2021-TYT/Basic Mathematics

BASIC MATHEMATICS TEST
1. This test contains 40 questions.
2. Mark your answers in the section reserved for the Basic Mathematics Test on the answer sheet.

****Question 1:****
Beyza weighs a glass of water first when it's empty, then when it's completely full of water, and finally with some water in it. The results of these weighing operations in grams are shown below.

According to this, what fraction of the glass is filled in the last weighing operation?

A) 1/2 B) 2/3 C) 3/5 D) 4/7 E) 5/8

****Question 2:****
The display on the cashier's screen showing the quantity and unit price information of all products a customer has chosen to purchase at a market is as follows:

Ürün	Birim Fiyatı (TL)	Adet
Çikolata	0,99	5
Süt	1,10	1
Ekmek	1,25	3

How much change in TL will a customer receive from the cashier after giving 10 TL for these products?

A) 0.2 B) 0.4 C) 0.8 D) 1 E) 1.2

Question 3:
Microscopes working with two lenses show the image of objects magnified by the product of the magnification ratios of the lenses.

For example, a microscope working with two lenses, one with a magnification ratio of 5 times and the other with a magnification ratio of 20 times, shows the image of the viewed object 100 times larger.

How many mm does an object with a size of 1/2 mm appear in a microscope with two lenses having magnification ratios of 4 times and 40 times?

A) 0.1 B) 0.2 C) 1 D) 2 E) 10

Question 4:
Mert, who was performing operations with radical numbers, divided $\sqrt{10} + \sqrt{6}$ by its conjugate $\sqrt{10} - \sqrt{6}$ instead of multiplying them by mistake.

According to this, how much more is the number Mert found than the number he should have found?

A) $\sqrt{12}$ B) $\sqrt{15}$ C) $\sqrt{18}$ D) $\sqrt{20}$ E) $\sqrt{30}$

Question 5:
A project has been organized to increase the number of schools in cities. 11 cities were included in this project. 12 districts from each of these 11 cities were included in the project. In each district, 13 schools were built, each with 2 floors and 7 classrooms on each floor.

According to this, what is the total number of classrooms built within the scope of this project?

A) 13!/10! B) 14!/9! C) 14!/10! D) 15!/9! E) 15!/10!

Question 6:
Bilge will choose two of the soup, salad, and fruit options, each served as one portion at lunch, according to the calorie amount she needs to consume.

Regarding the choices she can make, Bilge has calculated that:
- When she chooses soup and fruit, she exceeds the calorie amount she needs.
- When she chooses fruit and salad, she does not exceed it.
- When she chooses salad and soup, she gets exactly the amount she needs.

If the calories of one portion of soup, fruit, and salad are C, M, and S respectively, which of the following is the correct order of these values?

A) $C \leq M \leq S$ B) $C \leq S \leq M$ C) $S \leq C \leq M$ D) $S \leq M \leq C$ E) $M \leq S \leq C$

Question 7:
In an apartment building, there is an equal number of stair steps between every two consecutive numbered floors. The following is known about the floors where Arif, Berk, and Can, who live on different floors of this apartment building, reside:
- The total number of steps between Arif's floor and Berk's floor is odd.
- The total number of steps between Berk's floor and Can's floor is even.

According to this, which of the following could be the floor numbers where Arif, Berk, and Can live?

	Arif	Berk	Can
A)	3	4	5
B)	4	6	3
C)	5	7	6
D)	6	3	4
E)	8	5	7

Question 8:
A trainer at a parachute jumping course gave the following explanation to the trainees:

"When jumping from an airplane at a height of 800 meters from the ground, you need to open your parachute after 400 to 500 meters from the airplane to be able to land safely on the ground."

