



FSP SCIENCE CONTEST 2021

QUESTION BOOKLET
GRADE 9 & 10

VIBRANT YOUNGSTERS

TIME ALLOWED: 90 Minutes

MAXIMUM MARKS: 90



FAMOUS STUDENTS PLATFORM

INSTRUCTIONS

- 1) DON'T START ATTEMPTING THE PAPER UNTIL INSTRUCTED BY THE INVIGILATOR.
- 2) INSTRUCTIONS FROM THE EXAMINATION INVIGILATOR MUST BE CARRIED OUT PROMPTLY.
- 3) CAREFULLY RECHECK YOUR NAME, FATHER NAME, SCHOOL NAME, ADDRESS ETC AT THE BUBBLE SHEET / ANSWER SHEET.
- 4) RECORD ALL ANSWERS ON THE BUBBLE SHEET ONLY. SELECT BEST ANSWER FROM THE FOUR GIVEN OPTIONS AND MARK ONLY ONE OPTION IN EACH QUESTION.
- 5) USE BLUE / BLACK INK TO FILL UP THE CIRCLES FOR YOUR ANSWERS ON THE BUBBLE SHEET. USE OF LEAD PENCIL IS NOT ALLOWED.
- 6) USE OF ANY HELPING MATERIAL INCLUDING CELL PHONES AND ELECTRONIC DEVICES IS STRICTLY PROHIBITED.
- 7) EVERY CORRECT ANSWER EARNS THREE POINTS. THERE WOULD BE NEGATIVE MARKING. ONE POINT WOULD BE DEDUCTED FOR EVERY INCORRECT ANSWER.
- 8) CANDIDATES MAY NOT LEAVE THE EXAMINATION ROOM UNESCORTED FOR ANY REASON, AND THIS INCLUDES USING THE WASHROOM.
- 9) NO MATERIALS OR ELECTRONIC DEVICES SHALL BE BROUGHT IN TO THE ROOM.
- 10) THERE ARE FIVE CATEGORIES OF THE CONTEST AS UNDER:
 - A) VIBRANT YOUNGSTERS (GRADE 1 & 2)
 - B) VIBRANT YOUNGSTERS (GRADE 3 & 4)
 - C) VIBRANT YOUNGSTERS (GRADE 5 & 6)
 - D) VIBRANT YOUNGSTERS (GRADE 7 & 8)
 - E) VIBRANT YOUNGSTERS (GRADE 9 & 10 / 0-LEVELS)
- 11) ONLY REGISTERED STUDENTS CAN PARTICIPATE IN THE CONTEST.
- 12) NO CANDIDATE SHALL TAKE OUT OF THE HALL ANY ANSWER BOOK(S) OR PART OF AN ANSWER BOOK, WHETHER USED OR UNUSED, OR OTHER SUPPLIED MATERIAL.
- 13) IF A PARTICIPANT DOES NOT UNDERSTAND A WORD OR PHRASE ON THE EXAM PAPER, NEITHER EXAMINER NOR INVIGILATOR IS PERMITTED TO ANSWER.
- 14) FOR INFORMATION ABOUT UPCOMING CONTESTS OR PROVIDING VALUABLE FEEDBACK, PLEASE VISIT WWW.FSPCOMPETITIONS.ORG
- 15) ANY ACADEMIC MISCONDUCT OR MALPRACTICE MUST BE REPORTED TO FSP VIBRANT YOUNGSTERS AT INFO@FSPCOMPETITIONS.ORG

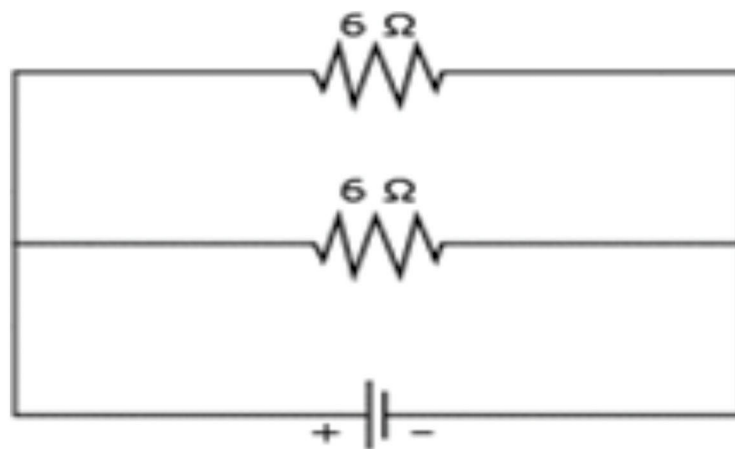
Q.5) A tennis ball rolled off the edge of a table that has a height of 1.00 m.



The ball took 0.45 s to hit the ground 0.72 m from the table. What was the horizontal velocity of the ball as it rolled off the table?

