

NOT FOR SALE



Department of Science and Technology
Science Education Institute

PRIMER

on the
DOST-SEI
Undergraduate Scholarship
Examination

*Building the next generation of
S&T professionals committed to the
well-being of every Filipino.*

Data-Driven | Laser-Focused | People-Centered



Department of Science and Technology
SCIENCE EDUCATION INSTITUTE

FOREWORD

The Science Education Institute (SEI) of the Department of Science and Technology (DOST) provides opportunities to talented young students who wish to pursue careers in science and technology through its scholarship programs.

A highly competitive qualifying examination is administered annually. Applicants must meet the eligibility requirements and pass the exam to become scholars.



We designed this Primer for the DOST-SEI Undergraduate Scholarship Examination to help applicants prepare well for the test. Sample test items are also provided to help applicants get a sense of what to expect on the exam day.

We hope applicants find this Primer helpful in readying themselves for the examination. We look forward to welcoming the next cohort of DOST-SEI scholars.

JAYEEL S. CORNELIO, PhD
Director IV

ABOUT THE DOST-SEI UNDERGRADUATE SCHOLARSHIP EXAMINATION

The DOST-SEI Undergraduate Scholarship Examination continuously evolves as we try to have the best instrument that identifies who among you will be successful in a career in science and technology. This aligns with our S&T human resource development plan.

While you may have taken many examinations already, taking a scholarship exam may cause some anxiety because your performance on the test is life-defining. Passing the test can lead you to a career that you will pursue in your lifetime. You must do your best, thus, this Primer.

First, let us look at the basic makeup of the examination. It is a multiple-choice test consisting of three main parts and timed as follows:

Part	Domain	Sub-domains	Time in Minutes
I	Creative Reasoning	Mechanical Reasoning	35
		Spatial Reasoning	
		Verbal Reasoning	
	Language and Literature		
II	Science	Biology	75
		Chemistry	
		Earth Science	
		Physics	
		Space Science	
III	Mathematics		70

When you finish a part before the end of the allotted time, you can use the remaining time wisely by reviewing your answers to that part only or close your test booklet. You are not allowed to go back to the previous part nor proceed to the next part of the test.

The actual examination will be taken in approximately three hours including reading of instructions and filling out some information on the answer sheet. Instructions will be given step by step so you will be properly guided. It is designed to be taken in one sitting.

You will encounter multiple-choice items in the test. There will be four options per item, and only one is the correct answer. You will indicate your answer by shading the circle in the answer sheet with the letter of your choice. Your score will be the total number of correct answers you make.

You may eat your snacks or drink water at any time during the examination but make sure that you do not smear the test materials. You may also be allowed to go to the comfort room as necessary, but you will use your time in the test.

Helpful Tips When Taking an Exam:

1. On the day before the exam, prepare your Test Permit, School ID, Parent Waiver, pencils, an eraser, and maybe a sharpener. Do not forget your snacks and water.
2. Rest well the night before the exam so you will be mentally alert and ready for the rigors of it.
3. Go to your Test Center early. It will be easier if you know the location of your designated Test Center before exam day so you can plan your trip and arrive at the site long before the start of the exam.
4. Dress properly. Wearing shorts and slippers is not allowed. The host school may not allow you to enter the premises if you are attired inappropriately.
5. Time Management in Taking an Exam: Given the limited time per test, manage your time wisely. Do not spend too much time on any particular item you find difficult. Answer all the test items you know and if there is still time, go back to the difficult or unfamiliar test item and choose your best option.
6. Follow instructions diligently. The Examiner will give step-by-step instructions.
7. Pray. Do your best!

To have a better idea of the DOST-SEI Scholarship Examination, try answering the sample test items :

Part I: Creative Reasoning and Language and Literature

A. **CREATIVE REASONING.** This consists of verbal, spatial and mechanical reasoning.

1. **Mechanical Reasoning** test items measure your ability to acquire information about everyday physics and to comprehend mechanical relationships. This test consists of mechanical and electrical problems and items that deal with physical forces.

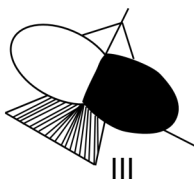
Sample Test Items



1. If you are carrying this glass of soda while riding a bus accelerating in the direction of the arrow, which of the following BEST represents the shape of cross-section of the water surface in the glass?



2. Which of the kites illustrated below will fly the highest in the shortest possible time?

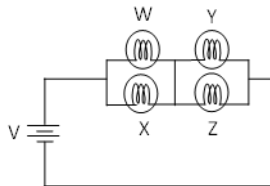


- A. I
B. II

- C. III
D. There is no difference among I, II, and III

3. Four identical bulbs, W, X, Y, and Z as shown below are initially operating with equal brightness. If bulb Y is busted, which of the following are TRUE?

- I. Bulb Z will be darker than before.
II. Bulb Z will be brighter than before.
III. Bulbs W and X will be darker than before.
IV. Bulbs W and X will be brighter than before.

