

# COMBINED SCIENCE

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Paper 5129/11  
Multiple Choice

<i>Question Number</i>	<i>Key</i>	<i>Question Number</i>	<i>Key</i>
1	D	21	B
2	D	22	B
3	D	23	B
4	A	24	B
5	B	25	A
6	A	26	C
7	C	27	A
8	D	28	D
9	C	29	A
10	D	30	C
11	B	31	A
12	D	32	C
13	A	33	A
14	D	34	A
15	C	35	C
16	A	36	D
17	D	37	D
18	C	38	C
19	C	39	B
20	D	40	B

## General comments

Candidates found no questions very easy but only **Question 37** to be very difficult.

## Comments on specific questions

### Question 1

Most candidates found this question straightforward, although a significant number thought that the cell wall is the common feature of plant and animal cells.

### Question 2

This question proved more difficult. Many candidates correctly identified that water had moved out of the cells, but far fewer were able to link this to the relative water concentrations in the cell and in solution X.

### Question 3

Option **C** was a strong distractor for many candidates suggesting some misunderstanding about the effect of high temperatures on enzyme action.

### Question 4

Many candidates answered this question correctly, demonstrating their understanding of how light intensity affects the rate of photosynthesis.

### Question 5

This question worked well. Option **D** was a strong distractor for the weaker candidates suggesting some uncertainty about the causes of tooth decay.

### Question 6

This question, which asked for the functions of xylem and phloem, was answered correctly by the majority of candidates.

### Question 7

Candidates found this question more difficult. Option **A**, artery, was the strongest distractor.

### Question 8

Candidates found this question relatively easy. Some weaker candidates suggested that the breathing rate decreases during exercise, despite the data showing the opposite pattern.

### Question 9

The majority thought the capillaries were in the kidney.

### Question 10

This question worked well. Weaker candidates knew that hormones are destroyed by the liver but they were less confident about the part of the body on which a hormone works.

### Question 11

This question was answered correctly by most candidates.

### Question 12

The strongest distractor was Option **C**, suggesting some confusion about the role of animals and decomposers in the carbon cycle.

### Question 13

Option **B** proved to be the strongest distractor which suggests that a significant number of candidates think gametes are produced in asexual reproduction.

### Question 14

The method used to separate a mixture of water and an insoluble solid was well known by the better candidates.

**Question 15**

The better candidates identified the diagram representing a mixture of gases.

**Question 16**

A large proportion of the candidates do not know that isotopes must have different physical properties due to the differences in their masses.

**Question 17**

A significant number of the better candidates chose option **B**, the formation of an ionic compound with a formula XY.

**Question 18**

A majority of the candidates recognised that carbon (P) and oxygen (Q) combine to give a compound with the formula PQ<sub>2</sub>.

**Question 19**

A significant proportion of the candidates chose option **B**, indicating a misconception about how to use an equation to calculate the mass of products produced in a reaction.

**Question 20**

Many candidates knew that a metal oxide reacts with an acid to produce a salt and water, but a significant number of candidates thought that hydrogen is a product of the reaction, and chose option **B**.

**Question 21**

This proved to be an easy question for the better candidates.

**Question 22**

This was well answered by all candidates.

**Question 23**

Candidates found this question challenging.

**Question 24**

Many of the candidates recognised that the gas collected in the test-tube is oxygen and identified that oxygen relights a glowing splint.

**Question 25**

This was an easy question for the majority of the candidates.

**Question 26**

The cracking of alkanes to produce hydrogen and an alkene is understood by many of the candidates, but a number of candidates chose option **B**, the structure of ethane.

**Question 27**

A significant proportion of the candidates thought that water is a product of the fermentation of glucose.

**Question 28**

This was well known and showed good discrimination, with weaker candidates favouring option **C**.

**Question 29**

This also showed good discrimination.

**Question 30**

This was well answered.

**Question 31**

A significant number of candidates chose option **D**.

**Question 32**

This was also well answered.

