



VANDA

SCIENCE GLOBAL FINALS

Secondary 1 / Grade 7

Full Name: _____ Country: _____

School: _____ Index Number: _____

Instructions to Students:

1. Only scientific calculators are allowed during the contest for secondary school/Grade 7 and above students.
2. The duration of this contest is **1 hour**. You may not leave the contest venue within the first half an hour of the paper.
3. This examination paper contains **20** questions and comprises of **14** printed pages, inclusive of the cover page.
4. Each question has only 4 possible answers: **A, B, C** and **D**. You must shade your correct option on the Answer Entry Sheet provided.
5. The total marks for this paper is 70 points:

Section A:

Question 1 to 5: +2 points for correct answer, 0 points for no answer and –1 point for wrong answer.

Section B:

Question 6 to 10: +3 points for correct answer, 0 points for no answer or wrong answer.

Section C:

Question 11 to 20: +4 points for correct answer, 0 points for no answer or wrong answer.

6. You are not allowed to bring the question paper and answer script out of the contest venue.

Note:

- 1) You may assume that there is no air resistance throughout the contest, unless otherwise stated.
- 2) All temperatures are in degree Celsius, unless otherwise stated.
- 3) Room temperature is 25°C at 1 atmospheric pressure.
- 4) Gravitational Acceleration is taken to be 9.8 m/s²

Rough Working

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Section A (Question 1 to 5: +2 points for correct answer, 0 points for no answer and -1 point for wrong answer.)

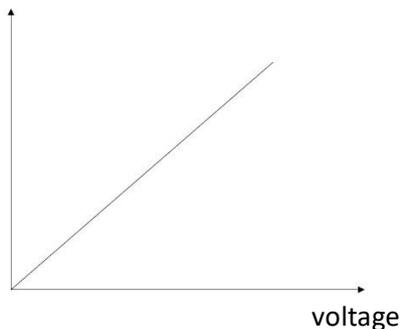
1. Which of the following phenomena would not happen in both in the expansion of a solid and melting of a solid?
 - A. Energy is absorbed by the particles in the solid.
 - B. The particles in the solid move further apart.
 - C. The particles in the solid vibrate faster.
 - D. The mass of the particles will increase.

2. AIDS, or acquired immune deficiency syndrome, is a sexually transmitted infection caused by HIV, or human immunodeficiency virus. HIV is spread mostly by fluids from the human sexual reproductive system, blood and from mother to child. One day, Penny discovered one of her relatives was tested positive for the HIV virus.

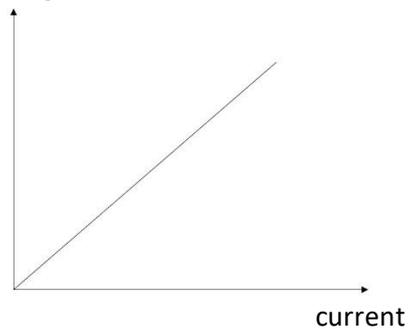
Which of the following should she do to prevent HIV virus transmission to herself?

- A. avoid sharing food with her relative during shared dinners
 - B. avoid using the toilet at her relative's house whenever Penny visits
 - C. avoid giving first aid without the use of gloves whenever her relative gets an open cut
 - D. all of the above
3. Which of the following graphs can be used to find the resistance of a device using the gradient of the line?

