Answers: GCSE /Y9 Mastery Practice Book

Acceleration

1.1 Distance travelled
Q1. 6 m.
Q2. 45 km.
Q3. 45 m.
Q4. 20 s.

1.2 Acceleration & gradients
Q1. 0.0916 m/s^2
Q2. a) 11.6 m/s^2 b). Straight line from origin which goes through 1.5 s and -17.5 m/s.
Q3. C.
Q4. a) 15 m/s. b) 6.6 m/s^2.

1.3 Equation of motion
Q1. 10.8 m/s.
Q2. –0.867 m/s^2.
Q3. 20 mph: 6.75 m/s^2. 40 mph: 6.75 m/s^2. It's the maximum deceleration the force from the brakes can provide.
Q4. a) 8 m/s. b) 8.27 m/s.

1.4 Newton's 1st law
Q1. a) 800 N (2cm) upwards and the same force downwards. b) i) The upthrust from the air on the parachute is greater than her weight, so the resultant is upwards. b) ii) The upthrust is the same as her weight and the resultant is zero.
Q2. a) Engine thrust forwards, drag and tension in the tow bar backwards. b) the tension force disappears and there is a resultant force forwards. The car accelerates.
Q3. a) Upthrust upwards = weight downwards. b) Upthrust upwards = weight downwards. Engine thrust forwards > drag backwards. c) Upthrust upwards = weight downwards. Engine thrust forwards = drag backwards. d) Upthrust upwards = weight downwards. Engine thrust forwards < drag backwards.
Q4. It folds it wings to reduce the upthrust to a minimum. There is a resultant acting downwards because its weight is bigger than the upthrust. The kestrel accelerates downwards.

1.5 Adding vectors
Q1. Resultant force = 0.85 N (8.5 cm) at angle 45 ° downwards to the right.
Q2. a) 50 N to the left. b) Resultant force = 71 N (7.1 cm) at angle 45 ° downwards to the left.
Q3. 700 N upwards. b) Resultant force = 720 N (7.2 cm) at angle 12 ° from vertical to the right.
Q4. a) Resultant force = 2800 N (5.6 cm) at angle 45 ° downwards to the left. b) Resultant force = 2800 N (5.6 cm) at angle 27 ° to the left.

1.6 Vector components
Q1. a) Vertical component of each force = 250 N. b) 500 N
Q2. a) Horizontal component = 310-330 N (3.1-3.3 cm) to the right. b) A smaller angle of 30 ° gives a larger horizontal component of the force pulling horizontally.
Q3. a) Speed = 8 m/s in direction 75 ° from horizontal to left. b) Vertical speed becomes 7.5-7.7 m/s (7.5-5.5 cm). Horizontal speed becomes 2.0-2.2 m/s (2.0-2.2 cm).
Q4. Forces vertically upwards and downwards must be balanced. So vertical component of the upthrust = weight. b) Resultant force = 570-590 N (5.7-5.9 cm) at angle 30 ° from vertical to the left.

Heating

2.1 Particle energy transfer
Q1. 80% of the sun's energy is reflected. The rest is absorbed and conducted to the air gap. Thermal conductivity is very low. Energy is dissipated in bricks and air so less is conducted through the walls.
Q2. a) Nitrogen bubbles have low thermal conductivity. The thicker suit transfers energy at a lower rate than the thinner suit. b) In warm water, below body temperature, a higher rate of heat transfer keeps the wearer cool, so the 3mm suit is better.
Q3. The asphalt roof reaches a higher temperature. The shiny terracotta reflects more of the sun's radiation. It is 5 times thicker so it takes longer for energy to pass through. The asphalt is matt black so absorbs more of the sun's radiation, heating up faster.
Q4. The surface is pale and shiny so reflects much of the solar radiation. Carbon foam is a poor thermal conductor as it has few particles to pass energy through conduction.

