

1. Genetic engineers have developed technology that is able to manipulate the genes in some plants. Farmers use the results of this technology to grow crops that are more profitable. The genetically engineered crops can provide more food per acre, are less prone to diseases and insect damage, and are able to withstand greater environmental changes. Which question about manipulating genes in plants are scientists **most likely** investigating through experimentation?

- A. Should laws allow genetic modification to make plants pest resistant?
- B. Should the genes of plants be manipulated for the benefit of humans?
- C. In which temperature range will genetically engineered plants be able to survive?
- D. Are plants that have been genetically manipulated better tasting than natural plants?

2. Why do scientists refer to evolution as a theory?

- A. Evolution occurred in the past and is not universally accepted.
- B. Evolution is an explanation with little supporting scientific evidence.
- C. Evidence of evolution can only be observed during laboratory experimentation.
- D. Evidence that supports evolution has been provided by many scientists over time.

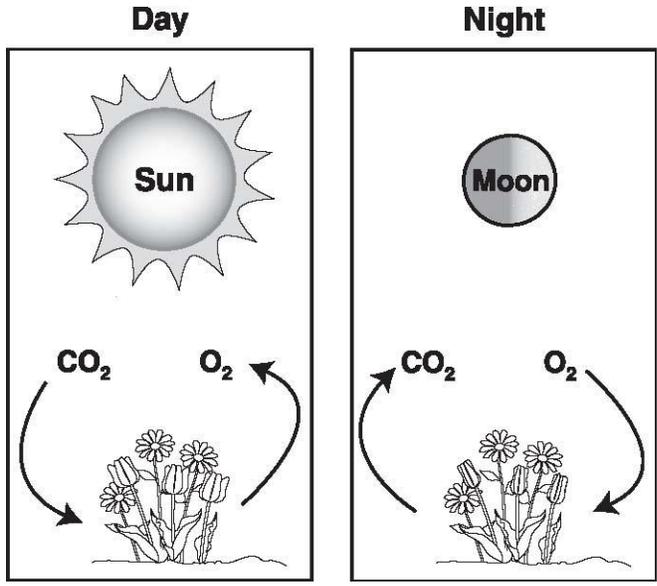
3. Vestigial structures are body structures that are of limited or no use to an organism. They are remnants of structures that may have been useful to the organism's ancestors. Which statement explains the **most likely** reason why vestigial structures can be used as evidence for biological evolution?

- A. They mutate at a predictable rate.
- B. They are commonly preserved in the fossil record.
- C. They show how individual organisms have adapted.
- D. They provide information about how species may be related.

4. Which macromolecule is made of only carbon, hydrogen, and oxygen and is used as short-term energy storage for building the structural components of living things?

- A. lipid
- B. protein
- C. nucleic acid
- D. carbohydrate

5. Use the diagram below to answer the question.

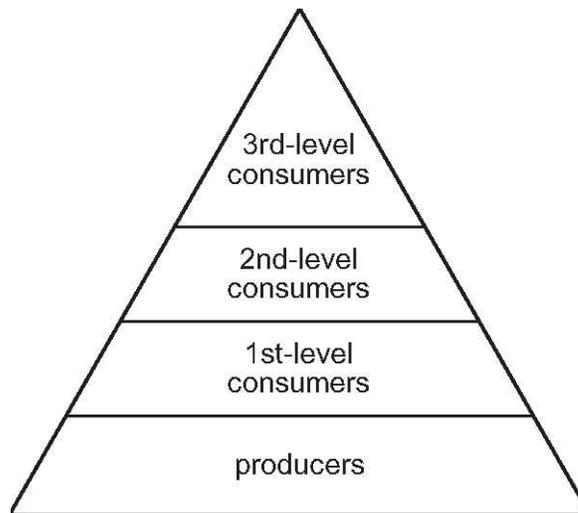


What does the arrow pointing away from the O₂ toward the plants during the night **most likely** represent?

- A. O₂ is taken in by the plants during differentiation.
- B. O₂ is taken in by the plants during photosynthesis.
- C. O₂ is taken in by the plants during cellular respiration.
- D. O₂ is taken in by the plants during sexual reproduction.

