

**MS ECON/CS/CMPE
&
PhD CS/CMPE**

**LUMS GRADUATE ADMISSION TEST
(LGAT)**

(SAMPLE PAPER)



LAHORE UNIVERSITY OF MANAGEMENT SCIENCES

DESCRIPTION AND FORMAT OF THE TEST

LGAT measures mathematical, verbal and analytical abilities with the objective to assess a candidate's suitability for graduate study. Questions are designed to explore knowledge and skills acquired over a period of time. The test makes it possible to compare candidates with different backgrounds.

The test will take around three hours. There will be five multiple-choice sections of the test, which are as follows:

- Mathematics sections 2
- Verbal 1 section
- Analytical 2 sections

MATHEMATICS SECTIONS

There will be two sections of 30 minutes each.

These sections measure basic mathematical skills of the candidates. It will cover topics in **algebra, geometry, and arithmetic**. The mathematics sections contain questions from a number of areas including: word problems, fractions, percentages, exponents and roots, operations with algebraic expressions, ratio and proportion, angle and area problems, geometry, inequalities, equations, and quantitative and comprehension comparison problems.

VERBAL SECTION

There will be one section of 30 minutes.

These sections test the English language skills of the candidates, and may contain **antonyms, synonyms, sentence completion, and reading comprehension**. The questions on **synonyms** and **antonyms** test the vocabulary of the candidates. Questions on **sentence completion** test the ability to grasp the context of a sentence even when some of the words are missing, as well as the ability to select the most appropriate word or phrase in order to construct meaningful sentences. In the **reading comprehension** section, the candidates will be given passages followed by a series of questions related to the passages. Among other things, these questions test the ability to understand directly stated information, the ability to recognise implications and draw inferences, and to identify the main ideas and opinions expressed in passages.

ANALYTICAL SECTIONS

There will be two sections of 30 minutes each.

The purpose of the analytical sections is to test the analytical and logical abilities of the candidates. The questions in this section would focus on assessing the ability to understand structure of given relationships and deduce new information. It also includes question on logical reasoning problems including understanding assumptions, structure of an argument, and conclusions for a given situation.

SECTION: MATHEMATICS

There will be two sections of 30 minutes each.

Directions: While solving problems you can use any available space on the page for scratchwork. For each question in this section, read the five choices marked (A), (B), (C), (D) and (E) in your test book. Select the letter of the choice which you consider is the correct answer. Then fill in the corresponding oval on your answer sheet.

Numbers:

All numbers used are real numbers.

Figures:

Figures that accompany problems are intended to provide information useful for solving the problems. Figures are drawn as accurately as possible EXCEPT when it is stated in a specific problem that it is not drawn to scale. All figures lie in a plane unless otherwise indicated.

1. The curve $y = x^2 + x - 6$
1. Is a parabola opening upwards
 2. Is a parabola opening downwards
 3. Crosses the x -axis at 2 and -3
 4. Crosses the x -axis at -2 and 3

The true statements are:

- (A) 1 and 3
 - (B) 1 and 4
 - (C) 2 and 3
 - (D) 2 and 4
 - (E) None of the above.
2. The difference between two numbers is 18. Twice the smaller number plus three times the larger is 74. What are the numbers?
- (A) 22 and 6
 - (B) 18 and 36
 - (C) 4 and 22
 - (D) 30 and 12
 - (E) None of the above.

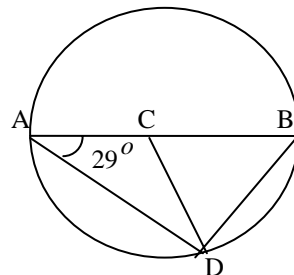
3. If $A = \frac{a + b + c}{3}$, then solving for a gives:

- (A) $\frac{A + b + c}{3}$
- (B) $3A - b - c$

- (C) $3A + b + c$
- (D) $\frac{1}{3}(b + c - A)$
- (E) $\frac{1}{3}(A + b + c)$

4. In the figure angle \widehat{ADB} is inscribed in the semicircle. What is the value of angle \widehat{DCA} (C is the centre of the circle)?

