Hints

Contact Forces

3.1 Find missing forces
Q2. Write down the total force upwards and downwards.
Q3. Write down the total force left and right.
Q4. Write down the total force upwards and downwards.
3.2 Explain floating & sinking
Q2. How does removing mass affect density?
Q3. Try putting the densities in order.
Q4. Think why the balloon sinks in air.
3.3 Calculate density
Q2. What is the meaning of a high density?
Q3. Remember the formula for density.
Q4. How does volume affect density?
3.4 Friction factors
Q2. How much does the force change each time?
Q3. Which shows friction doubles when weight doubles?
Q4. What other factors could affect friction and the results?
3.5 Friction and motion
Q2. How does air resistance change as she speeds up?
Q3. How does drag change as the ball gets faster?
Q4. When are the weight and air resistance balanced?
3.6 Mixed up problems
Q1. What is the total upwards force to balance weight?
Q2. Remember the formula for density.
Q3. Try putting the densities in order.
Q4. How will friction change for the same weight?
Q5. Is the force to move the trainer exactly 2.5 or 3 N?
Q6. What is air resistance on the Moon?

Electric circuits

2.1 Complete loops
Q2. How many bulbs are in the loop of switch D?
Q3. Are the heater and fan in the same loop?
Q4. Which loops are complete with this combination?
2.2 Ammeter readings
Q2. i) How do you combine several loops?
Q3. i) A1 + A2 = A3. ii) What happens to current when you add more components?
Q4. What do you know about current in a loop?
2.3 Bulb brightness
Q2. Which circuit has more components?
Q3. Which loops combine?
Q4. Which loop has more components?
2.4 Batteries to bulbs
Q2. The resistors are like bulbs, compare it to Q1.
Q3. i)-iii) Think about the number of batteries per bulb.
Q4. What is the effect of cancelling out two batteries?
2.5 Mixed up problems
Q1. Where can the switch be part of both loops?
Q2. Remember how the currents from each loop combine.
Q3. Is it position or resistance that affects brightness?
Q4. Think about the number of batteries per bulb.
Q5. Which loops are complete when switch Z is open?
Q6. How do the currents in the three loops combine?

Energy transfer

3.1 Identify energy change
Q2. Which stores are filled before the catapult fires?
Q3. How much bigger is the input than output store?
Q4. What energy store does the fuel (gas) have?
3.2 Energy in/out
Q2. First calculate the energy in two mastery bars.
Q3. i) Look at the value with skim milk. ii) Put the answer from i) into the equation: energy in = energy out.
Q4. Find the total energy for both activities. See how much energy is left from two servings of cereal.
3.3 KE and GPE transfers
Q2. i) How much GPE has the marble lost when it is half way down? ii) What has happened to the GPE at C?
Q3. i)-iii) KE is biggest when the speed is fastest. GPE is biggest when the height is greatest.
Q4. i)-iv) KE is biggest when the speed is fastest. GPE is biggest when the height is greatest.
3.4 Temperature change
Q2. What is the average of the hot and cold buckets?
Q3. Will the temperature be closer to the 100 g or 200 g?
Q4. Is the final temperature closer to the tea or cold water?
3.5 Temperature graphs
Q2. The line for the beaker that warms quicker is steeper.
Q3. Start by drawing a dotted line 'if no milk added'. Adding milk makes the temperature drop quickly.
Q4. The line for the one that cools quicker has a steeper slope.
3.6 Interpret energy diagrams
Q2. How many squares are there at the start?
Q3. What store does the energy move to when a car brakes?
Q4. What device uses a chemical energy store?
3.7 Identify wasted energy
Q2. i)-ii) What input energy store does a tablet use? Which stores are part of watching a cartoon and which not?
Q3. i)-ii) Energy is wasted where there is friction.
Q4. The height relates to the gravitational potential energy.
3.8 Calculate efficiency
Q2. i) What fraction of energy is transferred to a useful store? ii) The KE is the efficiency x the amount of input energy.
Q3. What fraction of energy is transferred to a useful store?
Q4. What fraction of energy is transferred to a useful store?
3.9 Mixed up problems
Q1. What is the input energy store and the final output store?
Q2. Calculate how much energy for100 minutes of standing.
Q3. i) Calculate the change in GPE. ii) The energy has moved from the GPE to the KE store.
Q4. Will the temperature be closer to ice or the cold drink?
Q5. The line starting nearer room temperature is less steep.
Q6. i)-ii) What else does the fire heat apart from the potato? iii) Compare how much energy is wasted by each.

