## 2007 MATH OLYMPIAD

GRADE 7 ZONE COMPETITION

## PROBLEM ONE

The set of stairs shown at the right is constructed by placing layers of cubes on top of each other.


WHAT IS THE TOTAL NUMBER OF CUBES CONTAINED IN THE STAIRCASE?

2007 MATH OLYMPIAD
GRADE 7 ZONE COMPETITION

## PROBLEM FOUR

My age this year is a multiple of seven. Next year it will be a multiple of five. I am more than 20 years of age but less than 80 .


## HOW OLD WILL I BE 6 YEARS

 FROM NOW?2007 MATH OLYMPIAD
GRADE 7 ZONE COMPETITION

## PROBLEM THREE

A
$B$
Each of the small boxes in the figure at the right is a square. The perimeter of square $A B C D$ is 36 cm .


WHAT IS THE PERIMETER OF THE FIGURE SHOWN WITH THE DARKENED OUTLINE?

2007 MATH OLYMPIAD GRADE 7 ZONE COMPETITION

## PROBLEM TWO

Bart has one of each of the following coins in his pocket: a penny, a nickel, a dime, a quarter, and a loonie. Four of these coins are taken out of the pocket and the sum of their values is calculated.


## HOW MANY DIFFERENT SUMS ARE POSSIBLE?

2007 MATH OLYMPIAD GRADE 7 ZONE COMPETITION

## PROBLEM FIVE

A group of 12 bears decided to spend some time in the forest. They had enough food to last for 8 days when they arrived at their camp. However, 4 more bears joined them without the amount of food being increased.


## HOW LONG WILL THE FOOD LAST IF EACH BEAR IS GIVEN THE SAME DAILY RATION AS ORIGINALLY PLANNED?

# 2007 MATH OLYMPIAD <br> GRADE 7 ZONE COMPETITION 

## ANSWERS:

1. 48
2. 5
3. 36
4. 55
5. 6

# 2007 MATH OLYMPIAD GRADE 8 ZONE COMPETITION 

## PROBLEM ONE

SAM'S TEACHER HAS GIVEN $\circ$ HIM TEN BOXES.
FIVE BOXES CONTAIN PENCILS, FOUR BOXES CONTAIN PENS AND ONLY
TWO BOXES CONTAIN BOTH PENCILS AND PENS.


## HOW MANY BOXES ARE EMPTY?

## 2007 MATH OLYMPIAD GRADE 8 ZONE COMPETITION

## PROBLEM TWO



The figure shown consists of 3 layers of cubes with no gaps. Suppose the complete exterior of the figure, including the bottom, is painted red and then separated into individual cubes.

## HOW MANY CUBES WILL HAVE EXACTLY 3 RED FACES?

2007 MATH OLYMPIAD GRADE 8 ZONE COMPETITION

## PROBLEM FOUR



LISA STARTED A
MATH CLUB DURING
THE FIRST WEEK OF SCHOOL. AS THE ONLY MEMBER, SHE DECIDED TO RECRUIT TWO NEW MEMBERS DURING THE FOLLOWING WEEK OF SCHOOL. EACH NEW MEMBER, DURING THE WEEK FOLLOWING THE WEEK WHEN HE OR SHE BECAME A MEMBER, RECRUITS TWO NEW MEMBERS.

## HOW MANY MEMBERS WILL THE CLUB HAVE AT THE END OF FIVE WEEKS?

# 2007 MATH OLYMPIAD GRADE 8 ZONE COMPETITION 

## PROBLEM FIVE

A square piece of paper is folded in half and then cut into two rectangles along the fold. The perimeter of each of the two rectangles is 18 cm .


WHAT IS THE PERIMETER OF THE ORIGINAL SQUARE?

2007 MATH OLYMPIAD GRADE 8 ZONE COMPETITION

## PROBLEM THREE

Ten ping-pong balls are numbered from one to ten and placed in a bag. Pairs of balls are drawn randomly.


WHAT IS THE MOST LIKELY SUM OF THE NUMBERS ON THE TWO BALLS?
2007 MATH OLYMPIADGRADE 8 ZONE COMPETITIONANSWER KEY
PROBLEM ONE

$$
-3
$$

PROBLEM TWO - 16
PROBLEM THREE ..... 11
PROBLEM FOUR ..... - 31
PROBLEM FIVE ..... - 24

## 2007 MATH OLYMPIAD GRADE 9 ZONE COMPETITION

## PROBLEM ONE

Sunnyvale School is having their annual lobster race. A team consists of five lobsters. The team score is the average of the five finishing place positions.


