PIMS Elementary Grades Math Competition   NAME: _____
02 May 2015
Sprint Round - Grade Seven Division   SCHOOL: _____

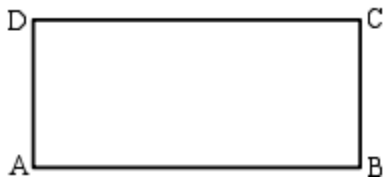1.   What is the smallest prime number that is larger than 31?

                                                                      _____   1

2.   How much is 350% of 20% of 30?   _____   2

3.   Express $\frac{3}{8}$ as a decimal correct to 3 decimal places.   _____   3

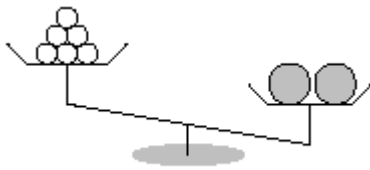4.   The perimeter of the rectangle $ABCD$ is 44, and one of its sides is 15.
      What is the area of the rectangle?

                                                                      _____   4

5.   In 2015, 330 students registered to participate in the Elmacon competition.
      132 of them are boys. What percent of the total registration is of girls?   _____(%) 5

6.   The scale is balanced. The weight of each of the smaller weights is 2 kg.
      What is the combined weight (in kg) of all weights (smaller and larger)?

                                                                      _____(kg) 6

7.   The cost of a pair of shoes (before tax of 12%) is 150 dollars.
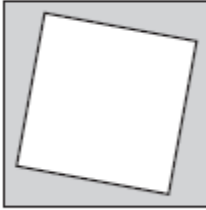   What is the total cost including tax?   _____($) 7

8.   What is the value of $(2\times(0+1)\times5)\times5\times2$?   _____   8

9.   How many whole numbers smaller than 2015 have digit sum of 26?   _____   9

Grade Seven (7) Division

10. If you reduce the volume of a cube by 27.1%, by
    what percent do you reduce the value of its side? _____ (%) 10

11. The side of the larger square is 20 and the side of the
    smaller square is 17. What is the area of the shaded region?

    _____ 11

12. P, Q, and R are the three largest different primes all smaller than 12.
    What is their product? _____ 12

13. You roll two fair dice. What is the probability that both show "**1**"? _____ 13

14. The perimeter of a rectangle is 51 and its area is 161.
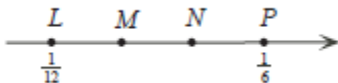   What is the value of its largest side?

    _____ 14

15. Express $\dfrac{1}{2015} + \dfrac{2}{2015} + \cdots + \dfrac{9}{2015}$ as a fraction in lowest terms. _____ 15

16. Gordi likes to trade Magic cards. He bought a card for $100. Then, he
    sold it for $ 110, bought it again for $120, sold it again for $130, and
    so on in increments of $10 until he finally sold the card for $270.
    What was his total profit from the combined trading transactions (in $)? _____($)16

17. The points L, M, N, and P are equally spaced.
    What is the value of $N - M$?

    $L \quad M \quad N \quad P$
    $\frac{1}{12} \qquad \frac{1}{6}$

    _____ 17

18. It takes 10 hours for 10 identical tractors to plow a 10 hectare field. How
    much time (in hours) does it take one tractor to plow a one hectare field? _____ (h)18

19. In the subtraction below, what is the value of $M + K + N + L$?

$$\begin{array}{cccc} 5 & K & 3 & L \\ - \; M & 4 & N & 1 \\ \hline 4 & 4 & 5 & 1 \end{array}$$

_____ 19

20. N, $N + K$, and $N + 2K$ are all integers and $K > 0$.
$N(N + K)(N + 2K) = P$ where P is prime.

What is the value of N ?

_____ 20

21. Zake tossed a coin 5 times and got at least one head.
What is the probability that he got exactly 4 heads?
Express your answer as a common fraction in lowest terms.

_____ 21

22. You can use the digits $2, 0, 1$, and 5 to form three digit numbers (but only the digit 1 is allowed to be used more than once). How many numbers can be formed? Examples for valid numbers: $111, 101, 251, 502$.
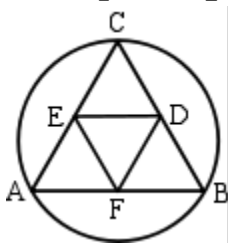
_____ 22

23. A regular polygon has 120 sides. How many non congruent regular polygons can be drawn using corners of this polygon as their corners?

_____ 23

24. Yoko is more than 8 years old and is younger than 50.
The sum of all factors of her age is twice her age.
What is her age (in years)? Note that 1 and N are factors of N.

_____ 24

25. Alice selects at random a digit from the four digits $2, 0, 1, 5$. Then, Bob selects at random a digit from $2, 0, 1, 5$, possibly the same digit as Alice's.

Suppose that Alice's selected digit is N, and Bob's selected digit is M.

What is the probability that $N - M$ is less than 3?
Express your answer as a common fraction in lowest terms.

_____ 25

26. ABC is an equilateral triangle inscribed in a circle with radius 1.
D, E, and F are mid points of the sides of ABC. What is

the area of triangle DEF ? Express your answer as $\dfrac{p\sqrt{q}}{n}$

where p and q are primes and n is a whole number.

_____ 26