2.2 Thermal transfer rates
Q1. a) The vacuum cup has a lower rate of energy transfer. In the standard cup, energy is transferred faster. The graph is steeper until the temperature difference between coffee and mug is small and the graph levels off. The vacuum cup does not reach the same temperature in the time because energy transfer is slow.
b) Line starts from 80 °C with a steep negative gradient at first becoming shallower until it reaches 50 °C.
Q2. Graph B. The gradient is steeper so the rate of energy loss is higher. The fluffy layer next to the skin traps a layer of air which has low thermal conductivity.
Q3. The initial rate of energy transfer is higher when the air is cold. This is due to the bigger temperature difference with the warm air.
Q4. The resistor heats up rapidly. When in contact with the heat sink, the rate of heating remains low. Energy is transferred to the thin metal fins. The metal has a high thermal conductivity due to the large number of small fins in contact with the air.

2.3 Specific heat capacity
Q1. 1100 J/(kg °C).
Q2. 42.9 °C
Q3. 178.8 °C
Q4. 0.14 kg

2.4 Latent heat
Q1. a) 210 J b) Energy is transferred from the higher temperature sauce to the lower temperature ice cream. At 18 °C, sauce particles lose potential, not kinetic energy, and line up in the solid state. The energy makes ice cream particles move faster.
Q2. Ethanol L_{vap} = 846 J/kg. Propanone L_{vap} = 518 (J/kg). The propanone graph is the one with the lower and shorter flat part.
Q3. 67 J. b) i) liquid, ii) liquid and gas, iii) gas.
Q4. a) 11.3 kJ b) A because 56500 kJ are delivered in 5 s.

2.5 Gas pressure
Q1. a) Air particles escape from the balloon over time, so there are fewer collisions with the walls and pressure decreases. b) As air temperature decreases, the particles move slower. There are fewer and collisions with the walls, and collisions produce less force.
Q2. A fire increases the temperature of the gas and the particles move much faster. More, harder collisions produce a force on the walls larger than they can withstand. The can explodes.
Q3. When air is removed the pressure becomes very low. The atmospheric pressure from outside is much greater.
Q4. In braking, friction causes the tyres and the air inside to heat up. This particles move faster so there are more, harder collisions with the tyre walls.

2.6 Liquid pressures
Q1. Liquid pressure increases with depth. The higher up the tank is, the greater the water pressure in the taps lower down. People can fill their kettles faster and have more powerful showers.
Q2. When the packet was sealed, the air was at standard atmospheric pressure. In the sky, air pressure is lower than on Earth. Higher pressure from inside forces the walls of the packet outwards.
Q3. a) The diver needs to return to the surface very slowly, stopping along the way. This will change the external pressure slowly. b) The external pressure is the sum of liquid and atmospheric pressure. Atmospheric pressure decreases as you go higher in the atmosphere.
Q4. Hole 2 first. It is deeper in the water. This means the water pressure will be greater, causing water to spurt through the hole faster.

Sound & waves

3.1 Sound waves
Q1. Cleaning chairs: the movement is in the same direction of the wave, so it causes a longitudinal wave. Energy is transferred as puls-

es of compression and extensions of the tube which pass along. Cleaning walls: the movement is at right angles to the direction of the wave, so it causes a transverse wave. Energy is transferred as the sections of the tube pull their neighbours up and down.
Q2. a) Jumping is at right angles to the bridge, and causes a transverse wave with up and down vibrations. b) Swinging side to side is at right angles to the bridge, and causes a transverse wave with left and right vibrations. c) Pulling the slats is in the same direction as the bridge and causes a longitudinal wave.
Q3. Air particles at high pressure push the diaphragm into the microphone and the oscilloscope shows a peak. As the diaphragm returns to its flat position, the signal goes through zero displacement. The lowest pressure of the sound wave moves the diaphragm to the front of the microphone, and the oscilloscope shows a trough.
Q4. Frog: water particles vibrate up and down, making a transverse wave which travels on the surface. Fish: under the water particles causes their neighbours to vibrate in the same direction as the wave, making a longitudinal wave.