- A 0 m/s B 0.63m/s C 1.6m/s D 2.6m/s
-

Q.6) A schematic diagram of a circuit consisting of two resistors is shown below.

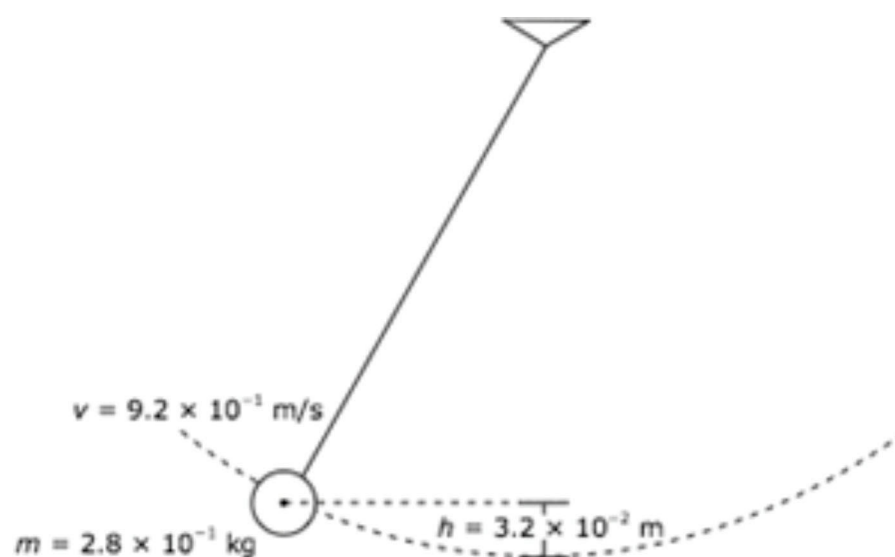


What is the total resistance of the circuit?

- A 12 Ω B 3 Ω C 2 Ω D 0.33 Ω
-

Q.7) A pendulum swings back and forth along the dashed path shown in the diagram. Its instantaneous velocity for the location shown is given in the diagram.

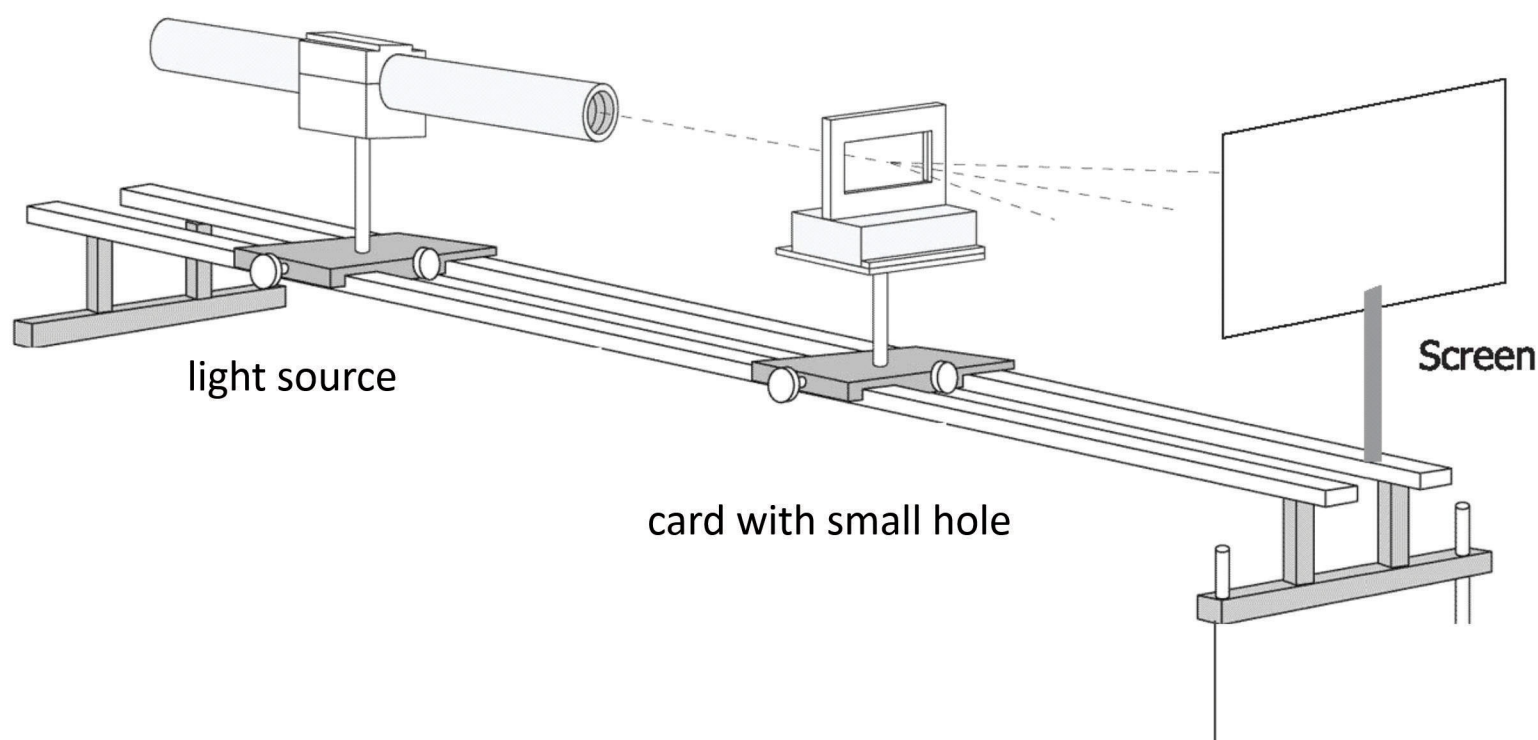
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What is the pendulum's total mechanical energy at the given location with respect to the bottom of the swing?

