

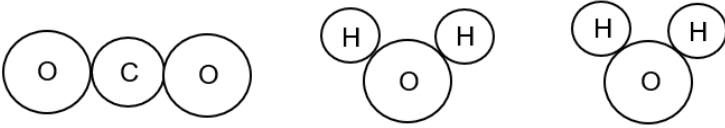
Beatty Secondary School**Subject** : 2G3 Science 2025**Exam** : End-Of-Year Examination**Setter** : Ain**Section A (30 marks)**

1	C	11	D	21	D
2	D	12	B	22	C
3	B	13	*A/B/C/D	23	B
4	C	14	A	24	B
5	B	15	B	25	B
6	C	16	B	26	B
7	B	17	D	27	B
8	C	18	C	28	D
9	D	19	C	29	D
10	A	20	C	30	B

Erratum, no answer to the question, accepted all options*Mark scheme will use these abbreviations**

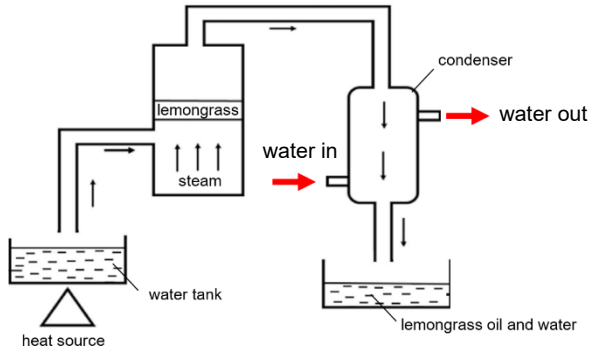
;	separates marking points
/	alternatives
R	reject
ORA	or reverse argument
<u>underline</u>	actual word given must be used by candidate (grammatical variants excepted)

Section B (40 marks)

No.	Expected Answer	Marks
1	(a) Combustion (b)  Accept: If atoms are not drawn to proportion If structure of water molecule is not linear (c) An element, example O_2 / oxygen, is a pure substance that is <u>made up of only one type of atom</u> (O / oxygen); A compound, example CO_2 / carbon dioxide / H_2O / water is <u>made up of 2 or more different elements / 2 or more different types of atoms from different elements (using elements from quoted examples) that are chemically combined in a fixed ratio.</u>	[1] [1] correct identity of molecules [1] correct no. of molecules [1]
2	(a) Both cells have cell membrane; The white blood cell has a nucleus but the red blood cell does not have a nucleus. (b) It is made up of <u>similar specialised cells / same type of cells</u> which <u>perform a specific/same/similar function.</u>	[1] [1] [1]
3	(a) Atomic number = 9 Nucleon number = 19 (b) An atom is electrically neutral as the <u>number of protons is equal to the number of electrons</u>; For Atom Y, there are <u>more protons than electrons</u>, hence it is positively charged and <u>not electrically neutral, thus not an atom.</u> (c) Neon Ne	[1] [1] [1] for both [1] for both

4	(a) (i) Energy can only be changed from one form to another, it cannot be created or destroyed. (ii) <u>No energy is converted to sound and/or heat as there is no matter / medium present in a vacuum.</u> Accept: No energy is lost, no air / air resistance in vacuum (b) (i) <u>Work is done</u>, force is applied on the object, <u>object moves in the same direction as the force applied on it.</u> (ii) Some energy is lost as sound energy / thermal energy Accept: Energy is lost due to friction (iii) Point R as <u>most gravitational potential energy</u> has been converted to <u>kinetic energy</u>.	[1] [1] [1] [1] [1]
5	(a) energy value of M = 3800 units energy value of N = 80 units (b) respiration / egestion (pass out faeces) / decomposition / uneaten body parts (c) Energy released in the form of heat into the surroundings cannot be reused / recycled by the producers for photosynthesis. (d) Decomposers <u>break down the remains of dead organisms</u> or the <u>faeces of organisms</u> and <u>return the nutrients to the environment</u>.	[1] for both [1] [1] [1]
6	(a) Image positioned directly above the real ring and must be drawn with dotted lines, same size as real object. (b) (i) 2 rays of light from the image to the eye. • 2 rays of light from apparent position of object to water surface drawn in <u>dotted line</u>. • Straight solid line from water surface to the eye • Direction of arrows to the eye (ii) 2 refracted rays of light travel from ring to the eye. • Rays of light from real ring to water surface in solid lines with correct direction of arrows • Rays bend away from the normal at water surface then to the eye in solid lines with correct direction of arrows	[1] [1] [1]

	(c) Water has a <u>higher optical density than air</u>; so when the light ray comes out of water, it <u>will bend/ refracted away from the normal</u> as it travels at a <u>faster speed</u> in air.	[1] [1]
7	(a) Solution J. Distilled water has the <u>highest water potential</u>, <u>most water molecules will move into the potato</u> by <u>osmosis</u>; Hence, the <u>length of potato will increase the most</u>. (b) Any value between 0.1 g/cm^3 to 0.3 g/cm^3 (c) Straight line drawn must be between K and L.	[1] [1] [1] [1] [1]

