

Questionnaire No. 1

STATING OF HYPOTHESES

(English version)

Name of the student-teacher :

Male or female :

Age :

Class :

Section :

Name of College :

Date :

Instructions

In this questionnaire, you are given some interesting problems to think. Please read them carefully. These problems tell you what you have to do. It is seen that student-teachers of your age, solve these problems in many different ways. Your job is to think hard on these problems and suggest as many different answers as you can possibly think of. You should feel free while answering these questions or problems. I may also add that there are no right or wrong answers. I am only interested in knowing about your ability to think.

The work I am doing, has nothing to do with your examination. I am only trying to understand how student-teachers at your age think to solve these problems. To repeat, your job is to think as freely as you possible can and write down all the various ideas which come to your mind. It does not matter if they are very strange or different. Sufficient space is provided in this questionnaire itself, for your writing. If you find the space insufficient, please ask for extra sheets. There is no time limit. So you can think as long as you wish.

Please number your ideas and write them down neatly. This will help me in understanding your ideas a bit more clearly.

Practice Problem

THE DRYING UP OF HANDKERCHIEF PROBLEM

Here there is a piece of cloth. Say, it is a handkerchief. It is not dry, that is it is soaked in some liquid. I want to dry it up as quickly as I can. How can I do it?

Its drying up depends upon certain factors.

1. Length of the handkerchief
2. Material of the handkerchief
3. Moisture in the air
4. Thickness of the handkerchief
5. Nature of the liquid

There are only the suggestive factors, or they are only the imagined possibilities. You can now think of some more factors which are responsible for the drying up of the handkerchief.

- 6.
- 7.
- 8.
- 9.
- 10.
- 11.
- 12.

Please continue

13



Problem No. 1

THE FLOW OF LIQUID THROUGH A TUBE PROBLEM

Have a look at the diagram given below :

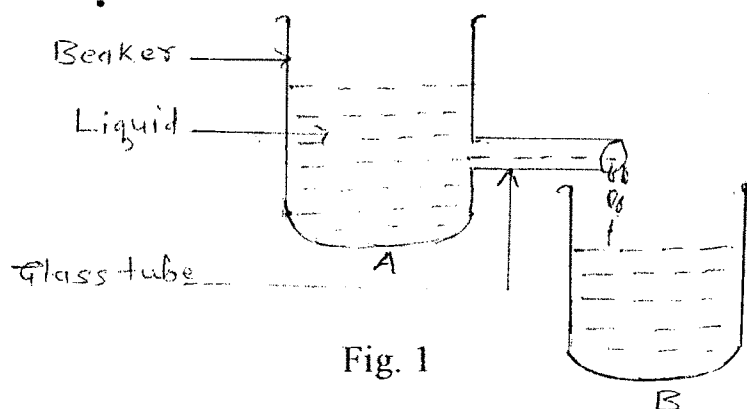


Fig. 1

There are two beakers A and B. Beaker A contains as much liquid as you wish (want). It (Beaker A) is placed at a higher level than the beaker B. A glass tube is fixed to the beaker A. The liquid flows from beaker A through the glass tube into the beaker B.

Name all the factors upon which the quick-filling up on the beaker B depends :

1. Size of the beaker
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

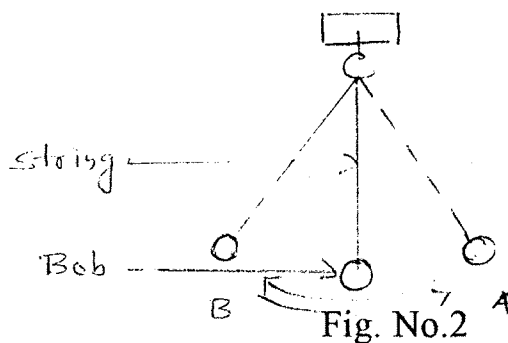
Please continue

- 8.

Problem NO. 2

THE SIMPLE PENDULUM PROBLEM

Have a look at the diagram of the simple pendulum problem.



It consists of a string whose one end is attached to a hook and the other end to a bob. If you give it a slight push, it moves to and fro sideways. To put in other words, it moves from A to B and back A. This is called one oscillation (a complete movement). Now name all the possible factors on which one oscillation of any simple pendulum depends.

1. Colour of the string
 - 2.
 - 3.
 - 4.
 - 5.
 - 6.
 - 7.
- Please continue
- 9.

Problem No. 3

THE RAMP PROBLEM

Look at the diagram very carefully.