- A $3.2 \times 10^{-2} \text{ J}$
 B $8.8 \times 10^{-2} \text{ J}$
 C $1.2 \times 10^{-1} \text{ J}$
 D $2.1 \times 10^{-1} \text{ J}$

Q.8) Students use the setup shown below for a lab activity.

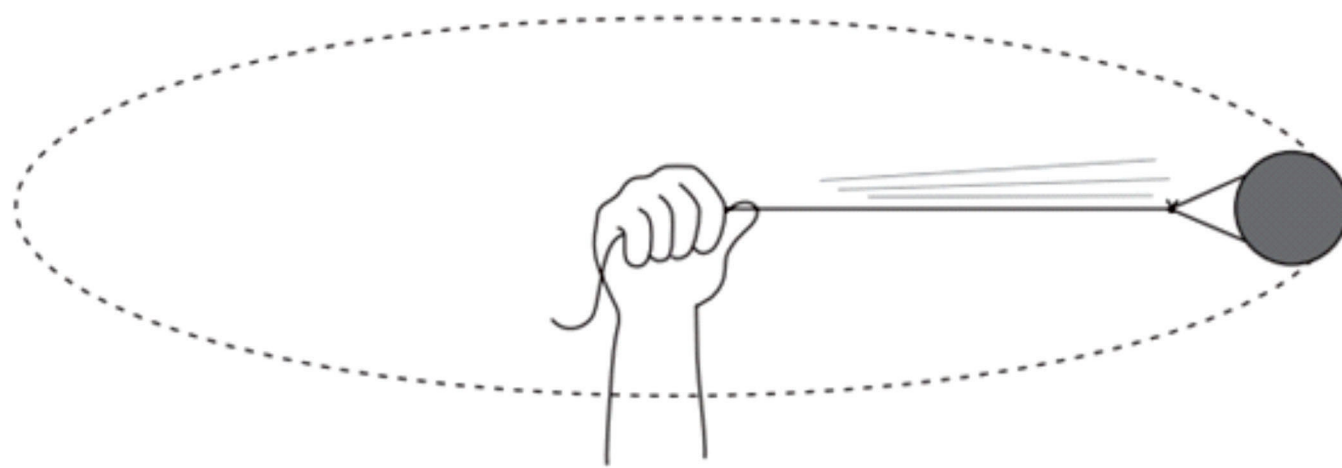


The setup is most useful for demonstrating –

- A absorption
 B diffraction
 C resonance
 D refraction

Q.9) A 0.040 kg ball tied to a string move in a circle that has a radius of 0.700 m

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If the ball is accelerating at 43.2 m/s^2 , what is the tangential velocity of the ball?

- A** -5.50 m/s **B** 30.2 m/s **C** 1.73 m/s **D** 61.7 m/s
-

Q.10) A student releases a ball from a height of 1.5 m above the floor.



Which of the following statements best describes the energy of the ball as it falls?

- A** Its potential energy is changed to kinetic energy.
B The total amount of its mechanical energy increases.
C Its kinetic energy is changed to potential energy.
D The total amount of its mechanical energy decreases.
-

Q.11) A train passes a stationary observer. Which of the following best describes how the amplitude and the apparent frequency of the sound waves heard by the observer change as the train moves away?

- Ⓐ Both the amplitude and the apparent frequency Increase.
 - Ⓑ Both the amplitude and the apparent frequency decrease.
 - Ⓒ The amplitude of the sound waves increases, and the apparent frequency decreases.
 - Ⓓ The amplitude of the sound waves decreases, and the apparent frequency increases.
-

Q.12) Which statement best explains the difference between light waves traveling through a vacuum and light wave traveling through a medium?

