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Preparatory Course in General Mathematics (Revised)

By:
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Including
Solved Question Papers

New Edition

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Preparatory Course in General Mathematics (Revised)

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Sample Preview of the Solved Sample Question Papers

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QUESTION PAPER

(June – 2018)

(Solved)

PREPARATORY COURSE IN GENERAL MATHEMATICS

Time: 3 Hours] ***[Maximum Marks: 100***

Notes: *(i) This is an Objective Type Question Paper. Options for the correct answer must be marked only in OMR sheet.*

(ii) All questions are ***compulsory****.*

(iii) The questions paper consists of ***50*** *questions each of which carries* ***one*** *mark.*

(iv) Each question has four alternatives, one of which is correct. Write the Sl. No. of your correct alternative/answer below the corresponding question number in the OMR sheet and then mark the rectangle for the same number in that column. If you find that none of the given alternatives is correct then write 0 and mark in column 0.

(v) Do not waste time in reading the whole question paper. Go on solving questions one by one. You may come back to the left out questions, if you have time at the end.

(vi) Use of calculators is ***not*** *allowed.*

Q. 1. The present ages of Vikas and Abha are in the ratio of 5 : 4, respectively. Three years hence, the ratio of their ages will become 11 : 9, respectively. What is Abha's present age in years?

(1) 36
(2) 24
(3) 18
(4) 27

Ans. (1) 36.

Q. 2. Three small lead spheres of radii 3 cm, 4 cm and 5 cm, respectively, are melted into a single sphere. The diameter of the new sphere is:

(1) 6 cm
(2) 16 cm
(3) 8 cm
(4) 12 cm

Ans. (1) 6 cm.

Q. 3. The height of a right circular cylinder is three times the radius of the base. If the height were four times the radius, the volume would be 1078 cm3 more than it was previously. Therefore, the radius of the base is (Take $\pi = \frac{22}{7}$).

(1) 6 cm
(2) 5 cm
(3) 7.5 cm
(4) 7 cm

Ans. (3) 7.5 cm.

Q. 4. ₹ 1,980 is divided among A, B and C so that half of A's part, one-third of B's part and one-sixth of C's part are equal. Then B's part is:

(1) ₹ 540
(2) ₹ 660
(3) ₹ 1,080
(4) ₹ 360

Ans. (2) ₹ 660.

Q. 5. What was the rate of discount, if a computer with marked price ₹ 30,000 was sold for ₹ 28,000?

(1) 20%
(2) $7\frac{1}{2}\%$
(3) $6\frac{2}{3}\%$
(4) 15%

Ans. (3) $6\frac{2}{3}\%$.

Q. 6. A trader marks the sale price 25% more on the cost price and gives a 10% discount at the time of selling. The percentage gain is:

(1) $12\frac{1}{3}\%$

(2) $12\frac{1}{2}\%$

(3) $11\frac{1}{2}\%$

(4) 12%

Ans. (1) $12\frac{1}{3}\%$.

Q. 7. Bahar bought an item at 20% discount on its marked price. She sold it with 40% increase on the price she bought it at. The new sale price is greater than the marked price (in percent) by:

(1) 10

(2) 8

(3) 7.5

(4) 12

Ans. (3) 7.5.

Q. 8. A sum of ₹ 2,400 lent at a simple interest of 12.5% per annum will double in:

(1) 8 years

(2) 12 years

(3) 16 years

(4) 20 years

Ans. (1) 8 years.

Q. 9. Which is the following is a measure of central tendency?

(1) Standard deviation

(2) Median

(3) Variance

(4) Mean deviation

Ans. (2) Median.

Q. 10. The following marks are obtained by 40 students in a class in a Mathematics unit test, with maximum marks 40:

Marks Group	5-10	10-15	15-20	20-25	25-30	30-35	35-40
Frequency	5	6	15	6	4	3	1

Then, the number of students getting 25 marks or more, is:

(1) 8

(2) 32

(3) 4

(4) 6

Ans. (1) 8.

