Questions for Parents

Physics

2018/2019

Physics

CP1

Motion

CP1a- Vectors and Scalar

1. **Runner A finishes a race in less time than runner B. Who is faster?**

   Runner A

2. **What two measurements are needed to calculate a speed?**

   Distance and time

3 **What is the unit for speed if the time is measured in hours and the distance is measured in miles?**

   Miles per hour

4 **What is the unit for speed used on the roads in the UK?**

   Miles per hour

5. **What is the SI unit for speed?**

   M/s

6 **What does 'acceleration' mean?**

   Speeding up or slowing down

7 **What is a force?**

   Push or pull

8 **How do we represent forces on diagrams?**

   Arrows, with length depending on size of force

9 **What does 'mass' mean?**

   Amount of substance

10 **What is the unit for mass?**

   Kilogram.

CP1b- Distance/Time Graphs

1 **What does a vector have that a scalar does not?**

   Direction

2 **Name a scalar and a vector measured in metres.**

   Distance, displacement

3 **Name a scalar and a vector measured in metres/second.**

   Speed, velocity

4 **Name a vector with units of newtons.**

Force or weight

5 **Is mass a vector or scalar?**

Scalar

6 **Is energy a vector or scalar?**

Scalar

7 **What is acceleration?**

A change in velocity

8 **Why is acceleration a vector?**

It is measuring a change in another vector

9. **How can speed be calculated?**

From a distance and time

10 **How fast is your walking speed?**

Typical brisk pace is 3 mph/5 km/h/1.4 m/s

CP1c- Acceleration

1 **What is the difference between speed and velocity?**

Velocity has a direction/is a vector

2 **What is the equation for calculating speed?**

Speed = distance/time

3 **What is the SI unit for speed?**

Metres per second

4 **What is average speed?**

Total distance/time for whole journey

5 **What is the equation for calculating distance?**

Distance = speed × time

6 **How is a constant speed shown on a distance/time graph?**

Straight, sloping line

7 **What does a horizontal line on a distance/time graph show?**

Stationary object

8 **How do you work out the gradient of a line on a graph?**

Vertical difference/horizontal difference

9 **What is the speed of sound?**

Approximately 330 m/s

10 **What is the maximum speed for vehicles on UK roads?**

70 mph/31 m/s.

CP1d- Velocity/Time graphs

1 **How is a stationary object shown on a distance/time graph?**

Horizontal line

2 **How can you tell which part of a journey shown on a distance/time graph has the highest speed?**

Steepest line

3. How can you calculate velocity from a distance/time graph?

Gradient of line

4 **What does acceleration mean?**

Change in velocity in time

5 **What are the units for acceleration?**

Metres per second squared

6 **In the acceleration equation, what does *u* stand for?**

Initial velocity

7 **In the acceleration equation, what does *v* stand for?**

Final velocity

8 **What is the equation for calculating acceleration?**

Change in velocity/time, or $(v - u) \div t$

9 **What is the acceleration due to gravity?**

10 m/s^2 to 1 sig. fig or 9.8 m/s^2 to 2 sig. fig

10 **What is the maximum horizontal acceleration students are likely to experience in everyday life?**

About 1.5 m/s^2 (average family car)

Physics

CP2

Forces and Motion

CP2- Forces and motion

CP2a- Resultant Forces

1. What is the force that pulls us towards the Earth?

Gravity

2. What is 'drag' another name for?

Air resistance or water resistance

3. Name two quantities that are vectors.

Force, velocity, acceleration, displacement

4. What are balanced forces?

Forces of the same size in opposite directions

5. What do we call the forwards force produced by an aeroplane's engine or propeller?

Thrust

6. What word describes both the speed and direction of movement of an object?

Velocity

7. **What is the name for a single force on an object with the same effect as all the forces combined?**

Resultant

8. How do we describe the forces on an object when the force in one direction is bigger than the force in the other?

Unbalanced

9 **Two forces on an object are in the same direction. How do we calculate the resultant force?**

Add

10 **Two forces on an object are in opposite directions. How do we calculate the resultant force?**

Find the difference between them

CP2b- Newton's First Law

1 **What is the name for the force on an object that acts in the same way as all the other forces combined?**

Resultant

2 **Give two examples of vector quantities.**

Velocity, force, acceleration, displacement, weight, momentum

3 **Give two examples of scalar quantities.**

Speed, mass, distance, energy

4 **What are the units for force?**

Newton's

5 **What is acceleration?**

Change in velocity – note, not change in speed

6 **What does the length of a force arrow on a diagram represent?**

Size of force

7 **An aeroplane has thrust of 2000 N and drag of 1800 N. What is the resultant?**

200 N forwards

8 **Air resistance on a cyclist is 20 N and friction is 5 N. What is the total force trying to slow the cyclist down?**

25 N backwards

9 **Name a vector quantity that changes as a car drives at constant speed around a roundabout.**

Velocity

10 **What are unbalanced forces?**

Forces of different sizes in opposite directions

<u>CP2c- Mass and weight</u>

1 **What is the direction of the resultant force on a car that is speeding up?**

Forwards

2 **What is the direction of the resultant force on a bicycle that is slowing down?**

Backwards

3 **How does a sideways resultant force affect the velocity of a moving object?**

Changes its direction

4 **How can the pilot of an aeroplane make the plane gain speed upwards?**

Increase the lift/upwards force

5 **How do balanced forces affect the velocity of a moving car?**

The car continues with the same velocity.