3.2 Wave properties
Q1. Period = 5 s. Frequency = 0.2 Hz. Wavelength = 2 m.
Q2. a) 7-9 ms: air particles vibrate back and forth with increasing displacement – the sound amplitude increases. 7-11 ms: the distance particles vibrate decreases - the sound amplitude decreases. b) A high frequency means a short period. The period increases in throughout the call as the frequency decreases.
Q3. Mega motor: frequency = 455 Hz. Shark surf: frequency = 526 Hz. Both these are within the frequency range of the reef.
Q4. a) Surface wave: period = 20 s, frequency = 0.05 Hz, wavelength = 60 km. P-wave: period = 2 s, frequency = 0.5 s, wavelength = 10 km. b) Surface waves move structures up and down through large amplitudes, causing them to break. P-wave amplitudes are smaller so causes less movement of the buildings, delivering less energy.

3.3 Wave speed equation
Q1. a) Wavelength = 1.56 m. b) 906 m/s.
Q2. Pipe: frequency = 1000 Hz. Air: frequency = 1000 Hz.
Q3. a) Speed = 936 m/s b) Wavelength = 1.5 m.
Q4. Frequency (both) = 330 Hz. Ear canal: wavelength = 1.0 m. Bones: wavelength = 11.2 m. Cochlea: wavelength = 4.5 m

Periodic table

4.1 Represent subatomic particles
Q1. Atom has 7 protons and 8 neutrons in nucleus. There are 2 electrons in first shell, and 5 electrons in the second.
b) Carbon–12
Q2. +2 charge. An magnesium ion has lost two electrons from its outer shell and now has two more protons than electrons.
Q3. Argon atoms have a larger radius because they contain more electron shells. Neon has atomic number 10. Its 10 electrons are arranged in 2 shells. Argon has an atomic number 18. Its 18 electrons arranged in three shells.
Q4. An atom with one proton and neutron in nucleus. There is one electron.

4.2 Calculate relative atomic mass
Q1. Relative atomic mass is a weighted average. 92% of silicon is silicon-28, so the average must be close to 28. b) $A_r = 28.1$
Q2. $A_r = 35.5$
Q3. 14 g of each isotope. A_r is the average so the abundance of each must be 50%.
Q4. Abundance of isotope-10 = 1/5 = 20%. Abundance of istope-11 = 4/5 = 80%. Therefore $A_r = 10.8$.

4.3 Periodic patterns
Q1 a) Group 7. It is a liquid or gas at room temperature and does not conduct electricity. Therefore it must be a non-metal and either in group 7 or group 0. It reacts with calcium and hydrogen so cannot be in group 0. b) 7 electrons.
Q2. The atomic radius increases down the group. Each element has more electron shells than the one above, so the atoms get larger.
Q3. A solid. As melting and boiling points increase down the group, both of these will be above 25°C. It will be a very dark colour because the colour gets darker down the group.
Q4. a) For group 1: it has one electron in its outer shell. Against group 1: it is not a metal, or solid at room temperature, and does not react with oxygen and water without heating. b) For group 7: it has one electron less than a full outer shell, or it is a gas.

4.4 Reactions of groups 1 & 7
Q1. a) Lithium: lithium hydroxide and hydrogen. Sodium: sodium hydroxide + hydrogen b) Sodium is a more reactive element, its atoms lose an electron more easily than lithium atoms. Sodium's outer shell is further from the nucleus and the attraction between electron and protons is lower than in lithium.
Q2. a) X: sodium iodide. Y: lithium bromide. Z: potassium chloride. b) Reaction Z. Potassium is more reactive than sodium and lithium. Chlorine is more reactive than bromine and iodine. Two reactive elements reacting together produces a violent reaction.
Q3. a) Lithium reacted with moisture/water in the air. b) It would take less time to go dull, because sodium is more reactive.
Q4. A: lithium hydroxide. B: lithium chloride. C: lithium fluoride. D: chlorine.

