



# Searching for the Corvina

14-15



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# Searching for the Corvina

**Topic:** Mathematics

**Level:** Secondary education (14-15 years old)

**Concepts:** Equations, Pythagoras theorem, history of King Matthias.

**Time required:** +/- 45 min

**Summary of the activity:** This adventure takes you to the Renaissance court of Matthias Corvinus, King Matthias of Hungary. By solving mathematical problems (equations and Pythagorean theorem), the student will get to the correct solution, find the code hidden in the Corvina and save the King's memory. While solving the mathematical problems, students will learn about King Matthias' life and the places where he lived.

**Itinerary/Process Summary:** This is a classic itinerary with multiple choices. The correct choice will lead to the progress of the story. Usually, the wrong choice leads to an explanation and a return to the previous paragraph to try again.

**Material needed:** Paper, pen, calculator, ruler, math knowledge and... motivation!

# 1

The weekend is coming up and you're thinking about maths homework.

In maths class today, you were given some extra work: the maths teacher assigned everyone an individual problem. She handed yours, written on a slip of paper, but you didn't care; you just read it and tucked it in your pocket.

You also think of the history lesson, but you only have a vague idea of the Hungarian King Matthias.

You toss and turn until you fall asleep. However, it seems that this is definitely not a time to rest for you because you suddenly feel someone shaking your shoulder vigorously.





The statue of King Matthias Corvinus in Cluj



You cannot believe your eyes: there are soldiers in armour in front of you, your room has disappeared, and you find yourself in a square. You suddenly realise that this is Cluj, the well-known historical city of Transylvania, Romania, and the soldiers are the animated members of the Matthias statue group from the main square.

"You must help me," says the King's rejuvenated statue, "If you do not solve the mystery and find the code in Corvina by morning, our memory will be lost forever, our statues will be destroyed. I will give you a ring that will expand time and help you travel through space and time. But before each journey, you'll be given a task, if you solve it, it will help you go where you want to go."

**Decide where you want to start your research:**

- **Buda Castle, Matthias Fountain**  **Go to paragraph 7.**
- **Cluj, the house where Matthias was born**  **Go to paragraph 5.**

## 2



In Matthias King's birth house, Mr Méhffi frowns and points to a stone plaque in the corner of the courtyard:

"Oops, that's incorrect! This may help you!" he says.

The stone plaque is inscribed with the year of King Matthias' birth in Roman numerals: MCDXLIII.



**Translate it into Arabic numerals!**

- **If the result is 1443**  **Go to paragraph 14.**
- **If the result is 1543**  **Go to paragraph 17.**



3

Photo by  
Andrew Bossi,  
Wikipedia  
Commons



Your answer was right: the arrow travels 13 metres.

You look around and realise you are in the Buda Castle.

**The Buda Castle** is an emblematic architectural masterpiece of Budapest, located on **Saint George Square**. It has been the home of the Hungarian kings since the 13th century. The medieval walls and a few buildings from this period have survived, but in the 19th century it was significantly remodelled according to the designs of **Miklós Ybl** and **Alajos Hauszmann**. The building is nowadays a complex and modern cultural institution. It houses the Hungarian National Gallery, the National Széchényi Library and the Budapest History Museum.

➡➡➡ → **Go to paragraph 16.**

4

Unfortunately, your answer was not correct. Keep going, you'll find help!

⚡ → **Go to paragraph 21.**

5

## The house where King Matthias was born



The ring took you back to the past. You find yourself in front of an imposing house in Cluj.

A strangely dressed gentleman approaches you and talks to you: "Welcome. I see that the magic ring has brought a new guest. I am Jakab Méhffi, vineyard master,

owner of this house. Erzsébet Szilágyi, the mother of King Matthias, usually stays at this house when she visits Cluj. Do you know that King Matthias was born here? Do you know in which century? I'll give you a clue!" he says, and hands you a piece of paper with the following task on it:



$$3 \cdot (x - 443) = x + 1557$$

The solution to the equation, is the year of King Matthias' birth.

➤ If the result is within the 14th century → Go to paragraph 2.

➤ If the result is within the 15th century → Go to paragraph 13.

6

Well done, your answer is correct: the solution is 7. Keep going!

→ Go to paragraph 16.

7

Photo by Harry NI on Flickr

You have arrived at **Buda Castle, at the Matthias Fountain.**

Budapest's Trevi Fountain, the Matthias Fountain by Alajos Stróbl, is under renovation.