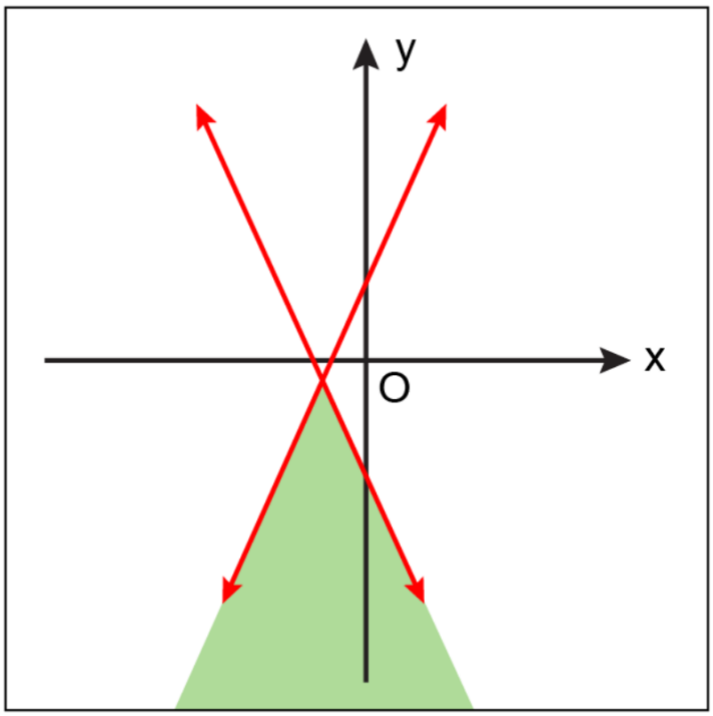
According to this, which of the following inequalities expresses the values that the height from the ground can take when the parachute is opened in order to land safely?

A) $|x - 350| \leq 50$ B) $|x - 300| \leq 100$ C) $|x - 250| \leq 150$
D) $|x - 200| \leq 200$ E) $|x - 150| \leq 250$

Question 9:
Let a, b, c, and d be real numbers, the solution set of the inequality system

$x + ay \leq b$
$x + cy \geq d$

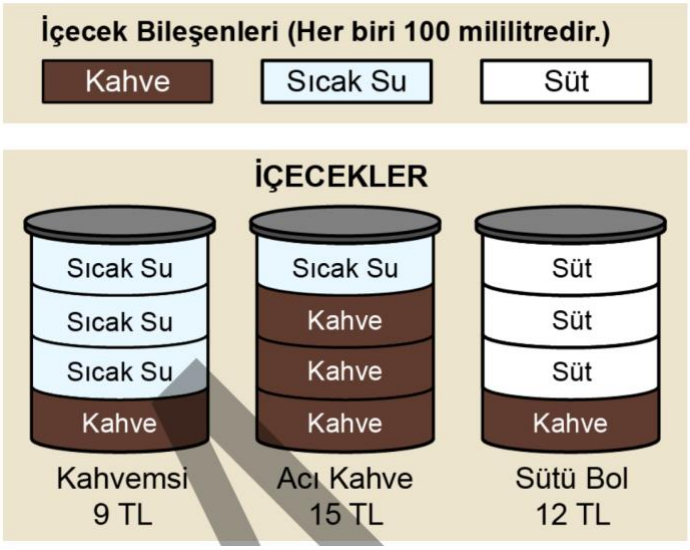
is shown shaded in green on the coordinate plane below.



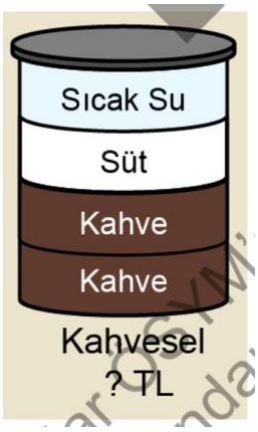
According to this, which of the following is the signs of the numbers a, b, c, and d respectively?

A) + - - - B) + + + - C) + - + - D) - - + - E) - + - +

Question 10:



In a coffee shop, the prices of 400-milliliter beverages created using coffee, hot water, and milk components are calculated by adding the prices of each 100-milliliter component separately. The prices and components of three of these beverages in this coffee shop are shown in the figure above.



According to this, how many TL did a customer pay for a beverage if the amounts of components in the beverage they ordered are as shown in the figure?

