2014 WMI Competition
Grade 6 Part 2 Applications Test

Ten Points Each. Total 150 Points.

1. Compute $\dfrac{19135\times 270-1611}{2014\times 810+273}$.

2. A row of benches has 50 sitting spaces where some of them are already occupied. Another person approaches to sit down and notices that no matter which seat she takes, she will be sitting next to someone who is already sitting. What is the minimum number of people who could already be sitting on the benches?

3. Based on the following three expressions and their pattern (each number in each product of an expression is increased by 3 to get the next expression), write down the 672th expression.

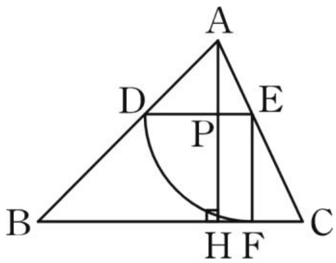
(1) $1\times1 + 7\times7 = 10 + 2\times2 + 6\times6$

(2) $4\times4 + 10\times10 = 10 + 5\times5 + 9\times9$

(3) $7\times7 + 13\times13 = 10 + 8\times8 + 12\times12$

4. There are 9 banknotes of different face values in \$1, \$5, \$10, and \$50. If there is at least one of each banknote and the total value of these 9 banknotes is \$177, how many \$10 notes are there?

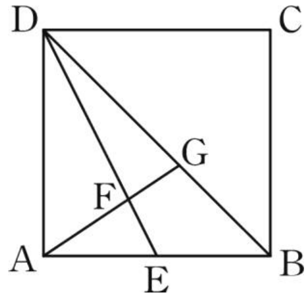
5. In triangle ABC in the figure on the right, $\overline{AH} = 15cm$, $\overline{BC} = 45cm$, $\overline{AH}$ and $\overline{BC}$ are perpendicular to each other and a 90° fan shape DEF with DE//BC can be exactly fitted inside of ΔABC. Find the length of $\overline{EF}$. (The figure on the right is not to scale)



6. Let x and y be two 2–digit natural numbers where $x < y$. The product xy is a 4–digit number and its thousands digit is 2. If this thousands digit is removed, the remaining number is exactly $x+y$. (For example: $x = 30$ and $y=70$, $30\times70 = 2100$, and $100 = 30+70$). Find another set of numbers for x and y that satisfies the above conditions.

7. Suppose A, B, and C need to go to a location that is 88 km away. A rides a motorbike that goes 24 km/hr and all three people walk at a speed of 3 km/hr. In the beginning, A takes B in his motorbike while C walks by himself. After A drops B off somewhere before the final destination and let B walks to the destination and A turns around and rides the motorbike back toward C. When A meets C, A takes C and turns around going toward their final destination on his motorbike. If all three arrive the final destination at the same time, how far should A take B in the beginning before he drops B off?

8. A train crosses a bridge 200 meters long, taking 15 seconds from the time its nose reaches the bridge until its tail leaves the bridge. A while later, it crosses another bridge 180 meters long, taking 14 seconds in the same way. Still later, the train passes through a tunnel 360 meters long. For how much time will the entire train be in the tunnel?



9. Consider square $ABCD$ as shown in the figure on the right. If E is the midpoint of $\overline{AB}$ and $\overline{DB} = \frac{3}{2}\overline{BG}$, find the proportion $\overline{FG} : \overline{AF}$.

10. Suppose both the whole number portion A and the decimal portion B of a certain number are 3–digit numbers and $A + B = 999$. If A and B switch position, the new number is 6 times the old number. Find the original number.

11. Suppose there are 5 blue balls, 3 yellow balls, and 4 green balls. How many different ways can these 12 balls be lined up in a straight line?

12. Consider an 8–digit number that satisfies the following 4 conditions:

(1) It is a multiple of 3 after 1 is subtracted from it.
(2) It is a multiple of 4 after 2 is subtracted from it.
(3) It is a multiple of 11.
(4) The first 6 digits of this number is 267533.

Find the last two digits of this number.

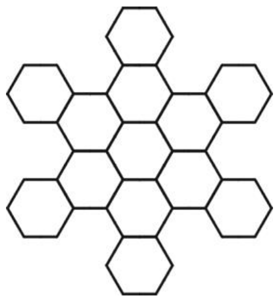
13. Fill two natural numbers inside the two sets of parentheses $\frac{(\ )}{19} + \frac{(\ )}{2014} = 1$ so that this expression is true. How many ways can we fill these two sets of parentheses?

14. The shape on the right has 13 hexagonal spaces. Place the numbers 1-13 in the 13 hexagons, each number can only use once, so that the sums of the following sets (a-e) are the same:

(a) The outer 6 hexagons
(b) The inner 6 hexagons surrounding the center hexagons

The straight row of 5 hexagons:

(c) vertical
(d) diagonal upper left to lower right
(e) diagonal lower left to upper right



15. Consider the two clocks, shown on the right, that are both inaccurate. One clock is 11 minutes too fast in a day and the other is 7 minutes too slow in a day. If these two clocks are set the time at 6 o'clock together, after how many days will these two clocks be pointing at 6 o'clock together again?