6. Use the energy pyramid below to answer the question.

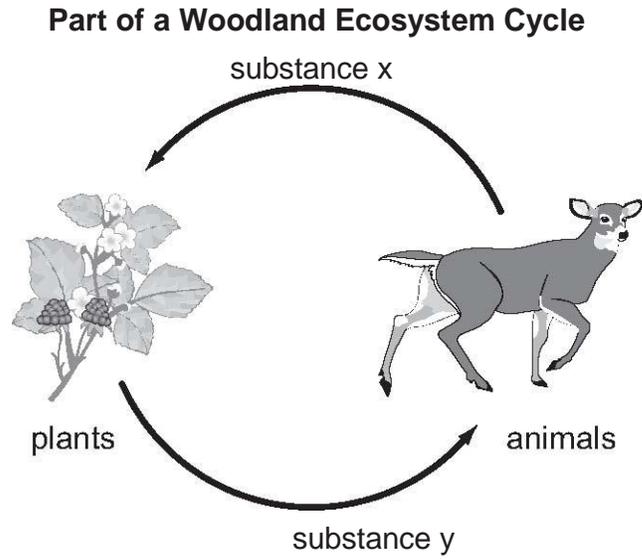
Energy Pyramid



Which statement **best** explains why the total amount of available energy decreases as it flows from organisms at the bottom of the energy pyramid to organisms at the top of the energy pyramid?

- A. There is more food available at lower levels.
- B. Most usable energy is converted to biomass.
- C. Most usable energy is lost as thermal energy resulting from cellular processes.
- D. Organisms occupying higher levels require less energy for their cellular processes.

7. Use the diagram below to answer the question.



The diagram shows the cycling of two substances in a woodland ecosystem. How would one of the substances shown in this diagram be cycled in an ocean ecosystem?

- A. Coral reef communities receive substance x from oceanic islands.
- B. Ocean water would generate substance x for ocean animals to use.
- C. Saltwater plants receive substance y from ocean mammals that breathe air.
- D. Phytoplankton would be the primary source of substance y for ocean animals.

8. Idaho laws include rules that govern controlled burning in forested areas. How might controlled burns positively affect the environment where they are occurring?

- A. They may remove old growth in forests preventing regrowth in the area.
- B. They may help limit the impact of the fires by reducing their size and frequency.
- C. They may cause a rise in average annual temperature by releasing carbon dioxide.
- D. They may increase the available thermal energy as it is released as heat from fires.

9. A leak develops in a settling pond surrounding an abandoned mine. What changes to the local ecosystem **most likely** result from this leak?

- A. increase in biodiversity and increase in rate of mutations
- B. increase in biodiversity and decrease in rate of mutations
- C. decrease in biodiversity and increase in rate of mutations in surviving organisms
- D. decrease in biodiversity and decrease in rate of mutations in surviving organisms

10. Which statement describes how using a renewable source of energy could negatively affect the environment?

- A. Obtaining energy from geothermal sources can produce radioactive waste.
- B. Obtaining energy from biomass can reduce the materials brought to landfills.
- C. Generating electricity using a hydroelectric power plant can impact migratory fish species.
- D. Generating electricity using wind power can create air pollution from particles released by wind turbines.

11. On the Portuguese island of Madeira, six distinct species of house mice have been identified. Which statement explains how different species **most likely** developed?

- A. Populations lived in geographically different areas of the island.
- B. Many offspring were produced over several generations on the island.
- C. Individuals changed due to different climate conditions on different parts of the island.
- D. DNA was destroyed in individuals in the original population that were brought to the island.

12. Which process would cause the **greatest** increase in entropy in a forest ecosystem?

- A. growth
- B. decomposition
- C. photosynthesis
- D. protein synthesis

13. Which pine tree has the **greatest** entropy?

- A. a pine tree growing in a forest
- B. a pine tree blown down by a wind storm
- C. a pine tree completely burned to ashes by a forest fire
- D. a pine tree that is no longer living and partially decomposed by fungi

14. Which action can humans use to reduce the amount of water runoff that enters a river?

- A. planting trees near the edges of the river
- B. removing trees from the area surrounding the river
- C. building a dam to control the flow of water in the river
- D. removing dams to allow the water to flow freely in the river

15. Which action is accomplished by chemical reactions in a ribosome?

- A. linking together amino acids
- B. linking together monosaccharides
- C. transforming lipids into carbohydrates
- D. transforming ADP molecules into ATP molecules

16. Which type of molecule is produced during the chemical reactions that occur within a chloroplast?

A. lipid

B. protein

C. amino acid

D. carbohydrate

17. A scientist removed a few cells from the root tips of a Venus flytrap plant. Using sterile conditions, the cells were transferred to a substance that provided both water and nutrients to the cells. The cells divided, forming a cluster of cells. The cluster of cells produced a tiny plant that grew into a typical Venus flytrap plant. Which statement **best** explains why the new plant was able to develop from these original cells?

