ACTUAL PROBLEMS OF MODERN SCIENCE, EDUCATION AND TRAINING

KHOREZMSCIENCE.UZ

CONTENTS

UDC: 370.12

METHODICAL RECOMMENDATIONS ON SOLVING TEXT PROBLEMS DURING THE WORK

Hodjiyev Safar
Bukhara State University,
Candidate of Physical and Mathematical Sciences,
Associate Professor)
Safarkhodjiev@mail.ru

Jurayeva Nargiza Oltinboyevna
Bukhara State University
PhD student
n-jurayeva@mail.ru

Аннотация: Ushbu ishda mantli masalalar va ular qanday turlarga bo'linishi, ularni yechish bosqichlari, bu kabi masalalarda uchraydigan asosiy qonuniyatlar haqida qisqacha tushunchalar keltirilgan. Risolada biz ishga doir matnli arifmetik masalalarni yechishda qanday tasdiqlarga e'tibor berish kerakligi haqida mulohazalarni umumlashtirishib, mavzu bo'yicha masalalar yechimlarini namuna sifatida keltirilgan. Keltirilgan tasdiqlar va mulohazalar bilan yechilgan masalalar o'quvchilar va fanni mustaqil o'rganuvchilarga matnli masalalarni qiyinchiliklarsiz o'zlashtirishga yordam beradi.

Kalit so'zlar: mantli masala, vaqt birligi, ish birligi, mehnat unumdorligi, reja bo'yicha, ob'yekt, quvur.

Аннотация: В данной статье дается краткий обзор проблем мантии и их типов, этапов их решения и основных закономерностей, встречающихся в таких проблемах. В брошюре мы суммируем соображения о том, какие утверждения следует учитывать при решении текстовых арифметических задач, связанных с работой, и приводим примеры решений проблем по теме. Задачи, решаемые с помощью данных утверждений и комментариев, помогут студентам и самостоятельным ученикам без труда освоить текстовые задачи.

Ключевые слова: мантийное вещество, единица времени, единица работы, производительность труда, по плану, объект, труба.

Annotation: The following article provides a brief overview of mantle problems and their types, stages of their solution, and the basic laws concerned with such problems. In the pamphlet, we summarize the considerations of what affirmations to use in solving textual arithmetic problems related to the work, and provide examples of solutions to problems on the topic. The problems solved with the given affirmations and comments will help students and independent learners to master the textual problems without difficulty.

Keywords: mantle problem, unit of time, unit of work, labor productivity, according to plan, object, pipe.

Introduction. Problems expressed in words are called text problems. Recently, university entrance exams have also focused on textual issues. Although such problems are not complicated, students have difficulty or lack the skills to solve them. Probably the reason for this is that the theory of solving such problems is not systematically described in textbooks and there is a lack of methodological manuals for teachers.

Literature review. In this article, we try to summarize the considerations of what assertions to look for when solving textual arithmetic problems related to work.

Textual tasks are problems related to the performance of a certain task (task) by an object in a unit of time. The object of the work may be one or more workers, equipment or other things, depending on the problem. In many cases, the object contains information about the performance of the work (or part of it) at a given time. Work-related issues relate to concepts such as the amount of work to be performed (referred to as work), time, and the productivity of the facility to perform the work (labor).

Research Methodology. The work done by an object in a given unit of time is its productivity. Unit work is the ratio of time spent on all work done, so to be sure, we express it as follows:

$$Productivity\ \frac{work}{time}.$$

Prosperity will be according to the problem task:

$$\frac{kg}{hour};\ \frac{m}{second};\ \frac{ha}{day};\ \frac{piece}{day}.$$

In most cases, for convenience, the whole work (all work) is taken as a whole (1 unit). The length of the road to be built, the planned 10 tons of product to be prepared, the area to be plowed, the pool to be filled with water or drained, and so on.

Job issues are divided into individual (object) and multiple (objects) tasks that have to be done together.

Given the time spent by an object on a task, its productivity per *(P)* unit of time (labor) is found by equality, and the remainder T of the work is found by the difference, without $P \cdot T$ multiplying the work done at one time.

$$P = \frac{1}{Total\ time\ spent}$$

In many cases, the "worker" is given to perform work (norm, plan) at a certain time more or less than the set time (late). In such cases, it is necessary to find out how much work is done per unit time and the time spent on the whole work, or the total amount of work.

In these cases, if we take the unit of work (plan) x to solve the problem, and the time spent to complete the whole work y (it is not necessary x to specify y exactly or), $x \cdot y$ the product is the amount of work to be performed. If the unit r performs more (less) than the norm in time, the time spent on the work decreases (increases) over time, but the amount of work performed must remain the same. In that case, we have $(x+r)(y-q)=xy$, $[(x-r)(y+q)=xy]$ equality.

Analysis and results. We will show how to apply the above considerations to specific problems.

