Exercises to Develop Students ' Logical Thinking

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ABSTRACT

This article is dedicated to the development of logical thinking in the formation of engineering problem-solving skills of future engineers and technologists.

All the specialists and students of technical institution in higher education must have sufficient knowledge to be able to analyze technical, technological, economical processes. They also build mathematical models of technical processes with their indicators by calculations. Moreover, all students and scientists can provide others with ideas and recommendations on how to improve their performance [1. 3.4]. It is necessary for future specialists to have sufficient knowledge of mathematics in order to build models of machines or a process under constructions. Moreover, mathematics is also necessary for prospective engineers to solve multiple issues and generate skills. We hope that the following issues will help future engineers clarify their logical thinking in the analysis of processes.

Therefore, a number of issues and solutions are given below. The circle of thinking expands if the reader independently solves the rest himself. In a reader who independently solves these issues, his logical thinking is clarified [1]. It is desirable to use literature skills and knowledge in this direction [1].

It will be easy for students to solve mathematic issues and think logically, when they can visualize the process of (machine and its working) or the technical structure as much as possible.

The calculation of indicators of the process is considered depends on the complex of knowledge that depends on the device and the analysis of their logical connections.

In process of analysis, mathematics frees us from excessive over counting and helps us to find previously unknown things with the help of a certain thing. We bring to your attention logical questions about mathematics, interesting puzzles and examples of puzzles for you in the below.

While some questions are based on mathematical accuracy, some are logical.

Some of the issues listed below were drawn up-some were taken from [...] s and used in the solution.

Issue 1. The two Masters collected money together and took a charring disc. One of the disc used until half of the it finished and gave it to the other partner. The diameter of the disc is 30 cm. The diameter of the hole made for mounting on the shaft in the middle is 4 cm. How much is the diameter of the disc left to the second master?

Solution: the main purpose of solving this issue is to know when the first master used half of the disk when it reached which circle, and to calculate it by defining the radius of the circle that should stop the work.
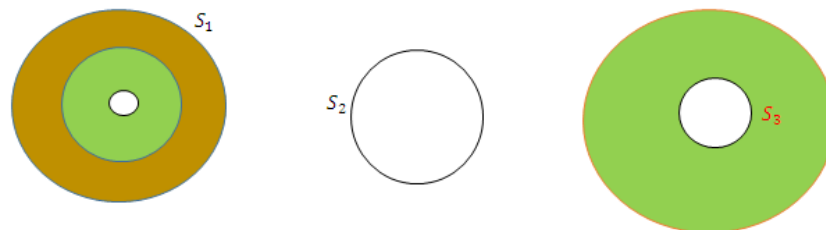
Here S_1 is the total surface of the disk, S_2 is the hole of the middle surface and S_3 is the remaining surface to the second master.

$$S_1 = 15^2\pi = 225\pi \ sm^2 \quad S_2 = 2^2\pi = 4\pi \ sm^2$$
$$S_3 = \frac{S_1 - S_2}{2} = \frac{225\pi - 4\pi}{2} = \frac{221\pi}{2} = 110.5\,\pi$$

The whole disk is consisted of $S = 221\,\pi\ sm^2$ surface, so that the first Master uses it by $S_3 = 110.5\,\pi\ sm^2$. The second master had $110.5\,\pi\ sm^2$ of working part in the disc

$$S_4 = \frac{S_1 - S_2}{2} + S_2 = 110.5\,\pi + 4\pi = 114.5\pi$$

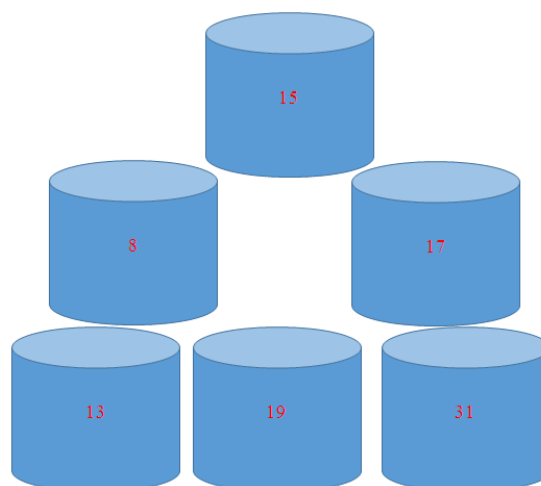The radius of a circle with a surface S_4 is $R_3 = \sqrt{114.5\pi}$.

Then $R_4 = \sqrt{225\pi} - \sqrt{114.5\pi}$=26.52-18.96=7.56

So the remaining disk diameter to the second master is

$$d = 2R_4 = 2 \cdot 7.56 = 15.1$$

Issue 2. What Barrel is left?

Each of the dishes in the picture has an motor oil or a carob. Carob oil costs twice then motor oil. The buyer bought 5 bottles of oils, paying 1400,000 sum for each of the motor oil and carob oils. the oil was left in container.

Solution: while solving this issue, one can meditate as follows. According to the issue condition, the price of 1 liter of motor oil would be x so while the price of 1 liter of carob oil would be $y = 2x$. In total, motor oil was also paid a separate sum of $1400,000$ and carob oil for $1400,000.$ Amounts of oil in the containers is given in liters with the numbers $8, 13, 15, 17, 19, 31$. If we get that the purchased motor oil is twice the amount of carob oil

$$13 + 15 = 28 \quad 8 + 17 + 31 = 56$$

That is followed that $2 \cdot 28 = 56$.

From this

$$\begin{cases} y \cdot 28 = 1400000 \\ x \cdot 56 = 1400000 \end{cases} \qquad \begin{aligned} y = 50000 \\ x = 25000 \end{aligned}$$

Answer. The buyer received motor oil from 25,000 sum per liter and carob oil from 50,000 sum and leaving a 19-liter product.

