Név: .... osztály: .....

ÉRETTSÉGI VIZSGA ● 2007. október 25.

MATEMATIKA ANGOL NYELVEN

KÖZÉPSZINTŰ ÍRÁSBELI VIZSGA

2007. október 25. 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 set A consists of the one digit numbers greater than three and the set B consists of the positive odd numbers less than twenty. List the elements of the set $A \cap B$.

$A \cap B = \{ \qquad \}$	2 points	

2. Given that $a = 2$ and $b = -1$ calculate the value of C if $\frac{1}{C} = \frac{1}{a} + \frac{1}{b}$.

$C =$	2 points	

3. Which one is bigger: $A = \sin\frac{7\pi}{2}$ or $B = \log_2 \frac{1}{4}$?

(The correct relation sign should be entered in the answer field. You should justify your answer.)

$A \qquad B$	2 points	

4. There are twenty marbles in a box, 45 percent of them are blue and the rest of them are red. Find the probability that a randomly drawn marble is red.

The probability is:	3 points	

5. Decide about each of the following statements if it is true or false.

a) If a natural number is divisible by both six and ten then it is divisible by sixty.
b) The sum of the positive prime numbers less than 20 is an odd number.
c) The diagonals of a deltoid are halving its respective internal angles.

a)	1 point	
b)	1 point	
c)	1 point	

6. Find the solution set of the equation $\lg x^2 = 2\lg x$.

The solution set is	2 points	

7. The sum of the first and the fifth term of an arithmetic progression is equal to 60. Showing your reasoning find the sum of the first five terms of this progression.

The sum of the terms is:	3 points	

8. Three digit numbers are formed using the digits 1, 2, 3, 4, 5 in such a way that non of them contains equal digits. How many numbers can be formed this way?

Answer:	2 points	

9. Which real numbers of the interval [0; 2π] satisfy the equality $\sin x = \frac{1}{2}$?

Answer:	2 points	

10. Given that $\mathbf{a} = 3\mathbf{i} - 2\mathbf{j}$ and $\mathbf{b} = -\mathbf{i} + 5\mathbf{j}$ express the vector $\mathbf{c} = 2\mathbf{a} - \mathbf{b}$ in terms of the vectors $\mathbf{i}$ and $\mathbf{j}$.

c =	3 points	

11. The average of five numbers is equal to 7 . Four of these numbers are given as 1, 8, 9 and 12. Find the missing number, justifying your answer by appropriate calculations.

The missing number is	3 points	

12. Find the range of the function $f(x) = x^2 + 1$ if the domain is the interval $[-2; 3]$.

The range of the function is	3 points	

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

date marking teacher

	score (pontszám)	score input for program (programba beírt pontszám)
Paper I (I. rész)		

date (dátum) date (dátum)

Marking teacher (javító tanár) registrar (jegyző)

Note:

1. Leave this table blank, and do not sign here if the candidate has started working on Paper II.
2. If the examination was interrupted during the candidate working on Paper I, or it was not continued with Paper II, fill out this table and sign.

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!

ÉRETTSÉGI VIZSGA ● 2007. október 25.

MATEMATIKA
ANGOL NYELVEN

KÖZÉPSZINTŰ
ÍRÁSBELI VIZSGA

2007. október 25. 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.

a) Find those positive integers that satisfy the following inequality.

$$5^{x-2} < 5^{13-2x}$$

b) Solve the following equation on the set of real numbers.

$$9^{\sqrt{x}} = 3^{x-3}$$

a)	4 points	
b)	8 points	
T.:	**12 points**	

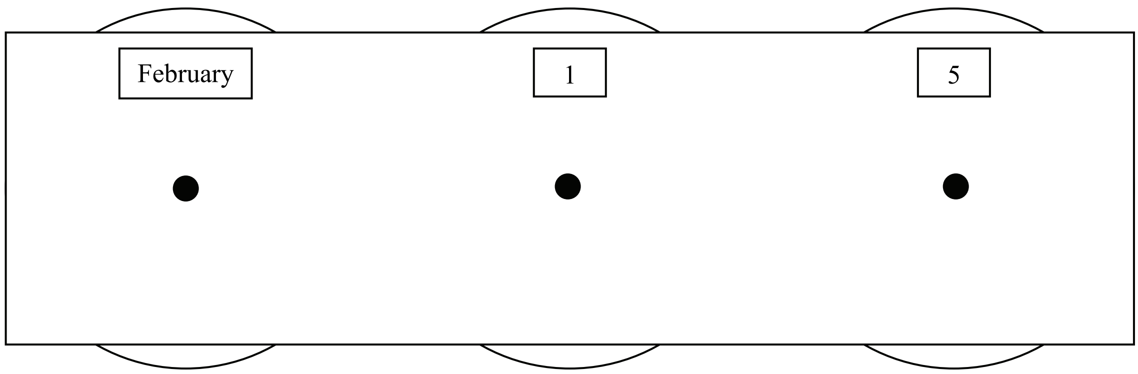
14. There were two chairs at each drawing desk in the art studio of the school and thus there were eight students left without a seat when the biggest class of the school entered the studio. There was one more chair put to each desk and this time they were left with seven empty chairs while every student of the class has found a seat.

a) How many desks were there in the studio? How many students are there in the biggest class?