Matter & energy

5.1 Products of combustion
Q1. A yellow flame means methane is being burnt in incomplete combustion. One product is carbon monoxide which is very toxic.
Q2. The elements in petrol are carbon, hydrogen and sulfur. These are oxidised to carbon monoxide, steam (water) and sulfur dioxide.
Q3. H2O/water only. b) It produces no carbon dioxide, carbon monoxide or soot. These are air pollutants and increase global warming.
Q4. $4CH_4 + 5O_2 \rightarrow 2CO + 2C + 8H2_O$

5.2 Calculate bond energies
Q1. Energy difference = -554 kJ/mol. The reaction is exothermic.
Q2. Energy difference = -802 kJ/mol. When methane burns it gives out a lot of heat which can be used to heat things.
Q3. 5794 – 4249 = +1545 kJ/mol. This value suggests an endothermic reaction, whereas a camping stove is designed to heat things.
Q4. a) B. Less energy is released when bonds are formed than energy needed to break the bonds. b) The reaction is endothermic so needs to take in energy from the surroundings.

5.3 Balance symbol equations
Q1. Q1. $3H_2 + 3N_2 \rightarrow 2NH_3$.
Q2. $CuSO_4 + 2NaOH \rightarrow Na_2SO_4 + Cu(OH)_2$.
Q3. Fe_2O_3. The balanced symbol equation is $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$. There must be 2 Fe atoms and 3 O atoms in the iron oxide to balance the equation.
Q4. B. The balanced symbol equation is $2H_2 + O_2 \rightarrow 2H_2O$. This ratio of 2 H_2 : 1 O_2 will give the biggest explosion.

5.4 Calculate mass in equations
Q1. 3.2 g
Q2. 320 g
Q3. 0.44 g
Q4. 0.4g

Using resources

6.1 Reactivity series
Q1. Potassium. Its volume went down more quickly than sodium, which shows metal Y is more reactive than sodium.
Q2. An acid. Metals above copper react with dilute acids. Nickel is below iron and does not react with water at room temperature.
Q3. a) Cell A: Mg to Cu. Cell B: Zn to Fe. Cell C: Fe to Cu.
b) Cell A. The metals have the largest difference in reactivity.
Q4. The more easily a metal loses electrons, the more reactive it is. Lithium only has to lose one electron but beryllium has to lose two.

6.2 Predict displacement reactions
Q1. Copper is near the bottom of a reactivity series. Metal Y did not displace any other metals from their salts.
b) No. The order of reactivity could be: X, Z, W, Y or Z, X, W, Y.

We do not know which metal (X or Y) is more reactive.
Q2. a) The brown colour is copper. Bismuth is more reactive than copper so has displaced it from copper sulfate solution. Tungsten and silver are less reactive than copper so cannot displace it.
b) React tungsten with a solution of silver salt. If it reacts then tungsten is more reactive than silver. If not then silver is more reactive.
Q3. a) It is a displacement reaction. Calcium is more reactive than hydrogen so displaces it from hydrochloric acid. b) Iron is more reactive than hydrogen, so displaces it from the acid. Gold is less reactive than hydrogen so cannot displace it.
Q4. Copper and iron. Carbon is more reactive than copper and iron so displaces these metals. Aluminium and magnesium would stay in their compounds because they are more reactive than carbon.

6.3 Potable water
Q1. The seawater is too high in sodium chloride, which needs to be removed. This can be done by distillation or reverse osmosis. The water contains harmful bacteria which will be removed by these methods. The pH is too high and can be reduced by adding acid.
Q2. D. The number of bacteria falls to 0 so this must be sterilisation. This happens after filtration (C) and before the water is stored (E).
Q3. X. Source Y has high sodium chloride levels, so desalination is needed. Distillation and reverse osmosis are expensive.
Q4. Measure the mass of an empty beaker. Add water and boil until it has turned into steam and only dissolved substances remain. Calculate the increase in mass, the mass of the dissolved substances.