- Ⓐ light waves traveling through a vacuum are transverse, but light waves traveling through a medium are longitudinal.
 - Ⓑ light waves traveling through a vacuum travel faster than light waves traveling through a medium.
 - Ⓒ light waves traveling through a vacuum have no mass, but light waves traveling through a medium have a mass greater than zero.
 - Ⓓ light waves traveling through a vacuum have a shorter wavelength than light waves traveling through a medium
-

Q.13) The resistance of a wire can be reduced by (i)_____ the diameter of the wire or by (ii)_____ the length of the wire.

The statement above is completed by the information in row

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Row	I	II
A	decreasing	decreasing
B	increasing	decreasing
C	decreasing	increasing
D	increasing	increasing

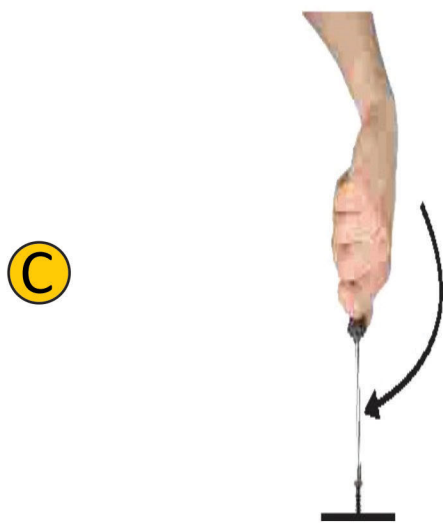
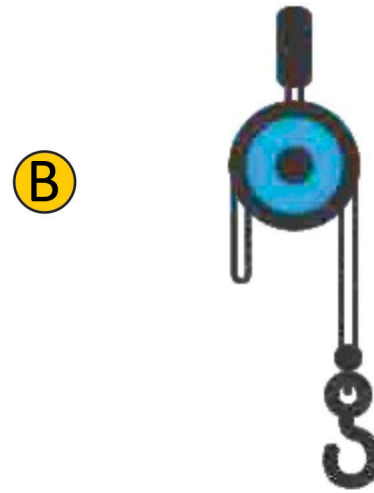
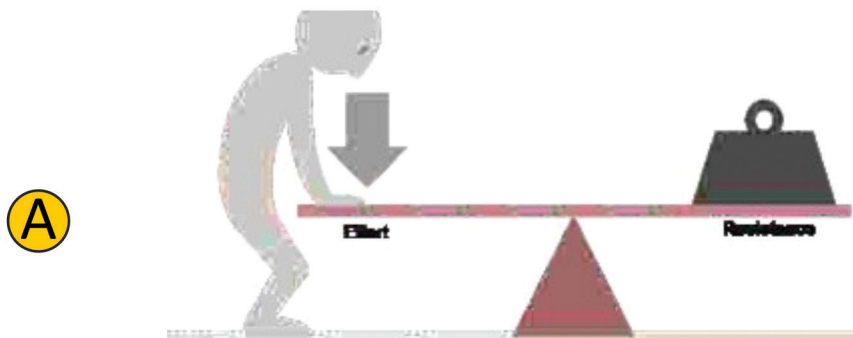
Q.14) The bobolink is a small blackbird that nests in fields of tall grass. It breeds in the summer across much of southern Canada and the northern United States. It migrates long distances, wintering in southern South America. The numbers of these birds are declining due to disruption of the areas where they live.



In order to save these birds from extinction, the best course of action would be to

- A prevent the birds from migrating to South America
- B encourage farmers to let their hay fields undergo succession
- C work to protect bobolink habitats in South & North America
- D capture all the bobolinks and keep them safe in zoos