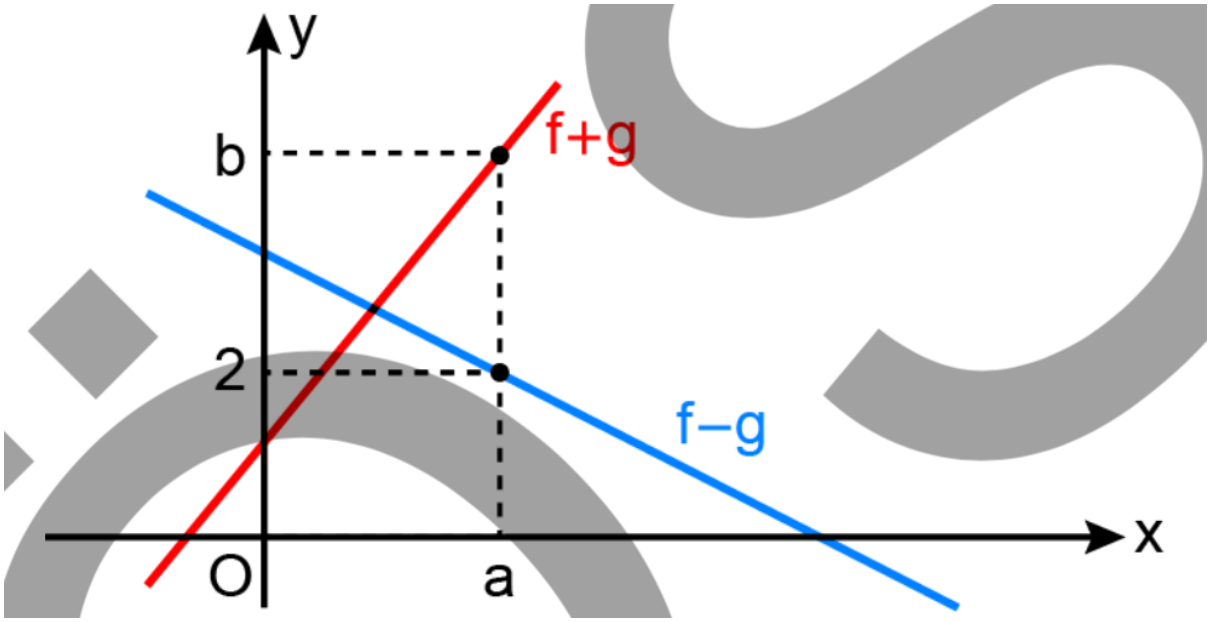
A) 11 B) 11.5 C) 12 D) 12.5 E) 13

Question 11:
Using the elements of sets A and B, which consist of letters and have 9 elements each, two of the words "asker" (soldier), "ressam" (painter), and "akademisyen" (academician) can be written with the elements of set A intersect B, and the other one can be written with the elements of set A or B.

According to this, which of the following words definitely cannot be written with the letters in set A?

A) şair (poet) B) hekim (doctor) C) memur (civil servant)
D) sanatçı (artist) E) sekreter (secretary)

Question 12:
The graphs of the functions f + g and f - g are given in the coordinate plane.



If f(g(a)) = 2, what is the value of b?

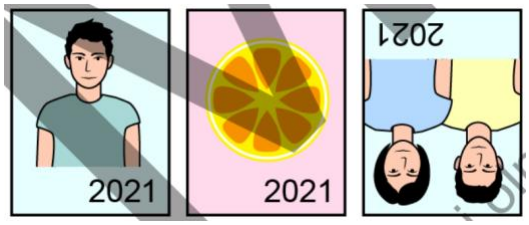
A) 3 B) 4 C) 5 D) 6 E) 7

Question 13:
A painter writes the year he completed each painting in the bottom right corner of that painting. The following propositions are given regarding the hanging of three paintings made by this painter in 2021 on the walls in the exhibition area:

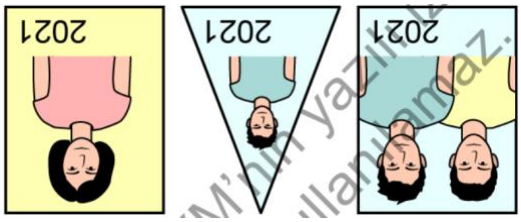
p: Every painting on the wall is hung upside down.
q: There is at least one person in each painting.
r: The shape of each painting is rectangular.

Given that the proposition $(p \vee q)' \wedge r$ is true, which of the following could be the appearance of these three paintings of the painter as they are hung on the wall in the exhibition area?