PETER'S TEAM HAS AN AVERAGE OF 18.
HIS SISTER SALLY'S TEAM HAS CONSISTENTLY FINISHED BEHIND HIS TEAM, HOWEVER, AN UNUSUAL PATTERN HAS BEEN NOTICED. FOR EXAMPLE, SALLY'S FIRST LOBSTER FINISHED RIGHT
 $\begin{array}{lcr}\text { BEHIND } & \text { PETER'S } & \text { FIRST } \\ \text { LOBSTER. } & \text { HER } & \text { SECOND }\end{array}$ LOBSTER FINISHED 2 PLACES BEHIND PETER'S SECOND LOBSTER. HER THIRD LOBSTER FINISHED 3 PLACES BEHIND PETER'S THIRD, HER FOURTH WAS 4 PLACES BEHIND HIS FOURTH AND HER FIFTH WAS 5 PLACES BEHIND HIS FIFTH.

## WHAT IS THE TEAM SCORE FOR SALLY'S TEAM?

2007 MATH OLYMPIAD<br>GRADE 9 ZONE COMPETITION

## PROBLEM TWO

Alvin the chipmunk has two older brothers, Simon and Theodore. The sum of the ages of all three chipmunks is 32. Simon, the oldest, is twice the age of Alvin. Simon and Theodore are three years apart in age.


## HOW OLD IS ALVIN?

## 2007 MATH OLYMPIAD

 GRADE 9 ZONE COMPETITION
## PROBLEM THREE

In the multiplication example at the right， each letter represents a different digit

and each represents a non－zero digit．

\＆\＆\＆ 9
\＆\＆\＆ 4


ニニニニニニニニニニニニニニニ

What digits do A，B，and C REPRESENT？

2007 MATH OLYMPIAD
GRADE 9 ZONE COMPETITION

## PROBLEM FOUR

When a natural number is multiplied by itself, the result is a square number. Some examples of square numbers are $1,4,9,16$, and 25 .


## HOW MANY SQUARE NUMBERS

 ARE THERE BETWEEN 1000 AND 2000?
## 2007 MATH OLYMPIAD GRADE 9 ZONE COMPETITION

## PROBLEM FIVE

A train traveling at 30 kilometers per hour reaches a tunnel which is 9 times as long as the train. It will take the train 2 minutes to completely clear the tunnel.

## HOW LONG IS THE

 TRAIN?(NOTE: ANSWER MUST BE IN METERS)
2007 MATH OLYMPIAD GRADE 9 ZONE COMPETITION
ANSWER KEY

$$
\begin{array}{llll}
\text { PROBLEM ONE } & -21 \\
\text { PROBLEM TWO } & -7 \\
\text { PROBLEM THREE } & -A=7 \quad B=8 \quad C=3 \\
\text { PROBLEM FOUR } & -13 & \\
\text { PROBLEM FIVE } & -100 &
\end{array}
$$

# 2007 MATH OLYMPIAD <br> ZONE COMPETITION CHALLENGE ROUND 

## PROBLEM ONE

THE STAIRCASE AT THE RIGHT HAS FOUR STEPS AND CONTAINS 10 UNIT SQUARES. SUPPOSE THE STAIRCASE IS EXTENDED UNTIL IT HAS 12 STEPS.


HOW MANY UNIT SQUARES WOULD IT THEN CONTAIN ALL TOGETHER?

# 2007 MATH OLYMPIAD <br> ZONE COMPETITION CHALLENGE ROUND 

## PROBLEM TWO

THE LORAX, DR. SEUSS'S CHAMPION OF THE ENVIRONMENT, WAS GIVEN THOUSANDS OF TREES TO PLANT. IT TOOK A TEAM OF FOUR BARBALOOTS 15 DAYS TO PLANT HALF OF THE TREES. THE LORAX WANTS THE JOB FINISHED SOONER SO HE HAS HIRED SIX ADDITIONAL BARBALOOTS TO HELP PLANT.


## HOW MANY DAYS WILL IT TAKE

 THE TEAM OF TEN BARBALOOTS TO FINISH PLANTING THE REMAINING TREES?(Assume that all Barbaloots plant trees at the same rate.)

