"Math is Cool" Masters – 2007-08

Sponsored by:

5th Grade – May 17, 2008

Individual Contest

GENERAL INSTRUCTIONS applying to all tests:

- *Good sportsmanship is expected throughout the competition by all involved. Bad sportsmanship may result in disqualification.*
- *Calculators or any other aids may not be used on any portion of this contest.*
- *Unless stated otherwise:*
  - *For problems dealing with money, a decimal answer should be given.*
  - *Express all rational, non-integer answers as reduced common fractions.*
- *For fifth and sixth grade, all fractions and ratios must be reduced.*
- *Units are not necessary unless it is a problem that deals with time and, in that case, am or pm is needed. However, if you choose to use units, they must be correct.*
- *Leave all answers in terms of π where applicable.*
- *Do not round any answers unless stated otherwise.*
- *Record all answers on the colored cover sheets in the answer column only.*
- *Make sure all answer sheets have all the information filled out at the top of the sheet.*
- *Tests will be scored as a 0 if answers are not recorded correctly on the answer sheets.*
- *Blank answer sheets and answer sheets with no name will also be scored as a 0.*

INDIVIDUAL TEST - *35 minutes*

When you are prompted to begin, tear off the colored sheet and begin testing. Make sure your name and school are recorded on the answer sheet. Each problem is scored as a 1 or 0. Record your answers on the score sheet. No talking during the test. You will be given a 5 minute warning.

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Individual Contest

Record all answers on the colored cover sheet.

1	Find the missing number: 5 + 3 – 2 + 8 + ? = 30
2	A flower grows $\frac{3}{4}$ of an inch every day. How many days will it take for the flower to grow 12 inches?
3	Joe has $72 in his savings account. He is saving money to buy a calculator for $110. He saves $2 a week. How many weeks will it take before he has $110?
4	Find the positive difference between 5.32 and 10.09, and give your answer as a decimal.
5	How many vertices does a hexagon have?
6	Colin is buying bananas. Bananas cost 50 cents each, or 2 for 75 cents, or 3 for 90 cents. (You must buy groups of 2 or 3 to get the lower prices.) He has $7.83. What is the largest number of bananas he can buy?
7	Two angles in a triangle are 37 degrees and 55 degrees. What is the degree measure of the other angle?
8	If all piano players are poor, and Biff is poor, does it follow logically (necessarily) that Biff is a piano player? Answer "yes" or "no".
9	What is the number of units in the perimeter of a pentagon with 3 sides of length 8 units each, and 2 sides whose lengths average to 6 units?
10	What is the 73rd letter in the pattern MATHISCOOLMATHISCOOLMA…
11	What is the maximum number of times a circle can intersect a triangle?
12	Find the average of the following values: 3, 5, 7, 8, and 2.
13	Dan Marino threw for 2,290 yards over 11 games. What was his average passing yards per game, to the nearest yard?
14	Frank has cows and chickens in a field. There are 27 heads and 78 feet. How many cows are in the field?
15	Shane is headed to Seattle from Spokane, which is 280 miles away. He was scheduled to stop at Moses Lake in order to pick up supplies. However, he didn't remember until he was 35 miles past Moses Lake. He traveled back and got his supplies. What is the total number of miles he drove before he arrived in Seattle?
16	What is the hundreds digit of the quotient of 76,842 divided by 3?