6 **You pedal harder on a bicycle. What happens?**

You accelerate/get faster

7 **What is the name of the force that makes objects move in a circular path?**

Centripetal

8 **What provides the centripetal force for a car going around a roundabout?**

Friction

Questions 7-9 (Higher Content)

9 **What are the forces on a moon orbiting around a planet?**

Gravity acting towards the planet

10 **In which direction does centripetal force act?**

Towards centre of the circle

CP2d- Newton's second Law

1 **Why is the force of gravity greater on a lorry than on a car?**

Larger mass

2 **What are the units for acceleration?**

Metres per second squared, m/s^2

3 **How is acceleration calculated from a change in velocity?**

Velocity change/time

4 **Is acceleration a vector or scalar quantity?**

Vector

5 **Name a force that accelerates objects downwards.**

Gravity/weight

6 **Why is the resultant force accelerating a car usually less than the force provided by its engine?**

Air resistance and/or friction

7 **Name one force that usually has to be taken into account when working out the resultant force on a moving object.**

Drag or friction

8 **When will a resultant force act to slow a car down?**

When backwards forces are greater than forwards ones

9 **How can friction act to make a car speed up?**

Between tyres and road

10 **How can friction act to make a car slow down?**

In brakes

CP2e- Newton's third law

1 **Name two factors that affect the acceleration of an object.**

Mass, force

2 **For the same force, how does reducing the mass of an object affect its acceleration?**

Increases it

3 **For the same mass, how does increasing the force affect the acceleration?**

Increases it

4 **What is the equation linking force, mass and acceleration?**

$F = m \times a$

5 **An object is moving at a constant velocity. What can you say about the forces on it?**

Balanced

6 **A stationary object has a 100 N force on it in one direction. What other force acts on it?**

100 N in the opposite direction

7 **What force stops your foot slipping on the ground when you walk?**

Friction

8 **What do you feel if you stretch a spring more and more?**

Spring pulls back more and more

Questions 9-10 (Higher Content)

9 **What is inertial mass?**

Mass obtained from a force and acceleration/a measure of how difficult it is to change the velocity of an object

10 **How are the values for the mass and the inertial mass of an object different?**

They aren't

CP2f- Momentum

1 **Name two vector quantities connected with movement.**

Any from velocity, acceleration, displacement, momentum

2 **Name the two factors that affect the acceleration of an object.**

Force and mass

3 **What is the equation relating acceleration, force and mass?**

Force = mass × acceleration

4 **What are the usual units for velocity in physics?**

Metres per second

5 **What are the units for acceleration?**

Metres per second squared

6 **What is the standard unit of mass?**

Kilogram

7 **What is the standard unit of time?**

Second

8 **What is the equation for calculating acceleration from velocity and time?**

Acceleration = change in velocity ÷ time

9 **What does 'conservation' mean in phrases such as 'conservation of energy'?**

Total amount stays the same

10 **What happens when there is a resultant force in the opposite direction to the movement of an object?**

It will decelerate/slow down

CP2g- Stopping Distance

1 **What two pieces of information are needed to work out the speed of a moving object?**

Distance covered, time

2 **What is the equation relating these factors?**

Speed = distance ÷ time

3 **What type of force is used to slow down a moving vehicle?**

Friction

4 **Where is this force applied?**

Brakes, tyres

5 **Why is a wet road more slippery than a dry one?**

Water acts as lubricant

6 **How does the mass of a moving object affect its acceleration?**

Higher mass, lower acceleration

7 **How does the force applied to an object affect its acceleration?**

Larger force, larger acceleration

8 **An object has a negative acceleration. What does this mean?**

It is slowing down

9 **What effect does drinking alcohol have on human reaction times?**

Slows them down/makes them longer

10 **How will being tired affect reaction time?**

Make it longer

CP2h- Crash Hazards

1 **What does 'braking distance' mean?**

The distance a car travels while slowing down

2 **What does 'thinking distance' mean?**

The distance a car travels while the driver is reacting to a danger and deciding to apply the brakes

3 **How does speed affect the thinking distance?**

Higher speed, longer thinking distance/thinking distance directly proportional to speed

4 **How does speed affect the braking distance?**

Higher speed, longer braking distance/braking distance proportional to speed squared

5 **How does the force needed for an acceleration depend on the size of the acceleration?**

Larger acceleration, larger force needed

6 **What does 'deceleration' mean?**

Slowing down/a negative acceleration

7 **What factors affect the momentum of a moving object?**

Mass, velocity

8 **How does the mass affect momentum?**

Higher mass, higher momentum

Questions 7-10 (Higher Content)

9 **How does the velocity affect momentum?**

Higher velocity, higher momentum

10 **What does 'momentum is conserved' mean?**

Total momentum is the same before and after a collision

Physics

CP3-

Conservation

of energy

CP3- Conservation of energy

CP3a- Energy stores and transfers

1 **What is the unit for measuring energy?**

Joule

2 **What is the name for energy stored in a hot object?**

Thermal/internal

3. How is energy transferred from hot objects to their surroundings?

By heating/convection/conduction/radiation/evaporation

4 **Energy stored in petrol in a car is transferred to energy stored in the moving car. What are the names for these two energy stores?**

Chemical, kinetic

5 **If 100 J of energy is transferred into a machine, how much is transferred out?**

100 J

6 In what way is most wasted energy transferred?

By heating

7. When an object is moved to a higher position, what name is given to the energy that it then stores?

Gravitational potential energy

8 **What are the energy transfers when a ball bounces?**

Kinetic → strain/elastic potential → kinetic

9 **What are the energy transfers when a moving car slows down?**

Kinetic → thermal energy stored in the brakes/surroundings, energy transferred by forces

10 **Name three different types of object or substance that store energy in chemicals.**

Food, fuel, batteries/cells

CP3b- Energy Efficiency

1 **Name two ways in which a television transfers useful energy to its surroundings?**

Light, sound

2 **Name one way in which a television transfers wasted energy to its surroundings**

By heating

3 In what way do most machines or processes transfer wasted energy to the surroundings?

By heating

4 Name two machines in which energy transferred by heating is useful energy.

Any two sensible answers, such as cooker or fire

5 When a kettle boils water, the useful energy ends up stored as thermal energy in the hot water. Where does the wasted energy end up?

Thermal energy in kettle/surroundings

6 When a moving car brakes and comes to a stop, where does all the kinetic energy it was storing eventually end up?

Thermal energy in the surroundings

7 When a moving car hits a wall, what happens to the kinetic energy it was originally storing?

Kinetic energy of crash fragments, transferred to surroundings by sound – but all ends up as thermal energy in the surroundings

8 **What does dissipated mean?**

Spread out

9 **Why is 'wasted' energy transferred by heating no longer useful?**

It is too spread out

10 **Which wastes more energy: a more efficient machine or a less efficient machine?**

Less efficient

<u>CP3c- Keeping Warm</u>

1 **What happens to the particles in a solid when the solid gets warmer?**

Vibrate more

2 **One end of a metal bar is heated. What is the name for the way energy is transferred along the bar?**

Conduction

3 What kind of materials are good thermal conductors?

Metals

4 Name two materials that are good thermal insulators.

Any two from wood, plastic, wool, etc.