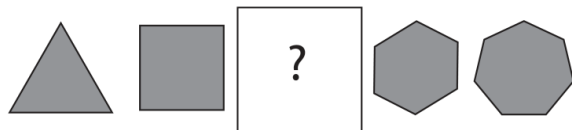


- A. I and III B. I and IV C. II and III D. II and IV

2. **Spatial Reasoning** test items measure your ability to understand objects in two and three-dimensional terms and draw conclusions about them with limited information. You visualize, rotate, or disassemble objects in your mind into alternate formats by reasoning about shape, measurement, depiction, and navigation.

Sample Test Items

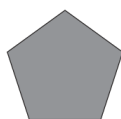
1. What shape is needed to complete the series below?



A.



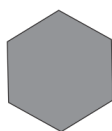
C.



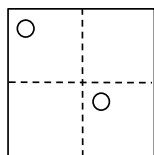
B.



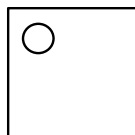
D.



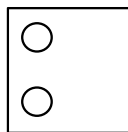
2. If a piece of paper containing two circular holes as shown is folded along the dashed lines, which of the following is the resulting figure?



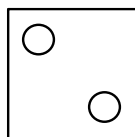
A.



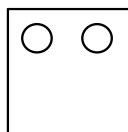
C.



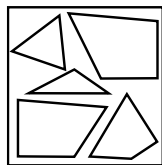
B.



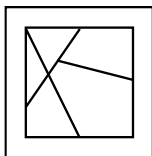
D.



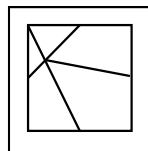
3. Which of the four figures below will show when all the given parts are fitted together?



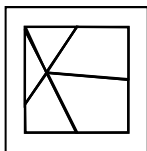
A.



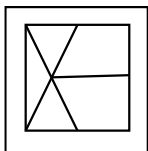
C.



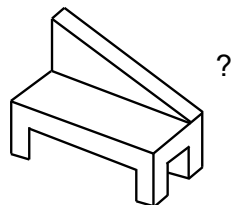
B.



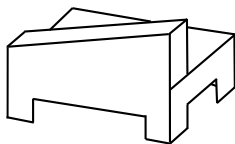
D.



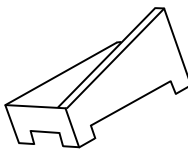
4. Which of the following is a rotation of the solid



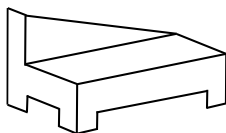
A.



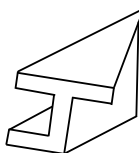
C.



B.



D.



3. **Verbal Reasoning** tests your ability to understand, analyze and interpret information. It also measures your ability to extract meaning from complex information and to think logically and analytically.

Sample Test Items

1. LIFE BELT : SEA :: AIR : _____

- | | |
|----------|--------------|
| A. pilot | C. balloon |
| B. strap | D. parachute |

2. ANTERIOR : POSTERIOR :: FRONT : _____

- | | |
|---------|---------------|
| A. side | C. head |
| B. hind | D. midsection |

3. GEO : EARTH :: FERRO : _____

- | | |
|---------|---------|
| A. air | C. iron |
| B. fire | D. sand |

4. NEWTON : CALCULUS :: COPERNICUS : _____

- | | |
|----------------|----------------|
| A. astrology | C. archaeology |
| B. meteorology | D. astronomy |

5. HAMMER : CARPENTER :: _____

- | | |
|--------------------|--------------------------|
| A. anchor : sailor | C. blueprint : architect |
| B. brush : painter | D. shaves : barber |

6. AFFECTION : INFATUATION :: _____

- | | |
|----------------------|-------------------------|
| A. lenient : forgive | C. timidity : cowardice |
| B. large : gigantic | D. frankness : candor |

- B. **Language and Literature.** This test measures your ability to apply the rules of the English language in grammar and syntax, vocabulary, and reading comprehension.

Sample Test Items

1. Which underlined part of the sentence shows an ERROR?

The old lady picked up the struggling puppy

A

B

straightening her hat grimly and took it to the veterinarian.

C

D

2. Which pair of words does NOT have the same meaning?

A. shy - effusive

C. slim - svelte

B. visible - conspicuous

D. talkative - loquacious

3. We will submit our report _____ next month because our computer was damaged by the flood.

A. some time

C. sometime

B. sometimes

D. some times

4. Which is the appropriate response to this sentence?

“Do you mind opening the window?”

A. Not at all.

C. Why? Do you feel hot?

B. Later. I'm busy.

D. Yes, please. I'd like that.

For item nos. 5-8, read the passage below and choose the best answer for each item.

The koala bear, a marsupial commonly found in Australia, is endangered. Often mistaken as bears, they are, in fact, associated to wombats. Their newborns stay in their mothers' pouches for several months after birth.

Koala bears live on gum trees known as eucalyptus. Being a nocturnal animal, koala bears usually rest during the day and become active only at night.

Koala bears are soft. They have thick, woolly, grey or brown fur. Their fur keeps them warm during the cold season. On their limbs are rough pads, enabling the koala bears to grip the branches of the eucalyptus.

