Bicentennial Olympiad - Qualifying Round

PROBLEM ONE

The figure at the right is a "magic square" with missing entries. When complete, the sum of the four entries in each column, each row, and each diagonal is the same.

Α		7	12
	4	9	
	5	16	
8	11		В

FIND THE VALUE OF **A** AND THE VALUE OF **B**.

PROBLEM TWO

When asked how many gold coins he had, the king said:

- If I arrange them in stacks of five, none are left over.
- If I arrange them in stacks of six, none are left over.
- If I arrange them in stacks of seven, one is left over.

What is the least number of coins he could have?



PROBLEM THREE



Alice and Brian run a 50-meter race and Alice wins by 10 meters. They then run a 60-meter race, and both run at the same speed they ran in the first race.

By how many meters will Alice win the second race?

PROBLEM FOUR

A twelve-hour clock loses 1 minute every hour. Suppose it shows the correct time now.

What is the least number of hours from now when it will again show the correct time?

PROBLEM FIVE

All the money made from the Grade 7 cookie sales, consisting of \$240, is going to be divided equally among the teachers. Unfortunately, it was discovered that one of the teachers was not eligible for his share because he had eaten cookies and never paid for them. This meant that the amount to be given to each remaining teacher increased by one dollar.



HOW MANY TEACHERS WILL RECEIVE A SHARE OF THE \$240?



Problem one	A = 1	В	=	13
Problem two	120			
Problem three	e 12			
Problem four	720			
Problem five	15			

Bicentennial Olympiad - Qualifying Round

PROBLEM ONE

Your mom has decided that it is time for you to organize your stuff, and she has provided some boxes. In fact, in your room there are 4 separate large boxes, and inside each large box there are 3 separate small boxes, and inside each of these small boxes there are 2 separate smaller boxes.



HOW MANY BOXES ARE THERE ALTOGETHER?

PROBLEM TWO

Larry has \$12 more than Curly and \$15 more than Moe. When they put their money together they have \$87.



HOW MUCH DOES LARRY HAVE?

PROBLEM THREE



A dog takes 3 steps to walk the same distance for which a cat takes 4 steps. Suppose 1 step of the dog covers 1 foot.

HOW MANY FEET WOULD THE CAT COVER IN TAKING 12 STEPS?

PROBLEM FOUR

In the multiplication problem at the right, A B A and B represent different digits, A B is <u>× 6</u> a two-digit number and B B B is a three-digit number. B B B WHAT TWO-DIGIT NUMBER DOES A B REPRESENT?

PROBLEM FIVE

The Math Police have arrested four students suspected of trying to divide by zero. They were given numbers to hold and are lined up in order of number size. The difference between any two adjacent numbers (students next to each other) is the same. The first student was given the number one-third and the fourth student was given the number one-half.



Grade seven:

ON A NUMBER LINE, WHAT WOULD BE THE DISTANCE BETWEEN THE FIRST STUDENT'S NUMBER AND THE FOURTH STUDENT'S NUMBER?

Grade eight & nine:

WHAT NUMBERS ARE THE REMAINING TWO STUDENTS HOLDING?

(Hint: Find the distance between the first and fourth student's numbers first)

Problem one	40				
Problem two	38	3			
Problem three	9				
Problem four	74	1			
Problem five	<u>1</u> 6	OR	<u>2</u> 12	OR	<u>3</u> 36

2006 BICENTENNIAL MATH OLYMPIAD CHAMPIONSHIP ROUND

PROBLEM ONE

Consecutive numbers are whole numbers that follow in order such as 3, 4, 5.



FIND THE SMALLEST OF THE FIVE CONSECUTIVE NUMBERS WHOSE SUM IS 100.

2006 BICENTENNIAL MATH OLYMPIAD CHAMPIONSHIP ROUND

PROBLEM TWO

The number of Timbits in this box is more than 40 but less than 80. If the Timbits are divided evenly between 5 kids, there will be 2 dougnuts left over. If they are divided evenly between 7 kids, there will be 4 left over.