You find a note: "Go back to Matthias' birthplace"

 **Go to paragraph 5.**



8



Image from Freepik

In **Prague's** main square, an old scholar carries big books. You help him and he reminds you that

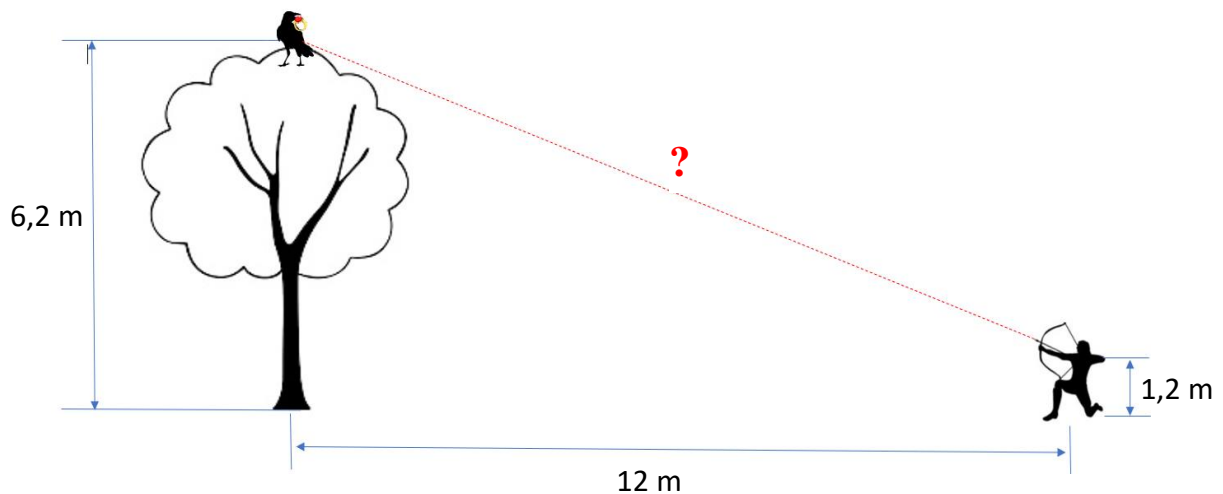
We call Pythagorean triple a number triple  $(x,y,z)$  of natural numbers if  $x^2 + y^2 = z^2$ .

The result of the previous paragraph is 15.

 **Go to paragraph 25.**

9

In the **Corvin Castle**, in Hunedoara, a knight steps out into the courtyard and draws with the point of his sword in the dust of the courtyard. You notice that he wants to help. You look closely at the drawing and this is what you see:



How far must the arrow fly to reach the bird?

- If the result is less than or equal to 12 → Go to paragraph 18.
- If the result is between 12 and 14 → Go to paragraph 3.
- If the result is greater than or equal to 14 → Go to paragraph 19.

10

You are still in Buda Castle. You are blocked... Hmm...



You notice a folded sheet on the knocker of the castle gate.

Looking inside, you find the words, "The sum of the numbers along each row, each column and each diagonal of the magic square is the same."

You slap your forehead. "Of course!" That way, you can easily calculate.

- → Go to paragraph 20.



11

“Matthias I” by János Thuróczy  
(Chronica Hungarorum, 1488)



Your answer was not right.

Matthias Hunyadi was elected king on January 24, 1458, on the frozen Danube. However, the young monarch arrived from Prague only on February 14, 1458.

**You can follow the young king to Budapest if you find the solution to the next challenge:**

**Which is the missing number in the Pythagorean number triple where the smallest number is 8 and the largest is 17?**

- **If the result is less than 13**      ➡➡➡ ➔ **Go to paragraph 8.**
- **If the result is between 13 and 18**      ➡➡➡ ➔ **Go to paragraph 25.**
- **If the result is greater than 18**      ➡➡➡ ➔ **Go to paragraph 29.**

12

You are still in the Széchenyi Library. Your answer was not correct.

The divisors of 6 that are less than itself are 1, 2 and 3. The sum of these is 6. So, 6 is the first perfect number and the number less by 1 is 5.

Now that you have understood, you turn one of the rings.

