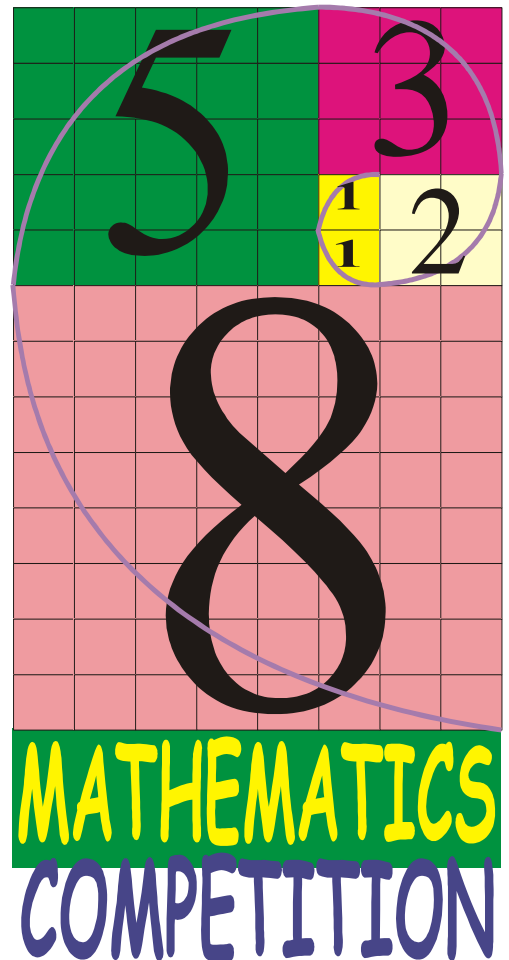


Horizon Mathematics Competition

HMC 2007
SECOND ROUND



INSTRUCTIONS

- Do not open this booklet until told to do so.
 - This examination paper consists of 30 multiple choice questions of mathematics, logical deduction, and analytical reasoning. Each question is followed by answers marked a, b, c, d and e. Only one of these is correct.
 - The final answers must be entered in the correct circle on the ANSWER SHEET which is supplied separately.
 - Each correct answer is worth:
 - 4 marks in Part A (Questions from 1 to 15),
 - 6 marks in Part B (Questions from 16 to 30).
- There is no penalty for an incorrect answer or an unanswered question.
- Exam duration is 75 minutes and no extra time will be given.
 - Calculators and geometry instruments are NOT permitted.
 - Diagrams are NOT necessarily drawn to scale.
 - Rough paper, pen, pencil, and rubber are permitted.
 - Start when the invigilator tells you to do so. Good luck!

1. The value of $1011 \times 811 - 8110$ is

- a) 811811 b) 808110 c) 810810 d) 881881 e) 810811

2. "Thirty million two hundred and seven thousand" is

- a) 30207000 b) 3207000 c) 327000 d) 3020700 e) 32007000

3. $1 - 2 + 3 - 4 + \dots + 9 = ?$

- a) -4 b) -1 c) 1 d) 4 e) 5

4. If today is Friday, what day of the week will it be in 38,880 minutes?

- a) Wednesday b) Tuesday c) Friday d) Thursday e) Saturday

5. Find the next number in the following number sequence; 11 , 12 , 14 , 18 , 26 , ...

- a) 52 b) 44 c) 42 d) 34 e) None of these

6. The angle between the hands of a clock at 4 o'clock is

- a) 20°
b) 40°
c) 80°
d) 120°
e) 160°



7. Which one of the following is a true statement?

- a) All rectangles are square.
b) All squares are rectangle.
c) No rectangles are square.
d) No squares are rectangle.
e) None of the above.

8. Starting at 778 and counting backwards by 7's, Dexter counts 778, 771, 764, etc.
A number that will be counted is:

- a) 42 b) 43 c) 44 d) 45 e) 46

9. 111 digits are used to number the pages of a book. How many pages does the book have?