17	Tom has 7 green socks, 3 purple socks, and 5 red socks in a drawer. What is the minimum number of socks he would need to take out of the drawer without looking to guarantee a matching pair of purple socks?
18	This year at state track Kai finished 4^{th} place in the mile race. He was also 4^{th} place from last. If there were no ties, how many runners were in the race?
19	Give the letters of all the following statements that are true. If no statement is true, answer "none". (A) An angle of 45 degrees is acute. (B) No angles of a triangle can be more than 90 degrees. (C) A triangle can have three acute angles.
20	From a list of the first ten counting numbers, Lynn selects 3 different numbers and adds them. If the sum she gets is the largest even sum possible, what is it?
21	What is the smallest counting number I could add to forty-five to get a number that can be divided by eight with no remainder?
22	A large group of mathletes stood equally spaced in a circle. They counted off and Biff said the number seven. He noticed Eho, number nineteen, was directly across from him. How many mathletes are in the circle?
23	A telephone call has a charge of 30 cents for the first five minutes and 4 cents for each minute after five minutes. Colin spent 62 cents on this phone call. How many minutes long was the phone call?
24	Find the largest possible odd remainder when a counting number is divided by 23.
25	If it takes one-fourth ounce of peanut butter to cover one cracker, how many crackers could I cover with half a pound of peanut butter?
26	Hyun has a cubical die numbered as usual except that the number on one of the faces has been erased, leaving that face blank. If the probability that Hyun rolls an odd number with this die is greater than the probability that he rolls a prime number, what number is missing from Hyun's die?
27	A line is drawn down the middle of a square, from the midpoint of one side to the midpoint of the opposite side, creating two equal rectangles. If the perimeter of the original square was 48 centimeters, what is the number of centimeters in the perimeter of one of these two equal rectangles?
28	A dog has three different toys, but plays with its favorite toy exactly twice as often as either of the other two. If the dog is currently playing with a toy, what is the likelihood that it is playing with its favorite toy? Give your answer as a fraction.
29	A bathtub drain can empty a full bathtub in 20 minutes. With the drain plugged, the faucet can fill the bathtub in 15 minutes. Annie decided to take a bath and turns on the water but forgets to plug the drain. How many minutes will it take to fill the bathtub?
30	I multiply my number by six, subtract seven, and then divide by five. If I get my number back again, what is my number?

Challenge Questions

31	I left my calculator out in the rain, and now it gives me weird answers to division problems. When I enter "175 ÷ 4", it shows the answer 433. When I enter "88 ÷ 3", it shows the answer 291. When I enter "315 ÷ 2", it shows the answer 1571. When I try to divide a certain number n by 5, it shows the answer 933. What is n?
32	Lori has equal numbers of half-dollars, quarters, dimes, and nickels. She then finds a quarter and three pennies on the sidewalk. Now when she counts her money, she has exactly 2008¢. Find the total number of coins Lori has.
33	Three numbers are in the ratio 6 to 3 to 5. If one of these three numbers is 210, what is the difference between the largest possible sum and the smallest possible sum of the three numbers?
34	After four boys moved away, exactly half of the students on the math team were boys. Before they moved, the proportion of boys was 21 boys out of every 40 math team members. How many girls are on the math team?
35	A palindrome does not change when its digits are reversed. How many integers between 95 and 300 are palindromes?
36	A snail tries to get out of a well. Each day it climbs up the side of the well 4 feet and each night it slides down the well 2 feet and 6 inches. If the snail starts 40 feet down inside in the morning, how many days will the snail take to get out of the well?
37	ABCD is a rectangle with area 36 units^2. Tony makes the following 5 statements about this rectangle: (1) AB = DA; (2) AB = AC; (3) CD = BC > AB; (4) AD < DC < BD; (5) DB = CA. Let x = the number of Tony's statements that cannot ever be true; y = the number of Tony's statements that might be true or might not be true; and z = the number of Tony's statements that must always be true. Give the ratio x : y : z.
38	The ratio of the side lengths of two similar triangles is 2:3. What is the ratio of their areas?
39	Bag A has 4 blue and 5 red balls. Bag B has 5 blue and 4 red balls. I randomly choose a ball from bag A and put it in B, mixing it up. I then randomly choose a ball from bag B. What is the probability that the ball chosen from bag B is red?
40	Colin, Kai, and Sampson are playing a dice game. Colin goes first, Kai second, and Sampson third. The first person to roll a three wins and the game is over. The dice are continuously passed in the above order until someone wins. What is the probability that Sampson wins?

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5th Grade – May 17, 2008

Team Multiple Choice Contest

When the Jay family went on safari in East Africa, they kept track of the numbers of big animals they saw per day. Below is their record for one day, in addition to some facts about these animals. All questions about the numbers of animals seen refer to the day for which the record is shown, unless you are told otherwise. Lions and cheetahs are predators, and have paws. Gazelles and zebras are prey, and have hooves.
Notes: The abbreviation "mph" stands for miles per hour. One ton is 2000 pounds.