5 What is the name for the way in which energy is transferred in a fluid (liquid or gas)?

Convection

6 What causes convection current?

Part of the fluid being hotter than the rest/warm fluid rises

7 Materials that contain trapped air are good insulators. Why does the air need to be trapped?

So it cannot transfer energy by convection

8 **How does warmth from the Sun reach the Earth?**

Radiation

9 **Will a black car or a white car get hotter on a sunny day?**

Black

10 **Name one thing a homeowner can do to reduce the money they spend on heating.**

Any from insulate loft, fit double glazing etc.

CP3d- Stored Energies

1 What is the unit for measuring energy?

Joule

2 What is the name for energy stored in an object because it is in a high position?

Gravitational potential energy

3 What is the name for energy stored in a moving object?

Kinetic energy

4 What is the standard unit in physics for measuring speed?

Metres per second

5 What is the standard unit for measuring mass?

Kilograms

6 How many grams are there in a kilogram?

1000

7 What is the standard unit in physics for measuring distances or heights?

Metres

8 What is the law of conservation of energy?

Total energy stays the same, or energy cannot be created or destroyed.

9 A ball has 5 J of gravitational potential energy before it is dropped. How much kinetic energy is it storing the moment before it hits the floor: 0 J, less than 5 J, 5 J, or more than 5 J?

5 J

10 How can you increase the gravitational potential energy stored in a box?

Move it up, away from the Earth.

CP3e- Non-renewable resources

1 **Name a store of chemical energy.**

Any from coal, oil, natural gas, food, batteries/cells

2 **What do we call the kind of energy stored inside atoms?**

Nuclear energy or atomic energy

3 When we burn a fuel, how is the energy transferred to the surroundings?

By heating

4 How is energy transferred to machines such as TVs and computers?

By electricity

5 Is electricity a fuel?

No

6 Name two fuels that are used by most vehicles on the roads?

Petrol, diesel

7 Name two fuels that we call fossil fuels.

Any two from coal, oil, natural gas, or oil derivatives such as petrol and diesel

8 **What are the two products of the complete burning of fossil fuels?**

Carbon dioxide, water

9 **What effect does carbon dioxide in the atmosphere have on the temperature of the Earth?**

Keeps it warm

10 **What is the name for the idea that the Earth is getting warmer?**

Climate change/global warming

CP3f- Renewable resources

1 **Name four different non-renewable resources.**

Coal, oil, natural gas, nuclear fuel/uranium

2 **Name two different uses for natural gas.**

Power stations, heating homes, cooking

3 Name the main use for coal.

Power stations

4 How is uranium used?

(Nuclear) power stations

5 What gas do fossil-fuelled power station emit that nuclear power stations do not?

Carbon dioxide

6 **Why is adding carbon dioxide to the atmosphere a problem?**

Contributing to climate change

7 **Why do some people object to nuclear power stations?**

Too expensive to build/decommission, or waste is dangerous/difficult to dispose of safely/accidents can cause harm over large areas

8 **Why will supplies of fossil fuels eventually run out?**

We are using them faster than they can be replaced

9 **Name two forms of renewable energy.**

Two from: solar, wind, waves, tides, bio-fuel

10 **What is the name for a fuel made from plants or from animal wastes?**

Bio-fuel

Physics

CP4-

Waves

CP4- Waves

CP4a- Describing Waves

1 Name three different types of wave.

Any three from: light, sound, waves on water, seismic waves

2 What property of a wave does the wavelength describe?

The distance from one wave to the same place on the next wave

3 What are the units for wavelength?

Metres

4 What property of a wave does the frequency describe?

The number of waves per second

5 What are the units for frequency?

Hertz

6 What is transferred by a wave?

Energy

7 What does amplitude mean?

The height of a wave – more correctly, the maximum displacement of a particle from its rest position

8 In which direction do the particles in a sound wave move compared to the direction the wave is travelling?

Backwards and forwards in the same direction as the wave

9 What word is used to describe waves like sound waves?

Longitudinal

10 What word is used to describe waves like the waves on water?

Transverse

CP4b- Wave Speed

1 Name a type of transverse wave.

Waves on water, some seismic waves, light waves

2 Name a type of longitudinal wave.

Sound, some seismic waves

3 What is the difference between longitudinal and transverse waves?

The direction the particles move compared to the direction the wave is travelling

4 What word describes the number of waves per second?

Frequency

5 What word describes the time taken for one wave to pass?

Period

6 What word describes the distance between a point on one wave and the same point on the next wave?

Wavelength

7 What are the units for frequency?

Hertz

8 Name two things that waves transfer.

Energy and information

9 Name one thing that waves do not transfer.

Matter

10 What is the difference between speed and velocity?

Velocity has a direction as well as a magnitude.

CP3c- Refraction

1 What is the equation that links speed, distance and time?

Speed = distance/time, or any rearrangements of it

2 What is the equation that links speed, frequency and wavelength?

Speed = frequency × wavelength

3 What two things do you need to measure to find the speed of a wave?

Either the time to cover a certain distance, or the wavelength and the frequency

4 Describe the path of light when you watch TV.

TV to eye

5 Describe the path of light when you sit underneath a lamp and read a book.

Light to book to eye

6 What is the word that describes light bouncing off a material?

Reflection

7 What does refraction mean?

Changing the direction of a wave

8 When does refraction happen to light waves?

When light goes into or out of a material

9 Name three materials that light can travel through.

Any three transparent materials, such as air, glass, water, Perspex

10 Why is it difficult to see objects in the bottom of a swimming pool?

Light is refracted as it leaves the water

Physics

CP5-

Light and

Electromagnetic

CP5- Light and electromagnetic Spectrum

CP5a- Electromagnetic Waves

1 What does the frequency of a wave describe?

Number of waves per second

2 What are the units for frequency?

Hertz

3 What does the wavelength of a wave describe?

Distance from one point on a wave to the same point on next wave

4 What are the standard units for wavelength?

Metres

5 What does refraction mean?

Waves changing direction when they go from one material to another

6 What is a vacuum?

Empty space

7 What materials can light pass through?

Vacuum, air, glass, water

8 Are light waves transverse or longitudinal?

Transverse

9 What do all waves transfer?

Energy

10 A nanometre is one millionth of a millimetre. Why are nanometres sometimes used for giving the wavelengths of light waves?