Hints

Gravity

4.1 Gravity & distance
Q2. How does gravitational force vary with distance?
Q3. How do Jupiter and Saturn compare with other planets?
Q4. At 2, is the rock closer to Earth or the Moon?
4.2 Seasons & daylight
Q2. Which season is it? Does it receive more or less energy?
Q3. How many daylight hours before and after midday?
Q4. Draw a line to show the path of each position to see how much time they are in sunlight.
4.3 Changing appearance
Q2. Which side of the Moon is bright?
Q3. i)-iv) How much of the bright side of Venus can someone on Earth see? Which side?
Q4. Where can the probe see just a bit of the left side of Io?
4.4 Planetary orbits
Q2. i)-ii) The planet further from the star has a longer orbit and receives less radiation. iii) What does zero tilt mean?
Q3. The planets are icy, so have temperatures below zero.
Q4. Further from the Sun, an object receives less radiation.
4.5 Calculate weight
Q2. Does the weight (on Earth) exceed the breaking force?
Q3. What is the weight of the laptop on Mars?
Q4. Mass is the same on Earth as on the Moon.
4.6 Mixed up problems
Q1. i)-iii) Which planet or the Sun is the probe closest to?
Q2. i)-ii) How much of the day is the location in sunlight?
Q3. Think which half of each Moon will be bright.
Q4. Distance from the Sun affects the length of an orbit.
Q5. Which value do you put in the formula W =m x g?
Q6. i)-ii) Distance to the star affects the orbit and amount of radiation it receives. iii) Tilt causes seasons.

Changing substances

5.1 Chemical change evidence
Q2. i)-iii) Is there one of the signs of a new substance?
Q3. i)-iii) Is there one of the signs of a new substance?
Q4. Is there a permanent colour change?
5.2 Physical change evidence
Q2. i)-iv) Are they changes of state, making a mixture or easily reversed?
Q3. i)-iv) Are they changes of state, making a mixture or easily reversed?
Q4. Which experiment looks the same at the end?
5.3 Mass change
Q2. What happened to the mass of copper?
Q3. i) Is there one of the signs of a new substance? ii) Why did the change stop?
Q4. Could this be a physical change?
5.4 Find pH with indicator
Q2. Which indicator shows a colour change around pH 3?
Q3. What is the lowest pH red where onion is dark and the highest pH where tomato is light?
Q4. Which indicator shows a colour change around pH 4?
5.5 Make solutions neutral
Q2. Which side of neutral are the soil samples?
Q3. What do you need to neutralise the sting?
Q4. i)-ii) How does this relate to neutralisation?
5.6 Mixed up problems
Q1. Which observation is a sign of chemical change?
Q2. What are the bubbles likely to be?
Q3. i)-ii) Is there one of the signs of a new substance?
Q4. i) How could the tablets reduce acidity? ii) Why does the stomach need to be acidic?
Q5. Do you need red or blue paper or both?
Q6. Do leaves change at all during the year?

Substances & particles

6.1 Identify dyes
Q2. What does the distance moved by the spots tell you?
Q3. All three contain the spots for tomato.
Q4. Why does the distance moved by the solvent matter?
6.2 Separate two substances
Q2. i)-ii) What different properties do the substances have?
Q3. i)-ii) What different properties do the substances have?
Q4. i) Filtering removes particles which cannot pass through a filter ii) Do water and salt have low boiling points?
6.3 Explain state changes
Q2. What happens to particle energy when the heater is on?
Q3. What happens to particle energy when solid->liquid?
Q4. What happens to the particles in melting and boiling?
6.4 Changing states
Q2. i)-iii) Is the temperature above/below the melting and boiling points?
Q3. Is the temperature above/below melting/boiling points?
Q4. Which have a different range from melting to boiling?
6.5 Solubility data
Q2. i) At what temperature would 30 g fit into the table? ii) 50 g of water is half of 100 g.
Q3. i) At what temperature would 40 g fit into the table? ii) 1 litre of water has a mass 10 times 100 g.
Q4. If he added more than 24 g, some would not dissolve.
6.6 Solubility curves
Q2. Remember to draw a curved line of best fit.
Q3. i)-ii) How much dissolves at the two temperatures?
Q4. i) Where do the lines have the same value? ii) What is the lowest temperature 50 g dissolves?
6.7 Mixed up problems.
Q1. How do the spots in the sample compare to the dyes?
Q2. Flavour/alcohol have a lower boiling point than water.
Q3. The air transfers energy to the particles in the puddle.
Q4. i) Look at the temperatures for no salt/salt. ii) What state is water with rock salt in? iii) Which type is still liquid?
Q5. Compare the values as fractions e.g. A is 10 g / 40 g.
Q6. Make sure you follow the right curve.