➡ **Go to paragraph 22.**

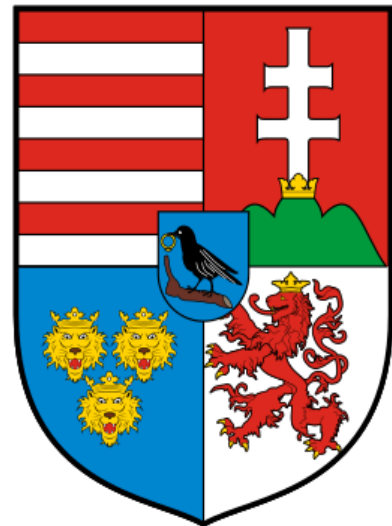
### 13

Great! The ring has taken you to the **Corvinus Castle** to Hunedoara, Romania. A group of tourists is actually visiting the castle, the guide is telling them about a legend:

Matthias took the name Corvinus from the family coat of arms, which depicted a raven (in latin: "corvus") holding a ring, probably after an estate held by his family, called the Stone of the Raven. Legend says that while Matthias was imprisoned in Prague, his mother sent him a message that he would soon be freed with the help of a raven.

When Matthias was elected king, he had a raven placed in his coat of arms because the raven brought him news of his difficult captivity.

On the family coat of arms - the lion of the Hunyadis` - a raven appears in front of the heart shield, holding a ring in its beak.



One of the coat of arms of Mathias Corvinus of Hungary (1458–1490)

 **Go to paragraph 9.**

### 14

Mr. Méhffi confirms that **Matthias the First**, by birth **Matthias Hunyadi**, popularly known as **King Matthias**, was born in Cluj on 23 February 1443 and died in Vienna on 6 April 1490. Matthias established one of the earliest professional standing armies of medieval Europe (the Black Army of Hungary), reformed the administration of justice, reduced the power of the barons, and promoted the careers of talented individuals chosen for their abilities rather than their social statuses. Matthias was the first non-Italian monarch promoting the spread of Renaissance style in his realm, he patronised art and science; his royal library, the Bibliotheca Corviniana, was one of the largest collections of books in Europe.



Matthias as a young monarch (after a contemporary miniature from the Corviniana collection of the British Museum)

 **Go back to paragraph 13.**

15

Your answer is not right.

Go to the North side of Hercules Fountain and read the note about it.

The most important decorative elements of the Hercules Fountain are the coats of arms of King Matthias Hunyadi and the childhood figure of Hercules defeating the Lernaean hydra. The rays of water originally escaped from the



hydra's throat. The depiction is symbolic, although Hercules is known in mythology as an adult, here appears in the form of a child, being a reference to Prince John Corvin, Matthias' illegal son, who was also a child at the time. Matthias presents the infant John Corvin as his successor. Just as Hercules defeats the Hydra, so John Corvin, as Matthias' appointed heir, brings the Habsburgs to their knees.

Photo from Dreamstime

At the end of the brochure, you will be delighted to discover some help to solve the problem.

"Apply Pythagoras' Theorem: The square of the diagonal of a rectangle is equal to the sum of the squares of the width and length of the rectangle.

Remember that in this exercise, the length of a rectangle is equal to the double of its width. Also, remember to use the same units!

If we use  $x$  to denote the width, then the theorem of Pythagoras is as follows:

$$x^2 + (2x)^2 = 120^2$$

You calculate the value of  $x$ , add 50 cm and compare it to 1 metre."

Now you know what to do. You realise that the depth of the well is more than 1 m.

 **Go to paragraph 28.**



16

Photo by Alice  
on Unsplash



You have arrived in nowadays Prague, in the Castle. You can find out more information in the Royal Castle, from the guardian at the Matthias Gate.

You show the ring, and the guardian tells you the story of the coronation:

“The execution of László Hunyadi (brother of Matthias) in Buda on 16 March 1457 provoked the anger of the Hunyadi family. Szilágyi Erzsébet and Szilágyi Mihály started an uprising. King László V and his followers fled to Vienna taking the young Matthias with them. In 1457 the King László V died unexpectedly and the throne of Hungary was once again vacant. Later Matthias returned to Buda as king.”

“How old was Matthias when he became king?”, you ask the guardian.

**Solve the next problem and you'll know at what age Matthias was crowned king. To have an answer, you need to add 3 to the number you find:**

“The clock has struck!” shouts the watchman.

“What time did it strike?” asks a night wanderer.

“Add a half, third and a quarter of the real time, and the sum you get is 1 hour more than the real time. What was the time?” asks the night watchman.

Now if you got the number, which expresses the time, add 3 and you will find Matthias' age when he became a king.

- If the result is less than or equal to 13 → → → Go to paragraph 11.
- If the result is greater than 13 → → → Go to paragraph 25.