## 2007 MATH OLYMPIAD <br> ZONE COMPETITION CHALLENGE ROUND

PROBLEM THREE

Have you worked
OUT YOUR VALUES T TO MUCH AROUND WORK? LIKE WORK...

Find the sum of these fractions


Write the sum in fractional form in lowest terms.


## 2007 MATH OLYMPIAD <br> ZONE COMPETITION CHALLENGE ROUND

## PROBLEM FOUR



FELIX IS NOT IMPRESSED WITH


HIS FRIEND DILBERT AND HIS PET FROG, HOPPY. DILBERT HAS THE HICCUPS, AND IS MAKING A LOUD "HIC" EVERY TWO MINUTES. HOPPY IS MAKING FUN OF HIM BY CROAKING EVERY $3 \frac{1}{2}$ MINUTES. AT EXACTLY 12:00 NOON DILBERT AND O0. HOPPY "HICCED" AND "CROAKED" AT THE SAME TIME.

## IF THEY CONTINUE TO HIC AND CROAK AT THE SAME RATE, WHAT IS THE FIRST TIME AFTER 1:00 PM THAT THEY WILL HIC AND CROAK TOGETHER?

# 2007 MATH OLYMPIAD <br> ZONE COMPETITION CHALLENGE ROUND 

PROBLEM FIVE


THE COST OF AN ICE CREAM CONE IS \$1 AND A WHOLE NUMBER OF CENTS. THE TOTAL COST OF 6 ICE-CREAM CONES IS LESS THAN \$8. HOWEVER, THE TOTAL COST OF SEVEN ICE CREAM CONES AT THE SAME PRICE PER CONE IS MORE THAN \$8.

## WHAT IS THE LEAST A SINGLE ICE CREAM CONE COULD COST?

# 2007 MATH OLYMPIAD <br> ZONE COMPETITION <br> CHALLENGE ROUND 

ANSWER KEY

1) 78
2) 6
3) $\frac{7}{10}$
4) 1:10
5) $\$ 1.15$

NOTE TO CHECKERS - 1.15 ALSO OKAY

## Math Olympiad

## 2007 GRADE 7 REGIONAL COMPETITION

## PROBLEM TWO

THIS IS A DIAGRAM OF THE DUMB DOG HOTEL OUTDOOR PLAY AREA.


THE OWNER OF THE DUMB DOG HOTEL, GARFIELD, WANTS TO PUT A FENCE AROUND PART OF THE OUTDOOR PLAY AREA. SQUARE ABCD AND RECTANGLE AEFG EACH HAVE AN AREA OF 36 SQUARE METERS. E IS THE MIDPOINT OF AB. GARFIELD WOULD LIKE TO PUT A FENCE AROUND THE RECTANGULAR
 AREA AEFG TO KEEP SOME DOGS IN.

$$
\begin{aligned}
& \text { WHAT IS THE PERIMETER } \\
& \text { OF RECTANGLE AEFG? }
\end{aligned}
$$

Math Olympiad
2007 GRADE 7 REGIONAL COMPETITION

## PROBLEM ONE

PETER HAS PERFECTED A NEW EXERCISE CRAZE, KING OF THE CASTLE! IN ORDER TO PROTECT HIS IDEA, HE NEEDS TO KNOW THE EXACT NUMBER OF BLOCKS HE USED TO BUILD THIS TOWER.


THE DIAGRAM SHOWS THAT IT IS MADE UP OF FIVE HORIZONTAL LAYERS OF BLOCKS WITH NO GAPS.

## HOW MANY INDIVIDUAL <br> BLOCKS ARE IN THE TOWER?

## Math Olympiad

2007 GRADE 7 REGIONAL COMPETITION

## PROBLEM FOUR



SUPPOSE TWO DAYS AGO WAS SUNDAY.

| Sun Mon Tue | Wed Thu | Fin | fil\| |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 |  |  |  |
| 24 | 25 | 26 | 27 |  |  |  |
| 31 |  |  |  |  |  |  |

WHAT DAY OF THE WEEK WILL 365 DAYS FROM TODAY BE?