Animal	**Top speed**	**Average adult weight**	**Number of animals seen**
Cheetah	70 mph	125 pounds	10
Lion	50 mph	500 pounds	15
Gazelle	35 mph	25 pounds	40
Zebra	40 mph	600 pounds	30

1	All the cheetahs seen were young adult males (brothers) living together in family groups. If there are always 3 to 5 males per family group, what is the largest number of cheetah family groups the Jay family could have seen? A) 10 B) 5 C) 4 D) 3 E) 2
2	How many animals of these four types did the Jay family see in all? A) 95 B) 85 C) 80 D) 75 E) answer not given
3	How many more hooves than paws did the Jay family see? A) 15 B) 45 C) 90 D) 35 E) answer not given
4	Assume each animal seen is of average adult weight. What is the total weight in pounds of all the animals seen by the Jay family? A) 6,150 B) 1,250 C) 2,775 D) 11,550 E) 27,750
5	A newborn lion cub weighs 40 ounces. By what factor will its weight increase if it reaches the average weight for an adult lion? A) 560 B) 12.5 C) 200 D) 15 E) 20
6	A gazelle and a zebra are five miles apart and are running toward each other at their top speeds. How many minutes does it take them to meet? A) 15 B) 24 C) 4 D) 3 E) 7.5

RESTATED:

When the Jay family went on safari in East Africa, they kept track of the numbers of big animals they saw per day. Below is their record for one day, in addition to some facts about these animals. All questions about the numbers of animals seen refer to the day for which the record is shown, unless you are told otherwise. Lions and cheetahs are predators, and have paws. Gazelles and zebras are prey, and have hooves.
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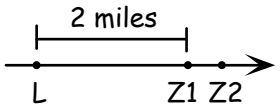
Zebra	40 mph	600 pounds	30

7	A lion (L) and two zebras (Z1 and Z2) and are standing in a line as shown in the figure. The two zebras are half a mile apart, and the lion is two miles from Z1. The lion runs at its top speed, but the zebras are not fully grown and run only at three-fourths of their top speed. If all three animals begin running at the same time, all in the direction of the arrow, how many miles will Z2 have traveled when the lion catches Z1?  A) 2.5 B) 2 C) 3 D) 0.5 E) answer not given
8	On a different day, the only animals the Jay family saw were five cheetahs and two gazelles. What was the average speed in mph of the animals they saw on this day? A) 50 B) 60 C) 70 D) 52.5 E) 48.75
9	A cheetah hunts and eats its prey alone. Lions share their prey with other members of their pride (living group). A cheetah kills one gazelle and a lion kills one zebra. How many members of a lion's pride (including the one who caught the zebra) could share the kill so that the ratio of prey weight to predator weight would be the same for the lions as for the cheetah? Assume all animals are of average weight. A) 2 B) 4 C) 6 D) 8 E) answer not given

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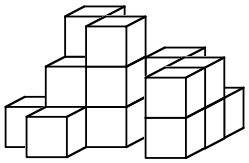
Team Contest

1	In the stack of identical cubes at right, each cube that is not resting on the table must be resting on another cube. What is the <u>smallest</u> number of cubes there could be in the stack? 
2	An experimental robotic vehicle moves at constant speed in half-hour time blocks. At the end of any half-hour block it may change its speed (which then remains the same for the next half-hour). In one test, the vehicle moved 220 kilometers in 4 hours. If its fastest speed is 60 kilometers per hour, what is the least possible distance in kilometers the vehicle could have moved during any half-hour block of this test trip?
3	Marty takes 5 steps for every 6 steps that Jon takes. Each of Jon's steps is 3 feet, and each of Marty's steps is 2 feet. In the time it takes Jon to walk 630 feet, how many feet does Marty walk?
4	My favorite number is a 2-digit counting number. One of its digits is in 12,450 and one of its digits is in 2,793. The sum of its digits is odd, and the difference between its digits is 3. Find the sum of all possible numbers that could be my favorite number.
5	What is the smallest even counting number that uses four different digits?
6	At the U-Pick cherry orchard, Cheryl picked 123 cherries and Charlene picked 58 cherries. They ate some cherries on the way home. When they got home, they had 74 cherries left. How many cherries did they eat on the way home?
7	How many ways can you make exactly 27 cents if you have a large supply of nickels, dimes, pennies, and quarters?
8	Put the following five values in order of size, smallest to largest. Your answer should consist of five letters in the correct order. A = 1.405 B = $\frac{51}{40}$ C = 1.450 D = $\frac{40}{51}$ E = 1.054
9	In a non-Leap Year, what is the date of the midpoint or middle day of the year? Give the <u>name</u> (not the number) of the month and the number of the day (eg, September 8, not 9/8).
10	Andy, Bonnie, Clem, and Deb are playing with blocks. Each child has at least 5 blocks. Andy has 1 more than twice as many blocks as Clem. Bonnie and Deb each have the same number of blocks. Bonnie can put her blocks into stacks of 6 with none left over, and Deb can put her blocks into stacks of 9 with none left over. When Andy, Bonnie, Clem, and Deb combine their blocks, the blocks can be put into stacks of 10 with none left over. What is the smallest total number of blocks the four children could have?