- a) 55 b) 56 c) 59 d) 60 e) 61

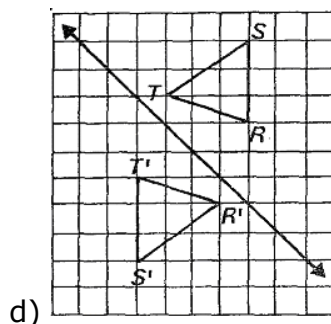
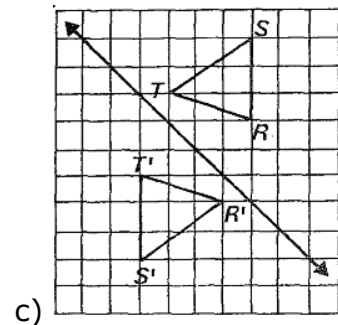
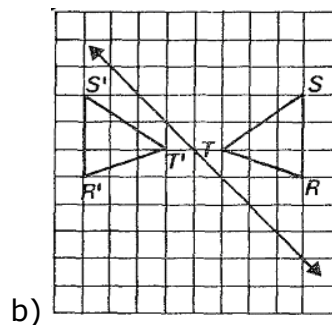
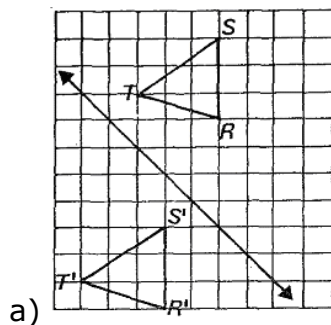
10. If p and q are numbers and $p \odot q = \frac{p}{q} + \frac{q}{p}$, find $2 \odot 4 = ?$

- a) $\frac{5}{2}$ b) $\frac{3}{2}$ c) $\frac{4}{3}$ d) $\frac{2}{3}$ e) 1

11. The edge of a sugar cube is about 1 cm. Roughly how many sugar cubes could you put in a dry, empty swimming pool which measures 15 m by 10 m by 5 m?

- a) 30000000 b) 30000 c) 200000000 d) 750000000 e) 750000

12. Which one of the following diagram shows the triangle RST reflected in the mirror line?



e) None of these

13. An organization has 64 members. It hopes to increase the membership by 50% each year. If this is done, how many members will the organization have in 5 years?

- a) 729 b) 486 c) 324 d) 224 e) 216

14. It takes 660 drops of water to fill two teaspoons and 3 tablespoons. One tablespoon contains three teaspoons. How many drops of water does it take to fill one tablespoon?

- a) 20 b) 60 c) 132 d) 180 e) None of these

15. Garfield can eat 2 pieces of lasagne in 3 minutes, while Shrek can eat 3 pieces of lasagne in 2 minutes. At these rates, how many lasagne pieces can they eat together in an hour?



- a) 54 b) 96 c) 130 d) 216 e) 250

16. Δ and \blacksquare are the symbols for two basic arithmetic operations so that;

$$5 \Delta 2 = 3 \text{ and } 3 \Delta 4 \blacksquare 2 = 1.$$

Which one of the following is the answer for the operation $3 \blacksquare 4 \Delta 2$?

- a) 5 b) 4 c) 3 d) 1 e) -1

17. A basketball team has won 20 games of 30 played. How many of the remaining 20 games must it win to have a 70% win record for the season?

- a) 35 b) 10 c) 15 d) 8 e) 14

18. A *palindromic* number is any number which has the same value when read from either direction. Therefore the digital time 14:41 is a *palindromic minute*. How many *palindromic minutes* are there in a day?

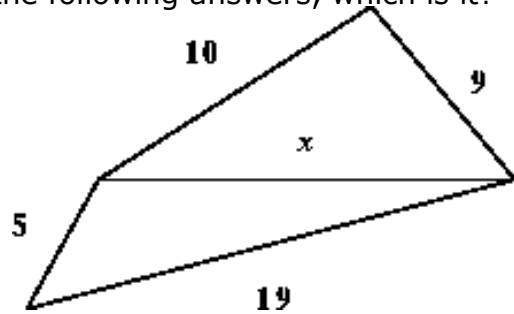
- a) 14 b) 16 c) 17 d) 22 e) None of these

19. If $5^4 = 5 \times 5 \times 5 \times 5 = 625$, what is the value of $(1,1)^3$?

- a) 1,231 b) 1,321 c) 1,331 d) 1,2321 e) 3,3

20. The sum of the lengths of two sides of a triangle is always greater than the third side. If the distance x is known to be one of the following answers, which is it?

- a) 9
b) 10
c) 14
d) 15
e) 20



21. One hundred marbles are placed in three bowls. The first and second bowls contain a total of 66 marbles, and the second and third bowls a total of 88 marbles. How many marbles are in the third bowl?