Math Olympiad 2007 GRADE 7 REGIONAL COMPETITION

## PROBLEM THREE



YESTERDAY, PEPPERMINT PATTY TOLD WOODSTOCK A MATH RIDDLE THAT MADE HIS HEAD HURT. IT WENT LIKE THIS...
"WHEN I ADD THE SAME WHOLE NUMBER TO BOTH THE
NUMERATOR AND THE
DENOMINATOR OF THE
FRACTION TWO-FIFTHS I GET A NEW FRACTION EQUIVALENT TO FOUR-FIFTHS."

## WHAT NUMBER DID PEPPERMINT PATTY ADD TO BOTH THE

 NUMERATOR AND THEDENOMINATOR TO MAKE THIS RIDDLE TRUE?

Math Olympiad 2007
GRADE 7 REGIONAL COMPETITION PROBLEM FIVE


BUBBLES, A WELL-KNOWN CAT LOVER, WANTED TO RAISE SOME MONEY TO SUPPORT THE LOCAL ANIMAL SHELTER. ON SATURDAY, HE BOUGHT APPLES AT 3 FOR 25*. ON SUNDAY HE SOLD ALL OF THEM FOR 2 FOR 25世 AND MADE A PROFIT OF \$1.

# HOW MANY APPLES DID HE SELL? 

# Math Olympiad 2007 <br> GRADE 7 REGIONAL COMPETITION 

## ANSWERS:

1. 35
2. 30
3. 10
4. WEDNESDAY
5. 24

## Math Olympiad

## 2007 GRADE 8 REGIONAL COMPETITION

 PROBLEM ONE

You have been chosen to represent your class in the annual jelly bean guessing contest. These are your clues:
there are more than 40 but less than 80
when the number of beans is divided by 5 , there is a remainder of 2
when the number of beans is divided by 7 , there is a remainder of 4
HOW MANY JELLY BEANS ARE IN THE JAR?

# Math Olympiad <br> 2007 GRADE 8 REGIONAL COMPETITION 

## PROBLEM TWO

Sponge Bob is very wound up about today's math contest. His question was to divide a given number by $2 \frac{1}{2}$. Unfortunately, because of his excitement, Sponge Bob got confused and ended up multiplying the number by $2 \frac{1}{2}$. When he did this his
 answer was 50 .

$$
\begin{aligned}
& \text { WHAT IS THE } \\
& \text { CORRECT ANSWER TO } \\
& \text { THE DIVISION } \\
& \text { PROBLEM? }
\end{aligned}
$$

Math Olympiad
2007 GRADE 8 REGIONAL COMPETITION

## PROBLEM THREE

It's tournament time in Jungle Town. Six giraffes have entered the checker tournament. Each giraffe will play exactly three games with each of the other participants.


## HOW MANY GAMES WILL BE PLAYED IN TOTAL?

Math Olympiad
2007 GRADE 8 REGIONAL COMPETITION

## PROBLEM FOUR

A jar filled with gummi bears has a mass of 10 kilograms. After half of the gummi bears are eaten, the jar and the remaining bears have a mass of 5 and three-
 fourths kilograms.


$$
\begin{gathered}
\text { WHAT IS } \\
\text { THE MASS OF } \\
\text { THE JAR IN } \\
\text { FRACTIONAL } \\
\text { FORM? }
\end{gathered}
$$

Math Olympiad
2007 GRADE 8 REGIONAL COMPETITION

## PROBLEM FIVE

A pup is worth a pooch and a mutt. A pup and a pooch are worth one bird dog. Two bird dogs are worth three mutts.


## HOW MANY POOCHES IS A PUP WORTH?

# Math Olympiad 2007 GRADE 8 REGIONAL COMPETITION 

## ANSWERS KEY:

1. 67
2. 8
3. 45
4. 1.5 OR $1 \frac{1}{2}$ OR one and one-half
5. 5

# Math Olympiad <br> 2007 GRADE 9 REGIONAL COMPETITION 

## PROBLEM ONE



The average age of Jimmy's five goldfish is six.
Unfortunately, on Friday, one
 of Jimmy's goldfish died.
The average age of the four remaining goldfish is seven.


$$
\begin{aligned}
& \text { HOW OLD WAS THE } \\
& \text { GOLDFISH THAT DIED? }
\end{aligned}
$$

# Math Olympiad <br> 2007 GRADE 9 REGIONAL COMPETITION 

## PROBLEM TWO



The Geico Gecko only had three dollars left in the bank when he finally got a job. He started earning seven dollars a week by walking dogs. After his first week on the job he wasn't paid, so he still only had three dollars in his bank account. His second week of work he was paid and his bank account increased to ten dollars. At the end of the third week he had seventeen dollars in the bank. His goal is to save $\$ 528$ for car insurance.