The wavelength is very short.

CP5b- The electromagnetic Spectrum

1 What are the colours of the rainbow?

Red, orange, yellow, green, blue, indigo, violet

2 What piece of apparatus can you use to split up light to form a spectrum?

Prism

3 Which colour in visible light has the longest wavelength?

Red

4 What does EM stand for?

Electromagnetic

5 Which EM waves have frequencies just higher than the frequency of visible light?

Ultraviolet

6 Which EM waves have frequencies just higher than the frequency of visible light?

Infrared

7 Are EM waves transverse or longitudinal?

Transverse

8 Which part of our bodies detects visible light?

Eyes

9 Which part of our bodies detects infrared?

Skin

10 Name two parts of the EM spectrum that can travel through the atmosphere?

All can to some extent, but the expected answer at this stage is infrared and visible light, as we can detect both of these from the Sun.

CP5c- Using the long wavelengths

1 Which electromagnetic waves have the highest frequency?

Gamma rays

2 Which electromagnetic waves have the longest wavelengths?

Radio waves

3 Which electromagnetic waves have lower frequencies than visible light?

Infrared, microwaves, radio waves

4 Which electromagnetic waves have higher frequencies than visible light?

Ultraviolet, X-rays, gamma rays

5 Which colour of visible light has the shortest wavelength?

Violet

6 Which colour of visible light has the highest frequency?

Violet

7 Which colour of visible light has the lowest frequency?

Red

8 Which part (or parts) of the electromagnetic spectrum is used for cooking?

Infrared, microwaves

9 **Which part (or parts) of the electromagnetic spectrum is used for sending TV programmes?**

Radio waves, microwaves

10 **Which part of the electromagnetic spectrum is used in TV remote controls?**

Infrared

CP5d-Using the short wavelength

1 **Which part of the electromagnetic spectrum is detected by our eyes?**

Visible

2 **Which part of the electromagnetic spectrum is emitted by toasters and grills?**

Infrared

3 **Which part of the electromagnetic spectrum is used for mobile phone communications?**

Microwaves

4 **Which part of the electromagnetic spectrum are light bulbs designed to emit?**

Visible light

5 **Which part of the electromagnetic spectrum is used to cook food from the inside?**

Microwaves

6 **Which part of the electromagnetic spectrum is used to treat cancer?**

Gamma rays

7 **Which part of the electromagnetic spectrum can be used to look inside bodies?**

X-rays

8 **How are radio waves produced?**

By oscillations in electrical circuits

Questions 8-10 (Higher Content)

9 **How are radio waves detected?**

They produce oscillations in circuits attached to an aerial.

10 **Why do radio waves sometimes have a longer range than microwaves?**

Refraction in the atmosphere

CP5e- EM Radiation Dangers

1 **Which transfers the most energy: red, green or violet light?**

Violet

2 **Which part of the electromagnetic spectrum is used to sterilise surgical instruments?**

Gamma rays

3 **Which part of the electromagnetic spectrum is used to examine luggage in airports?**

X-rays

4 **Which part of the electromagnetic spectrum is used to sterilise water?**

Ultraviolet

5 **Which part of the electromagnetic spectrum do fluorescent materials emit?**

Visible light

6 **Which part of the electromagnetic spectrum is produced *inside* many low energy light bulbs?**

Ultraviolet

7 **Which part of the electromagnetic spectrum is emitted by radioactive materials?**

Gamma rays

8 **Which part of the electromagnetic spectrum is used to make images of bones?**

X-rays

9 **Which part of the electromagnetic spectrum can cause skin cancer?**

Ultraviolet

10 **Which part of the electromagnetic spectrum can cook things by heating water inside them?**

Microwaves

Physics

CP6-

Radioactivity

CP6a- Atomic Models

1. **What is the difference between an atom and a molecule?**

   A molecule is two or more atoms bonded together.

2. **What is an element?**

   Substance where all atoms have the same atomic number

3. **What is the part in the middle of an atom called?**
   Nucleus

4. **Name two subatomic particles.**

   Any two from proton, electron, neutron

5. **What are the negatively charged particles in an atom called?**

   Electrons

6. **What are the positively charged particles in an atom called?**

   Protons

7. **Where is most of the mass of an atom concentrated?**

   Nucleus

8. **Which subatomic particles have a negligible mass?**

   Electrons

9. **How did scientists investigate the structure of an atom?**

   Fired particles at atoms/gold sheet

10. **Who investigated atoms in this way?**

    Rutherford

CP6b- Inside Atoms

1. **What is the name of the model that helps to explain the properties of materials?**

   Kinetic theory or particle theory

2. **What is the diameter of an atom – a hundredth of a millimetre, a thousandth of a millimetre or a millionth of a millimetre?**

   Millionth of a millimetre

3. **What charge do electrons have?**
   Negative

4. **How much mass do electrons have?**

Negligible/hardly any

5. **In Thompson's model, the atom was positively charged with tiny negative charges in it. What was this model called?**

   Plum pudding model

6. **Rutherford investigated the structure of the atom. What did he do?**

   He fired alpha particles at gold foil.

7. **What happened to most of the alpha particles in Rutherford's experiment?**

   Went straight through

8. **Why did Rutherford conclude that most of the mass of the atom was in the centre?**

   A few particles bounced back.

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    A few particles bounced back.