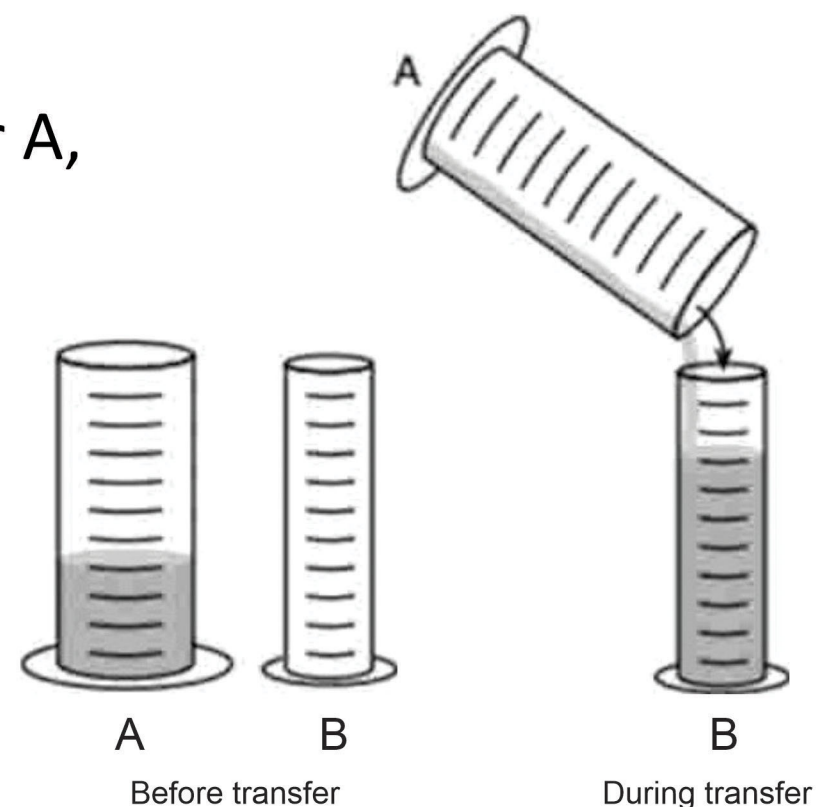
Q.15) The diagrams below represent four simple machines. The arrows in each diagram indicate the direction of the force being applied. Which machine is changing the direction of the force being applied?



Q.16) The diagrams below represent two cylinders. One hundred milliliters of a liquid was completely transferred from cylinder A to cylinder B.

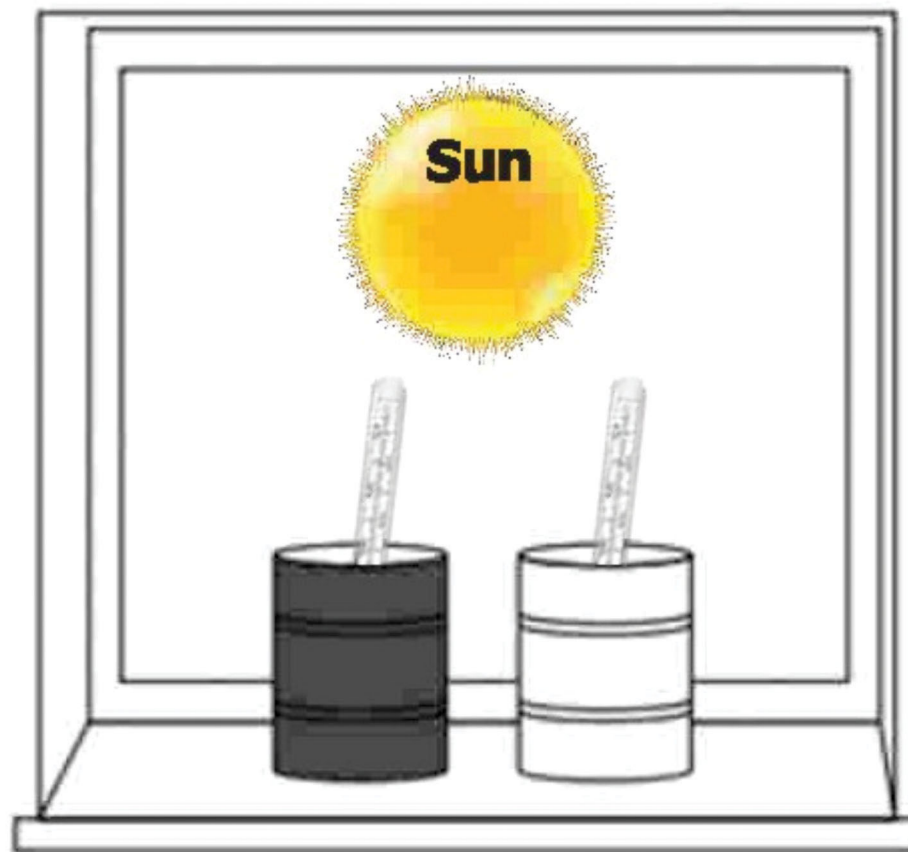
Compared to the liquid that was in cylinder A, the liquid in cylinder B will have

- A** less mass and more volume
- B** less mass and the same volume
- C** the same mass and more volume
- D** the same mass and the same volume



Q.17) The diagram below represents two cans of water at the same temperature.

One can is painted black and the other can is painted white. The cans are placed on a sunny windowsill, and a thermometer is placed in each can to measure the water temperature.

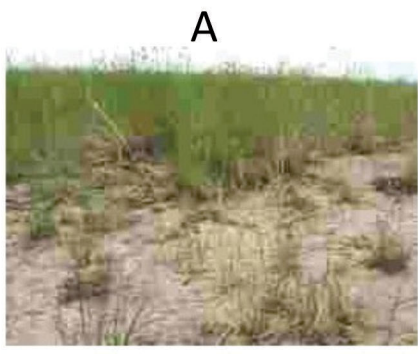


After four hours in the sunlight, the temperatures of the water in the cans will most likely be

- Ⓐ the same as when the cans were placed there
 - Ⓑ higher, with the same temperature in both cans
 - Ⓒ higher in the white can than in the black can
 - Ⓓ higher in the black can than in the white can
-

Q.18) A glacier in Alaska has melted back a distance of 100 kilometers over the last 200 years. Four stages in this process are shown in diagrams A, B, C, and D below.