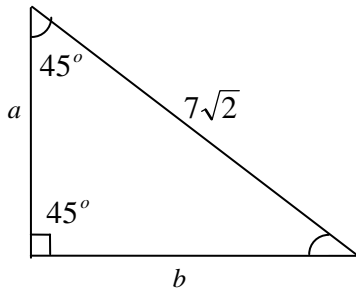
- (A) 61°
- (B) 129°
- (C) 58°
- (D) 122°
- (E) 121°



Note: The diagram is NOT drawn to scale.

5. What are the missing lengths a and b in the triangle:

- (A) 7 and $7\sqrt{2}$
- (B) $7\sqrt{2}$ and $7\sqrt{2}$
- (C) $\frac{7}{\sqrt{2}}$ and $\frac{7}{\sqrt{2}}$
- (D) 3 and 4
- (E) None of the above.



Note: The diagram is NOT drawn to scale.

6. On a four day trip a car was driven the following number of kilometers on consecutive days: 242, 302, 280, 320. What was the average number of kilometers done by the car per day?

- (A) 280
- (B) 310
- (C) 266
- (D) 286
- (E) 248

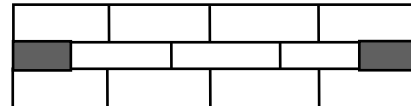
7. What does $\sqrt{3} + \sqrt{\frac{1}{3}}$ give?

- (A) $\frac{4}{3}\sqrt{3}$
- (B) $\frac{4}{3}$
- (C) $4\sqrt{3}$
- (D) $\frac{2}{\sqrt{3}}$
- (E) $3\sqrt{3}$

8. Amir purchases a colour television in a sale, where all items are reduced by 20%. If the original price (before the sale) was Rs 50,000, how much does Amir pay?

- (A) Rs 60,000
- (B) Rs 52,000
- (C) Rs 44,000
- (D) Rs 40,000
- (E) None of the above.

9. A 3 by 4 brick wall is shown below:



Two half-bricks (shaded) are used in its construction. If the wall was extended to the right and up to make it 8 by 8, how many half bricks would it use?

- (A) 14
- (B) 10
- (C) 20
- (D) 16
- (E) 18

10. The expression $(x + y)(x - y) + y^2$ simplifies to:

- (A) $x^2 + y^2$
- (B) $x^2 + 2y^2$
- (C) x^2
- (D) y^2
- (E) $x^2 - y^2$

SECTION: VERBAL

There will be one section of 30 minutes.

(a) Antonyms

Directions: For each question in this section, read the five choices marked (A), (B), (C), (D) and (E) in your test book. Select the letter of the choice which you consider is the correct answer. Then fill in the corresponding oval on your answer sheet.

1. UNEQUIVOCAL
- (A) ambiguous
 - (B) loud
 - (C) equal
 - (D) written
 - (E) attested
2. INTREPID
- (A) active
 - (B) lazy
 - (C) cowardly
 - (D) external
 - (E) honest

(b) Synonyms

Directions: For each question in this section, read the five choices marked (A), (B), (C), (D) and (E) in your test book. Select the letter of the choice which you consider is the correct answer. Then fill in the corresponding oval on your answer sheet.

1. FLOUT
- (A) sink
 - (B) defy
 - (C) float
 - (D) increase
 - (E) wish
2. RESCIND
- (A) attenuate
 - (B) smooth
 - (C) give
 - (D) revoke
 - (E) return

(c) Sentence Completion

Directions: For each question in this section select the letter corresponding to the **word or pair of words** from the given choices which **best completes** the sentence. Then fill in the corresponding oval on your answer sheet.

1. In an age without radio or recordings, an age _____ by print, fiction gained its greatest ascendancy.
- (A) decimated
 - (B) published
 - (C) dominated
 - (D) emphasized
 - (E) resurrected
2. Scientists' pristine reputation as devotees of the selfless pursuit of truth has been _____ by recent evidence that some scientists have deliberately _____ experimental results to further their own careers.
- (A) reinforced published
 - (B) validated suppressed
 - (C) exterminated replicated
 - (D) compromised fabricated
 - (E) resuscitated challenged
3. As their attention was diverted to other matters, Aamir and Adnan's initial fascination with the fortunes of those jockeying for power in the law firm _____ after a few months.
- (A) revived
 - (B) emerged
 - (C) intensified
 - (D) waned
 - (E) persisted

(d) **Reading Comprehension**

Directions: The passage given below is followed by questions based on its content. After reading the passage, choose the **best** answer to each question from the five choices marked (A), (B), (C), (D) and (E) in your test book. Then fill in the corresponding oval on your answer sheet.