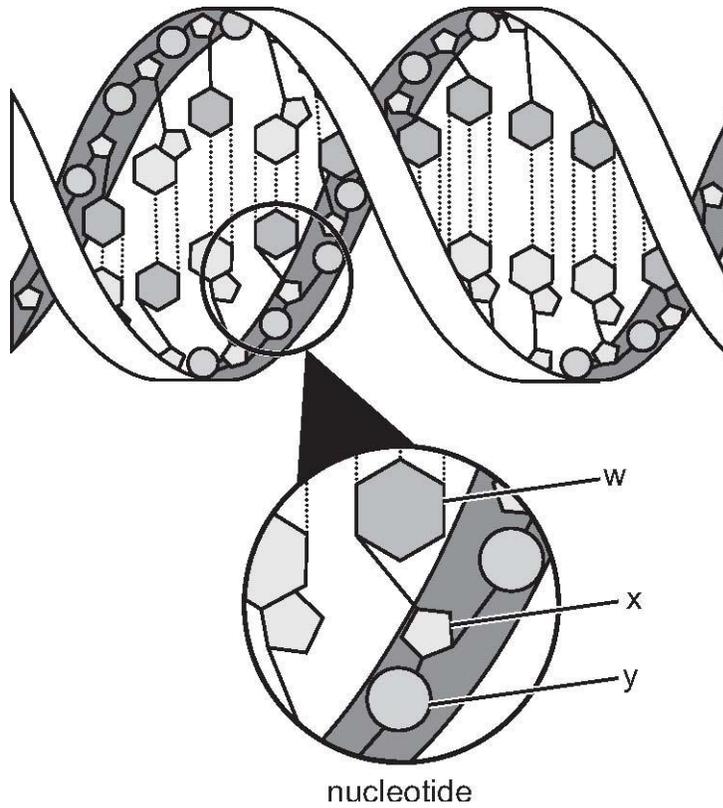
- A. The original cells had all of the genes that the different cells expressed.
- B. The original cells had a type of chlorophyll that could be copied during mitosis.
- C. The original cells had all of the necessary proteins to produce different cell types.
- D. The original cells had a sample of the different types of cells that are in the mature plant.

18. The body cells of an adult mammal originate from one initial cell formed from reproduction, called the zygote. Which statement **best** explains the great diversity of cells based on form and function within the adult mammal?

- A. Different cell types contain the same genome, but different sections of the genome are activated to direct form and function.
- B. During development, segments of the genome are distributed to different cells, so certain cell types contain different instructions to control form and function.
- C. During development, the genome is distributed to all the cells, but the form and function of each cell is directed externally by chemicals within the bloodstream.
- D. Different cell types initially contain the same genome, but in late development the unneeded sections of DNA are removed, resulting in only necessary cell forms and functions.

19. Use the diagram below to answer the question.

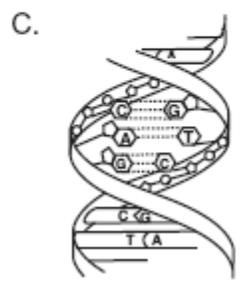
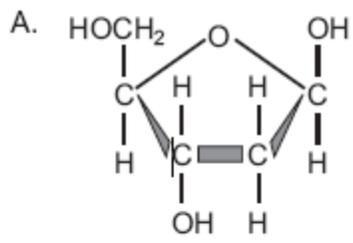
Biological Molecule



Which substance is **most likely** represented by structure x?

- A. ribose sugar
- B. nitrogen base
- C. phosphate group
- D. deoxyribose sugar

20. Which model **best** represents a molecule of DNA?



21. What are the final products of a cell that has gone through the process of meiosis?

- A. two genetically identical cells
- B. four genetically identical cells
- C. two genetically nonidentical cells
- D. four genetically nonidentical cells

22. A “smart nanoparticle” attached to a bacterium can deliver DNA or medicine into a cell. Which statement **best** describes how science advanced technology concerning the use of smart nanoparticles?

- A. Technology made it possible for DNA to be used to transport bacteria into cells.
- B. Understanding of bacterial entry into cells led to the development of smart nanoparticles.
- C. Technology made it possible for scientists to create new ways for bacteria to grow and replicate.
- D. Understanding of smart nanoparticles led to the development of bacteria that could transport materials.

