

Division



LEVEL 3
(Year 7, 8 & 9)

ASIAN SCIENCES OLYMPIAD 2018 CONTEST



Full Name:

Year:

IC No:

Date:

Time:

School Name:

School Code:

Rules and Regulations

(Please read these rules and regulation carefully)

1. Please fill in your **FULL name** correctly, IC no, school name, school code (if available) and the date and time of contest clearly in the spaces above. Those who do not fill in the required particulars will be disqualified automatically.
2. Do not open the question booklet until you are told to do so.
3. No calculators and any unauthorized electronic devices (including mobile phones) are allowed during the contest.
4. Strict silence must be observed at all times in the examination hall and please be reminded that you **MAY NOT** leave your seat without permission.
5. If you have any request or enquiry, please raise your hand and wait for an invigilator.
6. Only one candidate is allowed to leave the hall at a time. You are required to return to the hall within 10 minutes or else you will automatically be disqualified from the contest.
7. Each question in the contest have been verified by experienced trainers, thus no further explanation will be given.
8. The time allowed for the paper is **60 minutes**. You must stop writing when you are told to do so.
9. You **MUST** fill in your answer in the answer sheet provided in second page of the question booklet. You will not be awarded marks for any answer written in the question booklet.
10. Please be reminded that this is a contest and not an examination, try your level best to answer all questions within the prescribed time.
11. Please tear off the answer sheet carefully and returned to invigilator along with contest paper. Participant only can bring back the contest papers on next week.

Scoring System

1. For **Question 1- 10**, **3 marks** will be awarded for each correct answer.
For **Question 11- 20**, **4 marks** will be awarded for each correct answer.
For **Question 21- 25**, **6 marks** will be awarded for each correct answer.
However, you will **NOT** be penalized for each incorrect answer.
2. The organizer reserves the right to disqualify the event of malpractice to differentiate between those outstanding students.
3. Contestants or a team who are disqualified from the contest will be forfeited any right to re-sit this year.

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2018 ANSWER SHEET



1		6		11		16		21	
2		7		12		17		22	
3		8		13		18		23	
4		9		14		19		24	
5		10		15		20		25	

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Question 1-20 are Multiple Choices Questions.

1. The process in which molecules are transported across the plasma membrane against the concentration gradient is known as:

- A. Osmosis
- B. Simple diffusion
- C. Endocytosis
- D. Exocytosis
- E. Facilitated diffusion

(3 Marks)

2. When a cell's DNA has become damaged beyond repair, the cell undergoes which of the following processes?

- A. Endocytosis
- B. Exocytosis
- C. Photosynthesis
- D. Apoptosis
- E. Glycolysis

(3 Marks)

3. During which stage of the cell cycle would you expect to have the lowest amount of cellular growth and synthesis taking place?

- A. The M phase
- B. The G2 phase
- C. The S phase
- D. The G1 phase

(3 Marks)

4. Which of the following elements **MUST** exist in an organic compound?

- A. Nitrogen
- B. Hydrogen
- C. Chlorine
- D. Carbon
- E. Oxygen

(3 Marks)

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5. Which of the following is the most abundant rare gas in the earth atmosphere?

- A. He
- B. Ne
- C. Ar
- D. Kr
- E. Xe

(3 Marks)

6. Which of the following is the most malleable metal?

- A. Silver
- B. Gold
- C. Platinum
- D. Iron
- E. Copper

(3 Marks)

7. Which of the following is the hardest form of carbon?

- A. Coke
- B. Graphite
- C. Diamond
- D. Charcoal
- E. None of above

(3 Marks)

8. Which of the following contains the most neutrons?

- A. Oxygen-15
- B. Nitrogen-14
- C. Carbon-14
- D. Boron-12
- E. Carbon-12

(3 Marks)

9. The high reactivity of fluorine is due to

- A. Its high electronegativity
- B. The small size of fluorine atom
- C. Availability of d-orbitals
- D. Strong F-F bonding
- E. None of above

(3 Marks)

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10. Which of the following prefix corresponds to 10^{-15} ?

- A. NANO
- B. FEMTO
- C. PICO
- D. PETA
- E. ATTO

(3 Marks)

“Every action (force) in nature there is an equal and opposite reaction.”

11. Which Newton's law of motion does the above statement describe?

- A. Newton's first law of motion
- B. Newton's second law of motion
- C. Newton's third law of motion
- D. Newton's law of gravitation
- E. None of above

(4 Marks)

12. Which of the following is referring to static friction?

- A. Ground fiction of ice-skating
- B. Air friction of airplane
- C. Water resistance of a boat
- D. Ground friction on moving car's wheel
- E. None of above

(4 Marks)

13. What event would activate a G protein?

- A. Phosphorylation of GTP to GDP
- B. Replacement of GDP with GTP
- C. Hydrolysis of GTP to GDP
- D. Hydrolysis of GDP to GTP
- E. Phosphorylation of GDP to GTP

(4 Marks)

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14. Scientists can clarify various bacterial species into two groups based on cell wall composition by using ____?

- A. Gel electrophoresis
- B. Centrifugation
- C. Western blotting
- D. Gram staining
- E. DNA extraction

(4 Marks)

15. Which of the following is NOT an assumption required for Hardy-Weinberg equilibrium?

- A. No mutations
- B. Random mating
- C. No selection is occurring
- D. No migration
- E. Population size must fluctuate

(4 Marks)

16. Where does the electron transport chain occur in prokaryotic cells and eukaryotic cells respectively?

- A. The chloroplasts; the cellular membrane
- B. The cellular membrane; the mitochondria
- C. The chloroplasts; the mitochondria
- D. The mitochondria; the cellular membrane
- E. The cellular membrane; the chloroplasts

(4 Marks)

17. List the following bond types in order of increasing strength: non-polar covalent bonds, ionic bonds, hydrogen bonds, polar covalent bonds.