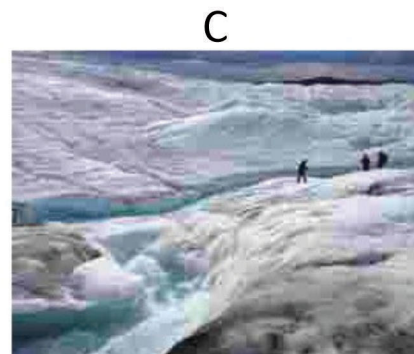
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A
Grasses & Shrubs appears.



B
Evergreen trees are plentiful.



C
Glacial ice covers the area



D
Rock and gravel are deposited.

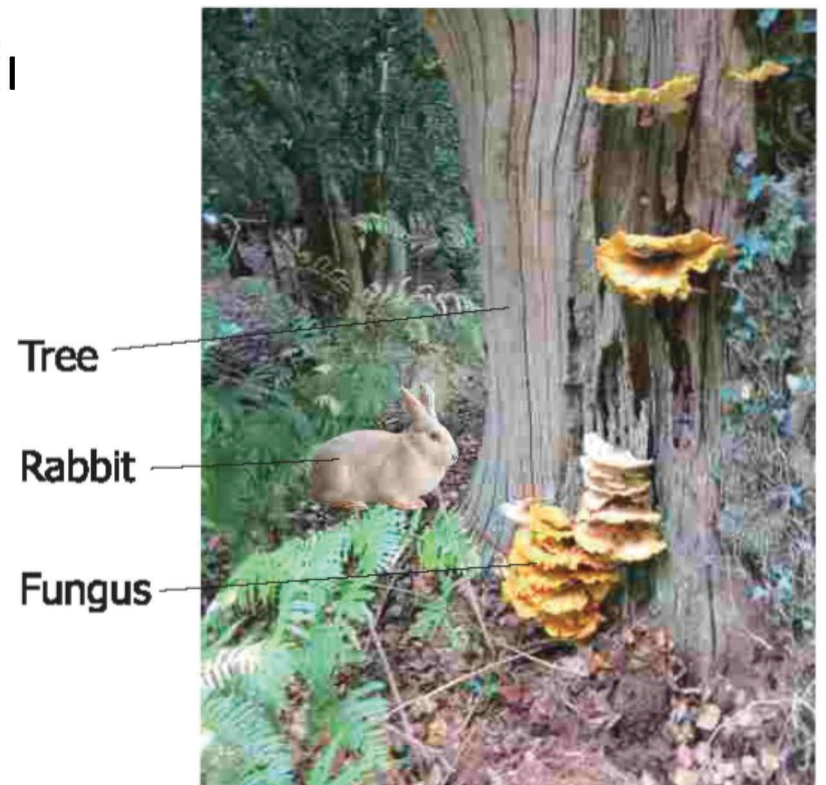
In which order should the diagrams be placed to represent the ecological succession that has taken place in the area?

- A C-D-A-B
 B C-D-B-A
 C D-C-B-A
 D D-C-A-B

Q.19) Three living organisms are labeled in the diagram below.

What do the rabbit fungus, and tree have in common?

- A They are all producers.
 B They are all omnivores.
 C They all belong to the same kingdom.
 D They are all multicellular organisms



Q.20) The diagram below represents strawberry in a food processor. When the processor is turned on, the blades will break the strawberry into smaller pieces.

Which human digestive process is most similar to this activity?

- A mechanical digestion
 B chemical digestion
 C solid waste elimination
 D liquid waste elimination



Read the passage below and answer questions 21 to 23.

Acid drainage from old mine sites is an environmental problem. Ground water combines with sulfide minerals and oxygen in these old mines to form sulfuric acid. The sulfuric acid reacts with any metal ores left in the mine to form a new substance. The new substance made by these reactions enters the surface water to become an environmental hazard.

Q.21) What property must this new substance possess?

- A It is acidic.
 - B It is a liquid.
 - C It is soluble
 - D It reacts with oxygen.
-

Q.22) Acid drainage also occurs naturally. What would be the main difference between acid drainage in mines and that which occurs naturally?

- A The process in the mines requires less oxygen.
 - B The natural process occurs much more slowly.
 - C Sulfuric acid is only created from the rocks in mines.
 - D Metals dissolve to different extents in mines compared to naturally.
-

Q.23) Acid drainage from mining can be treated before it is released into the environment.