23. Use the data table below to answer the question.

Cell Model Measurements

| Length of Each Side (mm) | Surface Area (mm ²) | Volume (mm ³) | Surface Area-to-Volume Ratio |
|--------------------------|---------------------------------|---------------------------|------------------------------|
| 1 | 6 | 1 | ? |
| 2 | 24 | 8 | ? |
| 3 | 54 | 27 | ? |
| 4 | 96 | 64 | ? |

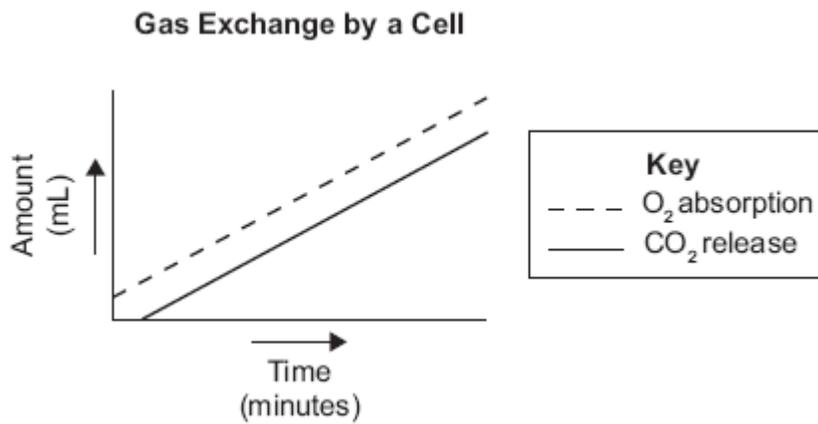
A student is studying the relationship between the size of a cell and its surface area-to-volume ratio. Using a cube-shaped cell model, the student calculates the surface area and volume for cubes with sides of different lengths. Which statement **best** describes the relationship between the cell model's size and its surface area-to-volume ratio?

- A. The greater the volume of a cell, the greater the surface area-to-volume ratio.
- B. The greater the length of each cell side, the smaller the surface area-to-volume ratio.
- C. The smaller the surface area of the cell, the smaller the surface area-to-volume ratio.
- D. The smaller the surface area-to-volume ratio, the greater the number of sides to the cell.

24. Which pair of statements provides accurate examples of an observation and a hypothesis?

- A. observation: A liver cell has a hexagonal shape.
hypothesis: If water diffuses into a liver cell, the cell will become swollen.
- B. observation: A pine needle is 9 cm long.
hypothesis: A pine needle appears green in daylight.
- C. observation: If a dog shivers, its body temperature will increase.
hypothesis: Adult Rottweiler dogs have a mass of about 35 to 65 kg.
- D. observation: If a plant is introduced into a new environment, it will always adapt.
hypothesis: Plants in direct sunlight will grow taller than plants growing in shade.

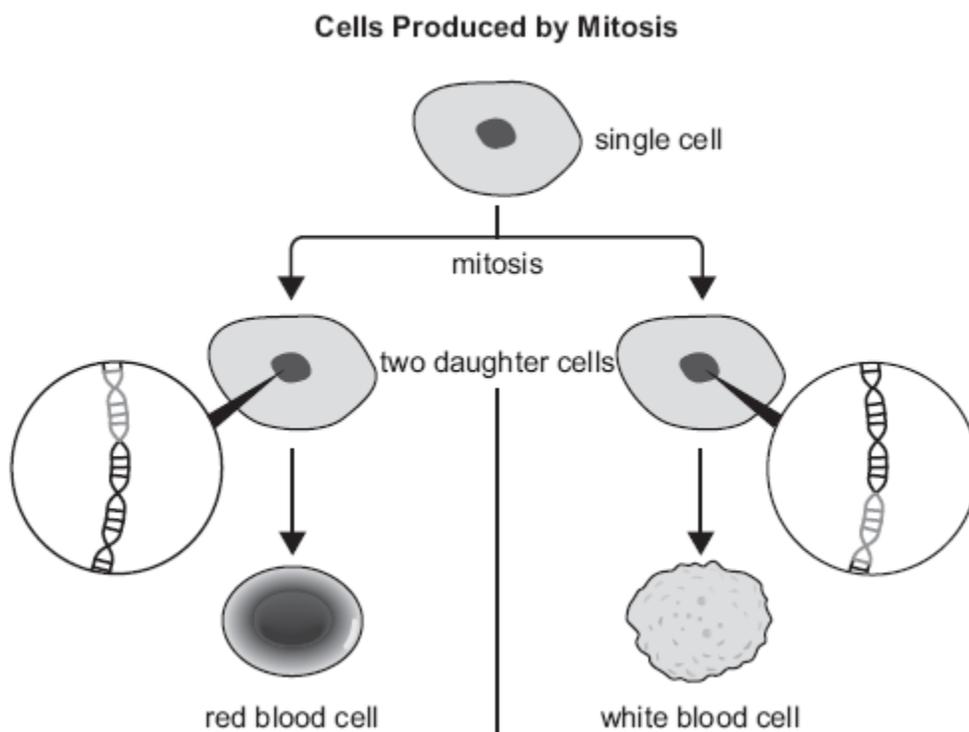
25. Use the graph below to answer the question.