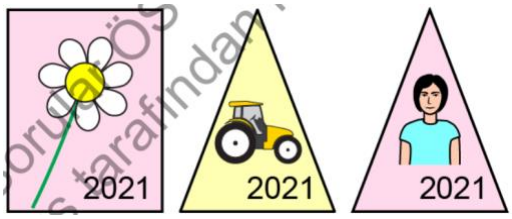
A.



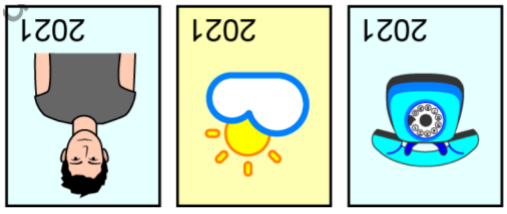
B.



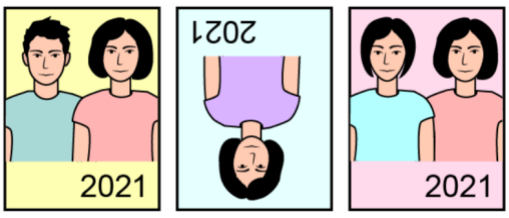
C.



D.



E.



Question 14:
When the numbers in a data group are arranged from smallest to largest, if the number of terms in the group is odd, the middle number, or if it is even, the arithmetic mean of the two middle numbers is called the median of that data group.

The ages and heights of the players of a 9-person volleyball team are given as the following ordered data group according to their heights, where the first component shows their ages and the second component shows their heights:

(18; 1.76), (17; 1.79), (18; 1.82), (19; 1.84), (20; 1.84), (21; 1.88), (17; 1.90), (20; 1.92), (19; 1.96)

One player has left this 9-person team, but the median of both the ages and heights of the remaining players has not changed.

According to this, which of the following correctly gives the age and height of the player who left this team?

A) (17; 1.79) B) (17; 1.90) C) (19; 1.84) D) (19; 1.96) E) (21; 1.88)

Question 15:
Let AAB and ABA be three-digit natural numbers that are divisible by 9, where one of these numbers is divisible by 5 and the other is divisible by 12.

According to this, what is the sum of A + B?

A) 7 B) 8 C) 9 D) 10 E) 11

Question 16:
To factorize the polynomial $P(x) = x^2 + mx + n$, numbers r and s are sought such that $P(x) = (x - r)(x - s)$ and $rs = n$, $r + s = -m$. If these numbers satisfying the given conditions can be found, the polynomial is factorized as $P(x) = (x - r)(x - s)$.

Using the method described above, Sude wanted to factorize the polynomial $P(x) = x^2 + x + b$ where $a \neq 0$. After finding the real numbers m, n, r, and s that satisfy the given conditions, she noticed that these numbers were all integers. Later, she mixed up where to write the numbers n and s, and mistakenly factorized the polynomial as $P(x) = (x - m)(x - n)$ instead of $P(x) = (x - r)(x - s)$, and found the factors of the polynomial $Q(x) = x^2 + ax + b$.

According to this, what is the value of b?

A) 11 B) 12 C) 13 D) 14 E) 15

Question 17:
For a natural number n, the sum of the digits of the natural number $(10^n - 22)/3$ is 44.

According to this, what is the value of n?

A) 13 B) 14 C) 15 D) 16 E) 17

Question 18:
Ahmet has separated the achievement comprehension test files prepared for mathematics class according to their subjects and filed them on his computer as follows:

According to Ahmet's filing process, there are 5 folders inside the main folder named Mathematics, n sub-folders inside each folder, p test files inside each sub-folder, and 12 questions in each test.

Ahmet has deleted one of the sub-folders in the Probability folder along with its contents because he has solved all the tests in that sub-folder.

In the final situation, how many questions are there in total in the main Mathematics folder?

A) 48*n*p B) n*(60*p - 1) C) 60*p*(n - 1) D) 12*p*(5*n - 1) E) 60*n*p - 1

Question 19:
While reading information about a vase he saw in a museum he visited in 2020, Faruk learned that the year the vase was found was the same as his birth year, and that the vase was 300 years old when it was found. He also calculated during this visit that 39 times his age equals the year the vase was made.