Issue 3. Signaling device that cannot be sold.

Without selling for $ 20, the device reduced the cost to $ 8. No one bought device again, so the price had to be lowered again to $ 7.2 and finally to $ 4.32. Another price fell and the galanterist sells the device at a cost. It is supposed that while lowering prices, it follows a certain system. Can you tell what the next price should be?

Solubility:

$B_1 = A \cdot (1 - P)^n$

$n = 1$ da $B_1 = 12 \cdot (1 - 0.4)^1 = 12 \cdot 0.6 = 7.2$

$n = 2$ da $B_2 = 12 \cdot (1 - 0.4)^2 = 12 \cdot 0.36 = 4.32$

$n = 3$ da $B_3 = 12 \cdot (1 - 0.4)^3 = 12 \cdot 0.216 = 2.6$

Answer: each descending price of the device is 40 % of the previous one, and then the next price of the alarm will be 2.6 dollar.

Issue 4. Multiplication and addition

While the teacher was giving the lesson, he wrote to the board:

$2 \times 2 = 4$ $a \times b = y$

$2 + 2 = 4$ $a + b = y$

That is seemed that even if we multiply 2 by 2 and add 2 to 2, a homogeneous result will come out.

Even if 2 is the only integer with such a sense, there are still pairs of such numbers that can be substituted for a and b in the equation. Can you please find these numbers? Of course, these numbers can be fractional numbers, but equality must be certain.

Answer: if one of the numbers is equal to a, the number 2 is found with $b = \dfrac{a}{a-1}$. substituting the values of a and b, for example taking $a = 3$. $b = \dfrac{3}{3-1} = 1.5$

$$3 \times 1.5 = 4.5 \qquad\qquad 3 + 1.5 = 4.5$$

Issue 5. Possibility of how to properly distribute the salary.

Hasan and Husan agreed to plant potatoes in the farmer's field for 5 dollars. Hassan will pick a series of potatoes in 40 minutes and bury them in 40 minutes. Husan, on the other hand, can be plucked in 1 row for 20 minutes, and Hasan can bury 3 rows until he can bury two rows. Hassan and Husan thus worked at a homogeneous pace, picking and burying potatoes in 12 rows. Now, should each receive his share of the $ 5 given to the salary, proportionally to what he did?

Answer. When Hassan picks a row of potatoes in 40 minutes and buries them in as many minutes, he plants 6 rows in 240 minutes and buries them in 240 minutes. That is, 6 rows can be planted in 480 minutes.

Issue 6: How old is Zamira?

Farmer Qo'chqarvoy had 15 children who were born at intervals of one year. The oldest child according to Zamira's view he is the smallest child 8 times oldest from Boltavoy.

How old is Zamira?

Answer: Zamira is 16 years old, and Boltavoy is 2 years old.

Issue 7: How much does a baby weigh?

Mrs. Jamila was very economical and wanted to measure both the weight of her child and the weight of herself and doggie at the same time at the cost of one cent.

The weight of Mrs. Jamila is 100 pounds more than the weight of a child of her both child and puppy; while the weight of a puppy is 60 percent less than that of a child. what is the weight of a child?

Answer: Mrs. Jamila weighs 135 pounds, the boy weighs 25 pounds puppy weighs 10 pounds.

Issue 8: Stamps of a dollar.

A man gave a dollar to the postal worker: give me 1 cent, 2 cent, 5-cent stamps. 1 cent stamps out of 2 cent stamps would be 10 times as many, giving 5 cent stamps to the rest. How to complete this strange task?

Answer: 5 2-cent, 50 1-cent, 8 50-cent stamps must be issued.

Issue 9: two turkeys
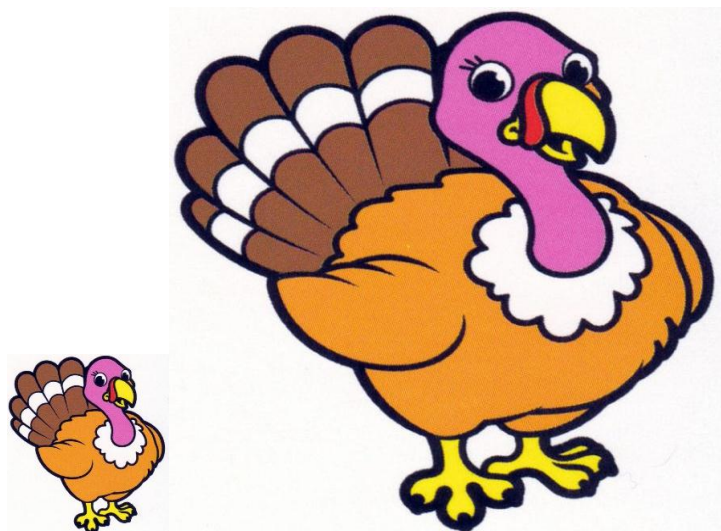
Here are 2 turkeys weighing 20 pounds. However, 1 pound of Turkey's meat costs 2 cents per

pound of big turkey meat-said The Butcher.

Mrs. Smith took the turkey and paid 82 cents. Mrs. Brown took big Turkey and paid $ 2.96. What was the weight of each Turkey?

Answer: big turkey 16 pounds, small turkey 4 pounds.

Issue 9: How old is the child?

➢ How old is this child? - asked conductor.

The father, who had been denied the interest expressed in his family, responded:

➢ My son is 5 times bigger from my daughter, my wife is 5 times bigger from my son, I am 2 times bigger from my wife. When we add the age of all of us, the age of my mother comes. Today we celebrate the 81st anniversary of his birth.

How old is the child?

Answer: the child is 5 years old.

Foydalanilgan adabiyotlar

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