- a) 34 b) 44 c) 54 d) 77 e) Cannot be determined

22. $(\frac{9}{7} - \frac{3}{4}) \div \frac{45}{49} = ?$

- a) $\frac{56}{25}$ b) $\frac{35}{12}$ c) $\frac{21}{20}$ d) $\frac{7}{3}$ e) $\frac{7}{12}$

23. If x is more than 5 and y is less than 5, then for **all** such x and y ,

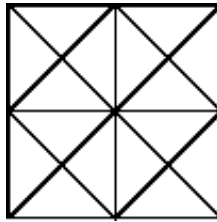
- a) $x - y$ is equal to 5
b) $x + y$ is less than 10
c) $x + y$ is more than 5
d) $x - y$ is less than 5
e) $x - y$ is more than 0

24. How many positive 3-digit integers have the result of 0 when their digits are multiplied?

- a) 300 b) 180 c) 171 d) 162 e) 111

25. How many squares are contained in the diagram below?

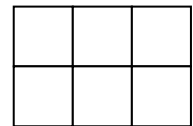
- a) 10
- b) 9
- c) 6
- d) 5
- e) None of these



26. In how many different ways can we split 6 people into 3 pairs?

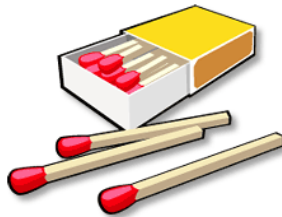
- a) 24
- b) 15
- c) 6
- d) 18
- e) 12

27. As shown in the figure to draw 1x2 block 7 matches are used and for a 2x3 block 17 matches are used.



Accordingly, how many matches are needed to draw a block of sizes 11 x 31 ?

- a) 694
- b) 724
- c) 752
- d) 1024
- e) 1054



28. In a recent soccer competition, each of three teams played each other team once. In the table, *GF* is "goals for" (the number of goals scored by a team), and *GA* is "goals against" (the number of goals scored against a team). What was the score of the DUIKER vs KUDU game (Give DUIKER's goals first)?

TEAMS	PLAYED	WINS	LOSSES	TIES	GF	GA
IMPALA	2	1	0	1	6	4
DUIKER	2	1	0	1	3	2
KUDU	2	0	2	0	2	5

- a) 2 - 0
- b) 2 - 1
- c) 3 - 1
- d) 3 - 2
- e) 1 - 0

29. There is only one rule for the famous logic game SUDOKU;

Fill in the grid so that every row, every column and every 2x2 grid contains the digits 1 through 4 with no repeats.

1	3	2	4
4	2	1	3
2	4	3	1
3	1	4	2

(A completed 4x4 sudoku)

If you fill the following sudoku grid in, a+b is

- a) 3
- b) 4
- c) 5
- d) 6
- e) 7

1	a		3
	2		
	3	4	
			b

30. Fibonacci Numbers are 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...

This sequence can be described as each following number is the sum of two previous with the starting values 0 and 1. The relation between the Fibonacci numbers can be written as:

$$a_1=0, a_2=1 \text{ and for all } n>2; a_n = a_{n-1} + a_{n-2}$$

		13	
		2	3
8		5	

If a sequence is defined as;

$$b_1=1, b_2=2 \text{ and for all } n>2; b_n = b_{n-2} - b_{n-1},$$

which one of the following has the value of b_6 ?

- a) 7
- b) -3
- c) 6
- d) -1
- e) None of these

--- THE END ---

PLEASE CHECK YOUR ANSWERS.

A man is like a fraction
whose numerator is what he is and whose denominator is
what he thinks of himself.
The larger the denominator the smaller the fraction.



Right decisions
depend on having a sound mind and on sound thinking.
What illuminates and develops mind is
science and knowledge.
For this reason, a mind deprived of science and knowledge
cannot reach right decisions and is always exposed to deception and
subject to being misled.



Teacher: What is further away, Australia or the Moon ?

Pupil: **Australia, you can see the Moon at night!**

Pupil: I wished we lived in the olden days.

Teacher: Why is that ?

Pupil: **We wouldn't have so much history to learn!**

Teacher: If you add $34,312 + 76,188$, divide the answer by 3 and times by 4,
what do you get?

Pupil: **The wrong answer!**

Why did the teacher wear sunglasses? **Because his class was so bright!**

Teacher: Can anyone tell me how many seconds there are in a year?

Pupil: **12 - 2nd January, 2nd February...!**

Why is six afraid of seven? **Because seven ate nine.**

If I had seven oranges in one hand and eight oranges in the other, what would I have?
Big hands!