**Question 33**

Candidates needed to take care over the detail from the diagram and the header in the table here. While most candidates chose the correct answer, a number of candidates chose a distractor that gave an order of conductivity completely opposite to the correct answer.

**Question 34**

This was answered poorly, indicating some misunderstanding of the nature of the image formed in a plane mirror.

**Question 35**

This was also poorly answered, indicating that there are some misconceptions on how to calculate a refractive index.

**Question 36**

This discriminated very well, with weaker candidates divided equally between options **A** and **B**.

**Question 37**

There was some evidence of guesswork amongst the candidates for this question.

**Question 38**

A significant number of candidates did not convert minutes into seconds before using the result in the potential difference calculation and chose option **D**.

**Question 39**

The structure of the atom was well known and the question showed good discrimination.

# COMBINED SCIENCE

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Paper 5129/12  
Multiple Choice

<i>Question Number</i>	<i>Key</i>	<i>Question Number</i>	<i>Key</i>
1	<b>B</b>	21	<b>C</b>
2	<b>D</b>	22	<b>D</b>
3	<b>B</b>	23	<b>B</b>
4	<b>A</b>	24	<b>B</b>
5	<b>B</b>	25	<b>A</b>
6	<b>C</b>	26	<b>C</b>
7	<b>B</b>	27	<b>A</b>
8	<b>D</b>	28	<b>D</b>
9	<b>C</b>	29	<b>A</b>
10	<b>B</b>	30	<b>A</b>
11	<b>A</b>	31	<b>D</b>
12	<b>D</b>	32	<b>C</b>
13	<b>C</b>	33	<b>A</b>
14	<b>B</b>	34	<b>C</b>
15	<b>D</b>	35	<b>B</b>
16	<b>A</b>	36	<b>C</b>
17	<b>D</b>	37	<b>D</b>
18	<b>C</b>	38	<b>A</b>
19	<b>D</b>	39	<b>A</b>
20	<b>B</b>	40	<b>B</b>

## General comments

Candidates found no question to be very easy but only **Question 36** to be very difficult.

## Comments on specific questions

### Question 1

Most candidates found this question straightforward, although a significant number thought that the cell membrane controls the activities of the cell.

### Question 2

This question proved more difficult. Many candidates correctly identified that water had moved out of the cells, but fewer were able to link this to the relative water concentrations in the cell and in solution X.

### Question 3

Option **A** was a strong distractor for many candidates suggesting some misunderstanding about the effect of pH on the action of enzymes.

### Question 4

This question discriminated well between candidates. Many were able to correctly identify the parts of a leaf. Some of the weaker candidates confused the cuticle with the epidermis.

### Question 5

This question worked well. Option **D** was a strong distractor for the weaker candidates suggesting some uncertainty about the causes of tooth decay.

### Question 6

This question was challenging, with Option **B** proving the strongest distractor. The question asked which weather conditions are most likely to stop the crops from wilting. Candidates must read questions carefully.

### Question 7

Candidates found this question, which asked for the function of platelets, relatively easy.

### Question 8

This question worked well. Option **B** was a strong distractor for the weaker candidates suggesting they may not have focussed on the gases moving across the surface of the alveolus.

### Question 9

A significant number of candidates thought the capillaries were in the kidney.

### Question 10

This question discriminated well between candidates, with many knowing that hormones are destroyed in the liver.

### Question 11

This question was well answered.

### Question 12

The strongest distractor was Option **C**, suggesting some confusion about the role of animals and decomposers in the carbon cycle.

### Question 13

Option **A** proved to be the strongest distractor for the weaker candidates suggesting that they think carbon dioxide is required for germination.

### Question 14

The separation of sand from aqueous sodium chloride by filtration is well known by a majority of the candidates.

**Question 15**

There was evidence of widespread guesswork amongst the weaker candidates.

**Question 16**

A significant proportion of the weaker candidates chose option **C**, the total number of electrons in an atom of boron.

**Question 17**

This question was well done by the better candidates.