CP6- Electrons and Orbits

1. **Which subatomic particle has no charge?**

   Neutron

2. **What is another name for nucleon number?**

   Mass number

3. **What is the mass number of an atom?**

   Total number of protons and neutrons

4. **What is the atomic number of an atom?**

   Number of protons

5. **What is another name for atomic number?**

   Proton number

6. **What is the relative mass of a neutron?**

   1

7. **What is the charge on a proton?**

   +1

8. **What are isotopes?**

   Atoms of same element with different masses

9. **How are electrons arranged in an atom?**

   Shells/orbits/energy levels

10. **What is ionisation?**

    When an atom gains or loses an electron

CP6d- Background Radiation

1. **Where are the positive charges in an atom?**

   Nucleus

2. **What particles in an atom have negative charges?**

   Electrons

3. **How are electrons arranged in an atom?**

   Orbits/electron shells around the nucleus.

4. **What happens to one or more electrons when an atom gains energy?**

   Jump to higher orbits/shells/energy levels

5. **Name two ways in which an atom can gain energy**

   Two from: by heating, by electricity, by electromagnetic radiation

6. **What happens to electrons when the atom loses energy?**

   They fall to a lower orbit/shell/energy level.

7. **What is ionisation?**

   When an atom absorbs enough energy to let an electron escape completely

8. **What charge does an ion have when it has lost an electron?**

   Positive

9. **Name one source of background radiation in everyday life**

   Any sensible source, such as space, food, rocks etc.

10. **Name one thing that can detect radiation.**

    Geiger-Müller tube/photographic film

CP6e- Types of Radiation

1. **What is ionising radiation?**

   Radiation that can cause atoms to form ions

2. **Is most background radiation natural or from human causes?**

   Natural

3. **Where does radon gas come from?**

   Uranium in some rocks

4. **What are cosmic rays?**

   Charged particles from stars

5. **Why is background radiation different in different places?**

   Different rocks and/or building materials

6. **What happens to photographic film when radiation hits it?**

   Darkens

7. **What is the name of an instrument that detects radiation?**

   Geiger-Müller tube

8. **What is a count rate?**

   The number of clicks/the number of radiation events detected per second

9. **Name two types of ionising radiation that consist of particles.**

   Two from: alpha, beta, positron

10. **What are gamma rays?**

    High frequency electromagnetic waves

CP6f- Radioactive decay

1. **What is an alpha particle?**

   Helium nucleus, or two protons and two neutrons

2. **What is a beta particle?**

   Electron from the nucleus of an atom

3. **What is the mass of an alpha particle?**

   4

4. **What is the charge on an alpha particle?**

   +2

5. **What is the charge on a beta particle?**

   -1

6. **What is the charge on a positron?**

   +1

7. **Which form of radiation is the most penetrating?**

Gamma rays

8. **Which form of radiation is the most ionising?**

   Alpha particles

9. **What happens to the nucleus of an atom when it emits an alpha particle?**

   Becomes more stable/changes to a different element

10. **What happens to the nucleus of an atom if it ejects a neutron?**

    Changes to a different isotope of the same element

CP6g- Half Life

1. **What happens to the atomic number of a nucleus when an alpha particle is emitted?**

   It goes down by 2.

2. **What happens to the mass number of a nucleus when an alpha particle is emitted?**

   It goes down by 4.

3. **How is a beta particle formed?**

   A neutron changes into a proton and an electron.

4. **What happens to the atomic number of a nucleus when a beta particle is emitted?**

   It goes up by 1.

5. **How is a positron formed?**

   A proton changes into a neutron and a positron.

6. **What happens to the atomic number of a nucleus when a positron is emitted?**

   It goes down by 1.

7. **What is the symbol for an alpha particle?**

   $\left({}^{4}_{2}\mathrm{He}\right)$

8. **What is the symbol for a beta particle?**

   $\left({}^{0}_{-1}\beta\right)$

9. **What does the 'activity' of a radioactive source refer to?**

   The number of decays per second

10. **What does half-life mean?**

    The time it takes for the activity to halve, or for the number of unstable nuclei to halve.

CP6h- Dangers of radioactivity

1. **What is the unit for measuring the activity of a source?**

Becquerel

2. **What does 1 becquerel represent?**

   Decay per second

3. **Why can we not predict exactly how many nuclei will decay each second?**

   Decay is a random process.

4. **How does the activity of a radioactive source change over time?**

   It gets less.

5. **Why does the activity of a source get less over time?**

   After each decay, fewer unstable nuclei are left to decay.

6. **What does the half-life tell you about the activity of a sample of radioactive material?**

   The time until the activity falls by half

7. **What does the half-life tell you about the number of unstable nuclei in a sample of radioactive material?**

   The time until the number of unstable nuclei falls by half

8. **Name one disease that can be caused by radiation.**

   Cancer

9. **Name one type of job that may involve being exposed to nuclear radiation.**

   Hospital worker/nurse/doctor or nuclear power station worker

10. **What has happened if you are contaminated by radioactive material?**

    You have got it on your skin or inside your body

<u>CP7a – Work and Power</u>

1 **What are the units for energy?**

joules

2 **How is energy transferred to a light bulb?**

by electricity

3 **How is energy transferred away from a light bulb?**

by light, by heating

4 **Describe one other way in which energy can be transferred.**

by sound, by forces

5 **What is a force?**

a push or a pull

6 **What are the units for measuring forces?**

newtons

7 **What is your weight?**

the force of gravity pulling on you

8 **What does work done mean in physics?**

energy transferred by a force

9 **What does power measure?**

how fast energy is transferred/work is done

10 **What are the units for power?**

watts

CP8a – Objects affecting each other

1 **What does work done mean?**

energy transferred by a force

2 **What are the units for work done?**

joules

3 **How do you calculate work done?**

Multiply force by distance moved in the direction of the force.

4 **What does power mean?**

how fast energy is transferred

5 **What are the units for power?**

watts

6 **How do you calculate power?**

work done divided by time

7 **Two people with the same weight go up a flight of stairs. How can you tell which one has exerted more power?**

the one that went up fastest

8 **Name two non-contact forces.**

two from: gravity, magnetism, static electricity

9 **What is a magnetic field?**

the space around a magnet where it can affect things

10 **What is a vector quantity?**

a quantity that has both magnitude and direction

CP8b – Vector Diagrams

1 **Name two contact forces.**

any two from: normal contact force, upthrust, air resistance, etc.