HOW MANY TIMBITS ARE THERE IN THE BOX?

2006 BICENTENNIAL MATH OLYMPIAD CHAMPIONSHIP ROUND

PROBLEM THREE

Each of the three diagrams at the right shows a balance of weights using different objects.



HOW MANY " - S" WILL BALANCE A "O"?

2006 BICENTENNIAL MATH OLYMPIAD CHAMPIONSHIP ROUND

PROBLEM FOUR

The square at the right is divided into four congruent rectangles. The perimeter of each of the four congruent rectangles is 25 units.



HOW MANY UNITS ARE THERE IN THE PERIMETER OF THE SQUARE?

2006 BICENTENNIAL MATH OLYMPIAD CHAMPIONSHIP ROUND

PROBLEM FIVE

Tickets for the Rolling Stones concert cost \$20 each for children and \$50 each for adults. A group of thirty people consisting of children and adults paid a total of \$870 for the concert.



HOW MANY ADULTS WERE IN THE GROUP?

2006 BICENTENNIAL MATH OLYMPIAD CHAMPIONSHIP ROUND ANSWER KEY

- 18 PROBLEM ONE
- 67 PROBLEM TWO
- 6 PROBLEM THREE
- 40 PROBLEM FOUR
- 9 PROBLEM FIVE

2006 BICENTENNIAL MATH OLYMPIAD GRADE SEVEN PROBLEM ONE

Two cash registers of a store had a combined total of \$300. When the manager transferred \$15 from one register to the other register, each register then had the same amount.



HOW MUCH DID THE REGISTER WITH THE LARGER AMOUNT HAVE BEFORE THE TRANSFER WAS MADE?

2006 BICENTENNIAL MATH OLYMPIAD GRADE SEVEN PROBLEM TWO

Suppose the time is now 2 o'clock on a twelve-hour clock which runs continuously.

WHAT TIME WILL IT SHOW 1000 HOURS FROM NOW?



2006 BICENTENNIAL MATH OLYMPIAD GRADE SEVEN PROBLEM THREE

In the figure at the right, each number represents the length of the segment which is nearest it.



HOW MANY SQUARE UNITS ARE IN THE AREA OF THE FIGURE IF THERE IS A RIGHT ANGLE AT EACH CORNER OF THE FIGURE?

2006 BICENTENNIAL MATH OLYMPIAD GRADE SEVEN PROBLEM FOUR

Lisa went to Mic Mac Mall with a pocket full of money. She spent one-third of her money at The Gap. Then she went to the food court and spent one-third of what remained. When Bart asked to borrow some money, Lisa checked her pockets and discovered that she had twelve dollars left.



HOW MUCH MONEY DID LISA HAVE TO BEGIN WITH?

2006 BICENTENNIAL MATH OLYMPIAD GRADE SEVEN PROBLEM FIVE

A restaurant has a total of 30 tables which are of two types. The first type seats two people at each table; the second type seats five people at each table. A total of 81 people are seated when all seats are occupied.



HOW MANY TABLES FOR TWO ARE THERE?

2006 BICENTENNIAL MATH OLYMPIAD	GRADE SEVEN
ANSWER KEY	

- PROBLEM ONE 165
- PROBLEM TWO 6:00
- PROBLEM THREE 58
- PROBLEM FOUR 27
- PROBLEM FIVE 23

2006 BICENTENNIAL MATH OLYMPIAD PROBLEM ONE

A slow 12-hour clock loses 3 minutes every hour. Suppose the slow clock and a correct clock both show the correct time at 9 AM.



2006 BICENTENNIAL MATH OLYMPIAD PROBLEM TWO

Last June, the average amount of rain that fell during the last week of school (Monday to Friday - five days) was 6 cm. If Friday's rainfall is not counted, the average of the four remaining days is 7 cm.



HOW MUCH RAIN FELL ON THE LAST DAY OF SCHOOL LAST YEAR?