There is a particular calendar equipped with three rotating discs hanging on the wall of the studio (see the figure). The names of the twelve months of the year are inscribed on the disc on the left. The other two discs can be used to set the day of the month: the digits 0, 1, 2, 3 are inscribed on the middle disc and the digits 0, 1, 2, 3, ...8, 9 are inscribed on the disc on the right. Hence the date set on the figure is February, the 15th. Having this device, one can adjust both proper and improper days of the year.

b) How many ways are there to adjust „dates" on this calendar altogether?

c) The discs are now rotated randomly. Given that it is not a leap year what is the probability that the date hence obtained is a proper day of the year?.



a)	6 points	
b)	3 points	
c)	3 points	
T.:	**12 points**	

15. A square and a rhombus are sharing a common side that is 13 cm long. The area of the square and that of the rhombus are in the ration 2 : 1.

a) Find the altitude of the rhombus.

b) Find the angles of the rhombus.

c) Find the length of the rhombus' longer diagonal, rounding the result to two decimal places.

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

B

You are required to solve any two of the problems from 16 to 18. Write the number of the problem NOT selected in the blank square on page 3.

16. There were 20 players participating in a TV quiz. The quiz consists of three rounds and there are four questions in each round, asked one by one. For every question there are three possible answers announced and one of them is correct. The players have to choose the correct answer by pressing one of the keys *A*, *B* or *C*. If a player chooses a wrong answer then it gets zero points for that question. The number of points for a correct answer is equal to the number of wrong answers on that question (i. e. if Peter's answer is correct and there are 12 players making the wrong choice then Peter gets 12 points on that question.)

a) Enter the missing information in the table containing some data about the first round of the quiz.

Results of the first round	Question 1.	Question 2.	Question 3.	Question 4.
Ann's answer	correct	wrong	correct	
Number of correct answers	7	10		8
Ann's score			5	0

b) By how many percents would Ann's total score have increased in the first round if she had answered the second question correctly? (Assuming, of course, that the answers of the other players are still the same.)

c) Suppose that in some further round Ann chooses the answers randomly on every one of the 4 question. What is the probability that her answers are all correct?

d) How many players should give the correct answer for a given question so that the total score of the 20 players be maximal? Justify your answer.

a)	4 points	
b)	3 points	
c)	3 points	
d)	7 points	
T.:	**17 points**	

You are required to solve any two of the problems from 16 to 18. Write the number of the problem NOT selected in the blank square on page 3.

17. Grandma has five grandchildren, one of them is a girl and the other four are boys. She is not very keen on writing letters, however, she still mails a letter once a week to some of her grandchildren. Thus each kid receives a letter from her in the course of five weeks.

a) How many orders are possible for the kids to receive their respective letters in the period of five weeks?

b) If Grandma decides randomly about the order of the delivery then what is the probability that she has written a letter to her granddaughter on the fifth week?

Grandma wanted to knit a nice scarf to her granddaughter. Having finished 8 cm on the first day, she decided that from the next day onwards she would knit 20 percent more on each day than on the previous day. In fact, she was able to fulfil her pledge.

c) How many days did it take her to finish the job if the scarf was planned to be 2 m long?

a)	3 points	
b)	3 points	
c)	11 points	
T.:	**17 points**	

You are required to solve any two of the problems from 16 to 18. Write the number of the problem NOT selected in the blank square on page 3.

18. The base of an isosceles triangle is 40 cm long, and the length of its sides is 52 cm. The triangle is rotated about its axis of symmetry.
(Give your results rounded to two decimal digits.)

a) Draw a neat diagram indicating the data and calculate the opening angle of the cone of revolution obtained.

b) Calculate the volume of the cone.

c) Find the surface area of the sphere that is touching both the base circle and the lateral surface of the cone.

d) Find the area of the cone's lateral surface once it is developed into the plane.

a)	4 points	
b)	3 points	
c)	6 points	
d)	4 points	
T.:	**17 points**	

	number of problem	score attained	total	maximum score
Part II./A	13.			12
	14.			12
	15.			12
Part II/ B				17
				17
		← problem not selected		
	TOTAL			**70**

	score attained	maximum score
Part I.		30
Part II.		70
GRAND TOTAL		**100**

date

examiner

	score attained (elért pontszám)	score input for program (programba beírt pontszám)
Paper I (I. rész)		
Paper II (II. rész)		

date (dátum)

date (dátum)

examiner (javító tanár)

registrar (jegyző)