

Sample Questions from past Educational Technology Ph.D. Entrance Tests

1) In a mixture 60 litres, the ratio of milk to water is 2:1. If the this ratio is to be 1:2, then the quantity of water to be further added is:

- a) 20
- b) 30
- c) 40
- d) 50
- e) 60

2) The point of intersection of two lines, whose equations are given by $x=0$ and $2x+y=6$ is:

- a) -6
- b) 0
- c) $1/2$
- d) 6

3) A teacher is teaching a 5th standard class on the solar system. One of the learning objectives is that the students should develop the ability of analysis, that is, they should be able to separate a whole complex system into its parts, so that the structure of the whole and the relationship between the parts in clear. Which of the following questions should she assign to assess this objective?

- a) Arrange the planets of the solar system in increasing order of distance from the sun.
- b) Compare and contrast the photos of landforms on Earth and Mars. How might the features on Mars have formed?
- c) How do most scientists believe that the solar system was first formed?
- d) Use Newton's laws to determine how much you would weigh on Jupiter.
- e) Any of a), b), c), d) will work to meet the objective

4) It is known that people are more likely to consider a change in a way of doing things, if they clearly see benefits of new method compared to the old one. This phenomenon is called the relative advantage of the new method. You will be asked to identify the relative advantage of a new technique from the passage below.

A high school biology teacher is considering the use of a dissection simulation program in a laboratory course, instead of actual dissections of frogs which was done in the past. She thinks this will save both time and money. Also, students who would be uncomfortable with killing live animals would prefer the simulation. After testing the simulation, she came to the conclusion that the program does a good job of clearly identifying parts of the frog's internal system. Furthermore, the teacher realizes that the simulation program can be used to easily compare internal anatomical features of different species.

Which of the following choices best identifies the relative advantages of the new simulation technology?

- a) The simulation could save time and money
- b) The simulation will help prevent frogs from being killed
- c) The simulation will help students analyze internal features of frog
- d) Choices a) & b) are both relative advantages
- e) Choices a), b) & c) are all relative advantages

5) There are three different football teams and each has played five games. Each team's goals from each of its games is given below.

	Game 1	Game 2	Game 3	Game 4	Game 5
East Bengal	3	2	0	4	5
Mohun Bagan	0	5	1	4	3
Lions	0	7	1	5	2

Suppose you want to join one of the three teams. You want to join the one that is doing the best so far. Which team would you join if you rank each team by their mean goals, and which team would you join if you instead rank them by their median goals?

- Lions according to mean goals as well as according to median goals
- Lions according to mean goals; East Bengal or Mohun Bagan according to median
- East Bengal or Mohun Bagan according to mean goals; Lions according to median
- East Bengal or Lions according to mean goals; Lions according to median goals
- All three teams are doing equally well according to mean and median goals

6) 100 bags are to be filled with sand. Two labourers Nathu and Kishan working independently on filling separate bags, but at the same time, take 40 minutes to fill all the bags. In order to calculate how long it will take Kishan alone to fill all the bags by himself, which of the additional information is required?

Statement 1: Kishan fills half as many bags as Nathu in the same time

Statement 2: Nathu would take 1 hour to fill all the bags by himself

- Each statement alone is sufficient
- Statement 1 alone is sufficient, but statement 2 alone is not sufficient
- Statement 2 alone is sufficient, but statement 1 alone is not sufficient
- Both statements together are sufficient but neither statement alone is sufficient
- Statements 1 and 2 together are not sufficient

7) You have 8 balls. One of them is defective and weighs less than others. You have a balance to measure balls against each other. You want to detect the defective ball in the minimum number of weighings. You first group the balls, and then start weighing one group against the other. You can then weigh the balls within a group against each other. In order to detect the defective ball in the minimum number of weighings, the number of balls in the first round of grouping is:

- 4, 4
- 5, 3
- 3, 3, 2
- 4, 3, 1
- 4, 2, 2

8) A couple has two children. The probability that both children are girls is p_1 and the probability that both children are girls if the eldest is a girl is p_2 . This implies:

- $p_1 = 1/2$ and $p_2 = 1/2$
- $p_1 = 1/4$ and $p_2 = 1/2$
- $p_1 = 1/2$ and $p_2 = 1/4$
- $p_1 = 1/4$ and $p_2 = 1/4$
- $p_1 = 1/4$ and $p_2 = 1$

9) A regression is a statistical analysis to determine the association or relationship between two variables. In a simple linear regression model, a straight line is fit through the set of data points such that makes the sum of squared residuals (that is, vertical distances between the points of the data set and the fitted line) is as small as possible. In a simple linear regression model, if there is a very strong correlation between the independent and response variables, then the correlation coefficient should be close to:

- a) + 1
- b) - 1
- c) + 1 or - 1
- d) 0
- e) Very large positive number

10) Studies have shown that many college students who are successful in mathematics took computers as a subject at the school level. Rita is a first year college student who took computers in school. Therefore she will be successful in mathematics in college. This inference is:

- a) not correct because Rita is only in the first year of college
- b) not correct because it is not true that all college students took computers
- c) not correct because it is not proven that taking computers as a school subject caused success in college mathematics
- d) correct

11) The average Indian taxpayer has a 5 percent chance of being randomly selected for an audit. Of those being audited, 70 percent are found to have underpaid their taxes and will have to pay extra. What percentage of all taxpayers will have to pay extra following an audit?

- a) 0.35%
- b) 3.5%
- c) 35%
- d) 7.5%
- e) None of the above

12) An employee of a company complains to her manager that she does not get any parking space in the company building for her vehicle when she comes in the morning. The parking space is only used by employees of the company. To this, the manager replies that if she is among the first employees to come in the morning, then obviously she will get parking space.

Which of the following is the most accurate and objective analysis of the manger's argument?

- a) The argument is correct since it is not the responsibility of the company to provide sufficient parking spaces for its employee.
- b) The argument is incorrect since if an employee has to spend time looking for parking space, it wastes the time of the employee, hence it is not good for the company.
- c) The argument is correct since if the employee is sincere enough, she will come early.
- d) The argument is incorrect since even if all employees were to come early, some of them would be left without parking space.

13) A function, f , that evaluates the number of divisors of a given number is defined as follows. $f(3) = 2$ as the divisors of 3 are 1 and 3. Which of the following are true?

- 1) $f(3) = f(7)$
- 2) $f(3) \times f(7) > f(21)$
- 3) $f(3) + f(7) < f(12)$
 - a) 1) only
 - b) 1) and 2)
 - c) 1) and 3)
 - d) 1), 2) and 3)
 - e) 2) and 3)

Questions 14 & 15 are based on the following passage:

The desire to understand nature is inherent in man. Knowledge may be divided into mathematical science, natural sciences (sciences dealing with physical, chemical and biological world) and sciences dealing with mankind (psychology, sociology). While man benefits from the results of technical progress resulting from scientific knowledge of various kinds, there is tremendous value in seeking pure knowledge for its own sake. Knowledge, when sought for immediate practical applications, may not have long reaching applications that might only ensue with time. For example, scientists who studied the nature of electricity for the first time, could not have imagined that we would be moving in superfast electric trains after a hundred years after that discovery. Those who calculated the value of escape velocity from the earth may not have immediately imagined that we would land on the moon some day.

- 14) In the above passage, the author opines that those who studied electricity for the first time
- a) invented its modern applications
 - b) were unaware of their impending applications
 - c) were not sure of the success of their investigations
 - d) knew that current consisted of moving positive charges.
- 15) The main point in the above passage is to:
- a) differentiate between mathematical, physical and biological scientific knowledge
 - b) explain how scientific knowledge always leads to practical applications
 - c) describe how the calculation of escape velocity helped us land on the moon
 - d) argue that it is not necessary to consider practical applications while seeking new knowledge