2 **Name three non-contact forces.**

gravity, magnetism, static electricity

3 **How is a force represented in a diagram?**

arrow showing direction, with length indicating size

4 **What are the units for measuring force?**

newtons

5 **Why is weight a vector quantity?**

It has a direction as well as a magnitude.

6 **The Earth attracts the Moon via gravity. What is the other force in this action–reaction pair?**

the Moon attracting the Earth

7 **What is the name for the space around an object where it attracts things with mass?**

a gravitational field

8 **What is the name for the space around something with an electric charge where it can affect other objects?**

an electrostatic or electric field

9 **What is the name for a single force that represents the combined effects of all the forces on an object?**

a resultant force

10 **What is the name for a diagram where a measurement on the diagram represents a larger measurement in real life?**

a scale diagram

CP9a – Electric Circuits

1 **What word describes materials that electricity will pass through?**

conductors

2 **What word describes materials that electricity cannot pass through?**

insulators

3 **What components do you need to make a circuit that would make a small torch bulb light up?**

battery, connecting wires, lamp; switch is optional

4 **What are the two terminals of an electric cell labelled as?**

plus (+) and minus (–)

5 **In an electric circuit with a battery, which of these materials will conduct: copper, wood, salty water?**

copper and salty water

6 **Which of these materials are insulators: plastic, metal, air?**

plastic and air

7 **What component is used to measure current?**

ammeter

8 **What name is given to the negatively charged subatomic particles that cause an electric current?**

electrons

9 **Is mains voltage about 15 times, 150 times or 1500 times bigger than the voltage from a battery?**

about 150 times

10 **If you connect some cells together in series, what is formed?**

a battery

CP9b – Current and Potential Difference

1 **What is the name of a circuit with one path around it and no branches?**

a series circuit

2 **Give a disadvantage of connecting lamps in series.**

If one goes out, they all go out/cannot switch one off independently.

3 **What is the name given to a circuit with components in different branches?**

a parallel circuit

4 **What is the circuit symbol for a lamp?**

circle with a cross in it

5 **What is the circuit symbol for a cell?**

two vertical lines, one longer than the other

6 **How can you tell which is the negative terminal of a cell from the circuit symbol?**

It is the shorter line.

7 **What is the name of the particle that flows around a circuit, forming an electric current?**

the electron

8 **What is the difference between conventional current and the flow of electrons?**

Electrons flow from the negative terminal of a cell to the positive terminal, conventional current flows the other way.

9 **What unit is current measured in?**

amps/amperes

10 **What is another term for potential difference?**

voltage

CP9c –Current, Change and Energy

1 **Which component is used to measure electric current?**

an ammeter

2 **What are the units for current?**

amps or amperes

3 **What two conditions are needed to give a current in a circuit?**

closed circuit and potential difference

4 **Is an ammeter connected in parallel or in series with a component?**

series

5 **A series circuit has two lamps. When the current through one lamp is 2 A, what is the current through the other lamp?**

2 A

6 **A parallel circuit has two lamps in parallel. When the current through each lamp is 2 A, what is the current from the battery?**

4 A

7 **Which component is used to measure potential difference?**

a voltmeter

8 **What are the units for potential difference?**

volts

9 **Current can be described as the rate of flow of charge. In a metal, what are the charged particles that flow?**

electrons

10 **In a circuit, energy is transferred to a charge. Where is this energy transferred from?**

cell/battery/power supply

CP9d – Resistance

1 **What is an electric current?**

a flow of charge

2 **State the unit and the symbol for current.**

amp/ampere, A

3 **State the unit and the symbol for charge.**

coulomb, C

4 **Write down the equation relating the total charge that flows to current and time.**

$Q = I \times t$

5 **State the unit and the symbol for potential difference.**

volt, V

6 **How many volts is one joule per coulomb?**

1 V

7 **Write down the equation relating the energy transferred in a circuit to the potential difference.**

$E = Q \times V$

8 **Describe the potential difference between two points in terms of energy transferred.**

It is the energy transferred when 1 coulomb of charge moves from one point to the other.

9 **State the unit and the symbol for electrical resistance.**

ohm, Ω

10 **Write down the equation that is used to work out electrical resistance.**

$R = V / I$

CP9e – More about Resistance

1 **What unit is used to measure resistance?**

ohms

2 **What is the symbol for a resistor?**

a rectangle

3 **What is the symbol for a variable resistor?**

a rectangle with an arrow through it

4 **What equation connects potential difference, current and resistance?**

$V = I \times R$

5 **A circuit contains a resistor. If another resistor is added in series with the first, does the total resistance in the circuit increase, decrease or stay the same?**

increase

6 **A circuit contains a resistor. If another resistor is added in parallel with the first, does the total resistance in the circuit increase, decrease or stay the same?**

decrease

7 **When resistors are connected in series, how can you calculate the total resistance?**

add the resistances together

8 **When the potential difference across a fixed resistor is doubled, what happens to the current?**

the current doubles

9 **What happens to the resistance of a light-dependent resistor (LDR) when light intensity increases?**

it decreases

10 **What happens to the resistance of a thermistor when the temperature increases?**

it decreases

CP9f – Transferring Energy

1 **What is the name of a resistor that can be changed by adjusting a dial?**

a variable resistor

2 **Which component could be used to change the current in a circuit when the temperature changes?**

a thermistor

3 **Which component could be used to change the current in a circuit when the light intensity changes?**

a light-dependent resistor

4 **What does a diode do?**

conducts electricity in only one direction

5 **What happens to the resistance of a filament lamp when the potential difference is increased?**

it increases

6 **What happens to the resistance of a thermistor when the temperature rises?**

it decreases

7 **What happens to the resistance of a light-dependent resistor when the light intensity increases?**

it decreases

8 **What does the graph of current against potential difference look like for a fixed resistor?**

straight line through the origin/directly proportional relationship

9 **When an electric current passes through a high-resistance wire, what happens to the wire?**

it becomes hot

10 **How can resistance in the wires in circuits be reduced?**

cool the wire / use low-resistance wire / make the wire thicker / make the wires as short as possible