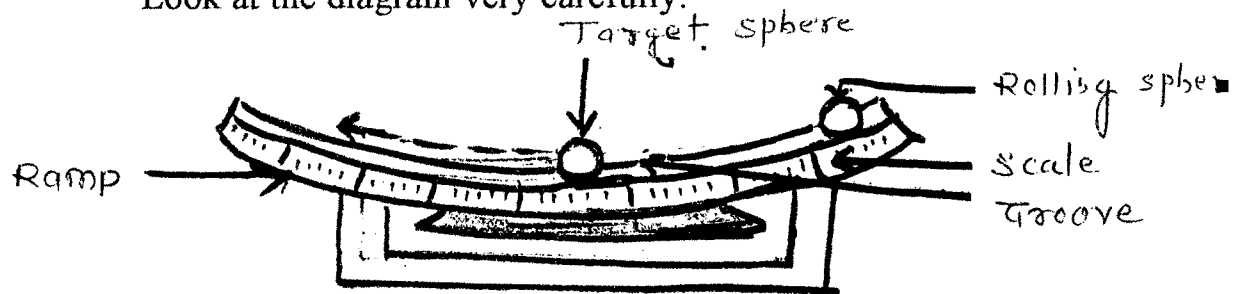


Fig. No. 3

There is a ramp with a groove along which spheres can roll up and down. A target sphere is placed at the centre of the ramp. When another (rolling) sphere is released from the right (see the diagram), it rolls down the ramp, strikes the target sphere and makes it move up the ramp on the left.

The movement of the target sphere on any ramp depends on the following possible factors :

1. Height of release of the rolling sphere
 - 2.
 - 3.
 - 4.
 - 5.
 - 6.
- Please continue
- 7.

Problem No. 4

THE SEED PROBLEM

A farmer wishes to grow healthy plants. Name all the possible factors he should consider to make the seeds grow into healthy plants.

1. Healthy seeds

2.

3.

4.

5.

6.

7.

8.

9.

10.

Please continue

11.

12.

13.

14.

Original Questionnaire
Questionnaire No. 2
TESTING OF HYPOTHESES
(English version)

Name of the student -teacher : -----

Male or Female : -----

Age : -----

Class : -----

Section : -----

Name of College : -----

Date : -----

Instructions

In the earlier questionnaire, you suggested a number of factors that were responsible for the solution of the problem. Now, you are told some factors that might be responsible for the solutions of the problem. Your job now is to test the so suggested factors in any way you like by designing some experiments. The experiment when performed should clearly tell, whether the factor under test is really true or not. To put in other words, it means that your experiment must prove whether the given factor is important or not.

Practice Problem

THE DRYING UP OF HANDKERCHIEF PROBLEM

Example No. 1

One student 'A' said that 'Length' of the handkerchief was an important factor in its drying up. When asked to test this factor, he gave the following experiment :

He said, "I shall take three cotton handkerchiefs of different lengths, say of 10 cms, 20 cms and 30 cms in all other respects, they will be exactly the same. I shall dip all three in water and spread them out in the sun. I will then note down the time taken for each handkerchief to dry up to the same degree. If the handkerchief of the smallest length (i.e. 10 cms) dries up first and that of the largest length (i.e. 30 cms) dries up the last, then I will conclude that, 'length' of the handkerchief is an important factor responsible for its drying up. In case all the three handkerchiefs of different lengths dry up at the same time, then I shall conclude that 'length' is not an important factor."

Example No. 2

Another student 'B' said that, the material of the handkerchief is an important factor. To test this he must use choose three handkerchiefs similar in all respects except the material of the cloth e.g. cotton, wool and nylon.

He should then dip all the three in water and spread them on the ground. He should then note down the time they take to dry up. If all the three handkerchiefs dry up at the same time, it means that, 'the material of the cloth' has no effect in that, 'the material of the cloth' has no effect in drying up. If time taken for each to dry up is different, it means that the 'material' of the handkerchief is an important factor in drying up.

Very Very Important Instructions

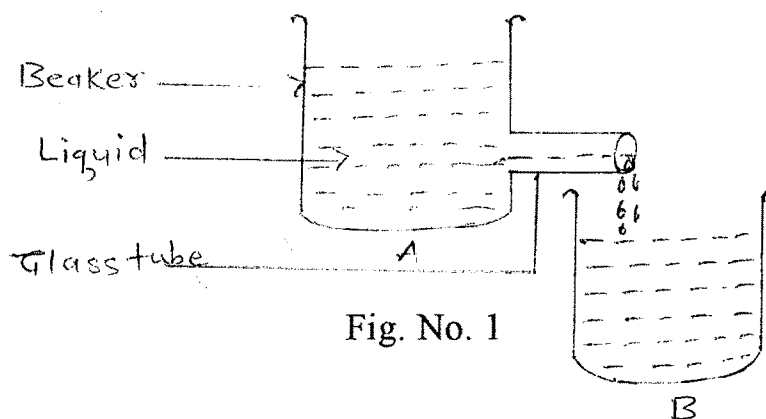
You are free to change the experimental materials. You are also free to suggest on experiment in any way you like. Anything you need for your experiment is supposed to be available. You have only to write its name.

Remember that you do not have to perform the experiment. You simply have to describe it in writing. You can also draw diagrams for explaining your point of view. Incidentally, this will reduce your amount of writing.