6.4 Environmental impact
Q1. Disadvantages: Made of crude oil, a finite resource. They can only be used once, and most are thrown away into landfill. Plastic is not biodegradable and may release toxic chemicals. Advantages: The mass of plastic bottles is less than glass, so transportation needs less energy. The maximum temperature in production is lower, so less energy used during manufacture.
Q2. Plastic is made from crude oil, a finite resource. Recycling it reduces the amount extracted so crude oil will last longer. It also reduces the energy used and destruction of ecosystems. However, recycling still needs energy. Bottles sent to landfill only travel a short distance, reducing the amount of fuel for transport and pollutants released. Bottles sent to Asia travel a long distance, increasing pollution. Plastic is not biodegradable and stay in landfill for a long time. When breaks down it may release toxic chemicals.
Q3. Reasons for: phones contain plastic and metals which are finite resources; extracting and processing materials needs resources and energy and may destroy habitats; new phones need to be manufactured and transported, needing energy and water; phones may end up in landfill, are not biodegradable and may release toxic materials. Reason against: a newer model may be more energy efficient, reducing the electricity used and pollution created in electricity generation; Ali might give his phone to someone or recycle it, so the materials can be reused.
Q4. a) Ceramic cups have less impact: they are made from a renewable source, paper cups contain a plastic liner, a finite resource; paper cups use more water in manufacture; ceramic cups generate less CO_2 during manufacture; ceramic cups can be reused but paper cups may be burnt, releasing air pollutants. Ceramic cups have more impact: they have a greater mass and take up more space, so more energy is needed for transportation. b) The company may only show advantages of the product. They assume people reuse the cups, but they may not and ceramic is not biodegradable.

Growth & differentiation

7.1 Cell magnification
Q1. Measles virus = 1.2×10^{-4} mm or 0.12 µm. White blood cell = 2.2×10^{-2} mm or 22 µm. b) Two orders of magnitude differences.
Q2 Magnification = X 5000.
Q3. 4 orders of magnitude.
Q4. Diameter of whole cell ~ 60 µm. Diameter of nucleus ~ 15 µm They are the same order of magnitude.

7.2 Cell cycle changes
Q1. Graph C. It shows the amount of cytoplasm doubles during interphase and then halves during mitosis.
Q2. B has 3 chromosome pairs. C and D have 3 individual chromosomes.
Q3. D, because there are fewest of them seen.
Q4. a) No, because the amount of DNA doubles and then halves twice. In mitosis the DNA doubles and then halves. b) 23.

7.3 Types of cell transport
Q1. Movement of chloride and potassium into the cells stops. Their concentrations are higher inside so they move by active transport, which requires energy from respiration. Movement of calcium and sodium continues. Their concentrations are higher outside the cell so they move by diffusion, which does not require energy.
Q2. Urea moves from the patient's blood into the dialysis fluid by diffusion because its concentration is higher in the blood. The fluid has to move to allow fresh fluid with no urea to be continually into contact with the membrane, for diffusion.
Q3. Active transport. Uptake of nitrate is reduced with no oxygen. Active transport requires energy from respiration. With oxygen, the uses aerobic respiration, which releases a lot of oxygen, so more nitrate is absorbed. Without oxygen, it uses anaerobic respiration, which releases less oxygen, so less nitrate is absorbed.
Q4. a) Glucose is absorbed by active transport. The results show this because when cyanide is used the rate of absorption decreases. The cell is unable to carry out respiration and produce energy so the cell is unable to absorb glucose using active transport.
b) Both sugars are absorbed by diffusion. Xylose is only absorbed by diffusion, because stopping energy production does not affect its absorption. Glucose absorption decreases but does not stop, so some glucose is absorbed by diffusion.

