Edmonton Junior High Mathematics Contest 2006

Multiple-Choice Problems

Problem 1

Ace, Bea, Cec, Dee, Eve, Fth and Geo are 1, 2, 3, 4, 5, 6 and 7 years old, in some order. Dee is three times as old as Bea. Cec is four years older than Eve. Fth is older than Ace and Ace is older than Geo, but the combined age of Ace and Geo is greater than the age of Fth. The age of Ace is

(a) 2 (b) 3 (c) 4 (d) 5

Problem 2

When 10 girls joined the Math Club in January, the percentage of boys in the club dropped to 20%. Then 10 boys joined the club in February, and this percentage rose to 40%. The percentage of boys in the club originally was

(a) less than 30% (b) 30% (c) 40% (d) between 30% and 40%

Problem 3

A $100 video game is not selling. The store gives an n% discount, but it is still not selling. So the store gives another n% discount on the reduced price, and the video game is finally sold for $64. The value of n is

(a) 6 (b) 8 (c) 18 (d) 20

Problem 4

There are four elevators in a building. Each makes only three stops, which do not have to be on consecutive floors or include the main floor. For any two floors, there is at least one elevator which stops on both of them. The maximum number of floors in this building is

(a) 5 (b) 6 (c) 7 (d) 12

Problem 5

A bookstore employed five part-time workers. Ace worked on Mondays, Tuesdays and Wednesdays. Bea worked on Wednesdays and Thursdays. Cec worked on Tuesdays and Thursdays. Dee worked on Mondays and Fridays. Eve worked on Thursdays and Fridays. During a certain week, they reported on the total numbers of books sold during the days in which they worked. The figures given by Ace, Bea, Cec, Dee and Eve were 115, 85, 90, 70 and 80 respectively. How many books were sold on Thursday of that week?

(a) 30 (b) 40 (c) 50 (d) 60

Problem 6

The value of $\sqrt{2+\sqrt{3}}+\sqrt{2-\sqrt{3}}$ is

(a) $\sqrt{6}$ (b) $2\sqrt{2}$ (c) $2\sqrt{3}$ (d) 6

Problem 7

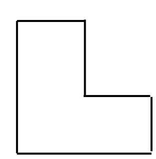
If a and b satisfy a+b-ab=1 and a is not an integer, then

(a) b cannot be an integer. (b) b must be a positive integer.

(c) b = 0. (d) b must be a negative integer.

Problem 8

Every two adjacent sides of a hexagon are perpendicular to each other. See diagram on the right for one such example. Five of the sides have lengths 6, 5, 4, 3 and 2, in some order. The area of this hexagon cannot be

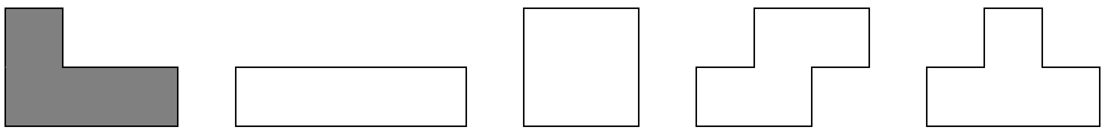


(a) 24 (b) 28 (c) 32 (d) all are possible

Problem 9

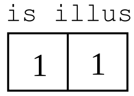
There are five Tetris pieces, each consisting of four unit squares joined edge to edge. Lily's favorite is the piece shaped like the letter L (shaded below). She tries to use it and one of the remaining four pieces to form a shape with one line of symmetry. The number of cases for which this is possible is

(a) 1 (b) 2 (c) 3 (d) 4



Problem 10

A domino consists of two unit squares joined edge to edge, each with a number on it. The domino numbered 11 is illustrated below.



Fifteen dominoes, numbered 11, 12, 13, 14, 15, 22, 23, 24, 25, 33, 34, 35, 44, 45 and 55, are assembled into the 5 by 6 rectangular grid shown in the diagram below. A domino can be placed vertically or horizontally on the grid. The square 4 in the second row and second column (in boldface) forms a domino with the square numbered

(a) 1 above it (d) 4 below it (c) 1 to the left of it (d) 3 to the right of it

1	1	3	5	2	3
1	**4**	3	1	5	2
2	4	5	5	3	2
3	3	1	1	2	4
2	5	4	5	4	4

Answers-Only Problems

Answers with fractions must be written in lowest terms.

Problem 1

Evan had no money. So Ray gave one third of his own money to Evan, Chauncey gave one quarter of his own money to Evan, and Sean gave one fifth of his own money to Evan. Evan received the same amount from each of the three. What fraction of the group's money did Evan have now?

Problem 2

On the left pan of a balance scale are 9 oranges, and on the right pan are 2 apples. The weight of each apple is $1\frac{1}{3}$ times that of an orange. If only whole fruits can be added, what is the smallest number of fruit which must be added to the right pan in order to achieve equilibrium?

Problem 3

Each of the digits from 0 to 9 are placed in one of the squares in a 2X5 table. The digit 0 goes into the square in the first row and the first column. The sum of the two numbers in each column except the first is constant. How many different digits could have gone into the square in the second row and the first column?

	C1	C2	C3	C4	C5
R1	0				
R2					

Problem 4

A nine-digit number consists of the nine non-zero digits in some order. The first digit is smaller than the last digit. The sum of the digits 1 and 2 and all the digits between them is 9. The sum of the digits 2 and 3 and all the digits between them is 19. The sum of the digits 3 and 4 and all the digits between them is 45. The sum of the digits 4 and 5 and all the digits between them is 18. What is this number?

Problem 5

Consider a fraction between 0 and 1. The sum of the numerator and the denominator of the fraction is 33. How many fractions are there such that the numerator and the denominator have no common divisors greater than 1?

Problem 6

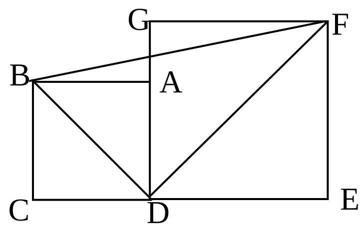
The sum of seven consecutive positive integers is the cube of an integer. The sum of the middle three of the seven numbers is the square of an integer. What is the smallest possible value of the middle one of the seven numbers?

Problem 7

A Pizza Joint cuts circular pizzas through the center into six equal slices. Each slice may be ham and pineapple, or salami and mushroom. How many different pizzas can be made up this way, if two pizzas which become the same after a rotation is counted as one?

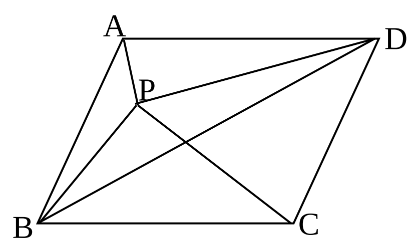
Problem 8

ABCD and DEFG are squares such that C, D and E lie on a straight line and A lies on DG. If AB=3 and FG=4, what is the area of triangle BDF?



Problem 9

ABCD is a parallelogram and P is a point inside triangle BAD. If the area of triangle PAB is 2 and the area of triangle PCB is 5, what is the area of triangle PBD?



Problem 10

Triangle ABC is cut out of a piece of paper, where AB=24, AC=32 and $\angle$CAB=90°. The paper triangle is folded so that B and C coincide. What is the length of the crease?