- A. Hydrogen bonds, ionic bonds, non-polar covalent bonds, polar covalent bonds.
- B. Hydrogen bonds, non-polar covalent bonds, polar covalent bonds, ionic bonds.
- C. Hydrogen bonds, ionic bonds, polar covalent bonds, non-polar covalent bonds.
- D. Ionic bonds, polar covalent bonds, non-polar covalent bonds, hydrogen bonds.
- E. Non-polar covalent bonds, polar covalent bonds, hydrogen bonds, ionic bonds.

(4 Marks)

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18. If an electron falls from the energy level of $n = 5$ to the ground state of $n = 1$, what is most likely to occur?

- A. A photon is absorbed.
- B. The electron changes its spin direction.
- C. A photon is emitted.
- D. The electron gains velocity.
- E. A neutron is transformed into a proton

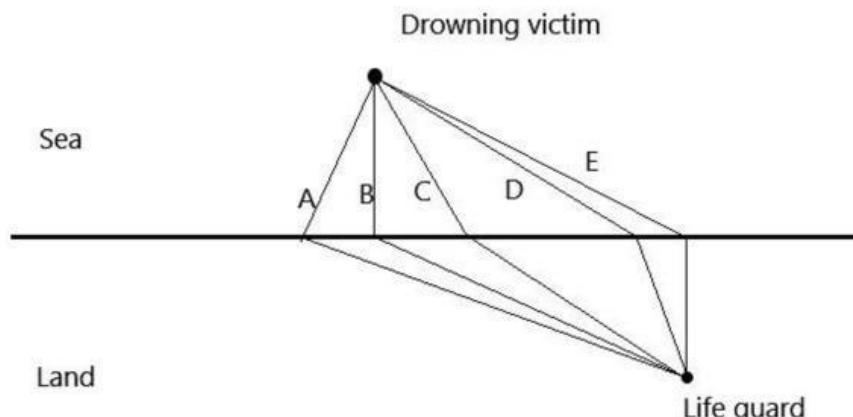
(4 Marks)

19. A boy throws a rubber ball downwards with the initial velocity of v . The rubber ball bounces on the floor and reaches the highest point 1m above its initial position. Assuming no energy loss, what is the magnitude of the initial velocity, v ?

- A. $\sqrt{2gh}$
- B. $2\sqrt{g}$
- C. $\sqrt{\frac{g}{2}}$
- D. $\frac{g}{\sqrt{2}}$
- E. Insufficient information.

(4 Marks)

20. Figure below shows the position of a life guard from a drowning victim. If the life guard can run faster than swim, which of the route allows him to get to the victim in the shortest time?



(4 Marks)

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Question 21-25 are Short Answer Questions.

Answers questions 21 and 22 based on your knowledge.

21. Using a cannon that fires a 1kg cannonball with kinetic energy of g kilojoules (g kJ), where g is the value of gravitational constant, what is the firing angle to hit a target at 1km from the cannon?

ANSWER _____

(6 Marks)

22. What is the percent by mass of bismuth in the compound Bi_2Te_3 ? (Molar mass of Bismuth & Tellurium: 208.98 g/mol and 127.6 g/mol respectively). Express your answer in one decimal place. (eg. 99.9%)

Answer : _____

(6 Marks)

23. A tank fully filled with liquid with refractive index of 1.5 appears to be 6m deep from above. What is the real depth of the tank? Express your answer in m (meters).

ANSWER _____

(6 Marks)

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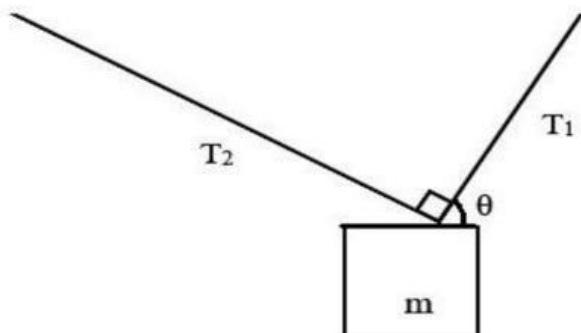


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24. The figure below shows a block with mass of 1kg suspended by two strings with tensions T_1 and T_2 . The two strings form a right angle as shown in the figure. Given that the angle θ is 60° , find the magnitude of T_1 .



A. $\frac{g}{2}$

B. $\sqrt{3}g$

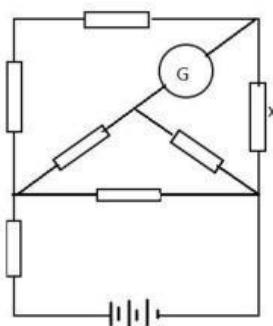
C. $\frac{\sqrt{3}}{2}g$

D. $\frac{2}{\sqrt{3}}g$

E. None of above

(6 Marks)

25. Figure below shows a circuit with power supply, resistors and a Galvanometer. All resistors other than resistor x have the resistance of 1Ω . If the Galvanometer reads 0, what is the resistance of resistor x? (Give your answer in unit of Ohm)



ANSWER _____.

(6 Marks)

THE END