According to this, how old is Faruk in 2020?

A) 41 B) 42 C) 43 D) 44 E) 45

Question 20:
A two-digit natural number written using the digits 1, 4, or 7 is called a "straightforward number" if the number obtained from the sum of its digits also consists of the digits 1, 4, or 7.

According to this, how many straightforward numbers are there?

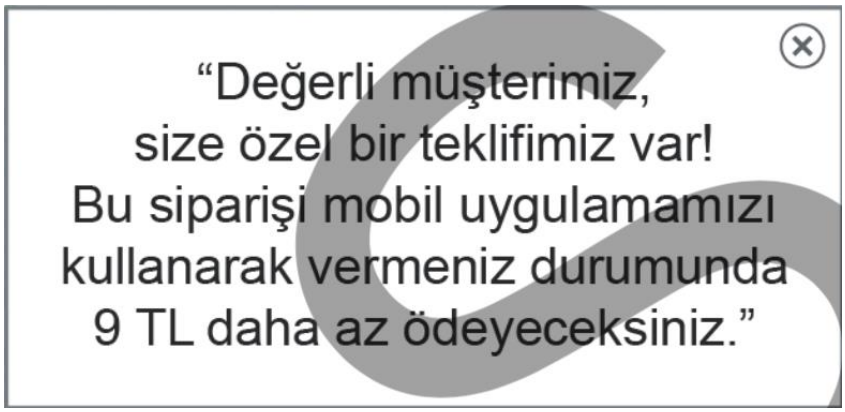
A) 1 B) 2 C) 3 D) 4 E) 5

Question 21:
A vehicle moving at a constant speed in the same direction on a circular track:
- Passes point B for the 3rd time 3 minutes after starting movement from point A,
- Passes point B for the 7th time 8 minutes after starting movement from point A.

According to this, how many seconds after starting movement from point A did this vehicle pass point B for the first time?

A) 30 B) 35 C) 40 D) 45 E) 50

Question 22:
A customer who wants to order pizzas selected from a pizza shop's website encounters the following message when reaching the payment screen:

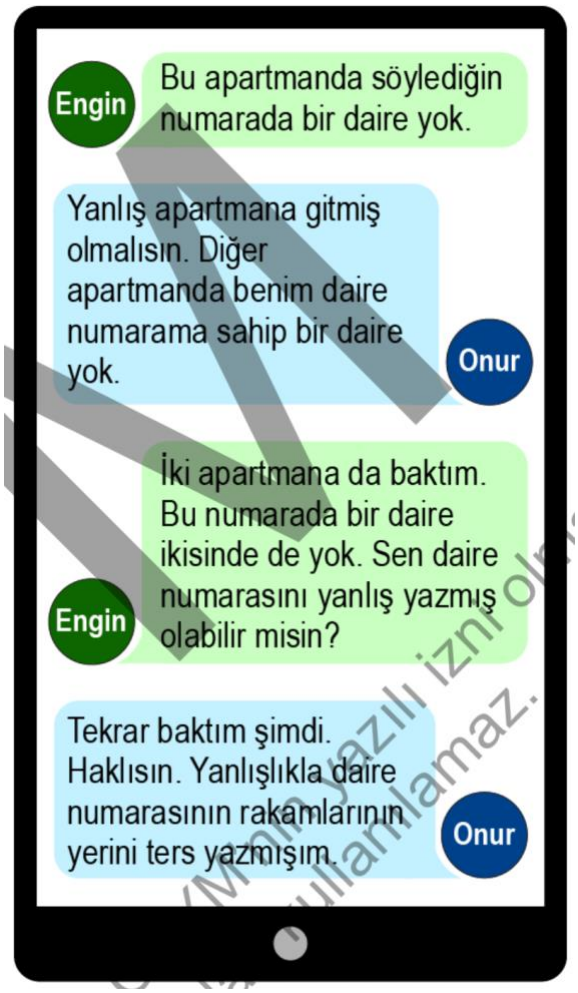


After this message, when this customer orders the same pizzas through the mobile application, they paid 15% less compared to the total amount they would have had to pay if they had ordered from the website.