7.4 Predict diffusion
Q1. a) Glucose moves into the cell. Oxygen moves out of the cell. Carbon dioxide does not move. b) Glucose move the fastest because the concentration gradient is the highest.
Q2. In both tubes the water inside the membrane is blue. In B it is darker as it was at a higher temperature so iodine diffused faster.
Q3. In emphysema the rate of gas exchange decreases. The rate gases diffuses is affected by surface area and with fewer alveoli there is less surface area.
Q4. The graph shows the higher the temperature, the darker the colour. This is because rate of diffusion is affected by temperature.

7.5 Explain osmosis
Q1. For 0.2 mol/dm^3 solution, the mass increased due to osmosis. So sugar content must be > 0.2 mol/dm^3. For 0.4 mol/dm^3 and above, mass decreased, so sugar content must be <0.4 mol/dm^3.
Q2. There was a net movement of water from the pure water into the salt solution by osmosis, pushing up water in the capillary tube.
Q3. There is a net movement of water from the less concentrated salt solution in the potato to the more concentrated salt in the well.
Q4. With pure water the mass went up. Egg contains solutes so there is a net movement of water into the egg. With 5% salt solution the mass decreased. There was a net movement of water out of the egg because its solute concentration is less than 5%.

7.6 Use stem cells
Q1. The patient's skin stem cells. They can differentiate to form skin cells and have the same genetic material so will not be rejected.
Q2. The diagram shows therapeutic cloning. Embryo cells can differentiate into many specialised cells and be used to treat many conditions by replacing damaged cells.
Q3. Laura's cells all contain a mistake in the genetic material. An embryo is produced from one of her cells contains the mistake. Stem cells from this embryo will not produce healthy cells.
Q4. The stem cells are like embryonic stem cells because they can differentiate into any specialised cell, so can be used for many treatments. The cells have the patient's genetic material so will not be rejected. Normally, embryonic stem cells mean an embryo has to be destroyed, but in this technique no embryo is destroyed.

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Genetics

8.1 Gene function

Q1. The patient's DNA has a mutation. GC has been substituted for AT, so the wrong amino acid will be used and the CFTR protein will not fold correctly way. It will not be able to do its job properly.
Q2. It cannot make melanin. This could be due a mutation in the gene for the protein tyrosinase. The order of bases could be wrong, causing the wrong order of amino acids in the protein. The chain will not fold into the correct shape so tyrosinase cannot do its job .
Q3. Strand X has a mutation with AGT instead of AGC. Both AGC code for amino acid. The mutation still produces the same amino acid, with no effect on cell activity. Strand Y has a mutation with AAA instead of AAT. AAT codes for amino acid N but AAA codes for K. the mutation will cause the incorrect amino acid so the protein will not fold correctly and not function.
Q4. Huntington's disease is caused by a mutation. The protein coded for by the gene cannot carry out its job in nerve cells. Scientists could change the gene to correct the mutation.

8.2 Construct Punnett squares

Q1. In F2 offspring, round seeds = 4935, wrinkled = 1645.
There are 3 round seeds to 1 wrinkled, so the F1 generation must all be Rr.
Q2. The ratio of grey: white offspring is about 1:1. Grey fur must be a dominant allele and white fur recessive. The parents must have genotypes Ff.
Q3. 6 lambs with brown eyes and 6 with blue eyes. 2 in 4 offspring have brown eyes (Ee) and 2 in 4 blue eyes (ee). This is a ratio of 1:1.
Q4. 2 in 4 offspring have the dominant allele (Dd) and have polydactyly. The probability of a child with the condition is 50%.