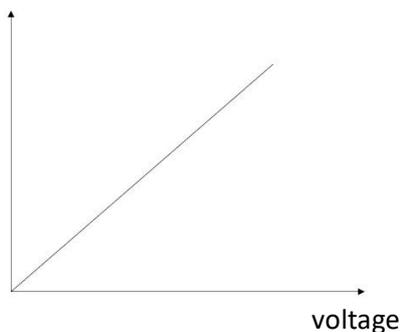
A. power



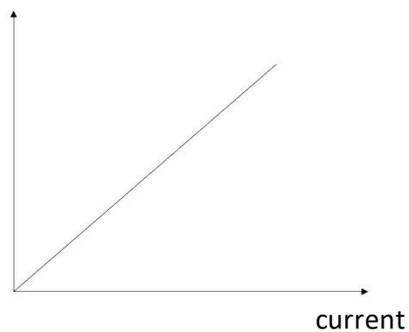
B. voltage



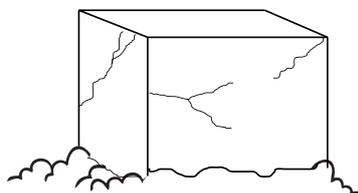
C. potential difference



D. power



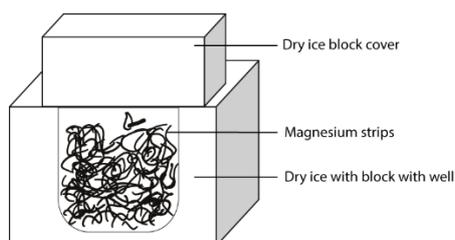
4. Tom set-up an experiment where he buried a fresh piece of concrete pavement block halfway in a temperate country at around evening time. He checked on the pavement block the next morning and observed cracks had appeared on it. He wrote down the following statements to explain why the cracks appeared in the pavement block.



- i. When the evening comes, cold wind blows across the surface of the pavement block and the surface gains coldness from the cold wind.
- ii. The surface of the pavement block expanded.
- iii. The bottom of the pavement block buried with the warm ground gains heat from the warm ground.
- iv. The bottom of the pavement block expanded.
- v. The uneven expansion and contraction of the pavement caused cracks to form on the pavement block.

Which of the statements are wrong?

- A. i and ii
 - B. i and iv
 - C. ii and v
 - D. iii and iv
5. The diagram below shows some magnesium strips placed in a small well dug into a block of dry ice.



A match was lit and then dropped into the well and the well was covered with another piece of dry ice block while the reaction was allowed to proceed. At the end of the reaction, the well was found to be bigger, and the magnesium strips had turned black.

Which of the following processes best described the reaction?

- A. combustion
- B. displacement
- C. decomposition
- D. neutralisation

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Section B (Question 6 to 10: +3 points for correct answer, 0 points for no answer or wrong answer.)

Each question has 4 numbered options. Response is based on the following table:

A	B	C	D
1 is correct only	1 and 3 correct only	2 and 4 correct only	1,2,3,4 are correct

6. The picture below is a screenshot of an element in a periodic table.

47
Ag
silver
107.9

Which of the following statements is/are true?

1. There are 60.9 neutrons in atom of silver.
 2. The number of electrons in an atom of silver is 47.
 3. The symbol for silver comes from the French "*L'Argent*".
 4. Only the element silver can have 47 protons in its atoms.
7. Four friends made the following statements about whether a substance is an element or not an element. Which of the following statements is/are correct?
1. "If the substance is made up of one type of atom, the substance is an element."
 2. "If the substance is highly reactive, the substance is an element."
 3. "If the name of the substance can be found in the Periodic Table, the substance must be an element."
 4. "If there are three products collected after the substance undergoes heating, the substance is an element."

8. The following statements are descriptions of four people and their actions to a heavy weight.

Person E: She lifts the heavy weight on to a table and pushes it across the table towards a corner.

Person F: With all the strength he can muster, he is unable to lift the heavy weight, and then walks away to find help.

Person G: He takes the weight to the edge of the cliff and drops it off. The weight lands at the bottom creating a small crater.

Person H: She presses on a sponge leaving a dent and then the sponge returns back to the original shape.

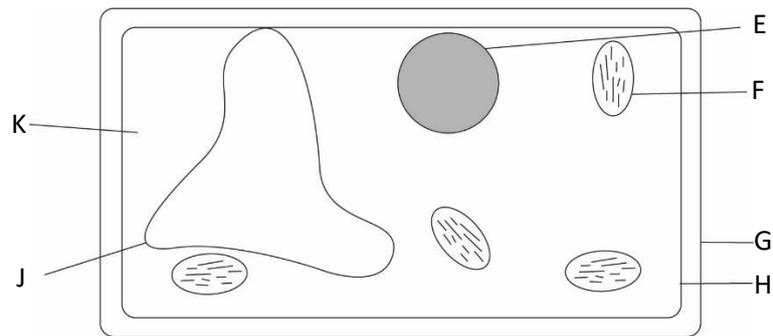
Which of the following people did work on the object either against gravity and/or against friction?

1. person E
 2. person F
 3. person G
 4. person H
9. The D-string on a regular guitar usually vibrates at about 147 Hz against a tuner. Old guitars that have not been played for a long time have strings become loose and lose their tension.

Which of the following statements is/are true?

