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INTERNATIONL MATHENATICS AND SCIENCE OLYMPIAD FOR PRIMARY SCHOOLS (IMSO) 2004

Mathematics Contest in Taiwan
The Second Round
Theoretical Examination

Name:_____ School:_____ Grade:_____ ID number:_____

Show your detailed solution in the space provided after each question. Each question is worth 3 points.

1. Now we are in the year 2004. The ratio of ages of my father, my mother, and my younger brother is 12:9:1. Five years from now, my father will be 41 years old. In what year was my younger brother born?

2. Laila's savings in a bank is $100. Tina's savings is $40. Every end of the week, Laila withdraws $3 from her savings. At the same time, Tina always deposit $2.40 into her savings. After how many weeks will Laila's savings be $6 more than Tina's savings?

3. The product of two positive integers is even, but not divisible by 4. Is their sum odd or even?

4. On the table, there are 6 coins each of the values \$5, \$10, and \$50. Deni takes \$75. The number of coins Deni takes is more than 5, but less than 9. Does Deni take all the three types of coins? If not, which type does he not take?

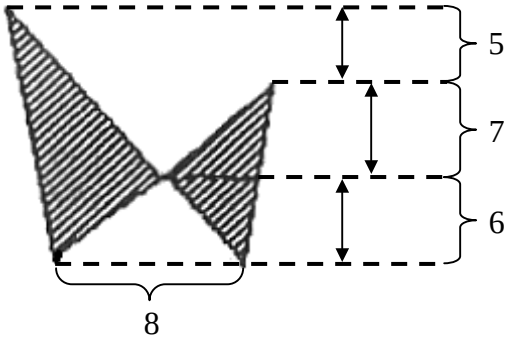
5. The weight of a small box, two medium boxes and a large box altogether is 10 kg. The weight of a small box, two medium boxes and two large boxes altogether is 15 kg. What is the total weight of two small boxes and four medium boxes?

6. Replace the letter *A* with an odd digit and the letter *B* with an even digit, so that 12 is a factor of the number *A*579*B*. Find the all possible values of *A*579*B*.

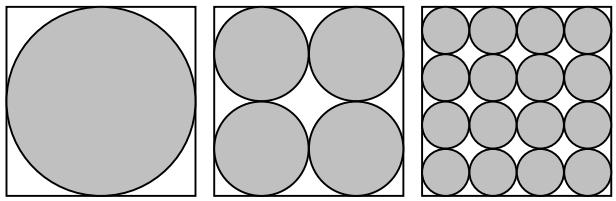
7. Find the missing digits.

$$\begin{array}{rcccc} & \square & \square & \square \\ \times & & \square & \square \\ \hline & 2 & 0 & 3 & 2 \\ + & 7 & 6 & 2 & \\ \hline & 9 & 6 & 5 & 2 \end{array}$$

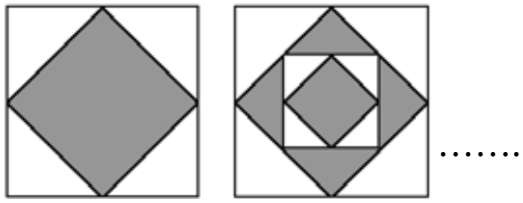
8. Find the total area of the shaded regions in the figure.



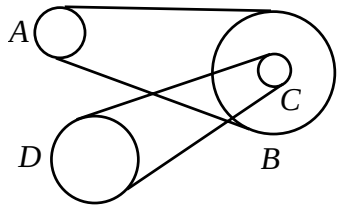
9. In the following figures, the three squares have equal areas. Determine whether the areas of the three shaded regions in each square are also equal.



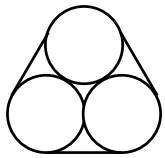
10. If the pattern below is continued, what is the percentage of the area of the shaded regions in the third picture compared to the area of the largest square?



11. Four wheels *A*, *B*, *C*, and *D* are connected by belts, see figure. The wheels *B* and *C* are fastened together. The diameters of wheels *A*, *B*, *C*, and *D* are 12 cm, 36 cm, 9 cm, and 27 cm, respectively. The wheel *A* turns at a speed of 450 rotations per minute. At what speed does the wheel *D* turn?



12. Three circular disks of radius 7 cm each are bound tightly with a belt, see figure. What is the length of the belt?



13. The volume of a small balloon is 2 liters and a larger balloon is 5 liters. The small balloon is increased at a rate of 0.3 liters per second. The larger balloon is decreased at a rate of 0.12 liters per second. After how many seconds will the two balloons have the same volume?

14. A train travels between two stations. The train will be on time if it runs at an average speed of 60 km/hour, but will be late by 5 minutes if it runs at an average speed of 50 km/hour. What is the distance between the two stations?

15. Twice the number of marbles in bag *A* is less than the number of marbles in bag *B*. The sum of the number of marbles in bags *A* and *C* is less than the number of marbles in bag *B*. There are more marbles in bag *D* than in bag *B*. There are 6 marbles in bag *C* and 9 marbles in bag *D*. How many marbles does bag *B* contain?