**Question 18**

A large proportion of the candidates recognised that options **A** and **C** produce a compound with a formula  $PQ_2$  but a significant number of even the better candidates chose option **A**, an ionic compound.

**Question 19**

There was evidence of widespread guesswork.

**Question 20**

The colour of Universal Indicator in a neutral solution is well known by many of the candidates.

**Question 21**

The diatomic nature of the Group VII elements is quite well known by the better candidates.

**Question 22**

The fact that metals conduct electricity is well known by the majority of the candidates but the fact that they are malleable is less well known.

**Question 23**

A significant number of the candidates thought that the gas collected is carbon dioxide.

**Question 24**

The fact that hydrogen burns to form water is not well known.

**Question 25**

The idea that members of the same homologous series have the same functional group is well understood by many of the candidates.

**Question 26**

The cracking of ethane to produce ethene and hydrogen is quite well known by the better candidates.

**Question 27**

The uses of ethanol are well known by a majority of the candidates.

**Question 28**

This showed good discrimination.

**Questions 29 and 30**

The weaker candidates were divided between options **B** and **D**.

**Question 30**

The weaker candidates chose option **B**.

**Question 31**

This was well answered with option **C** the most popular distractor.

**Question 32**

This showed very good discrimination with weaker candidates choosing each distractor in significant numbers.

**Question 33**

Option **C** was a 'positive distractor' for many of the better candidates.

**Question 34**

This showed good discrimination, with options **A** and **B** the most popular distractors.

**Question 35**

The component of the electromagnetic spectrum with the longest wavelengths was well known with option **A**, gamma rays, the most popular distractor.

**Question 36**

Current and voltage relationships in a series circuit were not well known.

**Question 37**

This discriminated well but showed widespread guessing among candidates, with roughly equal numbers choosing each distractor.

**Question 38**

This was not well answered.

**Question 39**

A significant number of better candidates chose option **B**.

**Question 40**

This discriminated well although many candidates, including some better ones, chose option **C**.



# COMBINED SCIENCE

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<p>Paper 5129/21 Theory</p>
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## General comments

It is pleasing to note that the candidates are stating the formulae used to perform calculations and showing their working in Physics calculations. Some candidates still have difficulty using scientific notation in their calculations.

Questions in the Biology section of the syllabus which require an explanation of an observation were less well done by many of the candidates. There is a tendency for the candidates to repeat the question in their response. Questions which required recall of knowledge were less well done than in previous examinations. Areas of the syllabus that are not well understood are highlighted in the specific comments on the questions.

## Comments on specific questions

### Question 1

- (a) The calculation was well done by many of the candidates. A number of the candidates did not take into account the gravitational field strength in their calculation. Candidates received credit for stating the correct equation for the calculation even when they used it incorrectly.
- (b) The better candidates recognised that the average useful power is the work done divided by the time. Credit was awarded to those candidates who used the incorrect answer from (a) correctly in this part.

Answers: (a) 1200 J, (b) 1500 W

### Question 2

This question was well answered by a majority of the candidates.

### Question 3

- (a) (i) The responses to this question were disappointing. There is a misconception amongst some of the candidates about the meaning of subscripts in the formula of a compound.
- (ii) The meaning of the stoichiometry of an equation is well understood by the better candidates. There is generally a greater understanding of the proportionality of reacting masses shown by the equation.
- (b) The structure of ethene was well known by a majority of the candidates.

Answers: (a)(i) 44, (ii) 88 36 2.2

### Question 4

The idea that the clockwise moment is equal to the anticlockwise moment is well known by many of the candidates. In this example, the fact that there were two masses on one side of the pivot caused some difficulty for a significant proportion of the candidates.

Answer: 16 N

### Question 5

This proved to be an easy question for many of the candidates.