1. Old D-strings will vibrate at frequencies lower than 147 Hz.
2. Tightening the D-string will cause the guitar to play at a higher pitch.
3. The loudness of the string is dependent on how hard the string is plucked.
4. Tightening the D-string will increase the frequency it will vibrate at when played.

10. The diagram below shows a plant cell.



Which of the following statements are true?

1. F will be stained blue/black when iodine is added to the cell after being placed in sunshine for a few hours.
2. G consists of a semi-permeable membrane.
3. H consists of a permeable membrane.
4. E controls the turgidity of the cell.

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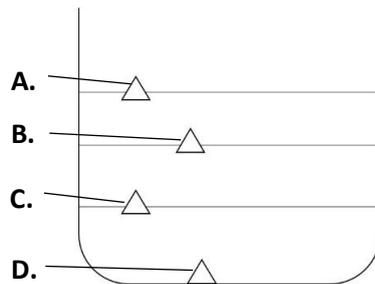
Section C: (Question 11 to 20: +4 points for correct answer, 0 points for no answer or wrong answer.)

11. Which one of the following statements cannot be concluded using scientific thinking?

- A. All bacteria are living organisms.
- B. Graphite is made up of one element.
- C. The density of pure water at 4°C is approximately 1 g/cm³.
- D. The Loch Ness monster only appears from the surface of its lake every 3 years.

12. The diagram below shows a container with three liquids that do not mix with one another. The densities of the liquids, in no particular order, are 3.12 g/cm³, 0.494 g/cm³ and 1.13 g/cm³.

An object was placed in the container with the liquids. The density of the object is known to be 2.51 g/cm³. Which position would the object be expected to be?



13. Alan wanted to separate salt solution into salt and water separately, and to collect them individually.

Which of the following separation techniques would be used in separating the mixture and collection of the individual components?

- A. evaporation
- B. distillation
- C. filtration
- D. magnetic attraction

14. The field mouse is a type of mammal. When comparing the amount of food consumed per unit mass of the animal's body, the field mouse consumes more food than reptiles, such as a tortoise.

Which of the following gives the best explanation for the above description?

- A. Reptiles digest their food sources faster than mammals.
- B. Reptiles consume their food sources faster than mammals.
- C. Mammals are not as active as reptiles.
- D. Mammals need to generate more heat to maintain their body temperatures.

15. The following actions are ways how pressure can be controlled in order to help people improve their way of life.

- i. Filling a balloon up with air.
- ii. Snowmobiles using tracks instead of wheels to move over thick snow.
- iii. Tying a cushion across both the handles of a bag and carrying the bag by the cushion.
- iv. Choosing a larger size of heels on stilettos to reduce muscle strain on the calves of legs.

Which of the actions described above modifies pressure differently from the rest of the actions?

- A. i
- B. ii
- C. iii
- D. iv

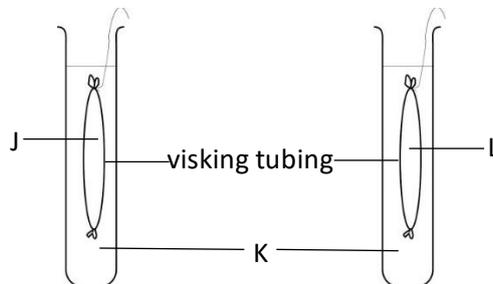
16. The diagram below shows the object number '5' in front of a mirror.



Which one of the following describes both the correct statement about the image and the correct orientation of the image as seen in the mirror?

- A. The image is real. The resultant image is Ɔ .
- B. The image is virtual. The resultant image is Ɔ .
- C. The distance from the object to the mirror is the same as the distance from the image to the mirror. The resultant image is 5 .
- D. The distance from the object to the mirror is the twice the distance from the image to the mirror. The resultant image is 5 .

17. The following set-up was used to test the concentration of three liquids J, K and L.



After leaving the set-up for 1 hour, Jake came back and noticed the visking tubing containing J had become firmer, whereas the visking tubing containing L had become smaller.

