Név: .... osztály:......

ÉRETTSÉGI VIZSGA ● 2010. május 4.

MATEMATIKA ANGOL NYELVEN

KÖZÉPSZINTŰ ÍRÁSBELI VIZSGA

2010. május 4. 8:00

I.

Időtartam: 45 perc

Pótlapok száma	
Tisztázati	
Piszkozati	

OKTATÁSI ÉS KULTURÁLIS MINISZTÉRIUM

Important information

1. The exam is 45 minutes long, after that you should stop working.

2. You may work on the problems in arbitrary order.

3. You may work with any calculator as long as it is not capable of storing and displaying textual information and you may also consult any type of four digit mathematical table. The use of any other kind of electronic device or written source is forbidden.

4. **The answer for a question should be entered into the corresponding frame**, the solution should be written down only if the question asks you to do so.

5. You are supposed to work in pen; diagrams, however, may also be drawn in pencil. Anything written in pencil outside the diagrams cannot be evaluated by the examiner. Any solution or some part of a solution that is crossed out will not be marked.

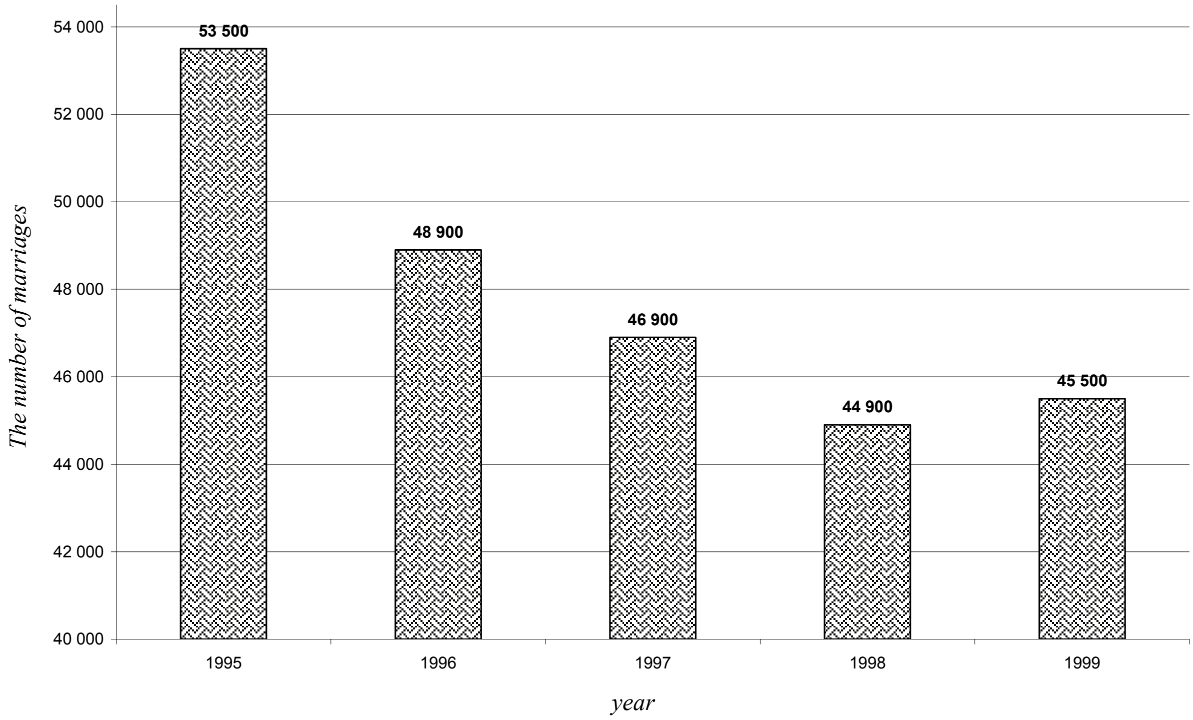
6. There is only one solution for every question that will be marked. If you attempt a question more than once then you should clearly indicate the one to be marked.

7. Please, leave the **rectangular shaded areas blank**.

1. The hypotenuse and a leg of a right triangle are 17 cm and 15 cm long, respectively. Find the length, in centimeters, of the third side of the triangle.

The third side of the triangle is …………. cm long.	2 points	

2. The values displayed on the bar chart below are rounded to the nearest hundred.
How many marriages less took place in 1998 than in 1995?