CP9g – Power

1 **Give an example of an appliance that uses the heating effect of a current.**

e.g. kettle

2 **Give an example of a disadvantage that can result from overheating by an electric current.**

e.g. fire, damage to the appliance/wires

3 **If the new connecting wires in a house have a lower resistance than the old ones, what effect will this have on daily electricity use?**

it will be less

4 **When electrons move through a lattice of positive ions, what happens to cause electrical resistance?**

collisions

5 **When a resistor heats up, what happens to the positive ions to increase resistance?**

they vibrate more

6 **What is the equation that connects energy transferred to current, potential difference and time?**

$E = I \times V \times t$, energy transferred = current × potential difference × time

7 **Apart from using lower resistance wires and without changing any components, state one way the resistance in a circuit can be reduced.**

thicker wires, cooling

8 **State a second way the resistance in circuits can be reduced.**

low resistance materials, thicker wires, or cooling

9 **What is the unit for measuring power?**

watts

10 **What is the equation that links power, energy transferred and time taken?**

$P = E/t$,

$$\text{power} = \frac{\text{energy transferred}}{\text{time taken}}$$

<u>CP9h – Transferring energy by electricity</u>

1 **Power is the transfer of what each second?**

energy

2 **Name the unit and give the symbol for power.**

watt, W

3 **Which is more powerful: kettle A, which boils a mug of water in 1 minute, or kettle B, which boils a mug of water in 2 minutes, or do they both have the same power?**

A

4 **Write down an equation that links power to energy transferred, *E*.**

$$P = \frac{E}{t}$$ *or in words*

5 **Which uses more power: A a 12 V 20 W lamp, or B a 240 V 9 W lamp or do they both use the same power?**

A

6 **Write down an equation that links power to current and potential difference.**

$P = I \times V$ or in words

7 **Write down an equation that links power to electrical resistance.**

$P = I^2 \times R$ or in words

8 **To reduce the transfer of energy by heating in a resistor, which should you use: A a low voltage and high current, or B a high voltage and low current, or doesn't it matter?**

B

9 **What is the mains voltage in the UK?**

230 V

10 **What is the frequency of the a.c. mains voltage in the UK?**

50 Hz

<u>CP9i – Electrical Safety</u>

1 **What type of energy store does a battery have?**

chemical

2 **At some time after energy is transferred to an electric toothbrush, in what energy store does the energy end up?**

in the thermal store of the surroundings

3 **What do the letters d.c. mean?**

direct current

4 **Describe the way the electrons move in d.c.**

in one continuous direction

5 **What do the letters a.c. mean?**

alternating current

6 **Describe the way the electrons move in a.c.**

keep reversing direction

7 **How many volts is the UK mains voltage?**

230 V

8 **What is the UK mains frequency?**

50 Hz

9 **What are the names of two of the wires in a plug?**

two of: live, neutral, earth

10 **What is the name of one electrical safety feature found in our homes (apart from the earth wire of a plug)?**

any suitable answer such as circuit breaker or fuse

CP10a – Magnets and Magnetic Fields

1 **What are the two ends of a bar magnet called?**

north-seeking pole and south-seeking pole, or just north pole and south pole

2 **Name two magnetic materials.**

any two from iron, cobalt, nickel, steel

3 **What happens if you arrange two magnets with their north poles close to each other?**

They repel each other.

4 **How can you arrange two magnets so they attract each other?**

put opposite poles close to each other/put a north pole near a south pole

5 **What is a magnetic field?**

the space around a magnet which affects magnetic materials

6 **How can you find the shape of a magnetic field?**

use iron filings or plotting compasses

7 **Name two electrical devices that use magnets.**

any two from motors, loudspeakers, generators

8 **Why do compasses point north?**

The Earth has a magnetic field.

9 **Describe the shape of the Earth's magnetic field.**

similar to the field of a bar magnet

10 **Why are compass needles weighted at one end?**

In most places the Earth's magnetic field is not parallel to the surface.

CP10b – Electromagnetism

1 **Which part of the Earth is responsible for the Earth's magnetic field?**

outer core

2 **What is the difference between the Earth's north magnetic pole and its North Pole?**

The Earth spins around an axis through the North Pole; the north magnetic pole is where compasses point to.

3 **What is an induced magnet?**

something that is a magnet only because it is in the magnetic field of another magnet

4 **Name two materials that an induced magnet could be made from.**

any two from iron, cobalt, nickel, steel

5 **You are using plotting compasses to find the shape of the magnetic field of a bar magnet. Which way does the needle point?**

away from the north pole/towards the south pole

6 **How does a magnetic field diagram show where the field is strongest?**

strongest where the lines are closest together

7 **What is a uniform magnetic field?**

a field with the same strength and direction everywhere

8 **How can you produce a uniform magnetic field?**

using two flat magnets

9 **What is the shape of the magnetic field around a wire with a current flowing through it?**

circular around the wire

10 **What is an electromagnet?**

a magnet made when current flows through a coil of wire

CP10c – Magnetic Forces

1 **How can you create a magnetic field around a wire?**

pass a current through it

2 **Where is the magnetic field of a wire strongest?**

close to the wire

3 **How can you increase the strength of the field around a wire?**

increase the current

4 **How can you change the direction of the field around a wire?**

change the direction of the current

5 **What is a solenoid?**

a coil of wire with a current flowing through it/another name for an electromagnet

6 **Why is an electromagnet called a temporary magnet?**

It is only magnetic when a current is flowing.