## HOW MANY WEEKS WILL HE HAVE TO WORK TO REACH HIS GOAL?

Math Olympiad
2007 GRADE 9 REGIONAL COMPETITION

## PROBLEM THREE

When $A$ is divided by $B$, the result is $\frac{3}{4}$. $\frac{5}{6}$


WHAT IS THE RESULT WHEN
A IS DIVIDED BY C?
(NOTE: ANSWER MUST BE IN
SIMPLIFIED FRACTIONAL FORM)

Math Olympiad 2007 GRADE 9 REGIONAL COMPETITION PROBLEM FOUR


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 $x$ ?


Math Olympiad
2007 GRADE 9 REGIONAL COMPETITION

## PROBLEM FIVE

The digits of a two-digit number are interchanged to form a new two-digit number. The difference of the original
 number and the new number is 45 .

> WHAT IS THE LARGEST TWO-DIGIT NUMBER THAT SATISFIES THESE CONDITIONS?

Math Olympiad
2007 GRADE 9 REGIONAL COMPETITION ANSWER KEY

1) 2
2) 76
3) FIVE-EIGHTHS OR $\frac{5}{8}$
4) $32 O R 32^{\circ}$
5) 94

## REGIONAL OLYMPIAD PROBLEMS CHALLENGE ROUND

## PROBLEM ONE

Nova Scotia's provincial flower is the mayflower. The mayflower has five petals.
Imagine that the petals are numbered 1, 2, 3, 4 and 5 in a clockwise $\cup$ order. A ladybug has landed on petal number 1.
She begins to jump in a counter clockwise direction $\cup$ from one petal
 to another, around the flower. When she jumps from an odd-numbered petal, she skips a petal. When she jumps from an even-numbered petal, she jumps to the next petal. Since it is the year 2007, she has decided to make 2007 jumps.

## WHAT NUMBER PETAL WILL SHE BE ON WHEN SHE STOPS JUMPING?

## REGIONAL OLYMPIAD PROBLEMS CHALLENGE ROUND

## PROBLEM TWO

Bertha has 6 daughters and no sons. Some of her daughters have 6 daughters, and the rest have none.
Bertha has a total of 30 daughters and granddaughters, but she has no greatgranddaughters.

# REGIONAL OLYMPIAD PROBLEMS CHALLENGE ROUND 

## PROBLEM THREE

Goofy wants to make the Disney Basketball Team. He attends practice on Monday, Tuesday, Wednesday, Thursday, and Friday. At each practice last week, he made twice as many free throws as he had made at the previous practice. At his fifth practice he
 made 48 free throws.

## HOW MANY TOTAL FREE THROWS DID GOOFY MAKE DURING THE WEEK?

# REGIONAL OLYMPIAD PROBLEMS CHALLENGE ROUND 

## PROBLEM FOUR

The Pre-teen Super Heroes decided that is was time to take a vacation. During their vacation rain occurred on 13 days. When it rained in the morning the afternoon was sunny. Every rainy afternoon was preceded by a sunny morning. There were 11 sunny mornings and 12 sunny afternoons.


## WHAT IS THE MINIMUM NUMBER OF DAYS THE PRE-TEEN SUPERHEROES WERE ON VACATION?

## REGIONAL OLYMPIAD PROBLEMS CHALLENGE ROUND

## PROBLEM FIVE



Last night, Speedy Gonzales had a Mexican fiesta party at the O'Taco Mexican Food Restaurant. He invited all of his family. Three different dishes were served, fajitas, nachos and refried beans. Sixty-five dishes were served altogether. Every 2 mice shared fajitas, every 3 mice shared a plate of nachos, and every 4 mice shared a plate of refried beans.

## HOW MANY MICE ARE IN SPEEDY'S FAMILY?

REGIONAL OLYMPIAD PROBLEMSCHALLENGE ROUND
Answer Key
PROBLEM ONE
PROBLEM THREE - ..... 93
PROBLEM FOUR - ..... 18
PROBLEM FIVE - ..... 60