All questions should be answered on the basis of what is stated or implied in the passage.

Since the nineteenth century when rigorous studies of poverty began, researchers have tried to establish a fixed yardstick against which to measure poverty. Ideally, such a yardstick would be applicable to all societies and should establish a fixed level, usually known as the poverty line, below which poverty begins and above which it ends. This concept of poverty is known as absolute poverty. It usually involves a judgment of basic human needs and is measured in terms of the resources required to maintain health and physical efficiency. Most measures of absolute poverty are concerned with establishing the quality and amount of food, clothing and shelter deemed necessary for a healthy life. Absolute poverty is often known as subsistence poverty since it is based on assessments of minimum subsistence requirements. It is usually measured by pricing the basic necessities of life, drawing a poverty line in terms of this price, and defining those as poor whose income falls below that figure.

There have been many attempts to define and operationalise - put into a form which can be measured - the concept of absolute poverty. For example Drewnowski and Scott in their 'Level of Living Index', define and operationalise 'basic physical needs' in the following way: nutrition, measured by factors such as intake of calories and protein; shelter, measured by quality of dwelling and degree of overcrowding; and health, measured by factors such as the rate of infant mortality and the quality of available medical facilities.

Some concepts of absolute poverty go beyond the notion of subsistence poverty by introducing the idea of 'basic cultural needs'. This broadens the idea of basic human needs beyond the level of physical survival. Drewnowski and Scott include education, security, leisure and recreation in their category of basic cultural needs. The proportion of children enrolled at school is one indication of the level of educational provision; the number of violent deaths relative to the size of the population

is one indication of security; and the amount of leisure relative to work time is one measure of the standard of leisure and recreation.

The concept of absolute poverty has been widely criticised. It is based on the assumption that there are minimum basic needs for all people, in all societies. This is a difficult argument to defend even in regard to subsistence poverty measured in terms of food, clothing, and shelter. Such needs vary both between and within societies. Thus Peter Townsend argues, 'It would be difficult to define nutritional needs without taking account of the kinds and demands of occupations and of leisure time pursuits in a society'. For example, the nutritional needs of the nomadic hunters and gatherers of the Kalahari Desert in Africa may well be very different from those of members of Western society. Within the same society, nutritional needs may vary widely, between, for example, the bank clerk sitting at his desk all day and the labourer on a building site. A similar criticism can be made of attempts to define absolute standards of shelter. Jack and Janet Roach give the following illustrations: 'City living, for example, requires that "adequate" shelter not only protects one from the elements, but that it does not present a fire hazard to others and that attention be paid to water supplies, sewage and garbage disposal. These problems are simply met in rural situations'. Thus flush toilets, which may well be considered a necessary part of adequate shelter in the city, could hardly be considered essential fixtures in the dwellings of traditional hunting and gathering, and agricultural societies.

The concept of absolute poverty is even more difficult to defend when it is broadened to include the idea of 'basic cultural needs'. Such 'needs' vary from time to time and place to place and any attempt to establish absolute, fixed standards is bound to fail. Drewnowski and Scott's basic cultural need of security is a case in point. Financial security for aged members of the

working class in nineteenth-century England involved younger relatives providing for them, whereas today it is largely met by state old age pensions and private insurance schemes. Increasing longevity, reduction in the size of families, and earlier retirement have altered the circumstances of the aged. Definitions of adequate provision for old age have changed since the last century. Thus, in terms of security, both the situation and expectations of the aged in England have changed and are not strictly comparable over time. A similar criticism can be applied to attempts to apply absolute standards to two or more societies. For instance, recreational and leisure provision in the West may be measured in terms of the number of televisions, cinemas, parks and playing fields per head of the population. However, the concept of leisure on which this is based and the items in terms of which it is measured may be largely irrelevant for other societies. For example, the Hopi and Zuni Indians of the Southwestern USA have an elaborate ceremonial life which forms the central theme of their leisure activities. Recreational needs are therefore largely determined by the culture of the particular society. Any absolute standard of cultural needs is based in part of the values of the researcher which to some degree reflect his particular culture. Peter Townsend notes that when societies are compared in terms of recreational facilities, 'Cinema attendance and ownership of radios take precedence over measures of direct participation in cultural events', such as religious rituals and other ceremonies. This is a clear illustration of Western bias.