7 **Describe the magnetic field inside a solenoid.**

uniform, along the centre of the coil

8 **Why is the magnetic field of a solenoid stronger inside the coil than outside it?**

The fields from the two halves of the coil reinforce each other in the middle and partially cancel each other out outside it

9 **Describe the magnetic field between two flat magnets.**

uniform – has the same strength and direction everywhere

10 **What is the motor effect?**

a force produced when a current flows in a magnetic field

CP11a - Transformers

1 **How can you make a magnetic field around a wire?**

pass a current through the wire

2 **Where is the magnetic field of a wire strongest?**

close to the wire

3 **How can you increase the strength of the field around a wire?**

increase the current

4 **What is a solenoid?**

a coil of wire with a current flowing through it/another name for an electromagnet

5 **Why is an electromagnet called a temporary magnet?**

it is only magnetic when a current is flowing

6 **Give two ways of increasing the strength of the motor effect**

increase the current, use a stronger magnetic field

7 **What does Fleming's left-hand rule help you to work out?**

the direction of the force produced when a current flows in a magnetic field

8 **What does magnetic flux density measure?**

strength of a magnetic field

9 **What are the units for magnetic flux density?**

tesla, or newtons/amp metre

10 **What is a transformer?**

a device for changing the potential difference of an electricity supply

CP11b – Transformers and Energy

1 **What does a transformer do?**

changes the potential difference of an electricity supply

2 **What are the two sets of coils in a transformer called?**

primary and secondary coils

3 **What are the coils in a transformer wound onto?**

iron core

4 **What does potential difference measure?**

energy transferred by each coulomb of charge

5 **What is the equation for calculating electrical power?**

power = current × potential difference

6 **What are the units for electrical power?**

watts

7 **100 W of power are transferred to a transformer via the primary coil. How much power is transferred away from the transformer?**

100 W

8 **What is the national grid?**

the wires and transformers that send electricity around the country

9 **What is a transmission line?**

the wires on pylons or underground that transfer electricity

10 **What is the difference between a step-up and a step-down transformer?**

one increases the voltage and the other decreases it

CP12a – Particles and Density

1 **Name the three states of matter.**

solid, liquid, gas

2 **Which of the three states of matter can be compressed?**

gases

3 **Why can gases be compressed?**

particles are far apart

4 **Which of the three states have a fixed volume?**

solids and liquids

5 **Why do substances in these states have a fixed volume?**

particles are held together by bonds

6 **Why do solids keep their shape?**

Bonds between particles are very strong

7 **Name a physical change.**

any change of state named, such as melting, freezing

8 **What does the density of a substance tell you?**

the mass for a certain volume

9 **What two quantities do you need to know to calculate density?**

mass and volume

10 **What are the units for these two quantities?**

kg and m^3 – accept g and cm^3

CP12b – Energy and States of State

1 **What are the units for density?**

kg/m^3 or g/cm^3

2 **What is the equation for calculating density?**

density = mass/volume

3 **What usually happens to the density of a substance when it melts?**

decreases

4 **Why does this happen?**

particles are closer together in a solid than in a liquid

5 **What happens to the mass of a substance when it melts?**

stays the same

6 **Is evaporating a physical or a chemical change?**

physical

7 **Why is evaporation a physical change?**

no new substance is made

8 **How is thermal energy stored in a substance?**

movement of the particles

9 **What does temperature tell you about the particles in a substance?**

how fast they are moving/vibrating

10 **What factors affect the amount of thermal energy stored in a substance?**

mass, temperature, material

CP12c – Energy Calculations

1 **What property of a substance tells you about the movement of its particles?**

temperature

2 **How can you reduce the amount of thermal energy transferred between an object and its surroundings?**

use insulation

3 **Name two insulating materials.**

wool, foam, bubble wrap, or any other sensible suggestions

4 **Why does a kettle full of water store more energy than a cupful of water at the same temperature?**

greater mass of water

5 **Give two other quantities that affect the amount of thermal energy stored in an object.**

temperature and material

6 **What does specific heat capacity mean?**

energy needed to raise 1 kg of a substance by 1 °C

7 **What happens to the temperature of a substance being heated when it changes state?**

temperature stops rising while the change in state is happening

8 **Why does this happen?**

energy is being used to break bonds between particles

9 **What does specific latent heat mean?**

energy needed to change the state of 1 kg of a substance

10 **What are the units for specific latent heat?**

J/kg

CP12d – Gas Temperature and Pressure

1 **What does specific heat capacity mean?**

energy needed to raise 1 kg of a substance by 1 °C

2 **Give the three factors that affect the amount of thermal energy stored in a substance.**

mass, temperature, material

3 **What is the unit for specific heat capacity?**

J/kg °C

4 **What symbol is used for change in thermal energy?**

ΔQ

5 **What symbol is used for change in temperature?**

$\Delta\vartheta$

6 **What symbol is used for specific heat capacity?**

c

7 **What does specific latent heat meant?**

energy needed to change the state of 1 kg of
a substance

8 **What are the units for specific latent heat?**

J/kg

9 **Describe the arrangement of particles in a gas.**

far apart and moving around quickly

10 **What causes gas pressure?**

forces from particles hitting the walls of the container

CP13a – Bending and Stretching

1 **What word do we use to describe something that deforms but returns to its original shape when forces are removed?**

elastic

2 **What word do we use to describe something that deforms and does not return to its original shape when forces are removed?**

inelastic

3 **What does a linear relationship on a scatter graph look like?**

a straight line

4 **What is the difference between the graphs for a linear and a directly proportional relationship?**

The graph for a directly proportional relationship passes through the origin; a graph for a linear one does not necessarily do so.

5 **Describe the relationship between the force on a spring and its length, for small forces.**

linear

6 **Describe the relationship between the force on a spring and its extension, for small forces.**

directly proportional

7 **What happens to the relationship between the force on a spring and its length (or extension) when the forces become very large?**

becomes non-linear

8 **Describe the relationship between the force on a rubber band and its length.**

non-linear

9 **What is the spring constant of a spring?**

force needed to produce a 1 m extension

10 **What is the equation linking the spring constant with the force and extension?**

force = spring constant × extension

CP13b – Extension and Energy Levels

1 **What word do we use to describe something that deforms but returns to its original shape when forces are removed?**

elastic

2 **What word do we use to describe something that deforms and does not return to its original shape when forces are removed?**

inelastic

3 **What does a linear relationship on a scatter graph look like?**

a straight line

4 **What is the difference between the graphs for a linear and a directly proportional relationship?**

The graph for a directly proportional relationship passes through the origin; a graph for a linear one does not necessarily do so.

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8 **Describe the relationship between the force on a rubber band and its length.**

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9 **What is the spring constant of a spring?**

force needed to produce a 1 m extension

10 **What is the equation linking the spring constant with the force and extension?**

force = spring constant × extension