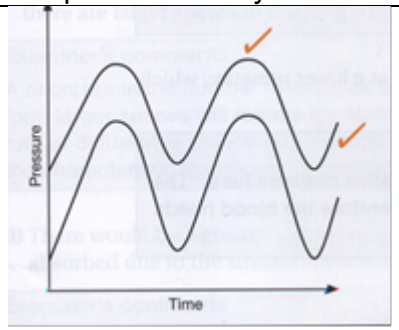
2024 Prelim 6093 Suggested Answers

Qns	Answer
1a	Organisms that spread diseases from one organisms to another
1b	Cell wall – inhibit synthesis of the cell wall; Cell membrane – breaks up cell membrane ; Cytoplasm – prevent synthesis of folic acid; Ribosome – prevent protein synthesis; Reject nucleus, RER, SER
1c	Complete dose of antibiotics ; Use antibiotics only when necessary ;
2a	all four organisms in a diagram ; producer/s and consumer/s linked by lines to reindeer ; correct arrow/s from (grasses ferns and mosses) to ground squirrels ;
2b	Only 10% of energy is pass to next trophic level : As 90% of the energy is loss in the form of heat via respiration/uneaten body parts/undigested food/faeces; If too many trophic levels, the energy transfer will not be effective;
2ci	carbon / C + hydrogen / H + oxygen / O
2cii	Onlu organisms that has the enzyme to digest lichenan ; Lichenan can fit into active site of the enzyme to form E-S complex ;
3ai	Breathing rate at rest = 1 breath every 5 seconds = 12 breathes per minute; Breathing rate while exercising = 1 breath every 2.5 seconds = 24 breathes per minute; Differences = 24 – 12 = 12 breathes per minute
3aii	During exercise, higher rate of aerobic respiration to release more energy needed for vigorous muscular contractions; Higher volume of carbon dioxide produced that needs to be removed More oxygen needed to be taken;
3b	body incurred an oxygen debt and accumulation of lactic acid, produced by anaerobic respiration; oxygen is needed to convert the lactic acid back to sugar/glucose in the liver;
4a	U: Capillaries; reject glomerulus V: Urea;
4b	fall in glucose concentration then concentration rises; glucose forced out of the glomerulus during ultrafiltration glucose is selectively reabsorbed into blood at proximal convoluted tubule;

5	3: bicuspid valve ; P: right ventricle ;
5b	**1**: Closed **2**: Open **3**: Closed **4**: Open for every 2 correct answers
5c	 Graph higher than original ; Crests and troughs at similar time points as original ;
6abi	The level of iodine solution in tubing **A** decreased ; Accept also the solution remains brown,
6aii	The concentrated starch solution in tubing **B** turned blue-black ;
6b	There is a higher concentration of iodine molecules in tubing **B** as compared to the surrounding concentrated starch solution ; Net movement of iodine molecules into the starch solution by diffusion; Iodine molecules are small enough to diffuse through the pores of tubing **B** into the starch solution. react with starch, turning the starch solution blue-black ;
6c	Ileum; Starch is too huge to pass through the walls of the ileum; Must be digested into small diffusible/soluble glucose before it can be absorbed ;
7a	Insect/ Bee/ Butterfly ; Nectar guides/ non-feathery stigma/ large petals/ non-pendulous stamens (**R**: colourful/ sweet smelling/ nectar present as these are not observable)

7b	Disadvantage: Energy consuming as need to attract insects ; depends on the availability of the insects ; Advantages: Use less pollen grain ; Pollinate flowers far away, increases genetic variation ;
7c	Spontaneous mutation takes place, resulting in variation in the organisms; Plants who are pest-resistant have the selective advantage, will survive while those who are not will die; Those who survive will be able to reproduce and pass the pest-resistant gene to the next generation;
8a	(J) cuticle ; prevent excessive water lost ; (K) palisade ; chloroplasts / chlorophyll + absorb max. light energy for photosynthesis **AW** ; (L) lower epidermis with guard cells / stomata allows oxygen and carbon dioxide to to be takin in for respiration and photosynthesis respectively ; correct identification 2 for 1 mark, 3 for 2 marks.
8bi	As light intensity increases from 0 to 2000 arbitrary units the size increase from 0.3 to 2.2 micro m. As light intensity increase after 2000 arbitrary units, the stomata opening remains at 2.2 micro m.
8bii	Light intensity increase, increase rate of photosynthesis, more starch stored in guard cells; Water potential in cell sap of guard cell lowered, more water molecules will enter by osmosis; Guard cells are turgid and stomata open wider, more water vapor diffuse out per unit time / rate of diffusion of water vapour will increase;
9a	Correct scale Correct labelling of axes with unit Correct plot Best fit with no extrapolation
9bi	Day 16 – 20 (accept day within this range); Developing follicle (ovary) secretes oestrogen for the repair and thickening of uterine lining where high level of oestrogen will trigger ovulation.
9bii	accept any 3 days after answer in 6bi ; Corpus luteum secretes progesterone; to maintain the thickness of the uterine lining in preparation for implantation of the embryo ;
9c	Provides protection for the developing foetus against shock and impact / surrounds the developing foetus and allows for foetal movement / lubricates the vagina during child birth. (Accepts any one reasonable function) (reject: Amniotic fluid contains nutrients and oxygen that diffuses into foetal blood and nourishes baby)

Ea	• DNA **(a)** • two / double polynucleotide,twisted around each other to form a double helix • Each nucleotide is made of deoxyribose, phosphate group and nitrogenous base • 4 bases are adenine, guanine, thymine and cytosine • Where adenine pairs with thymine and cytosine pairs with guanine via hydrogen bonds • According to rule of complementary base pair
Eb	• Obtain fragment of DNA containing insulin gene, cut out gene using a restriction enzyme to produce sticky ends • Use the same restriction enzyme to cut a bacterium plasmid, producing complementary sticky ends • Mix the plasmid with the insulin gene, use DNA ligase to form a recombinant plasmid. • Insert the recombinant plasmid into *E.coli* using heat/electric shock • to open up the pores of the membrane of host cell
ORa	• receptor cells are stimulated to generate nerve impulses • transmitted to brain by sensory neurone • impulse transmit from sensory neurone to relax neurone via a chemical synapse and from relay neurone to motor neurone via another chemical synapse • impulse transmit ny motor neurone to effector, the eyelid muscles which contract to close eyelids.
ORbi	• dominant: always expressed, • in either homozygous or heterozygous form
ORbii	• Mother **rr** and father **Rr** • Gametes **r/r** and **R/r** (circled) • F1 – **rr / rr / Rr / Rr** • Phenotypic ratio = **0.5** or **1/2**