According to this, what is the total amount in TL that the customer paid for the pizzas in the final situation?

A) 47 B) 48 C) 49 D) 50 E) 51

Question 23:
Onur, who lives in a site consisting of two apartment buildings, one with apartments numbered from 01 to 72 and the other with apartments numbered from 01 to 88, sends a message with the site's address and apartment and apartment number to Engin, whom he invited to his home. After Engin arrives at the site, the following exchange takes place between them on the phone:



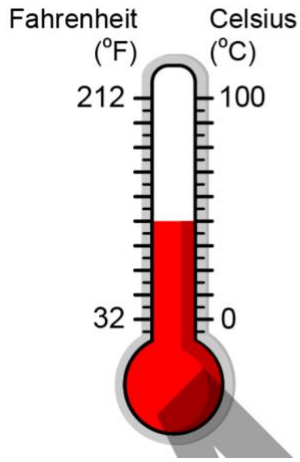
According to this, what is the sum of the digits of Onur's apartment number?
A) 8 B) 10 C) 12 D) 14 E) 16

Question 24:
Seda, who has agreed with an organization company for cold and hot beverages to be served at her birthday party, tells the company to make the necessary preparations, stating that she estimates that between 52% and 60% of the guests will take cold beverages, between 67% and 72% will take hot beverages, and at most 4% will not take any beverage.

According to Seda's estimate, between which two percentage values is the ratio of the number of guests who will take both a cold beverage and a hot beverage to the total number of guests?

A) 15% – 24% B) 16% – 33% C) 19% – 36% D) 22% – 30% E) 24% – 29%

Question 25:



Sıcaklık ölçü birimleri olan Fahrenheit (°F) ve Celsius (°C) arasındaki dönüşümler

$F=\frac{9}{5}\cdot C+32$ formülü

kullanılarak hesaplanmaktadır.

Cem was assigned to measure the temperature of the classroom at the same time every day for five days they went to school and find the average temperature of these five days in Celsius. For this measurement, the thermometer shown in the figure, which shows the current air temperature in both Fahrenheit and Celsius, was used.

Cem did not go to school on one of these five days, and his classmate Deniz made the measurement that day. However, Deniz mistakenly recorded the F value instead of the C value for that day's temperature on the list. Cem calculated the average temperature of these five days as 33.8°C according to the values on the list.

	Pazartesi	Salı	Çarşamba	Perşembe	Cuma
Sıcaklık (°C)	23	27	25	20	26

Given that the values of these five-day measurements on the list are as shown above after the temperature value on the day Deniz made the measurement was converted to Celsius, on which day did Cem not go to school?

A) Monday B) Tuesday C) Wednesday D) Thursday E) Friday

Question 26:
135 students at a school travelled to their homes during a holiday using bus companies A or B for both their departure and return journeys. While 75 students preferred company A for departure, 90 students preferred company B for return, and 86 students travelled with different companies for departure and return.

According to this, what is the total number of students who went with company B and returned with company A?