Q. 11. The mean of the prime numbers between 1 and 10 is:

(1) 17

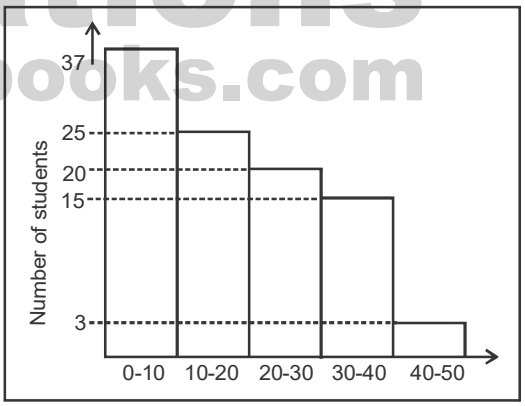
(2) $\frac{11}{2}$

(3) 4

(4) 4.25

Ans. (3) 4.

The following histogram shows the relationship between the marks obtained by the students and the number of students in an examination. Study the histogram and answer the questions number 12-14.



Q. 12. The percentage of students getting 60% marks or more is:

(1) less than 10

(2) less than 20

(3) between 20 and 30

(4) 50

Ans. (3) between 20 and 30.

Sample Preview of The Chapter

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PREPARATORY COURSE IN GENERAL MATHEMATICS

NUMBERS

Why Learn Mathematics?

1

INTRODUCTION

- Mathematics is abstract knowledge that we humans create about abstract objects by assuming some statements and then proving various other statements based on these assumptions. Then, we conjecture more statements and try and prove them to be true or false based on the statements proved earlier and the assumptions. This is a continuous process.
- Mathematics is useful everywhere in life.
- Mathematics can also be used to provide stimulating leisure time activity.
- Mathematical statement is absolutely unambiguous i.e., it leaves no place for confusion.
- If even one case is found for which the statement does not hold, then the statement is false.
- The symbolic representation makes the statement brief and clear, provided you understand the symbols and how to read statements formed by using them.
- Using the symbolic notation for various operations makes it easy to apply the step-by-step procedures for solving problems involving the operation i.e., the algorithms.
- Mathematical ideas usually grow from concrete situations to abstract concepts and from particular cases to general notations.
- The body of mathematics knowledge is hierarchically constructed, and similarly acquired in general.
- A stepwise build up is an hierarchy.
- Without a valid proof your conjecture is not acceptable as a true mathematical statement.
- The skills developed in the process of problem solving and problem posing enable us to think rationally in real world situation too.

EXERCISE QUESTIONS

Q. 1. In a discussion among primary school teachers, many of them said that mathematics is a study of numbers, and how to use them for calculation. Do you agree with this? Give reasons for your answer.

Ans. No, I am not agree with this because mathematics is not only the study of the numbers and their calculations but also the study of line, triangle, plane etc. Mathematics is abstract knowledge that we create about abstract objects by assuming some statements and then proving various other statements based on these assumptions.

Q. 2. Think of a card game and an outdoor sport that you or your friends play. Write down what mathematics is used while playing them?

Ans. In a card game and an outdoor game (cricket), we need mathematics to calculate score and other things.

Q. 3. A friend of mine said, "I'm just a housewife. I don't know maths, and I don't do maths." I strongly disagreed with her, giving her several examples of mathematics that she is doing all the time without realising it. Can you give four examples of different topics of mathematics, she would be applying at home?

Ans. *(i)* In preparation of tea, she uses proportion.

(ii) To make chapatis, she uses counting, geometry and addition.

(iii) In preparation of meal, she uses proportion, estimation etc.

(iv) Knowledge of space and area required to maintain kitchen.

Q. 4. Lata wants to put up a swing on the tree in front of her house. To put up the swing she needs a rope and an appropriate branch of the tree. Does she need, or use, any mathematics in the process of choosing them? Explain your answer.

Ans. Lata will use mathematics at every step for this activity which are given below:

(i) To choose the appropriate height of branch.

(ii) To measure the length of string.

(iii) To check that whether any other branches obstract the rope or not, when someone uses the swing.

(iv) To measure the thickness of rope.

(v) To measure that whether they can swing together or not.

Q. 5. When we:

***(i)* estimate quantity, and/or**

***(ii)* look for relationships, and/or**

***(iii)* observe patterns**

we are doing mathematics. List examples of these three activities occurring in each of the following situations:

***(a)* Saba lives in Jaipur, and has to reach Delhi on 23rd March by 10:00 A.M;**

***(b)* Suresh is planning to knit a sweater for his sister.**

Ans. *(a)* Saba will use mathematics to calculate distance between Delhi and Jaipur and require speed to reach Delhi at exact time.

(b) Suresh will also use the mathematics to measure the size of sweater.

