

By the end of Summer 1, you will know:

Circuit basics

1. Draw the following circuit symbols: cell, battery, switch, bulb, diode, LED, ammeter, voltmeter, resistor, variable resistor, fuse.
2. Define charge.
3. Define current.
4. How is current measured in a circuit?
5. State the equation linking charge, current and time.
6. Give the standard units for charge, current and time. State the pattern for current at any point in a single closed loop.

Resistance (Required Practical Part 1)

1. What is potential difference?
2. How is potential difference measured in a circuit?
3. What happens to potential difference in series circuit?
4. What happens to the potential difference in a parallel circuit?
5. State the equation linking potential difference, current and resistance.
6. Give the standard units for potential difference, current and resistance.
7. State the relationship between resistance and current through a component when the potential difference is constant.
8. What increases the resistance of a wire?
9. What is the relationship between current and temperature.
10. Sketch the graph to show the relationship between V and I .
11. What 2 mathematical words describe the shape of the graph?

Component characteristics (Required Practical Part 2)

1. State the relationship between resistance and temperature of a filament lamp.
2. State the relationship between resistance and current for a diode.
3. State the relationship between resistance and temperature for a thermistor.
4. State a use for a thermistor.
5. State the relationship between resistance and light intensity for an LDR.

6. State a use for an LDR.

Series and Parallel Circuits

1. What is a series circuit?
2. What is a parallel circuit?
3. What happens to current in a parallel circuit?
4. What is the equation and units for current?
5. What happens to resistance in a series circuit?
6. What happens to resistance in a parallel circuit?

Energy transfer in a circuit

1. What is the equation linking charge, current and time?
2. What are the units for each?
3. When is work done in a circuit?
4. What equation links energy, power and time?
5. What are the units for each?
6. What equation links energy, charge and potential difference?
7. What are the units of each?

Mains electricity, cables and plugs and the National Grid

1. What type of current is mains electricity?
2. What is the potential difference of mains electricity?
3. What is the frequency of mains electricity?
4. How are most electrical appliances connected to the mains?
5. Name the 3 wires and the colour of their insulation colouring.
6. What does the live wire carry?
7. What does the neutral wire do?
8. What does the earth wire do?
9. When does the earth wire carry a current?
10. What is the potential difference between the live wire and Earth?
11. What is the potential difference of the neutral wire?
12. What is the National Grid?
13. What do step up transformers do?
14. What do step down transformers do?

Electrical Power

1. What equation links power, potential difference and current?
2. What are the units for each?
3. What equation links power, current and resistance? (units of each)

Appliances and efficiency

1. What does the amount energy an appliance transfer depend on?
2. When is work done in a circuit?
3. What equation links energy, power and time?
4. What are the units for each?
5. What equation links energy, charge and potential difference?
6. What are the units of each?

Atoms and isotopes

1. Draw and label an atom.
2. How does the number of electrons and protons in an atom relate to each other?
3. What is the same for all atoms of a particular element?
4. What does the atomic number tell you about an element?
5. What is the radius of an atom?
6. What is the radius of the nucleus of an atom?
7. Where is the mass found in an atom?
8. How are electrons arranged in an atom?
9. What can affect the electron arrangement in an atom?
10. What is an isotope?
11. What is an ion?
12. What causes scientific models to be changed or replaced?
13. What were atoms thought to be before the discovery of the electron?
14. What model did the discovery of the electron lead to?
15. What does this model suggest the structure of an atom was like?
16. What did the alpha particle scattering experiment discover?
17. What did Niels Bohr do to the nuclear model?
18. What did James Chadwick discover?
19. What was the order of discovery of the subatomic particles?
20. What are the differences between the plum pudding model and the nuclear model of an atom?

Atoms and nuclear radiation

1. What makes an atomic-nuclei more stable and what is this process called?
2. What is activity?

3. What is activity measured in?
4. How can the count-rate be recorded?
5. What are the four types of nuclear radiation and what are they?
6. What are the properties of each in terms of penetration, range in air and ionising power?
7. What symbol can be used to represent an alpha particle?
8. What symbol can be used to represent a beta particle?
9. What is the general nuclear equation for alpha decay?
10. What is the general word equation for beta decay?
11. What happens when a gamma ray is emitted to the nucleus of an atom?

Activity and half life

1. What can be said about radioactive decay?
2. What are the two definitions for half-life?
3. What is radioactive contamination?
4. What is the hazard of radioactive contamination?
5. What affects the level of hazard?
6. What is irradiation?
7. Is an irradiated object radioactive?
8. What safety precautions should be taken when a radioactive source is present?
9. What is the name for scientists checking other scientists published work?

By the end of Summer 1, the skills you will know are:

Resistance of the wire

1. What is resistance?
2. What are the units for resistance?
3. What is the equation for resistance?
4. What safety precautions do you need to be aware of?
5. What piece of equipment is used to measure length?
6. What piece of equipment do you use to measure current?
7. What piece of equipment do you use to measure potential difference.
8. Draw a circuit diagram for this investigation.