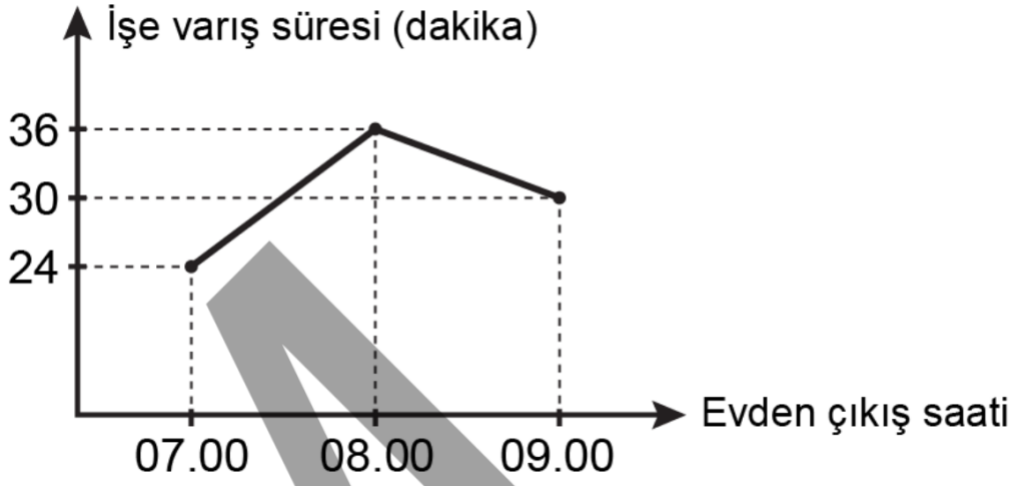
A) 22 B) 25 C) 28 D) 31 E) 34

Question 27:
Flexible working system has been introduced in a workplace where there is work every day. The owner of this workplace has asked some of the employees to come to the workplace every other day, and others every three days. After switching to this system, it was observed that the number of employees coming to this workplace in the first four days were 22, 19, 28, and 26, respectively.

According to this, how many employees came to this workplace on the fifth day after switching to this system?

A) 12 B) 15 C) 18 D) 21 E) 24

Question 28:
In the graph below showing Fatih's arrival time to work according to his departure time from home on a specific day, the graph representations between 07:00 - 08:00 and 08:00 - 09:00 are linear.



Fatih, who left home in one hour between 08:00 and 09:00, would have had the same arrival time to work if he had left home exactly one hour earlier.

According to this, at what time did Fatih arrive at work?

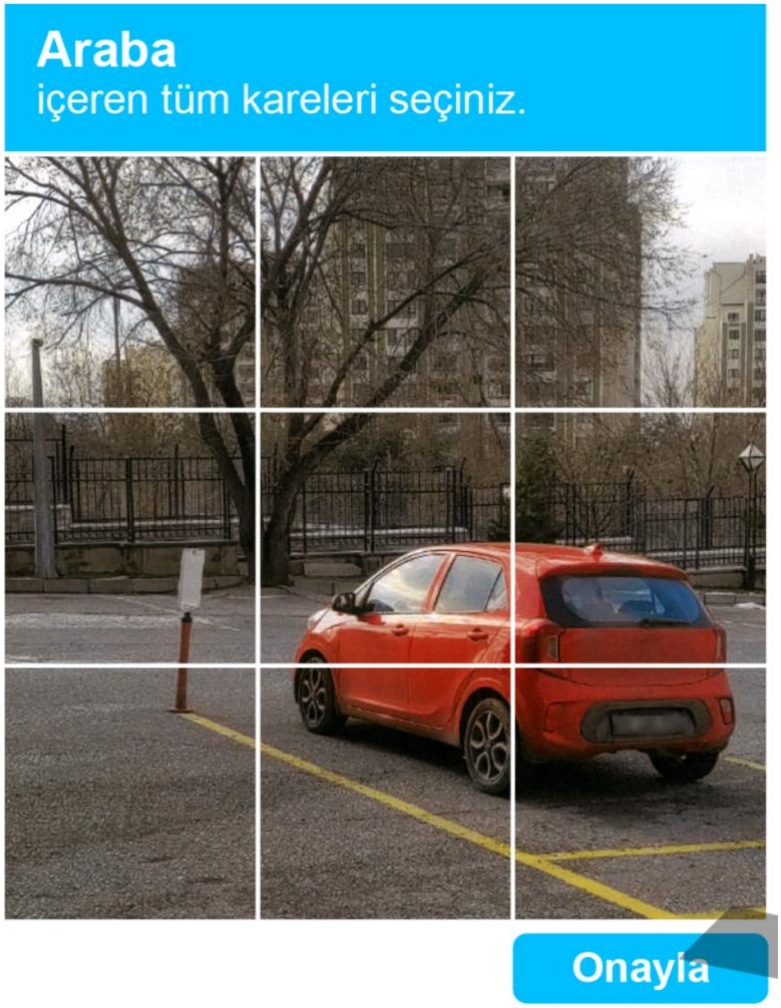
A) 09:12 B) 09:15 C) 09:18 D) 09:21 E) 09:24

Question 29:
In a mathematics class, the teacher asked Veli to calculate in how many different ways 3 students could be selected from the students in the class, Yasin to calculate in how many different ways 5 students could be selected, and Zeynep to calculate in how many different ways 11 students could be selected. All three students calculated the requested numbers correctly.