1. What is the writer's main intention in the first paragraph?
 - (A) to compare absolute poverty with subsistence poverty
 - (B) to describe various interpretations of the poverty line
 - (C) to introduce various ways in which poverty can be measured
 - (D) to suggest a clear definition of poverty
 - (E) to introduce the concept of absolute poverty
2. The 'Level of Living Index' described in paragraph 2

- (A) contradicts the ideas expressed in paragraph 1.
- (B) questions the ideas expressed in paragraph 1.
- (C) establishes the ideas expressed in paragraph 1.
- (D) amplifies the ideas expressed in paragraph 1.
- (E) has no connection with the ideas expressed in paragraph 1.

3. What is the primary purpose of the 3rd paragraph?
 - (A) It serves as a summary of the preceding two paragraphs.
 - (B) It counter balances the existing discussion.
 - (C) It justifies the writer's main contention.
 - (D) It extends the definitions introduced in the preceding two paragraphs.
 - (E) It negates the concepts introduced in the preceding two paragraphs.
4. According to the text, what is the main criticism levelled against the concept of absolute poverty?
 - (A) It is impossible to measure people's basic needs.
 - (B) One cannot assume people share the same basic needs.
 - (C) One cannot formulate any comprehensive definition of absolute poverty.
 - (D) It is impossible to describe the needs of different societies.
 - (E) Absolute poverty should be avoided.
5. According to the writer, all the following have primarily contributed to the change in situation and expectations of the aged EXCEPT:
 - (A) Longer life expectancies
 - (B) Smaller family systems
 - (C) More recreational opportunities
 - (D) Earlier retirement age
 - (E) Financial security through pensions and insurance

SECTION: ANALYTICAL

There will be two sections of 30 minutes of each

Directions: For each question in this section, read the five choices marked (A), (B), (C), (D) and (E) in your test book. Select the letter of the choice which you consider is the correct answer. Then fill in the corresponding oval on your answer sheet.

For Questions 1 to 3 select the set of words which best matches the analogy.

1. **ACCENT : SPEAK**

- (A) tongue : talk
- (B) mood : behave
- (C) see : eye
- (D) ear : listen
- (E) gait : walk

2. **BRAVE : AFRAID**

- (A) coward : caution
- (B) suspicious : question
- (C) sophisticated : crude
- (D) cultivated : breeding
- (E) friend : enemy

3. **CURIOSITY : KNOWLEDGE**

- (A) aptitude : skill
- (B) language : address
- (C) complacency : ignorance
- (D) effort : progress
- (E) memory : remember

4. Select the option from the given choices which best completes the sequence:

7, 11, 27, 91, _____

- (A) 347
- (B) 327
- (C) 155
- (D) 271
- (E) 387

5. Three stacks containing an equal number of chips are to be made from 10 red chips, 8 blue chips, and 6 green chips. If all of these chips are used and each stack contains at least 2 chips of each colour, what is the maximum number of red chips in any one stack?

- (A) 8
- (B) 7
- (C) 6
- (D) 4
- (E) 3

Questions 6 and 7 relate to the following data:

Some, but not all K's are M's
Some, but not all K's are L's
Some, but not all M's are L's
No P's are M's
All P's are K's
Some P's are L's

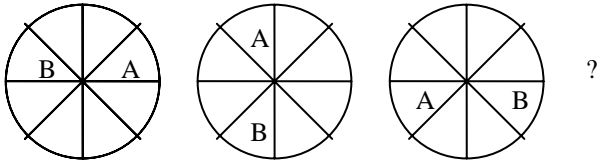
6. If all Q's are not M's, which of the following is not possible?

- (A) All Q's are P's
- (B) All Q's are K's
- (C) All K's are Q's
- (D) All Q's are not P's
- (E) All P's are Q's

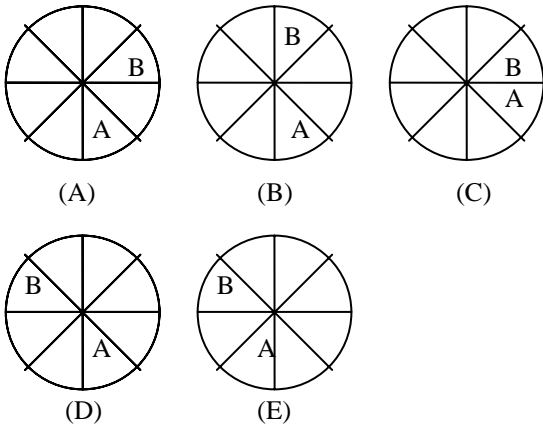
7. If all R's are not K's, which of the following is not possible?