Issue 1. Three ordinary and 2 rubber-powered tractors can plow the land for 6 days. This is done by 3 rubber tractors 5 days faster than 9 conventional tractors. How many times is the productivity of a rubber tractor higher than the productivity of a conventional tractor?

Solution: In the case, three ordinary and two rubber tractors are given to do the whole work together in six days.

Í. Identify data and make connections between them:

1.1. Suppose each of the ordinary tractors does all the work in a day, and each of the rubber tractors does the work in a day.

1.2. We find the productivity of each type of tractor as a unit of work (i.e., arable land).

Simple tractor productivity - $\frac{1}{x}$;

Single rubber tractor productivity - $\frac{1}{y}$.

From these definitions and the condition of the matter, three simple tractors work in one day $3\cdot\frac{1}{x}$ part in 6 days $6\cdot3\cdot\frac{1}{x}=18\cdot\frac{1}{x}$ part, two rubber tractors work in one day $2\cdot\frac{1}{y}$ part in 6 days $6\cdot2\cdot\frac{1}{y}=12\cdot\frac{1}{y}$ have fulfilled.

II. Let's create a problem equation (model):

2.1. Given that two types of tractors work together in 6 days, we have this equation.

$$6\cdot3\cdot\frac{1}{x}+6\cdot2\cdot\frac{1}{y}=1, \text{ or } 18\cdot\frac{1}{x}+12\cdot\frac{1}{y}=1.$$

In terms of the problem, it is said that 3 rubber tractors do the job 5 days faster (earlier) than 9 ordinary tractors. If one rubber tractor does all the work in y a day, the time is reduced three times and and it spends $\frac{y}{3}$ days, and 9 simple wheeled tractor does the whole work in $\frac{x}{9}$ days.

If three-wheeled tractors do 5 days faster than 9 tractors, they will take 5 days less than conventional tractors, and the following equation holds:

$$\frac{y}{3}+5=\frac{x}{9} \text{ or } x=3y+45.$$

2.2. Combining the above equations, we have this system and take it off (considering the time will be positive)

$$\begin{cases}18\cdot\frac{1}{x}+12\cdot\frac{1}{y}=1,\\ x=3y+45.\end{cases}$$

And the solution is $y = 15,\ x = 90$.

In the task ofthe problem the productivity of tractor $\left(\frac{1}{y}\right)$, learners should find find the number of times of the size from ordinary tractor $\left(\frac{1}{x}\right)$, it means that it is faster $\frac{1}{y} : \frac{1}{x} = \frac{x}{y} = 6$.

3. To check the solution. If an ordinary tractor does all the work in 90 days, it will do part of the work in one day $\frac{1}{90}$, three parts $3 \cdot \frac{1}{90} = \frac{1}{30}$, and if a rubber tractor does all the work in 15 days, it will do part of the work in one day $\frac{1}{15}$, and two of them will do two parts $\frac{2}{15}$. Together they do $\frac{1}{30} + \frac{2}{15} = \frac{5}{30} = \frac{1}{6}$ part of the whole job in one day and it turns out they do the whole job in 6 days.

The second task is that 3 rubber tractors perform 5 days faster than 9 conventional tractors. If one rubber tractor does the work in 15 days, three do it in 5 days, $\left(\frac{x}{3} = \frac{15}{3} = 5\right)$, 9 ordinary tractors do it in 10 days $\left(\frac{y}{9} = \frac{90}{9} = 10\right)$, and they spend 5 days extra time on the job, the condition of the problem is met.

Solution: 6 times.

Issue 2. There are four pipes in the pool. If the first, second and third pipes pour water into the pool at the same time, it will pay off in 12 minutes. If water is poured from the second and fourth pipes, it will be filled in 15 minutes. If water is pumped through the first, third and fourth pipes, the pool will be filled in 20 minutes. If four pipes are opened at the same time, how long will the pool be filled?

Solution: I. Preparation for problem solving. The text of the problem is large, so it is advisable to express its terms in a concise form or in a schematic form. For example, as in Figure 1 and

A: I, II, III-pipes – 12 minutes;
B: II, IV-pipes – 15 minutes;
C: I, III, IV-pipes – 20 minutes;
X: I, II, III, IV-pipes - ?

If the first pipe (I) alone fills the pool in x time (in minutes), it fills $\frac{1}{x}$ in part in 1 minute, which is its productivity, and we denote it by P_1 ($P_1 = \frac{1}{x}$). Similarly, the productivity of the second, third and fourth pipes are the same, we consider the whole work as 1 (for filling the whole pool).

$$P_2 = \frac{1}{y},\ P_3 = \frac{1}{z},\ P_4 = \frac{1}{t}$$

2. Now we construct the mathematical model of the problem:

In A-version we get this equation because the pipes together fill the pool in 12 minutes: $(P_1 + P_2 + P_3) \cdot 12 = 1$.