Q. 6. Create three problems/riddles/puzzles to help people realize that 'maths is fun'. Try them out on your friends. Find out which one they enjoyed, and why.

Sol. *(i)* Difference of a number of three consecutive digits and their reverse is always 198 e.g.,

(a) 321 – 123 = 198

(b) 432 – 234 = 198 .... so on.

(ii) Difference of a number of two consecutive digits and their reverse is always 9.e.g.,

98 – 89 = 9

65 – 56 = 9 ... so on.

(iii)

8	3	4	= 15
1	5	9	= 15
6	7	2	= 15
= 15	= 15	= 15	

It is a magic square i.e., the sum of each row and each column is equal (15). Construct an other magic square yourself.

Q. 7. List at least two more examples of a mathematical term being used loosely in ordinary conversation. Give reasons for your choice.

Ans. *(i)* Difference of distances of Delhi and Merrut is 130 km. We use in this statement, mathematical term difference.

(ii) Please. Give me half of butter. We use in the statement, mathematical term half.

Q. 8. In what way does the unambiguity of mathematical statement makes mathematics powerful?

Ans. Unambiguity of mathematical statements means mathematical statements do not leave any space for confusion. So, because of this, many things written in mathematical form become clear and precise. This allows us to express problems in many disciplines in a more compact form and hence makes them easier to deal with.

Q. 9. Prove, or disprove, the statement that every counting number is greater than or equal to the sum of its proper factors. (e.g., the proper factors of 6 are 1, 2, 3 and 1 + 2 + 3 = 6)

Sol. Factors of some counting numbers are:

2 = 1, 2

12 = 1, 2, 3, 4, 6, 12

15 = 1, 3, 5, 15

21 = 1, 3, 7, 21 .....so on.

We can see that factors of any counting number is either equal or less than the counting number.

Q. 10. Historically, it is said, that the concept of zero was invented in ancient India. How has this concept helped in developing a better way for symbolically representing numbers?

Ans. Using 0, a simple place value system for representing numbers has been developed. In this just using ten: digits, we can represent any number.

Q. 11. Would you say that the number system developed through the process of abstraction? If so, how?

Ans. The early counting numbers were obtained by the process of abstraction, in the same way as a child grasps their meaning (for instance, the concept of four is learnt by picking out the common property from a variety of sets of four items). Then, gradually names were given to the numbers that were obtained by adding 1. i.e., 9 + 1, 10 + 1, ... At one stage, zero was introduced, which may have come from a process of counting backwards. From here on a process of generalisation in the abstract world seems to have set in from which the sets of integers and rational numbers were formed.

Q. 12. Write down two hierarchical chains in mathematics. You can look for example related to number operations and shape.

Ans. For example, addition generalizes to multiplication in set of natural numbers which generalizes to multiplication in set of rational numbers. The polyons of n sides are the examples of hierarchy in geometry. An example from algebra could be the algorithm find the square root of the given number, generalized to find the cube root of a number, generalized to find the fourth root and so on.

Q. 13. Which subject is not hierarchically structured? Give reasons for your choice.

Ans. The subject, History, is not hierarchically structured. For instance, to understand any event of history at a particular time, you have no need to read all the concepts related with it or the concepts come earlier.

Q. 14. Several circles can be drawn through a point. How many can be drawn through two points, or three points, or .....?

(i) **Work on this problem and note down the processes you use.**

(ii) **Did the properties of mathematics, mentioned in Sec. 1.3 m show up while you were developing your arguments? If so, in what way?**

Ans. We can draw infinite number of circles through a point and two circles through two points but through more points, we draw only one circle only.

OTHER IMPORTANT QUESTIONS

Q. 1. In which way in the following activities, we use mathematics?

(a) **Cricket** ***(b)*** **Shopping** ***(c)*** **Construct a building** ***(d)*** **Preparation of sweets.**

Sol. *(a)* We use mathematics to calculate score and wickets.

(b) We use mathematics to measure prices and pay for it.

(c) We use mathematics to estimate its cost and choose a shape for it.

(d) In preparation of sweets, we use mathematics to mix the all elements in appropriate proportion.

Q. 2. Write the mathematical notation for given statements.

(a) **The sum of 2 and 3 multiplied by itself is equal to the sum of 2 multiplied by itself and 3 multiplied by itself with twice the product of 2 and 3.**

(b) **The sum of 7 multiplied by itself and 5 multiplied by itself is equal to the sum of 7 and 5 multiplied by difference 7 and 5.**

Ans.