17

Nothing happened. You move closer and turn the stone tablet over. The back of it has been vandalised.

When you look closely, you see that the Roman M stands for 1000, CD is the equivalent of 400, XL is 40 and III is 3. So Matthias was born in 1443.

I	II	III	IV	V	VI	VII	VIII	IX
1	2	3	4	5	6	7	8	9
X	XI	XII	XIII	XIV	XV			
10	11	12	13	14	15			
XVI	XVII	XVIII	XIX	XX				
16	17	18	19	20				
L	C	D	M					
50	100	500	1000					

 Go to paragraph 13.

18

Photo by Janos Virag  
on Pixabay



The right answer: the arrow travels 13 metres.

You look around and realise you're in the Buda Castle.

**The Buda Castle** is an emblematic architectural masterpiece of Budapest, located on **Saint George Square**. It has been the home of the Hungarian kings since the 13th century.

But this is not the castle you know, although it looks like it. You can see the Danube, but there is no sign of the Parliament. The whole environment, the people's clothes are different. You realise that the ring has moved you back in time - this is Buda Castle, but in the 15th century!

**A lady-in-waiting walks past you and drops a handkerchief. You can see by her gesture that it was addressed to you. You examine it more carefully and notice that the next task is embroidered on it. Solve it, the result will lead you further along your path.**

$$\frac{x+2}{3} + \frac{x-1}{4} + \frac{x-37}{12} = 2$$

- If the result is less than 9      >>> → Go to paragraph 6.
- If the result is between 9 and 10      >>> → Go to paragraph 4.
- If the result is greater than 10      >>> → Go to paragraph 21.

19

Photo by Marius 14sica on Pixabay

Your answer is not right. You should have used the Pythagorean theorem to solve the problem. Therefore, you must make a side trip to Corvin Castle in Hunedoara, Romania.

**The Corvin Castle** is a Gothic-Renaissance castle, one of the largest castles in Europe and is featured as one of the Seven Wonders of Romania. It was laid out in 1446, when construction began by order of Voivode of Transylvania John Hunyadi. His fame was a decisive factor in the election of his son, Matthias Corvinus, as king by the Diet of 1457. Hunyadi is a popular historical figure among Hungarians, Romanians, Serbs, Bulgarians and other nations of the region.

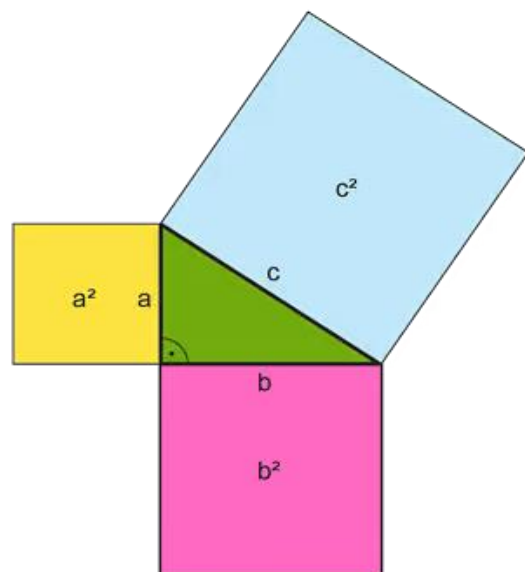
An old astronomer steps forward and makes you remember the Pythagoras theorem: "In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides."

In this way,  $x^2 = (6,2 - 1,2)^2 + 12^2$ , where  $x$  is the distance you are looking for.

Now you have understood it, so you can make the calculations.

Find out where the ring takes you.

 **Go to paragraph 18.**





20

Photo of the Renaissance Fountain,  
Visegrád, Hungary, by Mediatius



The magic square in Dürer's engraving was completed in 1514. Now you know the correct code, turn the ring.

You look around and recognise that the ring is next to the well in the courtyard of Visegrád Castle. In the courtyard, you can see one of the most unique monuments of the Hungarian Renaissance, the Fountain of Hercules.

You look into the well pool and there's a paper boat floating on the water. You take it out and see a writing on it. You realise it's a message for you.



On the sides of the octagonal basin of the Hercules Fountain, the Hunyadi coat of arms is carved in ornately rectangular shapes. The length of such a rectangle is twice its width and its diagonal is 120 cm.