There were …………….... marriages less.	2 points	

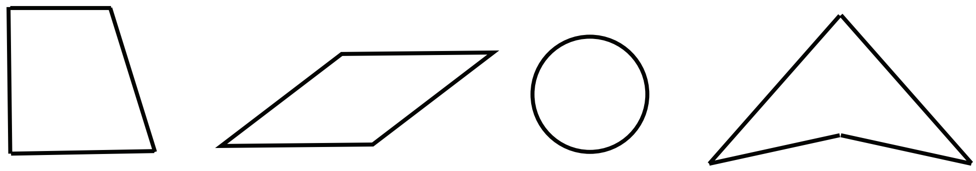
3. The coordinates of the vector **a** are (2; 3), and those of the vector **b** are (–1; 2). Find the coordinates of the vector **a**+**b**.

The coordinates of the vector **a**+**b** are (;)	2 points	

4. Find the real number satisfying $3^{x+2}=1$.

$x =$	2 points	

5. Find the centrally symmetric ones among the 4 figures on the diagram and enter their letter codes in the corresponding field below.



A: trapezium B: rhomb C: circle D: deltoid

The letter codes are	2 points	

6. Find the zero of the function defined as $x \mapsto 5x - 3$ ($x \in \mathbf{R}$).

The zero of the function is	2 points	

7. The edge of the base of a square based brick is 3 cm long. It is also given that its volume is equal to 72 cm^3. Find, in centimeters, the height of the brick.

The height of the brick is …………. cm long.	2 points	

8. Provide the distance 47.3 billion km in light years. It is given that 1 light year is equal to 9460 billion km. Show your calculations.

	2 points	
47.3 billion km = ..………… light years.	1 point	

9. The equation of a circle is $x^2+(y+1)^2-4=0$. Find the coordinates of its centre and also the length of its radius.

The coordinates of the centre of the circle are	2 points	
The radius of the circle is	1 point	

10. Write down a dataset, by listing its elements, that consists of three positive integers, its mean is 3 and its median is 2.

The elements of the data set are	3 points	

11. A new mayor was to be elected in a village. There were 12 608 citizens on the voters' list and there were 6347 valid votes for the two candidates altogether.
The two candidates got 4715 and 1632 votes, respectively. Selecting someone randomly from the voters's list, what is the probability that this person was actually submitting its vote and in favour of the eventually losing candidate?

The probability is:	3 points	

12. One base of a symmetric trapezium is 7 cm long and the measure of the angles on this base are 60°, respectively. The sides of the trapezium are 4 cm long each. Showing your calculations find the length of the other base.

	3 pont	
The length of the other base is ……… cm.	1 pont	

		maximal score	score
Part I.	problem 1.	2	
	problem 2.	2	
	problem 3.	2	
	problem 4.	2	
	problem 5.	2	
	problem 6.	2	
	problem 7.	2	
	problem 8.	3	
	problem 9.	3	
	problem 10.	3	
	problem 11.	3	
	problem 12.	4	
	TOTAL:	**30**	

date examiner

	score attained rounded to the **nearest integer** (elért pontszám **egész számra** kerekítve)	Integer score entered in the program (programba beírt **egész** pontszám)
I. rész/Part I		

javító tanár/examiner jegyző/registrar

dátum/date dátum/date

Megjegyzések:

1. Ha a vizsgázó a II. írásbeli összetevő megoldását elkezdte, akkor ez a táblázat és az aláírási rész üresen marad!
2. Ha a vizsga az I. összetevő teljesítése közben megszakad, illetve nem folytatódik a II. összetevővel, akkor ez a táblázat és az aláírási rész kitöltendő!

Remarks:

1. If the candidate started working on Part II., this table and the signature area should be left blank.
2. If the examination is stopped while the candidate is working on Part I. or it is not continued with Part II, this table and the signature area should be completed.

ÉRETTSÉGI VIZSGA ● 2010. május 4.

MATEMATIKA ANGOL NYELVEN

KÖZÉPSZINTŰ ÍRÁSBELI VIZSGA

2010. május 4. 8:00

II.

Időtartam: 135 perc

Pótlapok száma	
Tisztázati	
Piszkozati	

OKTATÁSI ÉS KULTURÁLIS MINISZTÉRIUM

Important information

1.The exam is 135 minutes long, after that you should stop working.

2. You may attempt the questions in arbitrary order.

3. You are supposed to answer two out of the three questions in part **B**. **Please remember to enter the number of the question you have not attempted into the empty square below.** Should there *arise any ambiguity* for the examiner as for the question not be marked, it is question no. 18 that will not going to be assessed.

4. You may work with any calculator as long as it is not capable of storing and displaying textual information and you may also consult any type of four digit mathematical table. The use of any other kind of electronic device or written source is forbidden.