Koala bears are herbivores. They feed on the gum leaves. Having a keen sense of smell, they are able to differentiate between edible and poisonous gum leaves.

Source: ELITE Level 4. First Edition 2011. SAP PTE Ltd.

5. _____ belong to the group of mammals known as marsupials.

- A. Koala bears and eucalyptus
- B. Wombats and koala bears
- C. Bears and koala bears
- D. Wombats and bears

6. The word that has the same meaning as "active at night" is "_____".

- | | |
|---------------|--------------|
| A. endangered | C. nocturnal |
| B. herbivores | D. keen |

7. The _____ keeps the koala bears warm during the cold season.

- | | |
|--------------|--------------|
| A. pouch | C. gum leaf |
| B. thick fur | D. rough pad |

8. The koala bears use their _____ to tell the non-poisonous leaves

- | | |
|-------------------|---------------------|
| A. thick fur | C. ability to smell |
| B. ability to see | D. body resistance |

Part II. Science

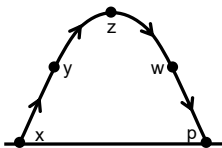
This test consists of items in **Biology, Chemistry, Earth Science, Physics** and **Space Science** that will test your ability to accomplish important scientific tasks.

Sample Test Items

1. Legumes can be important for agricultural production because bacteria in root nodules fix nitrogen that can then be used by the plant. Which of the following four crop rotation programs would be MOST DESIRABLE to increase soil fertility?

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
A.	Corn	Munggo beans	Corn	Munggo beans	Corn	Munggo beans
B.	Corn	Munggo beans	Corn	Tomato	Corn	Tomato
C.	Rice	Munggo beans	Munggo beans	Corn	Corn	Munggo beans
D.	Munggo beans	Corn	Munggo beans	Munggo beans	Corn	Munggo beans

2. What should be the final temperature of a 25.0 L sample of hydrogen gas at 1.00 atm and 35°C if it is compressed to a volume of 20.0 L and a pressure of 2.00 atm?
- A. 164 °C B. 220 °C C. 330 °C D. 493 °C
3. Consider the projectile shown in the figure below.



Ignoring air resistance, which of the following statements is CORRECT?

- A. Velocity at point Z is zero.
B. Acceleration at point Z is zero.
C. Speed at point X is equal to the speed at point P.
D. Velocity at point Y is equal to the velocity at point W.

4. Geothermal energy is possible where there is _____.

- A. wind
- B. oil
- C. coal
- D. magma

5. The amount of solar energy reaching the surface of the earth is maximum at the equator and minimum at the poles. Which of the following cause/es the uneven solar heating of the Earth's surface?

- I. Sunlight strikes the earth at a nearly perpendicular angle at the equator
- II. Atmosphere absorbs a certain fraction of the sunlight striking the earth
- III. Amount of solar activity varies in time

- A. I only
- B. II only
- C. I and II only
- D. II and III only

6. What is the largest planet in the solar system?

- A. Uranus
- B. Jupiter
- C. Neptune
- D. Saturn

Part III. Mathematics

This test consists of items/problems in Algebra, Geometry, Trigonometry, Statistics, and Calculus that will test your ability to comprehend quantitative relationships and their representations.

Sample Test Items

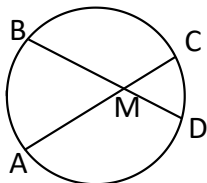
1. In how many points do the graphs of $2(x + 1)^2 + (y - 2)^2 = 25$ and $4(x + 1)^2 - 3(y - 2)^2 = 15$ intersect?

- A. 1
- B. 2
- C. 3
- D. 4

2. Two chips are drawn simultaneously from an urn containing 10 chips numbered from 1 to 10. What is the probability that one of the numbers on the chips is even, and the other is odd?

A. $\frac{2}{9}$ B. $\frac{4}{9}$ C. $\frac{5}{9}$ D. $\frac{5}{18}$

3. Consider the figure below. Arc CD measures $(x - 3)^\circ$, while arc AB measures $(3x + 11)^\circ$, what is the measure of $\angle CMD$?



A. $4x + 8$ B. $2x + 4$ C. $x + 1$ D. $2x + 14$

4. Consider the table below.

	Math Score	History Score
Joan	100	90
Jose	90	80
Maria	50	40
Marion	70	60
Carmen	80	70
Carlos	60	50

If X represents Math test scores while Y represents History test scores, which of the following notations best represents the relationship between math and history scores?

A. $X = Y - 10$ C. $X = (Y) 10$
 B. $Y = X - 10$ D. $X = (Y) - 10$

Answer Key:

Mechanical Reasoning

1. C
2. B
3. B

Spatial Reasoning

1. C
2. B
3. B
4. C

Verbal Reasoning

1. D
2. B
3. C
4. D
5. B
6. C

Language and Literature

1. C
2. A
3. C
4. A
5. B
6. C
7. B
8. C

Science

1. D
2. B
3. C
4. D
5. C
6. B

Mathematics

1. D
2. C
3. B
4. B

IMPORTANT:

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Department of Science and Technology
Science Education Institute

**SCIENCE & TECHNOLOGY
SCHOLARSHIP DIVISION**

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