- (A) Some R's are L's
- (B) Some R's are M's
- (C) Some R's are neither L's nor M's
- (D) Some R's are L's and M's
- (E) Some R's are L's and P's

8.



Which is the next figure in sequence?



Questions 9 and 10 relate to the following data:

Each member of a group of 64 students had to select exactly three out of four electives - Marketing, Finance, Production, and Economics.

9. If the number of students in each elective ends up to be equal, the number of students in each elective will be
- (A) 64
 - (B) 48
 - (C) 40
 - (D) 32
 - (E) 16
10. If 28 students selected Economics, 60 students selected Marketing, and the number of students in Production and Finance are equal, how many students are there in Production?
- (A) 104
 - (B) 24
 - (C) 48
 - (D) 52
 - (E) 44

ANSWERS TO THE SAMPLE QUESTIONS

Mathematics

1. (A)
2. (C)
3. (B)
4. (D)
5. (E)
6. (D)
7. (A)
8. (D)
9. (A)
10. (C)

English Language

(a) Antonyms

1. (A)
2. (C)

(b) Synonyms

1. (B)
2. (D)

(c) Sentence Completion

1. (C)
2. (D)
3. (D)

(d) Reading Comprehension

- | | | | |
|--------|--------|--------|--------|
| 1. (E) | 2. (D) | 3. (D) | 4. (B) |
| 5. (C) | | | |

Analytical

- | | | | |
|--------|---------|--------|--------|
| 1. (E) | 2. (C) | 3. (D) | 4. (A) |
| 5. (D) | 6. (C) | 7. (E) | 8. (B) |
| 9. (B) | 10. (D) | | |



GENERAL INSTRUCTIONS

FOR TAKING THE TEST

Reporting Time

Reporting time for the test is 8:00 a.m. Registration: 8.00 to 8:30 a.m.

Identification for Admission to the Test Centre

To be admitted to the test centre, you must bring one of the following photo-bearing forms of identification with you.

Original National Identity Card
Valid Passport

Test Centre Procedures and Regulations

- The test will be conducted only on the scheduled day and time.
- You must bring your photo-bearing Original National Identity Card or valid passport to the centre.
- No examinee will be admitted to the centre after test materials have been distributed.
- Items like scratch paper, calculators, watch calculators, books pamphlets, slide rules, protractors, compasses, rulers, highlighter pens, stereos or radios with headphones, watch alarms including those with flashing lights or alarm sounds, dictionaries, key board, or paper of any kind are not allowed.
- Eating, drinking, smoking or chewing tobacco is forbidden during the administration of the test.
- You can only leave the centre during the test if the Supervisor permits. You will not be permitted to make up lost time.
- You may wish to pace yourself with your own watch, but the Supervisor will be the official time-keeper of the test.

- During the time allowed for each section of the test, you are allowed to work only on the particular section. After the Supervisor announces "Please stop work and put your pencil down," you must stop writing.

- You may use the test book to work out your answers but you must mark all your answers on the separate answer sheet before time is called.
- Answers to multiple-choice questions recorded in the test book will not be considered. Only the answers on the answer sheet will be graded.
- Visitors will not be allowed in the test centre while the test is in progress.
- Failure to comply with the Supervisor's directions will result in your test being cancelled.
- A Supervisor is authorised to dismiss you from the test session for:
 - Creating a disturbance
 - Giving or receiving help
 - Using any unauthorised aids including notes, books, calculators or paper of any kind
 - Working on any part of a test after the time has been called
 - Attempting to remove test materials or notes from the test centre
 - Smoking and
 - Eating and/or drinking during the test.

At the conclusion of the test, you will be required to return your test books and answer sheets to the test Supervisor. These materials are the property of LUMS.

Negative Marking

1/4th of a mark will be subtracted for each wrong answer.

Completing your Answer Sheet

You are responsible for the proper completion of your answer sheet to ensure accurate scoring. Ovals must be completely filled in. Before you take the test, be sure to read the instructions on the test book. Follow these instructions carefully as you complete your answer sheet.