Which of the following contains the correct set of identities of J, K and L at the start of the experiment?

	liquid J	liquid K	liquid L
A.	25% salt solution	8% salt solution	water
B.	8% salt solution	water	25% salt solution
C.	8% salt solution	25% salt solution	water
D.	water	8% salt solution	25% salt solution

18. A piece of food that contains high amount of starch, maltose, protein and fat is processed through a human alimentary canal. Samples of food were taken in different parts of the alimentary canal at different times and tested for the presence of particular nutrients. The table below shows the test results for the presence of particular nutrients.

part of alimentary canal	starch	maltose	protein	fat
P	10%	20%	20%	20%
Q	40%	94%	98%	99%
R	30%	97%	28%	98%

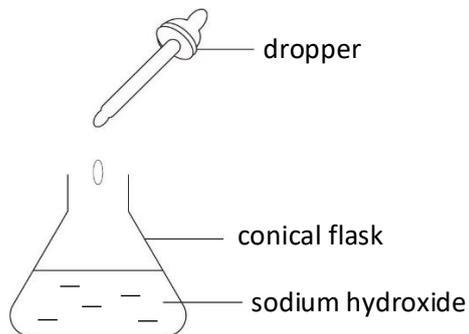
Which of the following statements is true?

- A. Q is at the oesophagus.
 - B. P is at the stomach.
 - C. R is at the mouth.
 - D. Q is at the large intestine.
19. The female jewel wasp (*Ampulex compressa*) finds a cockroach and stings it to control the cockroach's movements. Then, the wasp leads the cockroach to a prepared nest where it lays an egg on the cockroach's abdomen. Once hatched, the larva feeds on the cockroach and forms a cocoon inside the cockroach's body. An adult wasp eventually emerges from the cocoon and leaves the dead host to begin the cycle again.

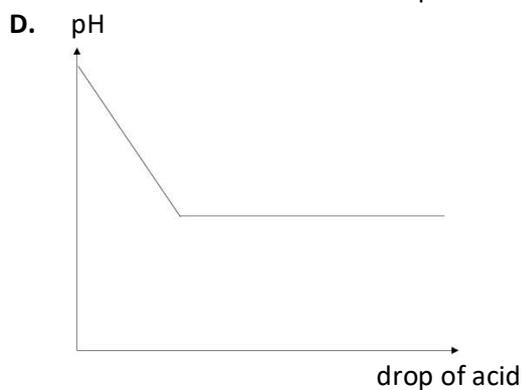
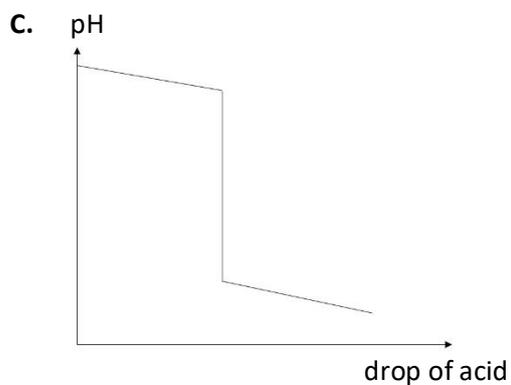
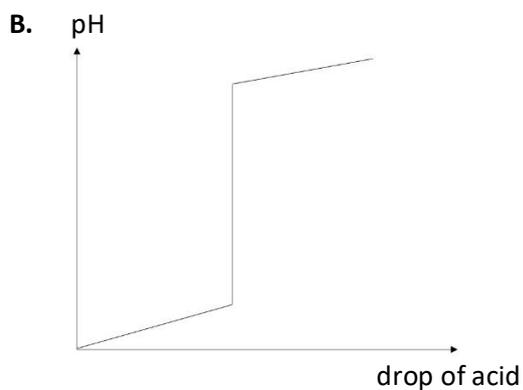
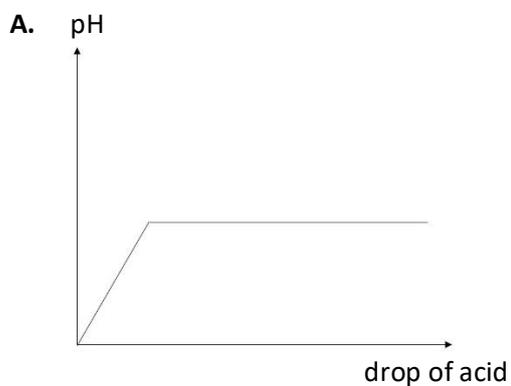
From the above description, what type of interrelationship does the jewel wasp and cockroach have?

- A. commensalism
- B. mutualism
- C. parasitism
- D. predator-prey relationship

20. The diagram below shows an experiment being conducted in which hydrochloric acid was added via dropper to a conical flask containing sodium hydroxide. After each drop of acid was added, the pH of the solution was measured.



Which of the following would best describe the resultant graph from this experiment?



Rough Working

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