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Relay Contest

RELAYS - 5 minutes per relay

	Relay #1	Answer
Person 1	What positive number multiplied by itself gives 49 as the product?	7
Person 2	Kai creates two triangles by drawing a diagonal (a line from one corner to the opposite corner) in a rectangle whose side lengths measure TNYWG meters and 4 meters. What is the area in square meters of each of these triangles?	14 [square meters]
Person 3	Find the sum of the first TNYWG odd counting numbers.	196
Person 4	Kathleen has TNYWG unit cubes, all the same size. When she puts them together to make the largest possible cube, how many of the unit cubes will she have left over?	71 [cubes]
	Relay #2	Answer
Person 1	Find the sum of (5 x 0) + (4 x 1) + (3 x 2), and then multiply this sum by 2.	20
Person 2	If Berkeley has 6 slices of pizza with TNYWG pieces of pepperoni and 5 pieces of sausage on each slice, how many pieces of meat does he have? (Both pepperoni and sausage are meat.)	150 [pieces]
Person 3	Evaluate: $\frac{TNYWG}{24} \times \frac{4}{5}$	5
Person 4	Find the sum of TNYWG and the median of the first 11 prime numbers.	18

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5th Grade – May 17, 2008

Final Score:

KEY

Mental Math Contest

MENTAL MATH - 30 seconds per question

PERSON 1 NAME:		**1 or 0**
1.1	Identify the median of the following set of numbers: seven, three, nine, four, and ten.	7
1.2	If Andrew rides a bike at ten miles per hour, how many hours of riding would it take him to go 470 miles?	47 [hours]
1.3	A square has an area of 16 square centimeters. Each side length of this square is doubled to form a new square. What is the area of the new square, in square centimeters?	64 [sq cm]
1.4	What is the remainder when sixty-eight is divided by eleven?	2
PERSON 2 NAME:		
2.1	If two-thirds of my number is equal to twelve, what is my number?	18
2.2	Ten people like ice cream. Five of these people like chocolate ice cream, while eight of them like vanilla ice cream. How many of these people like both vanilla and chocolate ice cream?	3 [people]
2.3	Two angles of a triangle are fifty degrees and sixty degrees. What is the degree measure of the third angle?	70 [deg]
2.4	Evaluate: two thousand four hundred minus one hundred thirty.	2270
PERSON 3 NAME:		
3.1	Find the combined area, in square meters, of one square with side lengths of five meters and another square with side lengths of six meters.	61 [sq m]
3.2	Evaluate: seventy-two minus twenty-three.	49
3.3	If I roll two standard dice, what is the probability that both of them will show an odd number? Give your answer as a fraction.	1/4
3.4	What time was it three hours ago if it is now one minute before 2 PM?	10:59 AM or one minute before 11:00 AM
PERSON 4 NAME:		
4.1	Find the area in square meters of a rectangle with length twelve meters and width eleven meters.	132 [sq meters]
4.2	Trevor has a round cheesecake cut into sixteen equal slices. Four slices have blueberry sauce, four have chocolate sauce, and the rest are plain. If Trevor chooses one slice at random, what is the probability that he will choose a slice with blueberry sauce?	1/4
4.3	Find the total length in inches of three inches plus one foot plus half a foot.	21 [inches]
4.4	If three chickens and three cows are in a field, what is the average number of legs per animal in the field?	3 [legs]