Hints

Cells

7.1 Functions of cell parts
Q2. A full vacuole pushes against the cell wall.
Q3. Ribosomes make proteins to help chemical reactions.
Q4. Energy for the cell is released from food in mitochondria.
7.2 Using a microscope
Q2. Mitochondria are tiny structures found inside cells.
Q3. Compare image with the microscope in question 1.
Q4. How do you calculate total magnification?
7.3 Identify cells
Q2. Which labelled features are from plant/animal cells?
Q3. Which labelled features are from plant cells?
Q4. Identify what parts each cell has.
7.4 Functions of specialised cells
Q2. The cell can change shape - where might this be useful?
Q3. It has a very thick cell wall - what is its function?
Q4. Why might skin need no gaps between its cells?
7.5 How cells are specialised
Q2. A blood cell changes shape when it meets a bacteria cell.
Q3. Cilia can help to move particles on the cell's surface.
Q4. How are the cells walls between phloem cells special?
7.6 Mixed up problems
Q1. What does each labelled cell part do?
Q2. What is the magnification of the objective lens he uses?
Q3. What part from animal and plant cells is missing?
Q4. What happens to stoma when guard cells change shape?
Q5. How do white blood cells move to the microorganisms?
Q6. Energy is needed for growth.

Interdependence

8.1 Interpret food webs
Q2. Which organism stores the energy from the Sun?
Q3. The manure is decaying.
Q4. Draw a food chain for a human being.
8.2 Change in population
Q2. What do both snails and slugs eat?
Q3. What do both squid and fish eat?
Q4. Mountain lions eat a greater variety of food than hawks.
8.3 Explain resources
Q2. What happens if plants get more water and warmth.
Q3. What resources affect the growth of plants?
Q4. What resources for survival are scarce in the desert?
8.4 Effect on population
Q2. How could the tree affect the population of daisies?
Q3. Why do butterflies and caterpillars need plants?
Q4. The lines show the population of both animals increases.
8.5 Explain competition
Q2. What do both soy plants and weeds need to grow?
Q3. What do the cheetahs need to survive?
Q4. What happens to the numbers of stoats?
8.6 Mixed up problems
Q1. Grass is a producer.
Q2. Work out what animals kites, snakes and owls eat.
Q3. Minerals are a resource that plants need.
Q4. The population of both animals decreases over time.
Q5. What does fewer plants mean for rhododendrons?
Q6. How does the heavy metal get into the food chain?

Reproduction

9.1 Sexual vs asexual
Q2. This is an example of sexual reproduction.
Q3. There is one parent: what type of reproduction is it?
Q4. The gametes are egg and sperm: who donated these?
9.2 Human reproductive organs
Q2. Where does fertilisation take place?
Q3. One sperm has to meet the egg. It's a difficult journey.
Q4. How can cilia and mucus help the egg travel?
9.3 Menstrual cycle
Q2. What is the function of the uterus lining?
Q3. Is day 18 before or after ovulation?
Q4. What is happening to the uterus lining on day 24?
9.4 Pregnancy time
Q2. After ovulation, an egg only survives for 1 day.
Q3. What happens at the same time the temperature rises?
Q4. Ovulation happens on day 14.
9.5 Supporting the foetus
Q2. Instead of one placenta for a foetus, twins have to share.
Q3. What does the mother's blood supply the foetus with?
Q4. What is the function of the umbilical cord?
9.6 Mixed up problems
Q1. How many parents are involved?
Q2. The sperm needs a tail to swim.
Q3. What happens to the uterus lining during menstruation?
Q4. The events don't always happen as in the diagram.
Q5. The foetus gets less oxygen if its mother smokes.
Q6. Which stage is asexual reproduction and which sexual?