At the right, there are two large congruent squares with sides 7 units long and four small congruent squares with sides 3 units long.

IF THE SHADED FIGURE IS ALSO A SQUARE, WHAT IS ITS AREA IN SQUARE UNITS?

2006 BICENTENNIAL MATH OLYMPIAD PROBLEM FOUR

The cost of a Mad Magazine in 1985 was \$1 and a whole number of cents. The total cost of six copies of this magazine was less than \$8. However, the total cost of seven copies of the same magazine, at the same price per magazine, was more than \$8.

WHAT IS THE LEAST A SINGLE COPY OF THE MAGAZINE COULD HAVE COST?

2006 BICENTENNIAL MATH OLYMPIAD PROBLEM THREE









2006 BICENTENNIAL MATH OLYMPIAD PROBLEM FIVE



Curious George was hired to deliver newspapers for 8 weeks at a fixed hourly rate. But instead of being given only money, he was to be given \$85 and a box of bananas. However, Curious George got into a little trouble with a customers' cat and was only able to work 5 weeks. His boss gave him \$25 and the box of bananas.



HOW MUCH WAS THE BOX OF BANANAS WORTH?

2006 BICENTENNIAL ANSWER KEY	. MATH OLYMPIAD	GRADE EIGHT
PROBLEM ONE	9:21	
PROBLEM TWO	2	
PROBLEM THREE	25	
PROBLEM FOUR	1•15	
PROBLEM FIVE	75	

2006 BICENTENNIAL MATH OLYMPIAD PROBLEM ONE

GRADE NINE

During her first week as a waitress, Alice earned a total of \$65 for working five days after school. Because her tips kept getting better, each day after the first day she earned \$2 more than she earned the day before.



HOW MUCH DID SHE EARN ON THE FIRST DAY?

2006 BICENTENNIAL MATH OLYMPIAD PROBLEM TWO

ABCD is a square with area 16 square meters. E and Fare midpoints of sides AB and BC, respectively.



GRADE NINE

WHAT IS THE AREA OF TRAPEZOID AEFC, THE SHADED REGION?

2006 BICENTENNIAL MATH OLYMPIAD PROBLEM THREE

GRADE NINE

In Beach Basketball, a field goal is worth 2 points and a foul shot is worth 1 point. Suppose a team scored 72 points and made 6 more field goals than foul shots.

HOW MANY FOUL SHOTS DID THE TEAM MAKE?



2006 BICENTENNIAL MATH OLYMPIAD GRADE NINE PROBLEM FOUR

If you start with 3 and count by 7s, you get the terms of the sequence 3, 10, 17, ..., 528 where 3 is the 1^{st} term, 10 is the 2^{nd} term, 17 is the 3^{rd} term, and so forth up to 528 which is the **Nth** term.



WHAT IS THE VALUE OF N?

2006 BICENTENNIAL MATH OLYMPIAD PROBLEM FIVE

Jimmy needs one hour to paint the fence. George, his older brother, can paint the same fence in $\frac{1}{2}$ hour.



2006 BICENTENNIAL MATH OLYMPIAD GRADE NINE ANSWER KEY

- PROBLEM ONE 9
- PROBLEM TWO 6
- PROBLEM THREE 20
- PROBLEM FOUR 76
- PROBLEM FIVE 20





PROBLEM ONE



So figure what they are, for fun!



Marty loves math

and marbles. He is holding a contest at school that involves both of these things in order to raise money to send the school's math team to the National Championships. Marty distributed 100 marbles among five bags.

Bag #1 and Bag #2 together contain 52 marbles.

Bag #2 and Bag #3 together contain 43 marbles.

Bag #3 and Bag #4 together contain 34 marbles.

Bag #4 and Bag #5 together contain 30 marbles

HOW MANY MARBLES ARE THERE IN EACH BAG?

PROBLEM THREE



A beam of light shines from point S, reflects off a reflector at point P, and reaches point T so that PT is perpendicular to RS.

What is the measurement of angle x?