Which form of treatment uses a chemical reaction?

- A Adding caustic soda or lime to the water.
 - B Covering waste rock from mines with plastic sheeting.
 - C Sealing mine shafts to prevent movement of water in and out.
 - D Storing mining waste underwater where oxygen levels are very low.
-

Read the passage below and answer questions 24 to 26.

All early observations of objects in space relied on visible light. As technology has evolved we have been able to 'look' into space in different ways. In AD 1054 Chinese astronomers saw a short-lived, bright light appear in the sky. The bright light is now thought to have been caused by a supernova. A supernova is an explosion of a star. This supernova created a structure we now know as the Crab Nebula. In 1968 repeating radio waves were discovered to be coming from the centre of the Crab Nebula. The object creating these radio waves is called the Crab Pulsar.

Q.24) What does the discovery of the Crab Nebula and Crab Pulsar tell us about the nature of scientific knowledge?

- A Scientific knowledge confirms what we already know to be true.
- B Current scientific knowledge can be used to explain past observations.
- C Current scientific knowledge always confirms the beliefs of pre-industrial societies.
- D Prior scientific knowledge only becomes relevant if it is confirmed by current research.

Q.25) Light from very distant objects in the universe has changed by the time it reaches the Earth. This phenomenon is called the Red Shift. What causes the Red Shift?

- A All objects in the universe are very hot.
- B The objects producing the light are moving away from Earth at high speeds.
- C Red light travels faster than other coloured light so more red light reaches Earth.
- D Any blue light from distant objects is absorbed in the atmosphere before it reaches Earth

Q.26) Why does the radiation from very distant objects help us understand the formation of the early universe?

- Ⓐ Objects near the edge of the observable universe were formed before those closer to the centre.
 - Ⓑ Objects must be very old before they can produce measurable amounts of radiation.
 - Ⓒ Radiation from very distant objects that reaches the Earth today was formed very early in the history of the universe.
 - Ⓓ Any radiation that reaches the Earth today from very distant objects must be very powerful, so the radiation must have come from the Big Bang.
-

Q.27) The paper ball kept near the mouth of a plastic bottle will be pushed out because:

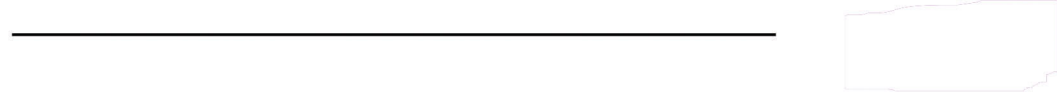
- Ⓐ the air pressure inside the bottle is same as that at the mouth
 - Ⓑ the air pressure inside the bottle is more than that at the mouth
 - Ⓒ the air pressure inside the bottle is less than that at the mouth
 - Ⓓ the pressure inside and outside the bottle same
-

Q.28) A student investigated how the mass of a plastic disk affected its motion.

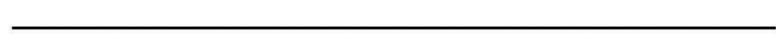
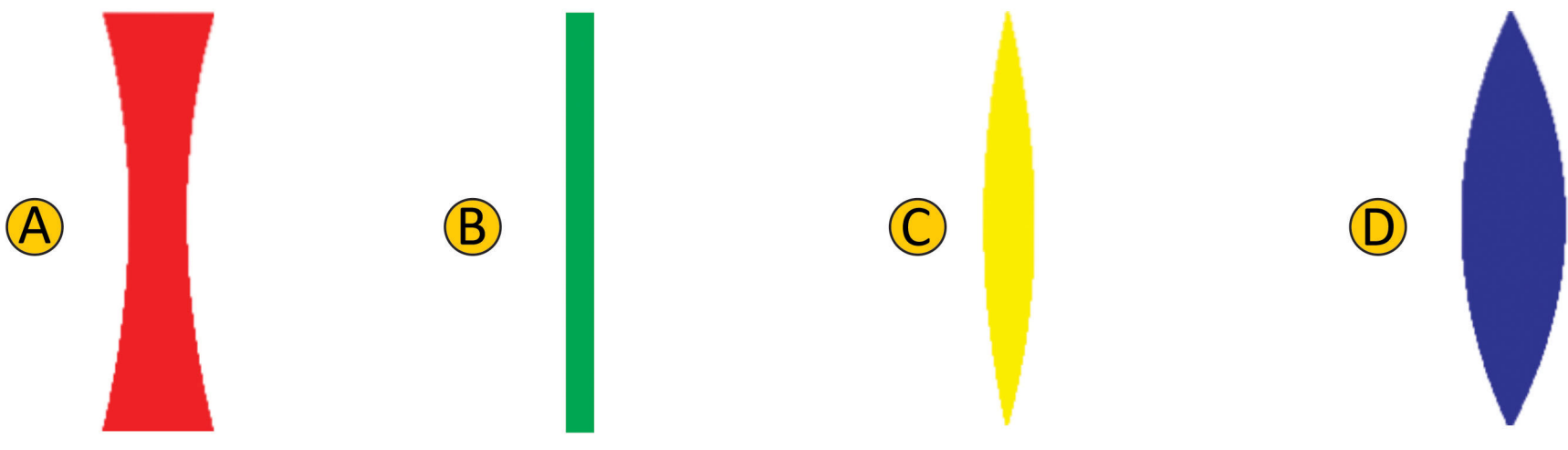
The student pushed five similar plastic disks, each with a different mass, across a wooden floor. The student recorded the distance each disk traveled. The investigation was repeated five times. The student concluded there was no relationship between mass and distance traveled. Which of these best describes an error in the investigation?