A student made the graph to show how the absorption of O₂ and release of CO₂ gases by a cell can change over time. An increase in the activity of which organelle **best** explains the graph?

- A. nucleus
- B. vacuole
- C. chloroplast
- D. mitochondrion

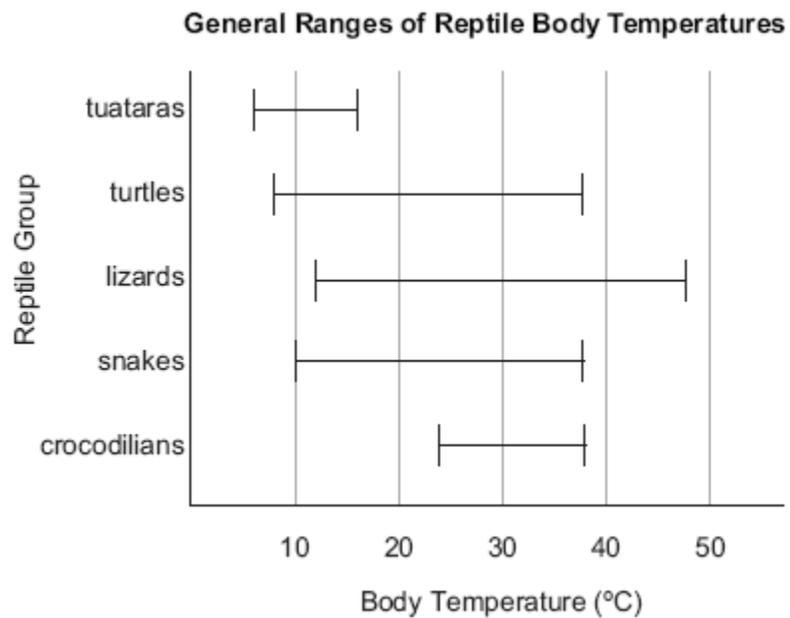
26. Use the diagram below to answer the question.



How can a red blood cell and a white blood cell form from the two daughter cells shown in the diagram?

- A. Mitosis produces cells with identical genes that are expressed differently.
- B. Transcription of DNA occurs in one of the daughter cells but fails to occur in the other cell.
- C. During mitosis, each cell receives different sections of DNA that provide instructions for specific body functions.
- D. A mutation during mitosis changes the gene sequence and alters the structure of an encoded protein in one cell.

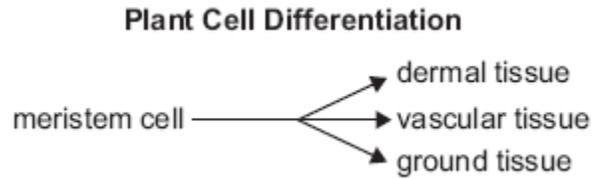
27. Use the graph below to answer the question.



The graph shows the body temperature ranges for several reptile groups. Which group has the largest range in body temperature?