Key Maths Skills

9. Substituting values into an equation.
10. Rearranging equations.
11. Multistep calculations.

12. Conversion between units and standard form.

IV characteristics

1. What are the symbols for filament lamp, diode and thermistor?
2. What piece of equipment is used to measure current and potential difference?
3. How is resistance calculated?
4. Draw a circuit diagram for measuring the current and potential difference of a filament lamp.
5. Draw a circuit diagram for measuring the current and potential difference of a diode.
6. Draw a circuit diagram for measuring the current and potential difference of a thermistor.
7. Sketch the IV graphs for filament lamp, diode and thermistor.
8. What needs to be controlled in this investigation?

Key Maths Skills

9. Substituting values into an equation.
10. Rearranging equations.
11. Calculating the gradient.
12. Conversion between units and standard form.

Density

1. What is density?
2. Put these in order of highest to lowest density; liquid, solid, gas
3. What is the equation to calculate density?
4. What are the units for density?
5. What piece of equipment do you use to measure mass?
6. How is volume of a regular shape calculated?
7. How is volume of an irregular shape calculated?
8. How is the volume of a liquid calculated?
9. What piece of equipment do you use to measure volume?

Key Maths Skills

10. Substituting values into an equation.
11. Rearranging equations.
12. Calculating area and volumes of regular shapes.
13. Conversion between units and standard form.

By the end of Summer 2, you will know:

Homeostasis

1. What is homeostasis?

2. What does homeostasis allow the function of in the body?
3. Give three things controlled in the human body?
4. What are the two ways automatic control systems are controlled?
5. What are stimuli?
6. Give two examples of stimuli the body respond to.
7. What are receptors?
8. Give two places where receptors can be found in the body?

Nervous System

1. What is the nervous system made up of?
2. What is the central nervous system made up on?
3. What is the purpose of the nervous system?
4. What is an adaptation of nerves, allowing them to pass signals effectively?
5. Are the effects of nervous responses long lasting or short lasting?
6. What are the five stages of a nervous response?
7. What is a stimulus?
8. What is the role of receptors?
9. What is the coordination centre made up of?
10. What is the role of the coordination centre?
11. What are the two types of effector?
12. What is the role of effectors?
13. What are the parts in a reflex arc?
14. What is the role of each part of a reflex arc?
15. Are reflexes faster or slower than nervous responses?
16. What is the different about the steps in a reflex compared to a nervous response?

Endocrine System

1. What is the endocrine system?
2. What is a hormone?
3. What is the function of a hormone?
4. What are glands.
5. Name three glands.
6. Name two hormones.
7. Where are hormones secreted into?
8. Are the effects of hormones faster or slower than nervous responses?
9. Are the effects of hormones long lasting or short lasting?

10. What are the reasons the pituitary gland is called the master gland?

Diabetes and Blood Glucose

1. What organ monitors and controls blood glucose in the body?
2. What is the name of the hormone involved when blood glucose levels are too high?
3. What happens when blood glucose levels are too high?
4. When blood glucose levels are too high, what happens to the glucose in the liver and in muscle cells?
5. What is a negative feedback cycle? (HT)
6. What is the name of the hormone involved when blood glucose levels are too low? (HT)
7. What happens when blood glucose levels are too low? (HT)
8. When blood glucose levels are too low, what happens to glycogen in the liver and in muscle cells? (HT)
9. What is Type 1 diabetes?
10. What is Type 2 diabetes?
11. Is there a treatment for Type 1 diabetes, if so what is it?
12. Is there a treatment for Type 2 diabetes, if so what is it?
13. Name a risk factor for Type 2 diabetes.
14. Where are adrenaline and thyroxine produced? (HT)
15. When is adrenaline produced? (HT)
16. What is the role of thyroxine in the body? (HT)
17. What is the role of adrenaline in the body? (HT)
18. Where are adrenaline and thyroxine produced? (HT)
19. When is adrenaline produced? (HT)

Human Reproduction

1. What is puberty?
2. When does puberty happen?
3. What happens in puberty for boys?
4. What happens in puberty for girls?
5. What is puberty preparing the body for?
6. What is the role of oestrogen in puberty?
7. What is the role of testosterone in puberty?
8. What is the menstrual cycle?
9. At what age roughly, does the menstrual cycle start in females?
10. How many days is the menstrual cycle?

11. What happens during days 1-6 of the menstrual cycle?
12. What happens on days 7-13 of the menstrual cycle?
13. What happens on day 14 of the menstrual cycle?
14. What happens on days 15-28 of the menstrual cycle?
15. What are the four hormones involved in the menstrual cycle?
16. What is ovulation?
17. What is the role of FSH in the menstrual cycle?
18. What is the role of LH in the menstrual cycle?
19. What is the role of Oestrogen in the menstrual cycle?
20. What is the role of Progesterone in the menstrual cycle?
21. What effect does LH have on FSH? (HT)
22. What effect does Oestrogen have on LH? (HT)
23. What effect does Progesterone have on Oestrogen? (HT)
24. What does IVF stand for? (HT)
25. What two hormones can be given to a woman to help her conceive naturally? (HT)
26. What are the main steps of IVF? (HT)
27. What are the pros of IVF? (HT)
28. What are the cons of IVF? (HT)

Contraception

1. What is meant by contraception?
2. What is meant by fertility?
3. What is meant by hormonal contraception?
4. What is meant by non-hormonal contraception?
5. Name 3 forms of hormonal contraception.
6. Name 3 forms of non-hormonal contraception.
7. What do oral contraceptives do to prevent pregnancy?
8. What does the injection or implant do to prevent pregnancy?
9. What are the two main barrier methods?
10. What do barrier methods do to prevent pregnancy?
11. What is an intrauterine device?
12. What does an intrauterine device do to prevent pregnancy?
13. What do spermicides do to sperm?
14. What is abstinence?
15. What are the two surgical methods to prevent pregnancy?