### Question 6

- (a) (i) The conditions used in the manufacture of ammonia are well known by the better candidates.
  - (ii) The use of iron as the catalyst is less well known by the candidates.
  - (iii) A majority of the candidates balanced the equation correctly.
- (b) The dot-and-cross diagram for the ammonia molecule was well done by many of the candidates but a proportion of the weaker candidates omitted the lone pair of electrons on the nitrogen.
- (c) The use of ammonia to manufacture fertilisers is well known by a majority of the candidates.

Answer: (a) 450, 200

### Question 7

- (a) (i) This question was well answered by the better candidates. There was some confusion between frequency and wavelength amongst the weaker candidates.
- (ii) The speed of microwaves in a vacuum was well known by the better candidates.
- (b) Many candidates knew the formula for calculating the wavelength but a significant proportion of the candidates had difficulty using scientific notation.
- (c) Many of the candidates seemed unaware of the need for accuracy in drawing the normal and the direction of the microwave radiation after reflection. The normal should be at  $90^\circ$  to the mirror and the reflection should be drawn so that the angle of reflection is equal to the angle of incidence.

Answer: (b) 0.125 m

### Question 8

- (a) A majority of the candidates labelled the nucleus correctly.
- (b) (i) A large proportion of the candidates answered the question in terms of the two cells rather than the cytoplasm in each of the cells. Candidates were expected to state that the cytoplasm of the red blood cell contains haemoglobin in order to be able to transport oxygen.
- (ii) Many of the candidates were able to state one difference between a white blood cell and a mesophyll cell.

### Question 9

- (a) This question posed difficulties even for the better candidates. Many candidates appreciated that sodium reacts vigorously with cold water but the reactions of the other metals were much less well known.
- (b) There is confusion amongst many of the candidates between the test for hydrogen and the test for oxygen. A significant proportion of the candidates used a glowing splint for the test but correctly stated the result of the test. The mark for the result is dependent on the correct test.

### Question 10

- (a) (i) This proved to be an easy question for the majority of the candidates.
- (ii) Many candidates calculated the increase in cardiac output for student F correctly.
- (iii) This question proved to be difficult for the majority of the candidates.

- (b) Many candidates recognised that the heart pumps blood faster but only the better candidates stated that more blood is pumped per beat.
- (c) A large proportion of the candidates answered the question in terms of the exercise rather than a difference in terms of the student F and student G. Candidates were expected to highlight possible differences between the students such as fitness, age, sex, etc.

Answers: (a)(i)  $5 \text{ dm}^3/\text{min}$ ,  $32 \text{ dm}^3/\text{min}$ , (ii)  $27 \text{ dm}^3/\text{min}$ , (iii) 540%

#### Question 11

Static electricity is not well understood by the candidates. Candidates were expected to state that the balloon gains negative charge or electrons, which induces an opposite charge on the surface of the glass, enabling the balloon to stick because opposite charges attract.

#### Question 12

This question was quite well done by the better candidates. However, the idea that the Periodic Table is arranged in order of proton number of the element is not well understood by many of the candidates

#### Question 13

The way that a lens and glass block affect rays of light is less well known than the reflection of a plain mirror and a convex mirror.

#### Question 14

- (a) The better candidates were able to identify the structures in a germinating seed.
- (b) The majority of the candidates did not recognise that the immersion of the seed in water means that oxygen is unable to reach the seed, and this prevents germination from occurring. Many of the candidates simply discussed the conditions required for germination.

#### Question 15

- (a) The better candidates recognised that a condenser must be used during distillation.
- (b) A large number of candidates did not appreciate the accuracy required to measure  $24.5 \text{ cm}^3$  and chose the more imprecise measuring cylinder to measure the volume of a liquid.
- (c) Only the very best candidates stated that a beaker must be used in chromatography experiment in order to separate coloured dyes.
- (d) The apparatus used for a titration is well known by many of the candidates.

#### Question 16

- (a) The responses to this question were disappointing. Many candidates thought that the current flowed from coil X to coil Y. Candidates were expected to state that closing the switch produces a magnetic field in coil X which cuts coil Y and induces an e.m.f. in coil Y. Candidates should also appreciate that the induced e.m.f. is only produced when the magnetic field changes and therefore only when the current is changing.
- (b) Only a small number of candidates appreciated that the reading on the voltmeter is lower because there is a smaller change in the flux cutting coil Y when the two coils are moved further apart (as the field reaching coil Y is weaker).