- A. turtles
- B. lizards
- C. snakes
- D. crocodilians

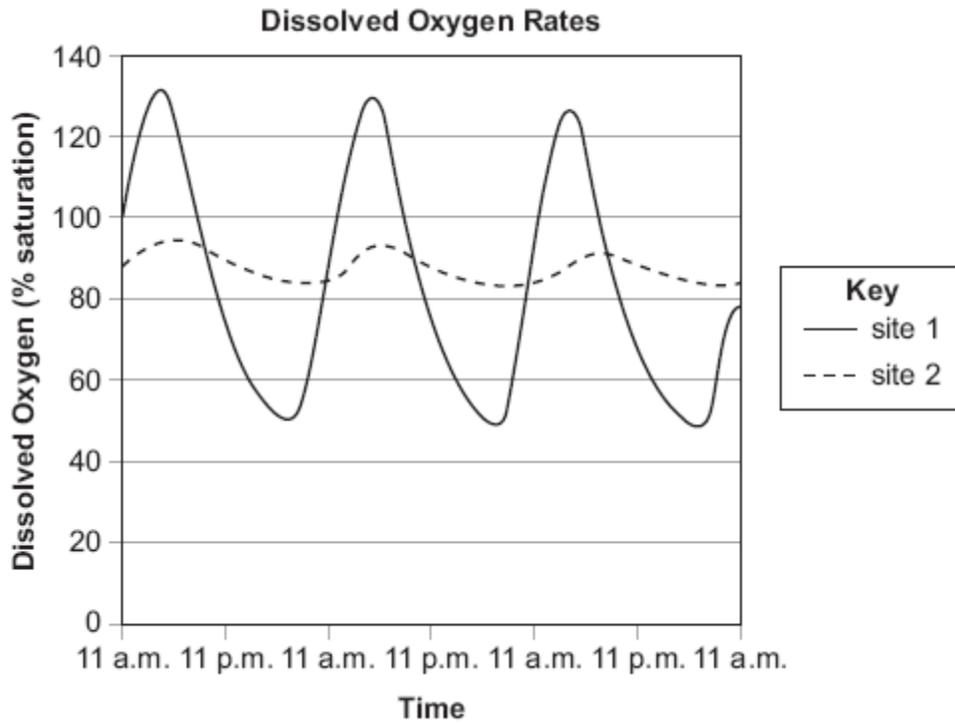
28. Use the diagram below to answer the question.



Which statement **best** explains how three different types of plant tissue can develop from a single meristem cell of a plant?

- A. Factors within the cell specify which genes will be expressed by the daughter cells.
- B. Cells undergo a mutation during replication producing genetic instructions that code for different tissue types.
- C. During cell division, limited portions of specific genetic code for each tissue type are passed to daughter cells.
- D. Environmental factors signal to the parent cell which sections of the genetic code need to be passed to daughter cells.

29. Use the graph below to answer the question.



Scientists measured the dissolved oxygen at two different river sites for three days, calculated the oxygen saturation, and displayed their calculations in a graph. Each site had similar types and amounts of aquatic vegetation. Which statement **best** explains the difference in the dissolved oxygen saturation ranges between the two sites?

- A. Site 1 has higher quantities of nutrients than does site 2.
- B. The elevation of site 2 is higher than the elevation of site 1.
- C. Site 1 receives more hours of direct sunlight than does site 2.
- D. Organisms at site 2 perform more cellular respiration than do organisms at site 1.

30. Which organism has the **least** entropy?

A. a wilted flower

B. a newborn calf

C. a 100-year-old tree

D. a mature, adult honey bee

Summary

| Sequence | Key | Set | Objective |
|----------|-----|--------|-----------|
| 1 | C | IASEOC | B.1.6.1 |
| 2 | D | IASEOC | B.1.6.7 |
| 3 | D | IASEOC | B.3.1.1 |
| 4 | D | IASEOC | B.3.2.4 |
| 5 | C | IASEOC | B.3.2.4 |
| 6 | C | IASEOC | B.3.2.2 |
| 7 | D | IASEOC | B.3.2.5 |
| 8 | B | IASEOC | B.5.1.1 |
| 9 | C | IASEOC | B.5.1.1 |
| 10 | C | IASEOC | B.5.3.1 |
| 11 | A | IASEOC | B.3.1.1 |
| 12 | B | IASEOC | B.3.2.1 |
| 13 | C | IASEOC | B.3.2.1 |
| 14 | A | IASEOC | B.5.1.1 |
| 15 | A | IASEOC | B.3.3.2 |
| 16 | D | IASEOC | B.3.3.2 |
| 17 | A | IASEOC | B.3.3.4 |
| 18 | A | IASEOC | B.3.3.4 |
| 19 | D | IASEOC | B.3.3.3 |
| 20 | C | IASEOC | B.3.3.3 |
| 21 | D | IASEOC | B.3.3.3 |
| 22 | B | IASEOC | B.5.2.1 |
| 23 | B | IASEOC | B.1.6.3 |
| 24 | A | IASEOC | B.1.6.7 |
| 25 | D | IASEOC | B.3.3.2 |
| 26 | A | IASEOC | B.3.3.4 |
| 27 | B | IASEOC | B.1.8.1 |
| 28 | A | IASEOC | B.3.3.4 |
| 29 | C | IASEOC | B.1.3.2 |
| 30 | B | IASEOC | B.3.2.1 |