Biology (130 MARKS)

Question 1 (52)

(*a*)(*i*) muscle / connective / blood / bone / tendon / ligament / epithelial / nervous, etc (3)

[do not accept named organ *or* organ tissue e.g. brain tissue]

(*ii*) group of tissues working together (tissues with a common function) (3)

(*b*)(*i*) a living thing (organism) that cannot be seen by the naked eye (is visible with a microscope) (3)

(*ii*) production of cheese (yogurt / alcohol / insulin) / bread making, etc (3)

[allow genetically modified foods]

(*c*) **A**: pulmonary artery (3)

B: aorta (3)

(*d*)(*i*) renal artery (3)

(*ii*) ureter(s) (3)

(*e*)(*i*) carbon dioxide // water (3)

(*ii*) limewater / lime / calcium oxide / calcium hydroxide // anhydrous cobalt chloride / anhydrous copper sulfate

[*answers must match*] [allow: cobalt chloride / copper sulfate] (3)

(*f*) (*i*) phototropism (3)

(*ii*) <u>more</u> light for photosynthesis (making food) (3)

(*g*) (*i*) iodine (3)

(*ii*) prevent sample drying out / prevent sample curling up (keeps sample flat) / prevents damage to lens / protects sample, etc. (3)

(*h*)(*i*) Benedict's / Fehling's

(*ii*) heat [do not accept boil]

(*iii*) blue to red / orange

(*iv*) test water *or* a solution which doesn't contain a reducing sugar
no colour change observed

(4 + 2 + 2 + 2)

Question 2

(39)

(*a*)(*i*) stomach (3)

(*ii*) produces bile / detox centre / breaks down proteins / regulates body temperature / stores glycogen / breaks down red blood cells, etc (3)

(*iii*) reabsorption (absorption) of water (minerals, salts, vitamins) / carry (form, store) faeces (waste) / accommodates useful bacteria (micro-organisms), etc (3)

[reabsorption of nutrients is insufficient on its own]

(*iv*) mouth / stomach / small intestine (3)

(*b*)(*i*) humerus (3)

(*ii*) knee / fingers / toes / jaw (3)

(*iii*) connects muscle to bone (3)

(*iv*) arm straightens / forearm (radius and ulna) lowers / **X** relaxes (3)

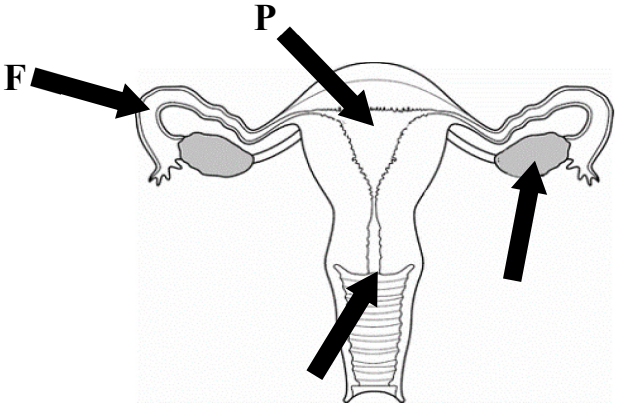
(*c*)(*i*) menstruation (breakdown / shedding of uterus lining) / period / bleeding (3)

(*ii*) when pregnancy (conception / fertilisation) can occur / ovulation occurs (3)

(*iii*) fuses (joins) with sperm [allow forms a zygote] (3)

(*iv*) **F** on fallopian tube arrow (3)

P on the uterus arrow (3)



Question 3 (39)

(*a*)(*i*) **Producer**: grass (3)

Decomposer: beetle / woodlouse (3)

(*ii*) Habitat named **(1)**

Organism from named habitat **(1)**

Name or description of adaptation //
How adaptation helps organism survive in habitat **(2 × 2)**

[adaptation must match organism]

(*b*)(*i*) xylem (3)

(*ii*) food storage / food manufacture (photosynthesis) / gas exchange / asexual reproduction (3)

(*c*) (*i*) **A**: testa (3)

B: food supply (store / source) [allow endosperm] / cotyledon (seed leaves) (3)

(*ii*) root (3)

(*iii*) **B** (3)

to remove oxygen (3)

(*iv*) **Sycamore**: wind (3)

Strawberry: animal (3)

Chemistry (130 MARKS)

Question 4 (52)

(*a*)(*i*) mixture of metals / mixture of a metal and another element (3)

(*ii*) bronze / brass / solder, etc (3)

(*b*)(*i*) coal / oil / gas (methane) / peat (turf) (3)

(*ii*) carbon dioxide / water (3)

(*c*) **Au**: gold **(2)**

Cu: copper **(2)**

Fe: iron **(2)**

(*d*)(*i*) electrolysis (3)

(*ii*) O_2 (3)

(*e*) In any order:

rusting of iron (3)

burning of paper (3)

(*f*) (*i*) pH meter // universal indicator (pH paper) **(2)**

read pH // compare with colour chart **(2)**

(*ii*) sodium hydroxide / bread soda / base (alkali) **(2)**

[do not accept bleach / window cleaner]

(*g*)(*i*) zinc / aluminium / calcium / named valid metal [accept symbols] (3)

(*ii*) hydrogen (3)

(*h*)(*i*) any two of:

sodium / potassium / lithium / rubidium / caesium / francium

(*ii*) soft / easy to cut / less dense than water / shiny when cut (dull when exposed) / low melting point

(*iii*) very reactive / one electron in outer shell / reacts vigorously (quickly) with oxygen (water) / loses one electron in chemical reactions (forms positive ion) / tarnishes quickly when exposed

(4 + 2 + 2 + 2)

Question 5 (39)

(*a*)(*i*) **B** (3)