#### Question 17

- (a) Many candidates were able to put the arrows on the diagram correctly. However, some candidates placed the arrows correctly but the arrow heads pointed in the wrong direction.
- (b) This was well answered by a majority of the candidates.

- (c) Most candidates were able to suggest what would happen to the number of blue tits and then explain the suggested change.

#### Question 18

The differences between an element and a compound are not well understood by the candidates. Candidates were expected to state that an element contains only one type of atom whereas a compound contains two different atoms chemically combined.

#### Question 19

- (a) The majority of the candidates identified X as the symbol for the element but the identities of A and Z were given the wrong way round.
- (b)(i) Only the best candidates were able to interpret the equation for the radioactive decay process. Candidates were expected to state that an alpha particle is emitted from nucleus and that the alpha particle is a helium nucleus.
- (ii) Ionisation, the process that produces charged air particles, was only identified by a few candidates.
- (iii) A large proportion of the candidates knew the equation for calculating the potential difference, and the unit, but some had difficulty with the scientific notation used in the question.

Answer: (b)(iii)  $4.5 \cdot 10^{-4}V$

#### Question 20

- (a) An easy question for the vast majority of the candidates.
- (b) The better candidates recognised that food is moved along the ileum by peristalsis, but the question required the candidates to explain the process. Only a small proportion of the candidates gave the explanation that the process occurs due to muscle contraction and relaxation of the ileum.

#### Question 21

- (a) Only the best candidates knew that the main constituent of natural gas is methane.
- (b) The process used to separate petroleum was well known by many candidates.
- (c) The idea that reactions that release energy are exothermic reactions is not well known by the candidates.
- (d) The definition of a hydrocarbon is not known by many of the candidates. Candidates are expected to know that a hydrocarbon is a compound containing carbon and hydrogen only.

# COMBINED SCIENCE

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Paper 5129/22  
Theory

## General comments

Candidates are increasingly showing their working for calculations in the Physics section of the syllabus. Credit can be gained by writing the formula being used in the calculation. A significant proportion of the candidates still find it difficult to rearrange formulae and struggle with the use of scientific notation in calculations.

Candidates must remember that simply repeating the information given in the stem of a question is not enough to gain credit.

The Biology questions which required recall of the syllabus were generally quite well done. However the candidates found the Chemistry parts of the syllabus more difficult. Areas of the syllabus that are not well understood are highlighted in the specific comments on each question.

## Comments on specific questions

### Question 1

- (a) Many of the candidates were able to state the formula ( $F = ma$ ) for calculating the acceleration of the diver but a number of the candidates had difficulty rearranging the equation to make acceleration the subject of the equation.

Answer: (a)  $0.21 \text{ m/s}^2$

- (b) This question proved challenging to many of the candidates. Candidates were expected to draw a line from the flag to the diver with the appropriate refraction at the surface of the water. There is a misconception amongst many candidates that the direction of the ray of light is from the diver to the flag.

### Question 2

This question was well answered, particularly by the better candidates.

### Question 3

- (a) The definition of relative atomic mass is not well known by the candidates. Candidates should know that relative atomic mass is defined as the average mass of one atom of the element relative to the mass of one atom of carbon-12. There is some confusion amongst the candidates between relative atomic mass and mass number, as many of the candidates thought that relative atomic mass is the sum of the number of protons and neutrons.
- (b)(i) The better candidates found this question easy but some of the responses indicate that there is a misunderstanding about the meaning of brackets and subscripts outside the brackets in chemical formulae.
- (ii) The calculation was well done by the better candidates but the weaker candidates frequently calculated the relative molecular masses of water and hydrogen incorrectly, or ignored the stoichiometry of the equation. A good many of the candidates were able to use their answers to the first sentence to calculate a correct answer in the second sentence, indicating that they understand the proportionality of the masses involved in a chemical equation.