**The length of such a rectangle is the double of its width and its diagonal is 120 cm. What is the height of the basin, knowing that it is half a metre longer than the width of the decorative rectangle?**

- If the result is less than 1     ➤➤➤➤➤➤ ➤ Go to paragraph 24.
- If the result is 1                 ➤➤➤➤➤➤ ➤ Go to paragraph 15.
- If the result is greater than 1     ➤➤➤➤➤➤ ➤ Go to paragraph 28.

21

Oops, your answer is not correct.

You meet a wise man in the Buda Castle. He can help you solve the equation:

**Multiply the  $\frac{x+2}{3} + \frac{x-1}{4} + \frac{x-37}{12} = 2$  equation with 12.**

Thus  $4(x+2) + 3(x-1) + x-37 = 24 \Leftrightarrow 4x+8+3x-3+x-37=24$

From this point, you can easily solve the equation. As you can see, the result is 7.

Knowing this, the ring will carry you on.



**Go to paragraph 16.**

22

And once again you find yourself in Cluj 's main square, in front of a group of statues that have just become alive.

**"The code is 5!" you shout.**

They smile happily, you know the code is right and seeing the five armoured men, you understand why that number is right.

The armoured men slowly fall into place and shrink back into statues.

And suddenly, you wake up and realise you were dreaming all along!

But regardless, you start your day on a positive note.

The history lesson is no longer a problem and you easily solve the mathematical problem on the slip of paper tucked in your pocket.

**Well done! Congratulations!**

**The end**

23

Photo of the Statue of Bonfini  
in Budapest by Edwinrijkaart



You're walking in **Buda Castle**, looking for a clue to move on.

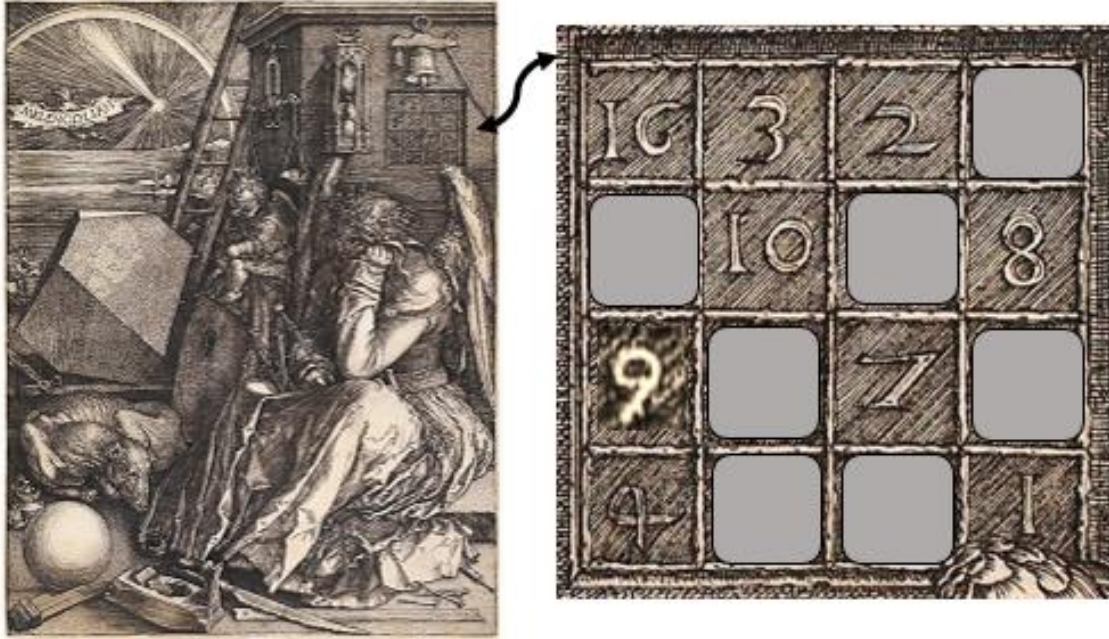
You're very thirsty, but here, in the time of King Matthias, where the ring has taken you, you won't find the usual shops, so you head for the marble pool of the fountain in the middle of the palace courtyard. A scholar-looking man stands beside the marble pool.

"I am Antonio Bonfini, the King's chronicler. In this book, you will find the answer to your question. Find the door and unlock the secret of the magic squares!"

You open the book, but there is no door. Suddenly you notice an interesting passage:

"King Matthias' contemporary was **Albrecht Ajtósi-Dürer** (1471-1528), the greatest figure of German Renaissance art, one of the most prominent artists of the early Reformation in Bavaria. His family came from Hungary. Dürer's father, the goldsmith Albrecht Dürer the Elder, emigrated from Ajtós near Gyula to Nuremberg, and their family name still preserves their origin, since it is derived from the German word **Tür = door** and is the German form of the Hungarian surname **Ajtósi**."