8	(a) The water molecules <u>gain energy</u> when heated and <u>overcome the strong forces of attraction between the water molecules</u>; water molecules <u>move faster and further apart from one another</u>; and <u>boils</u> and turns <u>into gas / water vapour / steam</u>. (b)  (c) (i) $2.5 \text{ kg} = 2500 \text{ g}$ Theoretical amount of essential oil present in 2500 g of lemongrass = $1.5 \% \times 2500 \text{ g}$ = <u>37.5 g</u> (ii) Percentage yield = $(20.0 \text{ g} / 37.5 \text{ g}) \times 100\%$ = <u>53.3 \%</u> (d) (i) Mass of lemongrass / volume of water / temperature of heat source / rate of water flowing in condenser / temperature of water in condenser. (ii) type of lemongrass / lemongrass <u>from East and West Indian</u> (iii) The essential oil is immiscible with water / essential oil floats on water / essential oil can be separated easily from water.	[1] [1] [1] [1] with labels of 'water in' and 'water out' [1] [1] [1] allow ecf from (c)(i) [1] [1] [1]
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Section C (30 marks)

No.	Expected Answer	Marks
9	(a) 36 °C (b) Energy used by web browsing = 0.962×1.0 $= 0.962 \text{ kWh}$ Energy used by playing music = 1.55×0.5 $= 0.775 \text{ kWh}$ Energy used by gaming = 2.78×2.0 $= 5.56 \text{ kWh}$ Total energy used = $0.962 + 0.775 + 5.56$ $= 7.297 \text{ kWh}$ Total cost of electricity = 7.30×29.30 $= 213.8021 \text{ cents}$ $= \\$2.1380$ $= \underline{\\$2.14}$ (c) (i) To lose heat / thermal energy to surroundings <u>faster</u> by <u>conduction</u> / Metal is a <u>good conductor of heat</u>, so the CPU can dissipate / conducted the thermal energy to the surroundings <u>faster</u> R: metal is a good absorber/emitter of heat (ii) To increase the (total) <u>surface area</u> to increase the <u>rate of radiation</u> of heat to the surroundings (iii) Black surfaces are <u>good emitters / radiators heat</u>, to enable the warm heat sink to <u>lose heat</u> to surroundings more quickly / <u>faster</u> / Black surfaces can <u>emit/radiate heat faster</u> R: black surface is a good absorber of heat (iv) To allow <u>less dense hot air to rise and escape to</u> <u>surroundings / To increase the rate of heat lost to the</u> <u>surroundings via convection</u> (v) Conduction; Particles at the CPU <u>gain heat and vibrate faster</u>. This causes the <u>neighbouring particles to vibrate</u> as well, and this process is repeated from the particles in the CPU to the heat sink.	[1] [1] for correct use of formula $E = Pt$ [1] for total energy used [1] use of 29.30 cents [1] [1] [1] [1] [1] [1]

10	(a) (i) Nitric acid / HNO_3 (ii) nitric acid + potassium hydroxide → potassium nitrate + water (iii) 14 cm^3 (iv) Purple / Indigo (v) $\frac{14}{20} \times 30$ = <u>21 cm^3</u> (vi) Bromothymol blue. Colour change falls <u>within pH 7</u>. (b) Add acid to separate samples; If no effervescence (many bubbles) is observed, the sample is sodium chloride; For the other 2 samples which produce effervescence, bubble gas into limewater. The sample that produced white precipitate in limewater contains calcium carbonate; For the other 2 samples which produce effervescence, use lighted splint. If extinguishes with a pop sound, sample contains zinc.	[1] [1] Allow ecf from (a)(i) [1] [1] [1], accept ecf from (iii) [1] for both [1] [1] [1] limewater test [1] lighted splint test ECF marks Allow 1-2 for wrong initial steps
11	(a) (i) 16 to 22 June (3 days before and after ovulation, Day 14) / 15 to 20 June (Day 10 to 15 of cycle) (ii) An egg can survive for about a day after it is released from an ovary during <u>ovulation</u>, but the <u>sperms can survive for around three to five days</u> in the female reproductive system; Therefore, if sexual intercourse occurs on day 10 of the menstrual cycle, the sperm may survive until day 14 to fertilise the egg when it is released. (b) Endometriosis decreases the chances of successful fertilisation; The oviduct might be blocked, thus preventing the sperms from fertilising any egg and the ovaries might not be able to produce eggs.	[1] [1] [1] [1] [1]

	(c) (i) <u>Starch/Carbohydrate</u> is digested by <u>amylase</u> into <u>maltose</u> in the <u>mother's mouth</u>; <u>Maltose is digested by maltase into glucose</u> (simple sugars) in the <u>mother's small intestine</u>. (ii) Digested carbohydrates <u>diffuses</u> / move from a region of higher concentration in the maternal blood to a region of lower concentration in the foetal blood through diffusion; Waste products, on the other hand, <u>diffuses</u> / move from a region of higher concentration in the foetal blood to a region of lower concentration in the maternal blood through diffusion (iii) Oxygen is needed for cellular respiration / Cellular respiration releases energy from glucose/food Energy is required for cell division/growth.	[1] [1] [1] [1]
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