- (c) The use of Universal Indicator or litmus to show that a solution is alkaline is not well known.

Answers: (b)(i) 74, (b)(ii) 36 2 1.8

#### Question 4

- (a) (i) A large proportion of the candidates simply stated the difference between speed and velocity without any reference to the experiment. Candidates were expected to recognise that speed is measured rather than velocity because the direction of the ball is constantly changing.
- (ii) Many of the candidates recognised that the speed of the ball increases down the curved track but only the best candidates stated that the acceleration of the ball is decreasing.
- (iii) Many of the candidates calculated the increase in speed between 1 sec and 1.2 sec is 0.3 cm/sec and assumed that the speed increases at the same rate and gave the answer 3.4 cm/sec. The information in the question shows that the speed increases by smaller amounts as the ball rolls down the track and therefore the speed at 1.4 sec is between 3.1 and 3.4 cm/sec.
- (b) The better candidates were able to state that the ball slows down as the track becomes horizontal but the explanation as to why the ball slows down was only rarely seen.

#### Question 5

- (a) (i) The parts of the eye were well known by many of the candidates.
- (b) (i) The effect of a bright light on the pupil was well known by many of the candidates.
- (ii) Many of the candidates tried to explain *how* the pupil becomes smaller rather than suggest that *when* the pupil becomes smaller the amount of light entering the eye is decreased thereby preventing damage to the retina.

#### Question 6

- (a) The arrangement of the atoms in solid copper was not well known. Candidates were expected to state that the atoms are arranged in a giant lattice or closely packed in fixed positions. The fact that the atoms are only able to vibrate about the fixed position was known by more of the candidates.
- (b) Most candidates are unaware of the **differences** in the physical properties of copper and sodium chloride. Copper conducts electricity when it is solid and is malleable whereas sodium chloride is not. Both copper and sodium chloride have high melting points and boiling points, therefore these were not accepted as differences between their properties.
- (c) (i) The electronic structure of the chloride ion was well known by many of the candidates. However a number of the candidates drew the electronic structure of the chlorine atom.
- (ii) The idea that particles with an inert (noble) gas electronic structure or a full outer shell of electrons are stable is only known by the very best candidates. Many of the candidates simply stated how the sodium ion is formed from a sodium atom.

#### Question 7

- (a) (i) This question was well done by a majority of the candidates.
- (ii) The equation for calculating the energy transferred to the motor ( $E = ItV$ ) is not well known by the candidates.
- (iii) A majority of the candidates recognised that the energy loss is the difference between the answers to (a)(ii) and (a)(i).

- (b) Only a small number of candidates were able to state that when too much heat energy is transferred to the electric motor there is a danger that the motor will catch fire or the cables will melt.

Answers: (a)(i) 2400 J (ii) 3000 J (iii) 600 J

### Question 8

- (a) (i) This proved to be an easy question for many of the candidates.
- (ii) The better candidates were able to calculate the number of chloroplasts in a lower mesophyll cell as a percentage of the number in an upper mesophyll cell.
- (iii) Many of the candidates identified the upper mesophyll cell as the cell where most glucose is formed on a sunny day. The explanations as to why this occurs were varied. Candidates were expected to state from the information given in the question that the upper mesophyll cell contains **more** chloroplasts (chlorophyll) and therefore traps **more** sunlight, or **more** photosynthesis occurs.
- (b) The idea that the cuticle waterproofs or protects the leaf cells was well known by the better candidates.

Answers: (a)(i) 16 27.7 to 28, (ii) 57 or 58%

### Question 9

- (a) The process of fermentation of glucose is not well known by many of the candidates; however, the fact that (fractional) distillation is used to separate the ethanol from the mixture is well known by many of the candidates.
- (b) The better candidates were able to balance the equation correctly.
- (c) The structure of ethanol is not well known by many candidates.