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5th Grade - Division 1 & 2

COLLEGE KNOWLEDGE BOWL ROUND #1

#	Problem	Answer
1	Kevin the Kangaroo makes tacos using two parts lettuce, one part cheese, three parts chicken, and one part salsa. Chicken and cheese together make up what fraction of Kevin's tacos?	4/7
2	Marty the Mouse scampers at ten miles per hour. Lorna the Lion lopes at fifteen miles per hour. The two animals race on a straight road, and Marty gets an hour head start. Two hours after Marty starts, how many miles apart are the two animals?	5 [miles]
3	Frank the Fish eats one bug on day 1, five bugs on day 2, nine bugs on day 3, and so on. How many bugs does Frank eat on day 5?	17 [bugs]
4	Betty the Bunny has a rectangular garden. The length of the garden is one and a half times the width. If the length is twelve feet, what is the area of Betty's garden in square feet?	96 [square feet]
5	If Sally the Snake adds seven to her favorite number, then divides by three, her result is six. What is Sally's favorite number?	11
6	The probability that Sam the Seagull will be able to steal Ralph the Rat's food is seven-ninths. As a fraction, what is the probability that Sam will NOT be able to steal Ralph's food?	2/9
7	Connie the Cat is half as old as Hannah the Hippo. In fifteen years, Hannah will be twenty-seven years old. How many years old is Connie now?	6 [years]
	Extra Problem – Only if Needed	
8	Trevor the Toad is picking flowers at random. There are five red flowers, four yellow ones, and three purple ones. How many flowers must Trevor pick to ensure that he has two flowers of different colors?	6 [flowers]

"Math is Cool" Masters – 2007-08

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May 17, 2008

5th Grade - Division 1 & 2

COLLEGE KNOWLEDGE BOWL ROUND #2

#	Problem	Answer
1	When Andy plays tennis, the probability that his serve will go in is three-fifths. If he serves fifteen times, how many serves would you expect to go in?	9 [serves]
2	Peyton scores either field goals, worth three points, or touchdowns, worth six points. If he scores six times and scores thirty points, how many touchdowns does he make?	4 [touchdowns]
3	Lebron can make a basket every five seconds. At this rate, how many points can he score in two minutes, if each basket is worth two points?	48 [points]
4	Sizemore's shoe size is more than Bond's, but less than Jeter's. If Bond's shoe size is nine and a half and Jeter's is 13, how many different shoe sizes, including half sizes, could Sizemore wear?	6 [sizes]
5	Mia's soccer team starts a tour on Monday. If the tour lasts for twenty-five days, the last day of the tour will be on what day of the week?	Thursday
6	Marion sprints at an average of twenty miles per hour. If she sprints for six minutes at this rate, how many miles does she travel?	2 [miles]
7	On the four days of the US Open, Tiger shoots 74, 72, 70, and 68, respectively. If par is 72, how many shots below par is Tiger's average?	1 [shot]
	Extra Problem – Only if Needed	
8	The top of Chellsie's rectangular balance beam is two yards long and six inches wide. What is the perimeter, in feet, of the top of the beam?	13 [feet]

"Math is Cool" Masters – 2007-08

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May 17, 2008

5th Grade - Division 1 & 2

COLLEGE KNOWLEDGE BOWL ROUND #3

#	Problem	Answer
1	A brownie is a 2-inch by 3-inch rectangle, with a 1-inch square piece of chocolate on top. How many square inches of the top of the brownie are not covered by the chocolate?	5 [square inches]
2	Ice cream melts at a rate of two-thirds of a cubic inch per minute. If an ice cream scoop is six cubic inches, how many minutes does it take for the ice cream to melt completely?	9 [minutes]
3	A store sells apple, peach, pumpkin, and cherry pie. How many ways can I choose two different pies from these four?	6 [ways]
4	Helen takes half the cookies from a jar and then gives half of these cookies to Miya. She gives Miya five cookies. How many cookies are left in the jar?	10 [cookies]
5	The probability that I over-cook my shortcake in the oven is one-fifth. The probability that I under-cook my shortcake is three-tenths. What is the probability that my shortcake will be neither over-cooked nor under-cooked?	1/2
6	Kai eats two chocolate truffles on the first day, five on the second day, eight on the third day, and so on. How many truffles <u>in all</u> will he have eaten after five days?	40 [truffles]
7	An oven heats up 25 degrees every minute. How many minutes would this oven take to heat up from 220 to 370 degrees?	6 [minutes]
	Extra Problem – Only if Needed	
8	A circular cake is cut into 7 equal slices. If the top of the cake has an area of 49 pi square inches, is the area of the top of each slice closer to 7, 20, 22, or 49 square inches?	22 [sq inches]