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- Ⓐ The student performed too few trials.
- Ⓑ The student should have used disks that were the same mass.
- Ⓒ The student should have pushed the disks across different surfaces.
- Ⓓ The student failed to control the amount of force applied.



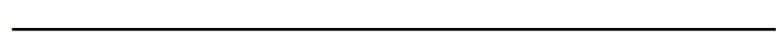
Q.29) If the four lenses shown below are made of the same material, which lens has the shortest positive focal length?



Q.30) Emperor penguins lay eggs during cold winter weather. Each male parent holds his egg on his feet to keep it warm with his body. It takes two months for the egg to hatch.

What would most likely happen if many eggs were not kept warm enough to hatch?

- Ⓐ Winter air temperatures would rise.
- Ⓑ Eggs would take less time to hatch.
- Ⓒ Emperor penguin populations would decrease.
- Ⓓ Emperor penguins would all become females.



BEST OF LUCK!



ANSWER SHEET

INSTRUCTIONS:

- This is a generic answer sheet to be used by participants of all grades. Students of Grade 1-2 will fill in circles of first 20 questions. Grade 3-4 will fill in circles of 25 questions & Grade 5-10 will fill in circles of 30 questions.
- Please recheck your Name, Father Name, Garde & School written below, the same would appear at your certificate.
- Use of lead pencil is not allowed.
- Use only Black / Blue ink to fill in the circles.

Choose only ONE of the FOUR proposed answers (A,B,C or D) & fill in the circles with your answer.

Example of correctly filled table of answers.

Ⓐ Ⓑ ● Ⓓ Correct Filling Answer "C"

Ⓐ Ⓑ ⊗ Ⓓ wrong filling

Ⓐ Ⓑ ■ Ⓓ wrong filling

Ⓐ Ⓑ ⊕ Ⓓ wrong filling

Ⓐ Ⓑ ● Ⓒ Ⓓ wrong filling

Q. No.	Answer				Q. No.	Answer			
1	Ⓐ	Ⓑ	Ⓒ	●	16	Ⓐ	Ⓑ	Ⓒ	●
2	●	Ⓑ	Ⓒ	Ⓓ	17	Ⓐ	Ⓑ	Ⓒ	●
3	●	Ⓑ	Ⓒ	Ⓓ	18	●	Ⓑ	Ⓒ	Ⓓ
4	Ⓐ	Ⓑ	Ⓒ	●	19	Ⓐ	Ⓑ	Ⓒ	●
5	Ⓐ	Ⓑ	●	Ⓓ	20	●	Ⓑ	Ⓒ	Ⓓ
6	Ⓐ	●	Ⓒ	Ⓓ	21	Ⓐ	Ⓑ	●	Ⓓ
7	Ⓐ	Ⓑ	Ⓒ	●	22	Ⓐ	●	Ⓒ	Ⓓ
8	Ⓐ	●	Ⓒ	Ⓓ	23	●	Ⓑ	Ⓒ	Ⓓ
9	●	Ⓑ	Ⓒ	Ⓓ	24	Ⓐ	●	Ⓒ	Ⓓ
10	●	Ⓑ	Ⓒ	Ⓓ	25	Ⓐ	●	Ⓒ	Ⓓ
11	●	Ⓑ	Ⓒ	Ⓓ	26	Ⓐ	Ⓑ	●	Ⓓ
12	Ⓐ	●	Ⓒ	Ⓓ	27	Ⓐ	●	Ⓒ	Ⓓ
13	Ⓐ	●	Ⓒ	Ⓓ	28	Ⓐ	Ⓑ	Ⓒ	●
14	Ⓐ	Ⓑ	●	Ⓓ	29	Ⓐ	Ⓑ	Ⓒ	●
15	Ⓐ	●	Ⓒ	Ⓓ	30	Ⓐ	Ⓑ	●	Ⓓ



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