### Question 10

- (a) A large proportion of the candidates were confused by the fact that the units on the rule were in centimetres and the answer was expected to be in millimetres. Candidates who changed the units on the answer line to centimetres and gave the correct answer in centimetres were given credit. A large proportion of the candidates read the position of the top and bottom of the opening of the spanner in the diagram incorrectly and gave their answer as 16mm, whilst other candidates had difficulty converting centimetres to millimetres.
- (b) The formula (moment = force  $\times$  distance) for calculating the moment is well known by many of the candidates. The units are less well known.
- (c) The formula for calculating density ( $D = m / V$ ) is well known by the candidates but there were a number of candidates who did not rearrange the formula correctly. Candidates should be aware of the mathematical requirements of the syllabus and be able to quote their answers to the correct number of significant figures rounded correctly.

Answers: (a) 15 mm (b) 125 N cm (c) 15.2 cm<sup>3</sup>

### Question 11

This question was well done by a majority of the candidates. Which structure destroys hormones proved to be the least well known of the links.

### Question 12

- (a) The products of the reaction were identified by the better candidates.



- (b) Only the very best candidates recognised that during the reaction the potassium gains oxygen and is therefore oxidised and the carbon dioxide loses oxygen and is therefore reduced.
- (c) The better candidates recognised that a solid is removed from a solution by filtration.
- (d)(i) The relationship between the colour of Universal Indicator and pH is not well known by many of the candidates.
  - (ii) Candidates were expected to state that the pH of the solution decreased when dilute hydrochloric acid is added to the solution. A significant proportion of the candidates answered the question in terms of the colour of Universal Indicator rather than a numerical pH value.

### Question 13

- (a) This question was well answered by many of the candidates.
- (b)(i) The speed of light in a vacuum is not well known by many of the candidates.
  - (ii) The formula  $v = f \lambda$  is well known but many candidates encountered difficulty rearranging the formula to make frequency the subject of the formula. Candidates also experienced difficulty with scientific notation.

Answers: (b)(i)  $3 \times 10^8$  m/s, (ii)  $3 \times 10^{15}$  Hz

### Question 14

- (a) A large number of candidates answered this question in terms of digestion rather than in the general terms that the question required. Candidates were expected to state that enzymes are proteins or biological catalysts or work at an optimum pH or temperature or are substrate specific.
- (b) This question proved to be easy for the vast majority of the candidates.
- (c) The better candidates found this question easy but the fact that bile is produced in the liver was less well known. Candidates were expected to state that amylase is produced in the pancreas or the salivary gland rather than simply stating that it is produced in the mouth.
- (d) The assimilation of glucose by the liver is not well understood by the majority of the candidates. Candidates were expected to describe that glucose is converted to glycogen in the liver, which is stored in the liver cells until it is required for respiration.

### Question 15

- (a) Candidates should be aware that both respiration and combustion use oxygen and produce water, carbon dioxide, and energy.
- (b)(i) A large proportion of the candidates stated a use of hydrocarbon fuels rather than the source of these fuels, which is petroleum or crude oil.
  - (ii) Only the very best candidates were able to state that *saturated* means that the compounds contain **carbon to carbon single** bonds.

### Question 16

- (a)(i) Candidates should know that the equipment used to remove radioactive sources from the container is either tongs or tweezers.
  - (ii) The use of gloves to handle radioactive sources was well known by the better candidates.
  - (iii) This was well answered by the better candidates.
- (b) A large proportion of the candidates concentrated on the safety aspects of the experiment rather than the method used. Candidates were expected to describe that three different absorbers are placed between the source and the detector and a reading is taken for each of the absorbers.



**Question 17**

The components of a balanced diet are well known by many of the candidates.

**Question 18**

- (a) The displacement of metals from a solution of their ions by a more reactive metal is not appreciated by many of the candidates. In this reaction copper displaces silver ions and the products are copper nitrate and silver.
- (b) The ability of carbon to displace metals from their ores related to the reactivity of the metal is understood by the better candidates.