You can easily avoid repetitive writing. But, at the same time, try hard to make your ideas as clear as possible for me. This you can safely do by numbering them.

Problem No. 1

THE FLOW OF LIQUID THROUGH A TUBE PROBLEM



Liquid from beaker 'A' flows through a glass tube and collects in the beaker 'B'.

The amount of liquid collected in the beaker B in half an hour, say, depends on the following two factors alone :

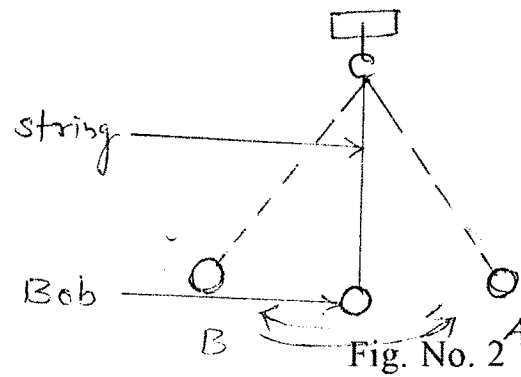
1. Size of the hole in the glass tube
2. Level of water in the beaker 'A'

Suggest experiment to test these factors :

1. Size of the hole in the glass tube
2. Level of liquid in beaker 'A'

Problem No. 2

THE SAMPLE PENDULUM PROBLEM



The time taken for one oscillation of the pendulum depends upon the following factors :

1. Volume of the bob
2. Weight of the bob

Suggest experiments to test these factors.

1. Volume of the bob
2. Weight of the bob

Problem No. 3
THE RAMP PROBLEM

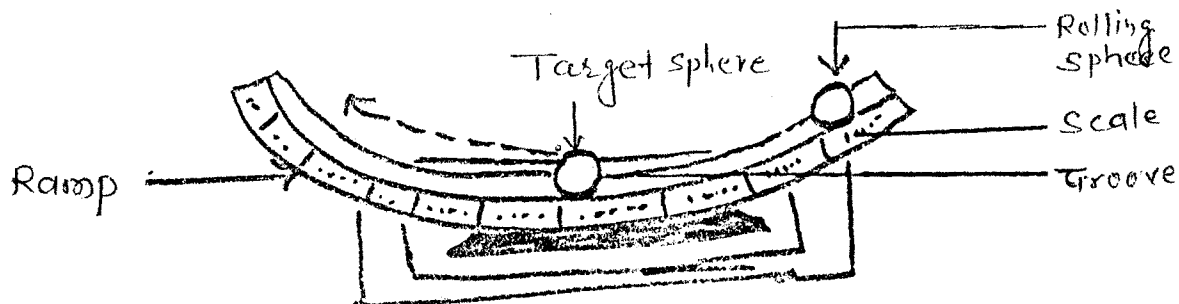


Fig. No. 3

The moving of the target sphere depends on the following factors :

1. The weight of the target sphere
2. The nature of the surface of the groove

Suggest experiments to test these factors.

1. The weight of the target sphere
2. The nature of the surface of the groove

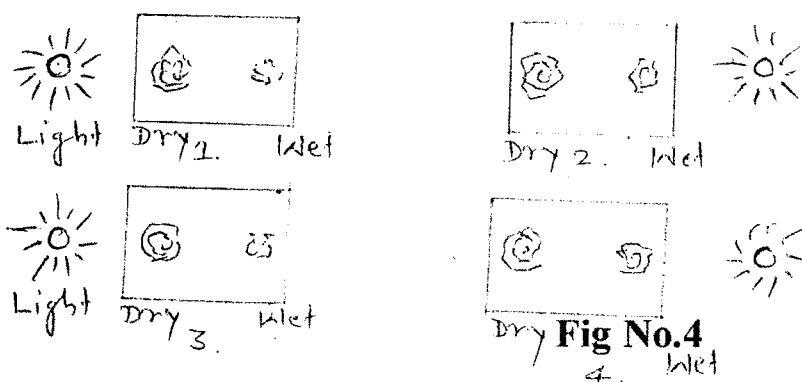


Problem No. 4
THE WORMS PROBLEM

A student-teacher of your age wanted to know how worms move about in light and moisture (Wetness).

To solve these problems, he placed 20 worms in the centre of each of four glass boxes under different conditions of light and moisture. For moisture, water was sprinkled on the bite of paper in the whole box or in half the portion of the box as required. Light was provided by the electric bulb to required part of the box. His data are shown in the four diagrams given below. Your problems is to have a close to look at each of these diagrams given below. Your problems is to have a class look at each of these diagrams and reach a suitable conclusion. You are free to suggest any other experiment, if it might help to solve the problem clearly. It also possible that the above mentioned students have missed an experiment or two.

Look at the diagrams carefully :



1. What do you conclude from the diagram (1) and (3)?
2. What do you conclude from the diagram (2) and (4)?
3. Is any other experiment necessary? If you suggest the experiment with diagram