8.3 Family tree evidence

Q1. Person A's mother has cystic fibrosis so person A must be aa. Their father does not, but he has a daughter who does so he must be a carrier (Aa). 2 out of 4 of the possible offspring genotypes are carriers (Aa) so there is a 50% probability that person A is a carrier.
Q2. Heterozygous genotype e.g. Aa. Person 8's mother does not have the syndrome so she is homozygous recessive (aa).
Their brothers do not have it so they must be homozygous recessive (aa). Their father has it, so to pass the recessive allele to his sons he must be heterozygous (Aa).
Q3. Person A = Nn. Person B = nn. Person B is nn because she has the disorder. They have two children without it so they must be Nn. They have one child that with it (nn). So, person A must be Nn.
Q4. Craig has the syndrome but because he has siblings without it he must be Mm. Kasey does not have it so she must be mm. The Punnett square shows a proportion of 1 in 2 children with the syndrome (Mm) so there is a 50% chance their child will have it.

Human interaction

9.1 Explain population distribution

Q1. As distance from the fountain increases, percentage cover of moss decreases. From 0-0.5 m there is shade from the fountain. This increases moisture levels, an abiotic factor where moss grows best. Water will spills from the fountain, increasing the amount of water for the moss. The biotic factor of competition is important further from the fountain. Light intensity increases and there is more grass, increasing competition for resources like minerals in the soil.
Q2. More algae grows on the north side. Factors that decrease moisture on the south side could be more heat from the sun or a higher wind intensity, which dries out the algae.
Q3. Sundews need low pH and a high moisture content to survive. Rush needs a pH of around 6 and a medium moisture level. Bracken needs a low pH and low moisture level.
Q4. a) 4-6 m. Growth of grass is low because the trampoline is stopping light reach the ground. Grass needs high light intensity.
b) Where light intensity is high the percentage cover of grass is higher than dandelion. The grass is out-competes the dandelion and gets more resources to grow faster. Under the trampoline, only dandelions can grow and do have to compete with grass.

9.2 Impacts on biodiversity

Q1. The graph shows the number increased from 1970-2000. Vehicles release acidic gases and carbon dioxide. Acidic gases cause acid rain, which kills trees and aquatic organisms. Carbon dioxide causes global warming. Changes in weather patterns can lead to loss of habitats e.g. through flooding. Climate change means many organisms are no longer adapted to their environment. These impacts reduce populations of organisms, decreasing biodiversity.
Q2. Flowchart: more people -> more land needed -> more forests cut down. More forests cut down -> fewer plants -> less food for prey, and cause -> loss of habitat -> less space for prey. Both cause -> less food for tigers -> fewer tigers. b) Biodiversity decreases because with fewer plants the forest can no longer support so many different organisms.
Q3. River B. It contains more different species. Pollution kills organisms so there are fewer species in more polluted water.
Q4. a) Adding trout to lakes (for fishing) and polluting the water, which changes the pH. b) Adding trout. Lakes with more than 20 water beetles have a pH from 5.0-7.5. In the trout lakes, the highest number of water beetle species is 16.

9.3 Control disease

Q1. Faeces enters the water supply, so bacteria infect the water. People drink it and bacteria reproduce in their bodies, causing illness. To prevent this, water needs to be treated to kill the bacteria.
Q2. Reasons for quarantine: a tick could bite him and carry pathogens as a vector. If this tick bites someone else it can pass the disease on. Reasons against: to pass the disease, someone else has to be bitten by a tick. There is a low chance this will happen.
Q3. a) Bacteria in food grow faster in warm summer months. They multiply to large numbers. When this happens, someone eating the food can get sick. Also in summer, outside activities increase. More people cook outside. Food may not be cooked to a high enough temperature to kill bacteria, or not be refrigerated or washed.
b) Keep food in the fridge to stop pathogens growing quickly. Cook food through to kill pathogens are killed. Wash hands and surfaces.
Q4. a) There are more deaths in ward 1. This suggests doctors cause the spread. They transfers the pathogens from ill patients on other wards to the women. b) The doctors should wash their hands to kill the pathogens in between treating patients.