

Part A

CCT Weekly Practice Mathematics

Unit 1 – Railway timings

Platform number	Train name	Expected Arrival time	Expected departure time	No. of journeys	No. of on-time arrival	No. of on-time departure
1	Express A	12:30 hours	12:35 hours	134	75	72
2	Express B	22:40 hours	22:43 hours	123	54	45
3	Express C	22:40 hours	22:45 hours	145	65	47
4	Express D	10:00 hours	10:06 hours	122	50	76

A station master in Malgudi made the above table for trains crossing Malgudi in a given year. A train is said to be on time for arrival if it reaches the platform on or before the expected arrival time. But a train is said to be on time for departure if it leaves the platform on the expected departure time only. A train cannot leave the station before its expected departure time. Using the given data, answer the following questions.

Question 1

What is the approximate probability of Express A arriving at the station after 12:30 hours?

- a) 0.44
- b) 0.55
- c) 0.78
- d) Cannot be determined

Question 2

What will be the probability of Express B and Express C leaving the station at the same time?

- a) 0
- b) 0.42
- c) 0.63
- d) Cannot be determined

Question 3

R is a ratio of the number of late arrivals to the number of on-time (or before) arrivals. Which of the following is true regarding R?

- a) R is greater than 1 for all the trains arriving in Malgudi.
- b) A train with $R = 1$, arrives on time more than it arrives late.
- c) The probability of arriving on time is inversely proportional to R
- d) $R < 1$ implies that the chances of arriving on time are more than 50%

Unit 2 – BMI

Body mass index (BMI) is a person's weight in kilograms divided by the square of height in meters. BMI is an inexpensive and easy screening method for weight category—underweight, healthy weight, overweight, and obesity. Based on the table given below, answer the following questions.

BMI	Weight Status
Below 18.5	Underweight
18.5 – 24.9	Healthy Weight
25.0 – 29.9	Overweight
30.0 and Above	Obesity

Source: www.cdc.gov

Question 4

Which of the following is TRUE?

- a) If Height increases and Weight increases, BMI will increase.
- b) If Height increases and Weight decreases, BMI will decrease.
- c) If Height decreases and Weight remains same, BMI will decrease.
- d) If Height decreases and Weight decreases, BMI will decrease.

Question 5

Which of the following will have the least decrease on the BMI of an individual?

- a) Height increases by 5% and weight increases by 5%
- b) Height increases by 3% and weight decreases by 3%
- c) Height increases by 5% and weight increases by 10%
- d) Height increases by 10% and weight decreases by 5%

Source of questions:

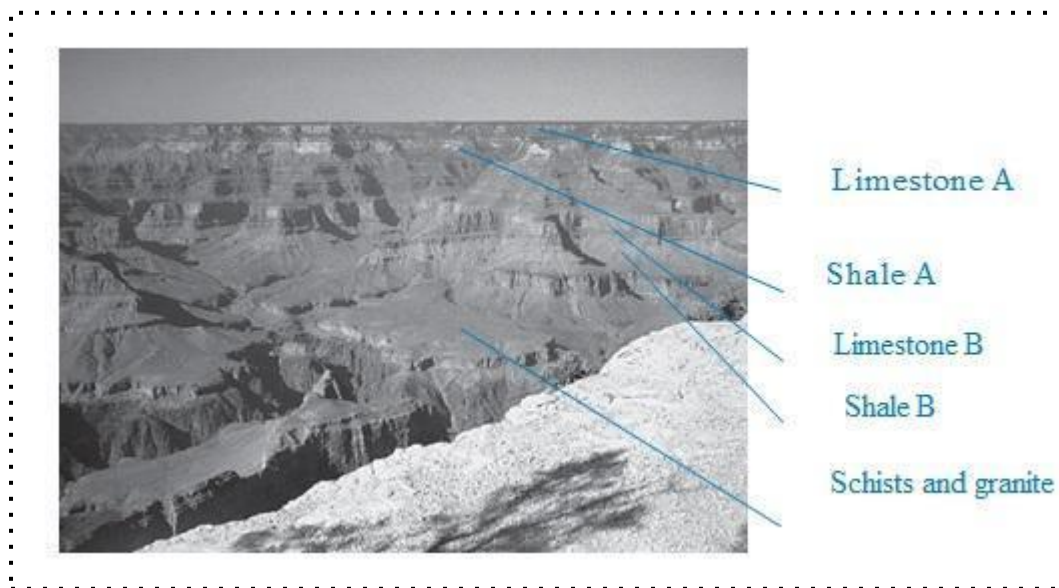
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Part B

THE GRAND CANYON

The Grand Canyon is located in a desert in the USA. It is a very large and deep canyon containing many layers of rock. Sometime in the past, movements in the Earth's crust lifted these layers up. The Grand Canyon is now 1.6 km deep in parts. The Colorado River runs through the bottom of the canyon.

See the picture below of the Grand Canyon taken from its south rim. Several different layers of rock can be seen in the walls of the canyon.



Question 5: The temperature in the Grand Canyon ranges from below 0° C to over 40° C. Although it is a desert area, cracks in the rocks sometimes contain water. How do these temperature changes and the water in rock cracks help to speed up the breakdown of rocks?

- A. Freezing water dissolves warm rocks.
- B. Water cements rocks together.
- C. Ice smooths the surface of rocks.
- D. Freezing water expands in the rock cracks.

Question 6: There are many fossils of marine animals, such as clams, fish and corals, in the Limestone A layer of the Grand Canyon. What happened millions of years ago that explains why such fossils are found there?

- A. In ancient times, people brought seafood to the area from the ocean.

- B. Oceans were once much rougher and sea life washed inland on giant waves.
- C. An ocean covered this area at that time and then receded later.
- D. Some sea animals once lived on land before migrating to the sea.

Question 7: About five million people visit the Grand Canyon national park every year. There is concern about the damage that is being caused to the park by so many visitors.

Can the following question be answered by scientific investigation? Circle “Yes” or “No” for each question.

Can this question be answered by scientific investigation?	Yes or No?
How much erosion is caused by use of the walking tracks?	Yes / No
Is the park area as beautiful as it was 100 years ago?	Yes / No

Part A

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Answers

1. Options A:
The probability of Express A arriving after 12.30 hours is equal to the probability of Express A not arriving on time.
2. Option D:
For calculating this probability, the following data needs to be known
 1. The time at which Express B and C has departed late.
 2. Frequency of late departure for a given time for both Express B and C.Therefore, with the given data it is not possible to calculate the probability of Express B and Express C leaving the station at the same time.
3. Option D:
 $R < 1$ means numerator i.e. late arrivals is less than the denominator, i.e. on-time arrivals. If on-time arrivals are more than late arrivals, chances of the train coming on time, which are $(\text{on-time arrival}) / (\text{on-time arrival} + \text{late arrivals})$ are more than 50%.
4. Option B:
As weight which is in the numerator is decreasing and height which is in the denominator is increasing, BMI will necessarily decrease. It does not depend upon how much the decrease or increase is.
5. Option C:
BMI will decrease by 1% when height increases by 5% and weight increases by 10%. This is the least among the given options.
$$\text{New BMI} = 1.1 \times W / (1.05 H)^2 = 0.99(W/H^2)$$

Source of questions:

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The solution for Part B is explained in Video Solution.