PIMS Elementary Grades Math Competition   NAME: _____

02 May 2015

Sprint Round - Grade Six Division   SCHOOL: _____

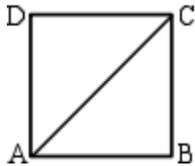1.   What is the smallest prime number that is larger than 21?

_____ 1

2.   How much is 250% of 20% of 30?   _____ 2

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

4.   The perimeter of the square $ABCD$ is 48.
     What is the area of triangle ABC?

_____ 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 weight (in kg) of each of the two larger weights?
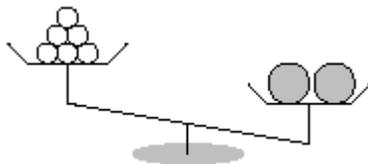
_____(kg) 6

7.   The cost of a pair of shoes (before tax of 12%) is 150 dollars.
     What is the total cost including tax?   _____($) 7
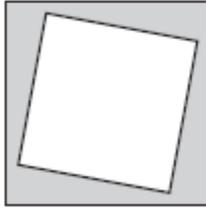
8.   What is the value of $(2+0+1+5)\times 5\times 2$?   _____ 8

9.   How many whole numbers smaller than 2015 have digit sum of 27?   _____ 9

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10. If you increase the volume of a cube by 6300%, by what percent do you increase 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 and Q are the two largest different primes both smaller than 15. 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 45 and its area is 126. 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 $250. 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 $L + M + N + P$?

$$L \quad M \quad N \quad P$$
$$\tfrac{1}{12} \qquad\qquad \tfrac{1}{6}$$
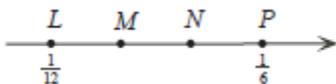
_____ 17

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

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

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

_____ 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 4 times and got at least one head.
What is the probability that he got exactly 3 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 60 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.
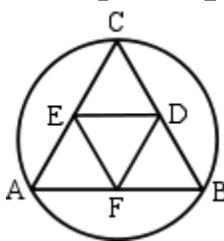
What is the probability that NM is less than 5?
Express your answer as a common fraction in lowest terms.

_____ 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