5. **Remember to show your reasoning, because a major part of the score is given for this component of your work.**

6. **Remember to outline the substantial calculations**.

7. When you refer to a theorem that has been covered at school and has a common name (e.g. Pithagoras' theorem, sine rule, etc.) you are not expected be state it meticulously; it is usually sufficient to put the name of the theorem. *However, you should briefly explain, why and how it can be applied.*

8. Remember to answer each question (i.e. communicating the result) also in textual form.

9. You are supposed to work in pen; diagrams, however, may also be drawn in pencil. Anything written in pencil outside the diagrams cannot be evaluated by the examiner. Any solution or some part of a solution that is crossed out will not be marked.

10. There is only one solution will be marked for every question. If you attempt a question more than once then you should **clearly indicate** the one to be marked.

11. Please, **do not write anything in the shaded rectangular areas**.

A

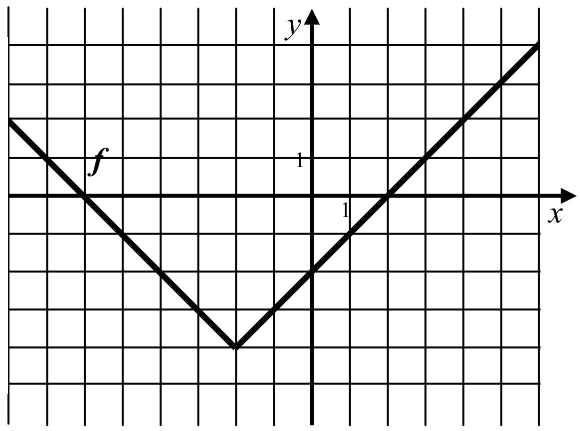
13. The function f is defined on the interval [–8; 6]. The diagram below shows its graph.

a) Find the zeros of f and also its range. What is the smallest value of the function? For which value of x is this minimum attained?

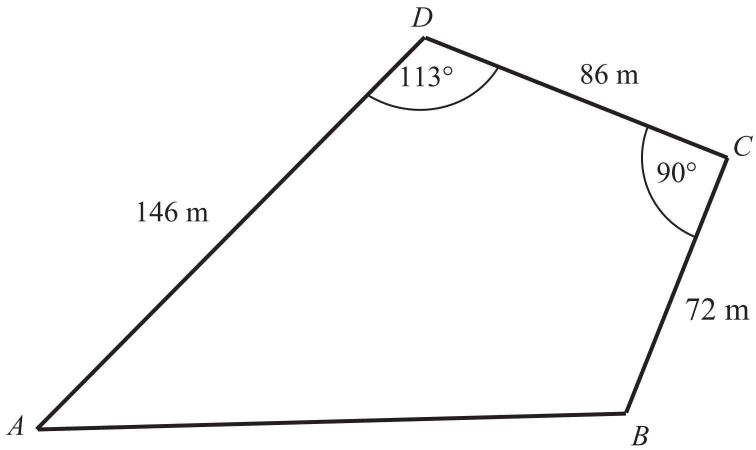
b) Write down the rule that computes the values of f.

c) Solve the equation $|x+2|-4=-2$ on the set of real numbers.

a)	5 points	
b)	4 points	
c)	3 points	
T.:	12 points	



14. The diagram shows the sketch of a quadrilateral piece of land. Calculate, in square meters, its area, rounding the result to the nearest hundred square meters.



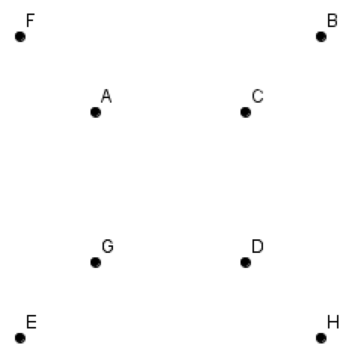
T.:	12 points	

15. Eight classmates, Andy, Bill, Cecily, Daniel, Ed, Frank, Gill and Helen are good friends. Andy came up with the idea of spending the first few days of the summer holidays together in his family's cottage. Not to waste time he called Cecily and Frank asking them to tell everyone in the group urgently about the plan. (There were always two speaking on the phone.)

a) At least how many phone calls must have been made (including those of Andy), to have everyone informed about the plan?

b) After the necessary number of phone calls everyone became aware of Andy's proposal. We are given the following information about these phone calls:
- Apart from those to Cecily and Frank, Andy made no other phone calls;
- Frank did not call anyone and Cecily was talking with Andy and Daniel only;
- Daniel was talking with two friends while Ed did so with three of them, altogether;
- Bill was called by Helen only and she knew that there was no one else she should call;
- Andy was called by Gill only and she asked for the address of the cottage.