(*ii*) same volume of water / same time (vigour, shaking) / same size of soap flakes / any valid answer (3)

(*iii*) calcium (Ca) / magnesium (Mg) (3)

(*iv*) **State *or* show**

method of boiling (evaporating) water +
method of cooling (condensing) water +
method of collecting pure water

[No labelled diagram - deduct 3 marks] **(9)**

(*b*)(*i*) solvent (3)

(*ii*) saturated (3)

(*iii*) heat the solution / add more water (solvent) [boil not acceptable] (3)

(*c*)(*i*) hydrogen peroxide (3)

(*ii*) colourless (3)

(*iii*) catalyst (3)

(*iv*) neutral (pH 7) / neither acidic nor basic (3)

Question 6 (39)

(*a*)(*i*) durable / brightly coloured / easily washed / low density / not heavy / less risk of injury from breakages / don't break easily / easily worked (moulded) / flexible (easy to bend) / non-toxic, etc (3)

(*ii*) crude oil (3)

(*b*) **A** = gas (3)

B = liquid (3)

C = solid (3)

(*c*)(*i*) periodic table / formula and tables booklet (log tables) / textbook / internet (named website) / teacher / any valid source **(2)**

(*ii*)

Particle	Number	Location
Proton	**9**	**Nucleus**
Neutron	**10**	**Nucleus**
Electron	**9**	Electron cloud

(2 + 2 + 2 + 2 + 2)

(*iii*) chlorine / bromine / iodine / astatine / ununseptium (tennessine) (3)

(*iv*) attraction between oppositely charged ions / transfer of electrons between atoms **(6)**

(*v*) carbon dioxide / methane / water / any valid example (3)

Physics (130 MARKS)

Question 7 (52)

(*a*)(*i*) 2000 N m (J) **(6)**
(250 × 8) N m (J) (slip – 1)

(*b*)(*i*) latent heat / change of state (3)
(*ii*) 42 º C (3)

(*c*)(*i*) North and South poles (3)

(*ii*) direction (3)

(*d*)(*i*) LED lights up (3)

(*ii*) LED wouldn't light (3)

(*e*)(i) chemical (3)
(*ii*) potential to kinetic (3)

(*f*) more dense / A is less dense (3)
less dense / B is more dense (3)

(*g*) light travels faster (3)
than sound (3)

(*h*)(*i*) 979

(*ii*) same / equal

(*iii*) centre of **X** anywhere below the front (in the H region)

(*iv*) barometer

(4 + 2 + 2 + 2)

Question 8 (39)

(*a*)(*i*) wax / petroleum jelly (vaseline), etc. (3)

(ii) **copper**: best conductor / worst insulator / transfers heat fastest (3)

glass: worst conductor / best insulator / transfers heat slowest (3)

(*b*)(*i*) heat the ball (3)

(*ii*) try fit ball through the ring and it won't fit (3)

(*iii*) cool the ball (3)

(*c*)(*i*) **State *or* show** [do not penalise if no diagram given]
Hang the piece of cardboard to rotate freely about a point and hang a weight from this point and mark the line (3)
Rotate the cardboard and repeat (3)
Where the lines intersect is centre of gravity **stated *or* clearly labelled in diagram** (3)

or

State *or* show [do not penalise if no diagram given]
Slide the piece of cardboard until it is about to fall off the edge of a table and mark line along cardboard corresponding to edge of table (3)
Rotate the cardboard and repeat (3)
Where the lines intersect is centre of gravity **stated *or* clearly labelled in diagram** (3)

or

[The following method carries a maximum of 6 marks]
State *or* show [Do not penalise if no diagram given]
Place the piece of cardboard on a pointed (thin) object (finger) and move the cardboard to find the point of balance (3)
The point of balance is the centre of gravity **stated *or* clearly labelled in diagram** (3)

(*ii*) low (lower) centre of gravity / broader base relative to height (3)

(*iii*) **B** (3)

left hand (anti-clockwise) moment equals (is greater than) right hand (clockwise) moment /

product of force by distance on left equals (is greater than) product of force by distance on right /

moments on left and right (moments at A and at C) are in balance (equal) **(6)**

Question 9 (39)

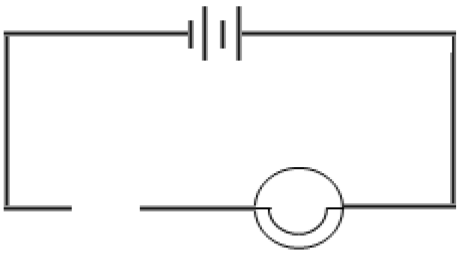
(*a*)(*i*) refraction (3)

(*ii*) dispersion (3)

(*iii*) spectrum (3)

(*iv*) red (3)

(*b*) (*i*)



battery

bulb / LED / buzzer / ammeter } in a circuit

gap / sample

correct working circuit using correct symbols *or* a correct working drawing of the set up with at least one component labelled correctly **(6)**

[no partial marks available]

(*ii*) the bulb (LED / buzzer / ammeter) will light (sound / show a reading) when a conductor is placed in the gap in the circuit (3)

(*c*) (*i*) all six points correctly plotted (3)

smooth curved line through all points (3)

[award zero marks for straight lines joining some *or* all dots.]

(*ii*) 19 ± 0.5 / answer consistent with graph ± 0.5 (3)

(*iii*) 14 m/s (m s^{-1}) (3)

56 ÷ 4 m/s (m s^{-1}) (slip –1)

(*iv*) velocity has direction / velocity is a vector / velocity is speed in a given direction / velocity has magnitude and direction / speed has no direction / speed is a scalar / speed has magnitude only / velocity is displacement over time but speed is distance over time **(6)**

[allow speed 'has any direction' for 6 marks]