You look up from the book, but Bonfini is nowhere to be seen. The answer has to be in the book. You turn the page and read this:



Left: Albrecht Dürer, "Melencolia I". Right: Detail of the magic square

Magic squares have long been known. A famous magic square can be seen in the top right-hand corner of Albrecht Dürer's engraving "Melancholy". The two values in the middle of the bottom row of the square add up to the year the engraving was made. This is the number you need to decipher.

- If the result is 1510 → → → → Go to paragraph 20.
- If the result is 1512 → → → → Go to paragraph 10.
- If the result is 1514 → → → → Go to paragraph 28.

24

You are still in Visegrád, unfortunately your answer was not right. Continue your trip to find some new information.

→ → → → → Go to paragraph 15.



25

"The Coronation of Matthias" by  
Tornyai Tibor from  
Szek-helyek.ro



Your answer was right.

Use your ring to follow the 15-year-old young king to Buda.

You stand in the Castle Court in Buda, where you are informed that:

Matthias, who returned home in February 1458 was consecrated king in a spectacular ceremony in the Church of Our Lady of the Assumption (today's Matthias Church).

 **Go to paragraph 23.**

### 26

At the **Széchenyi Library**, a welcoming guide is enthusiastic about presenting the Corvinas to you: the origin of the name of the Corvinas is the latin word “corvus”, meaning raven (the raven holding the ring can be seen in the family coat of arms of Matthias). The Bibliotheca Corviniana continued to grow during



the reign of King Matthias, helped by the work of copyists, translators, bookbinders and purchasers, mainly under the direction of Taddeo Ugoletti. From 1468 to 1471, the German mathematician and astronomer Regiomontanus lived at the court of King Matthias, where he organised the Greek manuscripts of the Corvina library. Here he wrote his astronomical work Ephemerides, which was also used by Columbus on his voyage of discovery.

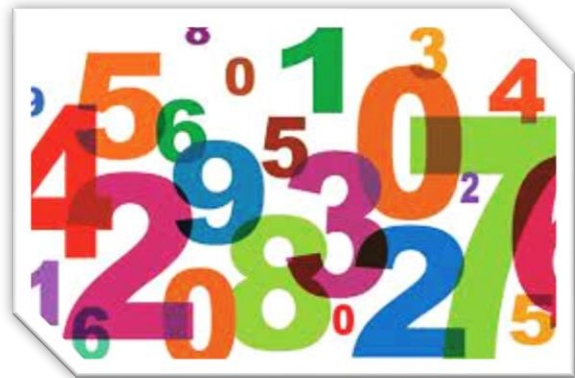
Regiomontanus (1436–1476)



**Go to paragraph 27.**

You are in the Buda Castle. You have to find a new clue. Enter the National Széchényi Library. The librarian gives you an Encyclopedia, in which you can find information about mathematicians from the Renaissance era. King Matthias supported art and science, and he hosted well known scientists of the era. Regiomontanus, the mathematician, was also one of the scientists, who was welcomed by the king.

Regiomontanus found the fifth perfect number. A perfect number is a positive integer (natural number excluding 0) that is equal to the sum of its positive divisors, excluding the number itself.



The concept of the perfect number comes from the Pythagoreans. They knew four perfect numbers.

**Which number do you think is a natural number less than the first perfect number by 1?**

- If the result is less than or equal to 4 → Go to paragraph 12.
- If the result is greater than 4 → Go to paragraph 22.



28

Philostratus by Antonio Bonfini



Great! You have entered King Matthias' famous library.

The Bibliotheca Corviniana was the famous library of Matthias Hunyadi in Buda, the most important collection of the Renaissance in Europe after the Vatican. The codices kept there or originating from there are called Corvinas. At the time of Matthias' death, it is estimated that 2,500 corvinas existed.

 **Go to paragraph 26.**

29

Your answer was not right. You can find out more about Pythagorean number triple if you go on.

 **Go to paragraph 8.**





Designed by 6 European organisations, the project intends to create efficient, engaging pedagogical materials and tools for teachers in order to implement an innovative gamified Homework methodology with pupils. In doing so, we wish to contribute to boosting their efficiency and engagement rate in remote work and, more specifically, in Homework.

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