"Math is Cool" Masters – 2007-08

5th Grade – May 17, 2008

Final Score:
KEY

First Score

School Name_____Team #_____

Proctor Name_____Room #_____

STUDENT NAME_____Division: _____

Individual Contest – Score Sheet

DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1	16		
2	16 [days]		
3	19 [weeks]		
4	4.77		
5	6 [vertices]		
6	25 [bananas]		
7	88 [degrees]		
8	no		
9	36 [units]		
10	T		
11	6 [times]		
12	5		
13	208 [yards]		
14	12 [cows]		
15	350 [miles]		
16	6		
17	14 [socks]		
18	7 [runners]		
19	A, C		
20	26		

	Answer	1 or 0	1 or 0
21	3		
22	24 [mathletes]		
23	13 [minutes]		
24	21		
25	32 [crackers]		
26	2		
27	36 [cm]		
28	1/2		
29	60 [minutes]		
30	7		
31	[n =] 468		
32	92 [coins]		
33	490		
34	38 [girls]		
35	21 [palindromes]		
36	25 [days]		
37	2: 2: 1		
38	4:9 or 4/9		
39	41/90		
40	25/91		

"Math is Cool" Masters – 2007-08

5th Grade – May 17, 2008

School Name_____Team #_____

Proctor Name_____Room #_____Division: _____

Final Score:
KEY

First Score

(out of 18)

Team Multiple Choice Contest – Score Sheet

TEAM MULTIPLE CHOICE - 15 minutes

This test is the only test where you will be penalized for incorrect responses. You will receive 2 points for a correct letter response, 0 points for leaving it blank and -1 point for an incorrect response. When you are prompted to begin, tear off the colored sheet, pass out a copy of the test to each team member, and begin testing. Since this is a multiple choice test, ONLY a letter response should be listed as an answer on the answer sheet.

Correct responses are worth 2 points, incorrect responses are worth -1 point and no response is 0 points.

DO NOT WRITE IN SHADED REGIONS

Answer		-1, 0 or 2	-1, 0 or 2
1	D		
2	A		
3	E [180]		
4	E		
5	C		
6	C		
7	C		
8	B		
9	C		

"Math is Cool" Masters – 2007-08

5th Grade – May 17, 2008

School Name_____Team #_____

Proctor Name_____Room #_____Div: _____

Final Score:
KEY

First Score

(out of 20)

Team Contest – Score Sheet

TEAM TEST - 15 minutes

When you are prompted to begin, tear off the colored sheet and give a copy of the test to each of your team members and begin testing. Each problem is scored as a 2 or 0.

DO NOT WRITE IN SHADED REGIONS

	Answer	2 or 0	2 or 0
1	17 [cubes]		
2	10 [km]		
3	350 [ft]		
4	228		
5	1024		
6	107 [cherries]		
7	13 [ways]		
8	DEBAC		
9	July 2		
10	70 [blocks]		

"Math is Cool" Masters -- 2007-08

KEY

5th Grade – May 17, 2008

School:_____Team #_____

Proctor: _____ Room #_____Div _____

RELAY # 1

Answer for person # 1	Answer for person # 2	Answer for person # 3	Answer for person # 4
7	**14 [sq meters]**	**196**	**71 [cubes]**
1 or 0	1 or 0	1 or 0	2 or 0

RELAY # 2

Answer for person # 1	Answer for person # 2	Answer for person # 3	Answer for person # 4
20	**150 [pieces]**	**5**	**18**
1 or 0	1 or 0	1 or 0	2 or 0