(a) $(2 + 3)^2 = 2^2 + 3^2 + 2 \times 2 \times 3$

(b) $7^2 - 5^2 = (7 + 5)(7 - 5)$.

OBJECTIVE TYPE QUESTIONS

Q. 1. In which of the following activity, mathematics is used?

(i) Card game *(ii)* Cricket

(iii) Shopping *(iv)* All of them

Ans. *(iv)* All of them.

Q. 2. The concept of zero was invented in:

(i) Ancient India *(ii)* Medival India

(iii) U.S.A. *(iv)* U.K.

Ans. *(i)* Ancient India.

Q. 3. How many square in a row on chess board?

(i) 4 *(ii)* 6

(iii) 8 *(iv)* 10

Ans. *(iii)* 8.

Q. 4. ..... is an hierarchically structured discipline. With which word it will be completed?

(i) Physics *(ii)* Chemistry
(iii) Mathematics *(iv)* None

Ans. *(iii)* Mathematics.

Q. 5. Which of the following is a set of natural numbers?

(i) { 1, 2, 3, 4 .....}
(ii) { 0, 1, 2, 3, ...}
(iii) { ....., –3, –2, –1, 0, 1, 2, 3, ...}
(iv) None

Ans. *(ii)* { 1, 2, 3, 4 .....}.

Q. 6. Which of the following is a set of whole numbers?

(i) { 1, 2, 3, 4 .....}
(ii) { 0, 1, 2, 3, ...}
(iii) { ....., –3, –2, –1, 0, 1, 2, 3, ...}
(iv) None

Ans. *(ii)* { 0, 1, 2, 3, ...}.

Q. 7. Which of the following is a set of Integers?

(i) { 1, 2, 3, 4 .....}
(ii) { 0, 1, 2, 3, ...}
(iii) { ....., –3, –2, –1, 0, 1, 2, 3, ...}
(iv) None

Ans. *(iii)* { ....., –3, –2, –1, 0, 1, 2, 3, ...}.

Q. 8. An ..... of ideas is a system of ideas in which they are organised into different grades, ranked one above another With which word, it will be completed?

(i) Generalized *(ii)* Collection
(iii) Group *(iv)* Hierarchy

Ans. *(iv)* Hierarchy.

Q. 9. Examples which counter the given statement are called:

(i) Special examples *(ii)* Statement
(iii) Counter examples *(iv)* Counterpart

Ans. *(iii)* counter examples.

Q. 10. If even one case is found for which the statement does not hold, then the statement is:

(i) True *(ii)* False
(iii) We cannot say *(iv)* None

Ans. *(ii)* False.

Q. 11. If any mathematical statement leaves no place for confusion, then it is called:

(i) Absolutely unambiguous
(ii) Confusion free
(iii) Ambiguous
(iv) None

Ans. *(i)* Absolutely unambiguous.

Q. 12. If any mathematical statement leaves enough scope for it to mean different things to different people, then it is called:

(i) Absolutely unambiguous
(ii) Confusion free
(iii) Ambiguous
(iv) None

Ans. *(iii)* Ambiguous.

Q. 13. The sum of six and eight multiplied by itself is equal to the sum of six multiplied by itself and eight multiplied by itself with twice the product of six and eight. The expression of above statement is:

(i) $(6 + 8)^2 = 6^2 + 8^2 + 2 \times 6 \times 8$
(ii) $(6 - 8)^2 = 6^2 + 8^2 + 2 \times 6 \times 8$
(iii) $(6 + 8)^2 \pm 6^2 + 8^2 + 2 \times 6 \times 8$
(iv) None

Ans. *(i)* $(6 + 8)^2 = 6^2 + 8^2 + 2 \times 6 \times 8$.

Q. 14. Without a valid proof your conjecture is not acceptable as a ..... mathematical statement. With which word, it will be completed?

(i) False *(ii)* True
(iii) We cannot say *(iv)* None

Ans. *(ii)* True.

Q. 15. Full name of Q.E.D. which is used to be written by the Roman after every proof.

(i) quod erat demonstration
(ii) quod demonstration
(iii) quod errect demonstration
(iv) quick erat demonstration

Ans. *(i)* quod erat demonstration.

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