In B-dversion we get this equation because the pipes together fill the pool in 15 minutes: $(P_2 + P_4)\cdot 15 = 1$.

In C-versionwe get this equation because the pipes together fill the pool in 20 minutes: $(P_1 + P_3 + P_4)\cdot 20 = 1$.

We bring together the equations, and get the system:

$$\begin{cases} P_1 + P_2 + P_3 = \dfrac{1}{12}, \\ P_2 + P_4 = \dfrac{1}{15}, \\ P_1 + P_3 + P_4 = \dfrac{1}{20}. \end{cases}$$

By connecting the right and left sides of the system, respectively:

$$2P_1 + 2P_2 + 2P_3 + 2P_4 = \frac{1}{5}$$

We devide the equation and get the equation's both sides:

$$P_1 + P_2 + P_3 + P_4 = \frac{1}{10}$$

Solution: All the pipes work together to fill the pool in 10 minutes.

Issue 3. . Two trucks had to carry a certain amount of cargo in 6 hours. When the second car arrived for shipping, the first car had already carried $\frac{3}{5}$ part of the cargo. Only the second car carried the rest of the cargo in 12 hours. How many hours can each car carry this load?

***Solution:* I. Preparation step.**

Two machines can carry the entire load (one unit of work) in 6 hours.

1. 1. Suppose that the first car can carry cargo in an x hour and the second in an y hour.

1. 2. We find the productivity of each car: the productivity of the first car is that it does $\frac{1}{x}$ part of the work in 1 hour. The second is the productivity of the car, which does $\frac{1}{y}$ part of the work in 1 hour.

II. Now we make problem solution equation.

Given that both trucks work in 6 hours (they add up) we get:

$$6\cdot\frac{1}{x} + 6\cdot\frac{1}{y} = 1$$

If the first truck has done $\frac{3}{5}$ part of the work, $1-\frac{3}{5}=\frac{2}{5}$ part of the work is left. The second truck will complete $\frac{2}{5}$ part of the work (cargo) in 12 hours, and this equation $12\cdot\frac{1}{y}=\frac{2}{5}$ is valid. From this $y=30$ equation, the second truck can do all the work in 30 hours, and from the equation $6\cdot\frac{1}{x}+6\cdot\frac{1}{y}=1$, the first truck alone can carry the load in 7.5 hours (it can be solved in another way).

Issue 4. The three pumps work together to fill the pool in 2 hours and 30 minutes. If the efficiency of the pumps is 3: 5: 8, the second and third pumps together will fill the pool by a certain percentage in 1 hour and 18 minutes.

Solution: If the size of the pool is not specified, we call it 1. If we consider about the coefficient of proportionality as x, the efficiency of the first pump will be $3x$, the productivity of the second will be $5x$ and the productivity of the third will be $8x$. Now, using the terms of the problem, let's translate it into mathematical language. The main part of the problem is to find the x coefficient of proportionality. Three pump productivity is $3x+5x+8x=16x$. When it comes to productivity, it takes time. Under the terms of the case, they will fill the pool together in 2.5 hours. From this condition we have the following equation $\frac{1}{16x}=2{,}5$ and find that it is a coefficient of $x=\frac{1}{40}$ proportionality.

We can find the efficiency of each pump: the efficiency of the first pump is $\frac{1}{40}\cdot 3=\frac{3}{40}$, the efficiency of the second pump is $\frac{1}{40}\cdot 5=\frac{1}{8}$, and the efficiency of the third pump is $\frac{1}{40}\cdot 8=\frac{1}{5}$. The second and third pumps will have $\frac{1}{8}+\frac{1}{5}=\frac{13}{40}$ combined capacity. If we increase the productivity over time, the second and third pumps together fill the part of the pool $\left(1\frac{18}{60}\right)$ in 1 hour and 18 minutes before the finished $\frac{13}{40}\cdot 1\frac{18}{60}=0{,}4225$ part of the work is formed. This makes up the whole $0{,}4225\cdot 100\%=42{,}25\%$ part of the pool.

Solution: 42,25%.

Conclusion. We hope that the issues addressed with the above affirmations and feedback will help students to finf solutiins for such issues.

References:

[1]. Unified State Exam – 2008. Mathematics. Real assignments / authors V.V. Kochagin, E.M. Boychenko. -Moscow: Astrel. 2008, –125 p.– (Federal Institute of Pedagogical Measurements).

[2]. A.P. Antonov and others. Collection of problems of elementary Mathematics (3rd edition according to the 15th edition in Russia). –Tashkent: “O’qituvchi” publishing 1975. -456 p.

[3]. P.T.Dybov, A.I. Zaboev, and others. Collection of problems in Mathematics for applicants to universities: Textbook. / Edited by A.I. Prilepko. - 2nd edittion. - Moscow: Высшая школа, 1989,-271p.