Represent the phone calls in a graph whose vertices are denoting the members of the group and two of them are connected by an edge if and only if the corresponding people have actually been talking to each other on the phone. (You are not supposed to indicate the person who has initiated the actual phone call).
Use the diagram below.



c) The next day they were all taking the overcrowded morning train. They managed to spot 3,3, and 2 vacant seats in three neighbouring compartments, respectively. Is it true that there are more than 500 ways to arrange themselves if the seats are not distinguished in the respective compartments?

a)	2 points	
b)	6 points	
c)	4 points	
T.:	12 points	

B

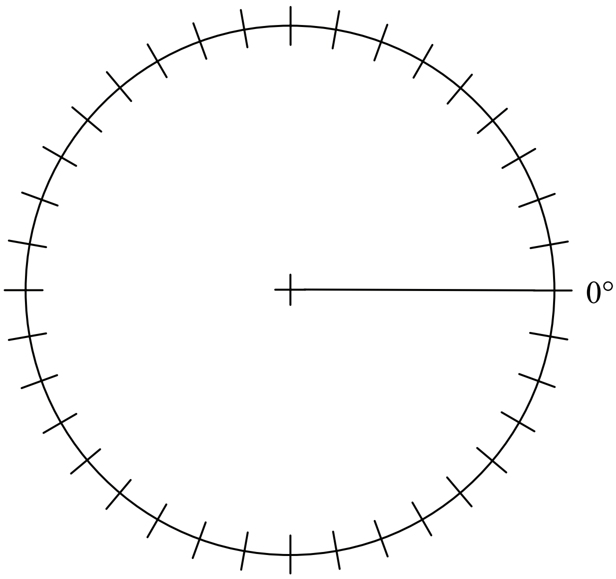
You are supposed to answer any two out of the questions no. 16-18. The number of the question not attempted should be entered into the empty square on sheet no. 3.

16. The woodstock of a forest was an estimated 29 000 m^3 in the beginning of January 1998.

a) After 11 years how many m^3 will be the stock of the forest if the yearly increment is 2 percent of the previous year's stock? Give your answer rounded to the nearest thousand.

The trees are grouped into four types: oak, beech, pine and mixed (different from the first three species).
In the beginning of 1998 there was 44% oaks and 16% pines of the total stock. It is also given that the proportion of the beech to the pines was equal to the proportion of the pines to the mixed. (There were more pines than mixed.)

b) Calculate the percentage of the given types of trees in the total, respectively, as of early 1998. Represent your results on a pie chart indicating also the magnitude , in degrees, of the correspondeng central angles.



a)	5 points	
b)	12 points	
T.:	17 points	

You are supposed to answer any two out of the questions no. 16-18. The number of the question not attempted should be entered into the empty square on sheet no. 3.

17.

a) Which angles greater or equal to 0° and less than or equal to 360° can be substituted for x in the following equation? Solve the equation on the set obtained.

$$4\operatorname{ctg} x = 5 - \operatorname{tg} x$$

b) Solve the equation $\lg(x-3)+1 = \lg x$ on the set of real numbers greater than 3.

a)	11 points	
b)	6 points	
T.:	17 points	

You are supposed to answer any two out of the questions no. 16-18. The number of the question not attempted should be entered into the empty square on sheet no. 3.

18. When conducting a quality control test, it came to light that out of 100 items there are 12 faulty (and hence 88 good ones.) There are six of the 100 items selected randomly, one by one, replacing the taken item after each selection.

a) What is the probability that there are no faulty ones among the selected items? Write down the result as a decimal fraction.

Once again there are 6 items selected randomly out of the same lot of 100, but this time without replacement.

b) Which is more probable:

there are no faulty ones among the selected items,

or

there are at least two faulty items selected?

Justify your answer with computation.

a)	5 points	
b)	12 points	
T.:	17 points	

	No. of the question	maximal score	Score	total
part II./A	13.	12		
	14.	12		
	15.	12		
part II./B		17		
		17		
		← problem not chosen		
	TOTAL	**70**		

	maximal score	Score
Part I.	30	
Part II.	70	
The score for the written component	**100**	

date

examiner

	score attained rounded to the **nearest integer** (elért pontszám **egész számra** kerekítve)	Integer score entered in the program (programba beírt **egész** pontszám)
I.rész/Part I.		
II. rész /Part II.		

javító tanár/examiner

jegyző/registrar

dátum/date

dátum/date