Reproduction and Cell Division

1. What is sexual reproduction?

2. What are gametes?
3. What are the gametes in animals?
4. What are the gametes in flowering plants?
5. What happens to genetic information in sexual reproduction?
6. Does sexual reproduction promote variation within a species?
7. What is asexual reproduction?
8. What happens to genetic information in asexual reproduction?
9. Does asexual reproduction promote variation within a species?
10. What type of cell division is involved in asexual reproduction?
11. What is meiosis?
12. How many chromosomes are there in human gametes?
13. Where does meiosis happen in animals and plants?
14. What happens in meiosis?
15. How many cells are produced in meiosis?
16. What can be said about the cells produced in meiosis?
17. What is it called when gametes fuse?
18. Once gametes fuse, do they divide by mitosis or meiosis?

DNA and Genome

1. Which organelle holds the DNA of a cell?
2. What are the parts of DNA?
3. What is the structure of DNA?
4. What is a genome?
5. What are the structures the DNA is contained inside called?
6. What is a gene?
7. What do genes code for?
8. What is the main purpose of studying the human genome?
9. Put these in order smallest to largest; Nucleus, Genome, Gene, Chromosome, DNA.

Variation

1. What is variation within a species?
2. What is a population?
3. How is genetic information passed from generation to generation?
4. What is a phenotype?

5. What is a genotype?
6. What are the ways the environment can influence the phenotype of an organism?
7. What are the ways genes that have been inherited can cause variation?
8. What is the reason why we cannot see all the genetic variation within the population of a species?
9. What is a mutation?
10. Is highly likely or not very likely that a mutation will lead to a new phenotype?
11. If a new phenotype is suited to an environmental change, what will this bring about?

Inheritance and Sex Determination

1. What are the meanings of these terms: gamete, chromosome, gene, allele, dominant, recessive, homozygous, heterozygous, genotype and phenotype.
2. What are different forms of the same gene called?
3. How many copies of a dominant allele are needed for it to be expressed?
4. How many copies of a recessive allele are needed for it to be expressed?
5. What is it called when two alleles that are the same are expressed?
6. What is it called when two alleles that are different are expressed?
7. What is a Punnett square?
8. How many chromosomes are there in a human body cell?
9. What are the sex chromosomes for a female?
10. What are the sex chromosomes for a male?
11. What is the probability of offspring being male or female?

Inherited Disorders and Embryo Screening

1. How is an inherited disorder passed from person to person?
2. Name two disorders that can be inherited?
3. What is embryo screening?
4. What are the pros of embryo screening?
5. What are the cons of embryo screening?
6. What is gene therapy?
7. What are the pros of gene therapy?
8. What are the cons of gene therapy?

Selective Breeding

1. What is selective breeding?
2. What is selective breeding used for in plants?
3. What is selective breeding used for in domesticated animals?
4. What does selective breeding involve?
5. Why does selective breeding lead to inbreeding?
6. What are the problems associated with inbreeding?

Genetic Engineering and Ethics

1. What is genetic engineering?
2. What is the purpose of genetic engineering?
3. What are two reasons plant crops have been genetically engineered?
4. What have bacterial cells been genetically engineered for?
5. What are the benefits to genetic engineering in agriculture?
6. What are the cons to genetic engineering in agriculture?
7. What are the pros to genetic engineering in medicine?
8. What are the cons to genetic engineering in medicine?
9. What are genetically modified crops?
10. What are three advantages of GM crops?
11. What are two concerns about the use of GM crops?
12. What are the main steps in the process of genetic engineering? (HT)
13. What is the role of enzymes in genetic engineering? (HT)
14. What is the role of a vector in genetic engineering? (HT)
15. What can be used as the vector? (HT)

By the end of Summer 2, the skills you will know are:

Density

1. What are reflexes for?
2. How do reflexes work?
3. What is the order of the reflex arc?
4. What type of graph is used to plot discrete data?
5. What type of graph is used to plot continuous data?
6. State the equipment needed for this practical.

7. What effect does caffeine have on reaction times? Why?
8. Why is the experiment first completed without consuming caffeine?
9. What are the safety considerations for this experiment?
10. What is an independent variable? Dependent variable? Control variable?
11. Why is it important to have control variables in an experiment?
12. Why is the experiment repeated?

Key Maths Skills

13. Understand simple algebraic equations
14. Translate information between numerical and graphical forms