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Po Leung Kuk
16th Primary Mathematics World Contest
Individual Contest 2013

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1. Nine cards are numbered from 1 to 9 respectively. Two cards are distributed to each of four children. The sum of the numbers on the two cards the children are given is: 7 for Ann, 10 for Ben, 11 for Cathy and 12 for Don. What is the number on the card that was not distributed?

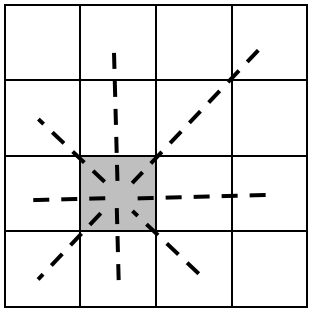
2. Given A, B, C and D are distinct digits and

$$\begin{array}{rrrrrr} & A & A & B & C & D \\ - & D & A & A & B & C \\ \hline & 2 & 0 & 1 & 3 & D \end{array}$$

   Find $A + B + C + D$.

3. A car traveled from Town A to Town B at an average speed of 100 km/h. It then traveled from Town B to Town C at an average speed of 75 km/h. Given that the distance from Town A to Town B is twice the distance from Town B to Town C, find the car's average speed, in km/h, for the entire journey.

4. In your answer sheet, there is a 4 × 4 board. Shade 4 of the 16 squares so that no two shaded squares lie on the same vertical, horizontal or diagonal path. Below is an illustration of the paths.



5. Find the sum of all the digits in the integers from 1 to 2013.

6. What is the 2013th term in the sequence

$$\frac{1}{1}, \frac{2}{1}, \frac{1}{2}, \frac{3}{1}, \frac{2}{2}, \frac{1}{3}, \frac{4}{1}, \frac{3}{2}, \frac{2}{3}, \frac{1}{4}, \ldots?$$

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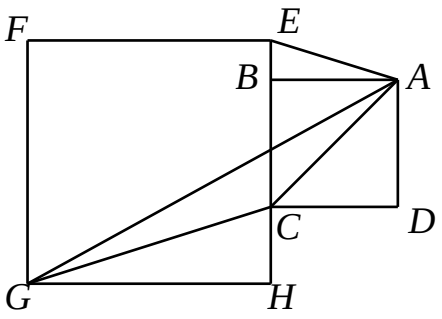
7. All the perfect square numbers are written in order in a line: 14916253649… Which digit falls in the 100th place?

8. A team of four children are to be chosen from 3 girls and 6 boys. There must be at least one girl in the team. How many different teams of 4 are possible?

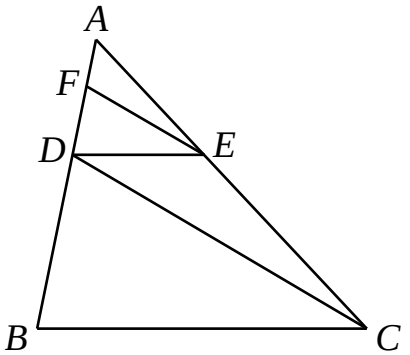
9. The sum of 13 distinct positive integers is 2013. What is the maximum value of the smallest integer?

10. Four teams participated in a soccer tournament. Each team played against all other teams exactly once. Three points were awarded for a win, one point for a draw and no points for a loss. At the end of the tournament, the four teams have obtained 5, 1, x and 6 points respectively. Find the value of x.

11. In the figure below, $ABCD$ and $EFGH$ are squares and side BC is on the line EH. The area of $ABCD$ is 121 cm^2 and the area of $EFGH$ is 441 cm^2. If the area of triangle AGC is 82.5 cm^2, what is the area of triangle ABE, in cm^2?

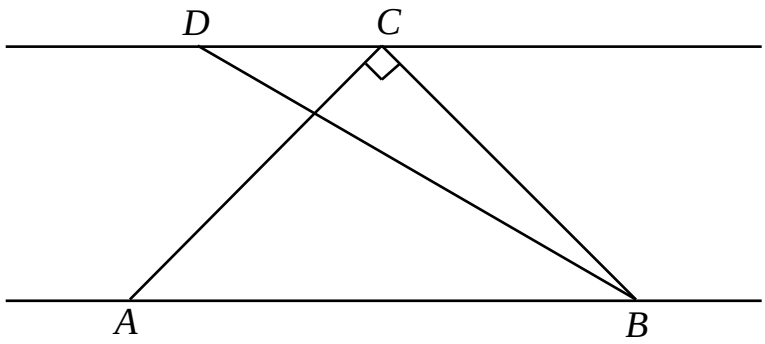


12. In triangle ABC below, $DE//BC$ and $FE//DC$. If $AF = 4$ and $FD = 6$, find DB.

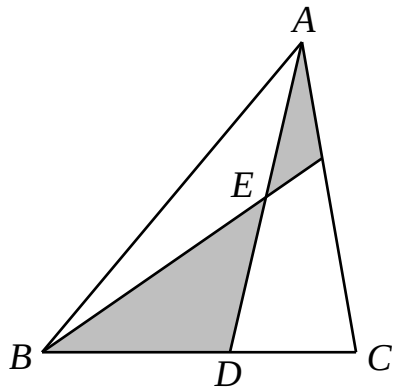


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13. In the diagram below, AB // DC, $\angle ACB = 90^o$, $AC = BC$ and $AB = DB$. Find $\angle CBD$, in degrees.



14. In the diagram below, the area of triangle ABC is 32 cm^2. Given that $2BD = 3CD$ and $AE = DE$, find the area of the shaded region, in cm^2.



15. Given that $1 + \frac{1}{2^2} + \frac{1}{3^2} + ... = M$, and $1 + \frac{1}{3^2} + \frac{1}{5^2} + ... = K$,

find the ratio of M : K.