Given that the numbers found by Yasin and Zeynep are the same positive integer, what is the number found by Veli?

A) 364 B) 560 C) 688 D) 816 E) 960

Question 30:
To be able to log in to a website, users need to select all unit squares containing car parts from the photo below divided into 9 unit squares and click the confirm button.



Eda, who wanted to enter this site, randomly selected four different unit squares from this photo and clicked the confirm button.

According to this, what is the probability of Eda being able to log in to this site?

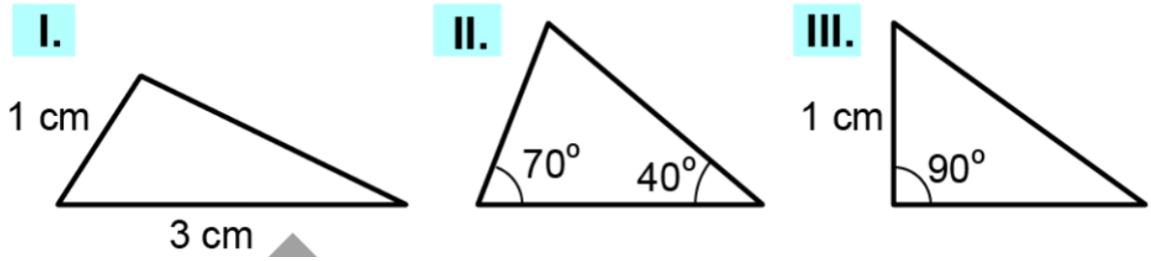
A) 1/15 B) 1/36 C) 1/56 D) 1/84 E) 1/126

Question 31:
Ali turns his direction to the north from the point where he is located on a flat surface, moves forward 5 meters, then turns clockwise and moves forward 5 more meters, reaching the point where Berk is located.

If Ali turns his direction to the north from the point where he was initially located, moves forward 10 meters, then turns clockwise by at least how many degrees and moves forward without changing his direction again to reach the point where Berk is located?

A) 108 B) 117 C) 144 D) 153 E) 162

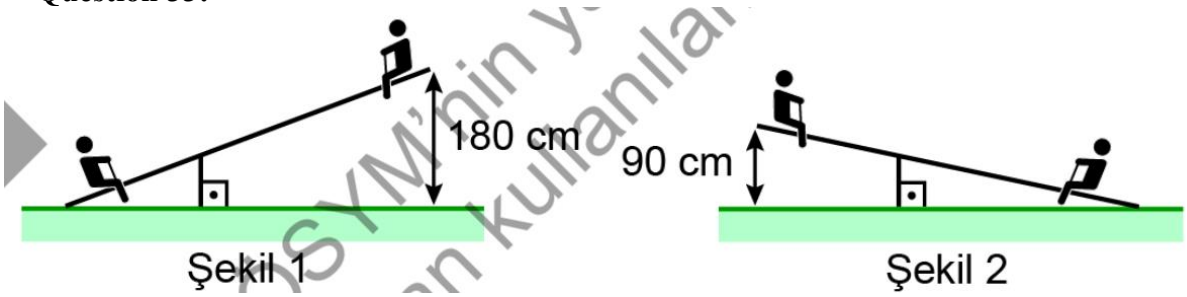
Question 32:
Triangles in which the length of one side is equal to the arithmetic mean of the lengths of the other two sides are called mean triangles.



According to this, which of the following triangles can be a mean triangle?
I. A triangle with side lengths 5, 8, and 13
II. A triangle with side lengths 4, 5, and 9
III. A triangle with side lengths 7, 12, and 19

A) Only I B) Only III C) I and II D) II and III E) I, II, and III

Question 33:



A seesaw that is not equilateral has been made with a linear piece and a support placed on this piece perpendicular to the ground. When the left end of this seesaw, which is placed on a flat surface, touches the ground as shown in Figure 1, the height of the right end from the ground is 180 cm. When the right end of the seesaw touches the ground as shown in Figure 2, the height of the left end from the ground is 90 cm.

According to this, what is the length of the support placed on the seesaw in cm?

A) 45 B) 54 C) 60 D) 75 E) 81