetic and electrical

2.) What does the principle of the conservation of energy state?
Energy cannot be created or destroyed, only transferred from one form to another

3.) How is the efficiency of a system defined?
Efficiency = useful energy output / total energy input

4.) By what three methods is thermal energy transferred?
Conduction, convection and radiation

5.) What is work done?
The work done is equal to the energy transferred

6.) How is the work done by a force calculated?
Work done = force × direction moved in direction of the force

7.) How is the change in gravitational potential energy of a body calculated?
Change in gravitational potential energy = mass × gravitational field strength × change in height

8.) How is kinetic energy calculated?
Kinetic energy = ½ × mass × velocity^2

9.) What is power?
Power is the rate of doing work

10.) How is power calculated?
Power = work done / time taken to do work

11.) What are the advantages and disadvantages of using the wind to generate electricity?
Clean, renewable; only works when windy, inefficient, noisy, causes visual pollution

12.) What are the advantages and disadvantages of using hydroelectric generation for electricity?
Renewable; specific to location, massive change to landscape

13.) What are the advantages and disadvantages of using geothermal generation for electricity?
Renewable, specific to location

14.) What are the advantages and disadvantages of using fossil fuels to generate electricity?
Easy to use, fuels can be easily transported to locations; non-renewable, damaging to environment

15.) How awesome is nuclear power?
Very

16.) What is the difference between solar panels and solar cells?
Solar panels store thermal energy, solar cells generate electricity

SOLIDS, LIQUIDS AND GASES

1.) What equation links density, mass and volume?
Density = mass / volume

2.) What equation links pressure, force and area?
Pressure = force / area

3.) In which direction does pressure in a liquid or gas act?
In all directions

4.) How is pressure underneath a fluid calculated?
pressure difference = height × density × gravitational field strength

5.) At what temperature does a substance change from gas to liquid?
Boiling point

6.) At what temperature does a substance change from solid to liquid?
Melting point

7.) What is absolute zero?
The coldest possible temperature (−273°C)

8.) How is the kinetic energy of particles in a gas affected by an increase in temperature?
Kinetic energy increases

9.) How are the pressure and temperature of a gas in a sealed container related?
Pressure is directly proportional to temperature