PIMS Elementary Grades Math Competition
06 May 2017
Sprint Round - Grade Seven Division

NAME: _____

SCHOOL: _____

1. Express 0.85 as fraction in lowest terms. _____ 1

2. Calculate: $2017+(2-0)\times(1+7)=$ _____ 2

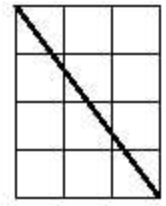
3. What percent of 15 is $\frac{9}{2}$? _____(%) 3

4. The music club bought headsets for all its 16 members,
and paid a total of $196.00 for them.
What was the cost per headset, in $, correct to 2 decimal places? _____($) 4

5. What is the circumference of a circle with area $\frac{144}{\pi}$. _____ 5

6. If 75% of N is 360, what is 25% of $\frac{N}{2}$? _____ 6

7. The measure of the side of each of the small squares is 5 units.
What is the measure of the bold line?



_____ 7

8. How many degrees, $(^\circ)$, does the hour hand of a clock move in 48 minutes? _____($^\circ$) 8

9. A bowl contains 3 red marbles, 2 yellow marbles and 6 blue marbles.
You pick one of the marbles at random. What is the probability that
you picked a blue marble? Express your answer as fraction in lowest terms. _____ 9

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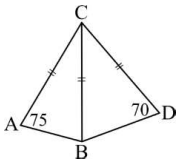
10. For each correct answer for any of the 26 Sprint questions of the Elmacon competition David got one mark. For each correct answer for any of the 12 Target questions David got two marks. David total score was 68% of the maximum possible total mark. If he answered correctly 18 Sprint questions, how many Target questions did he answer correctly?_____ 10

11. The sum of 7 different positive whole numbers is 200.
What is the maximum possible value of the smallest number? _____ 11

12. A four-digit number is called a "lucky number" if it has exactly three equal digits. For example 1000, and 1811 are lucky, while 1111 is not.
How many lucky numbers smaller than 2017 are there? _____ 12

13. $ABDC$ is a 4-sided polygon. $AC = BC = DC$, $\angle CAB = 75°$, and $\angle CDB = 70°$. What is the value, in degrees, of $\angle ABD - \angle ACD$?



_____(°) 13

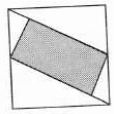
14. Some Red Robins, 7 Blue Jays, and 3 Wood Peckers line up in a queue to feed from the bird feeder. There are exactly 2 Red Robins directly ahead and directly behind every Blue Jay and every Wood Pecker.
How many birds are there, in total, in the line up? _____ 14

15. The distance, if travelling by train, from Toronto to Vancouver is $4200km$.
If the average speed of the train over this entire route is $72\frac{km}{h}$,
how long will be the entire trip, in hours (h), rounded to the nearest hour? _____(h) 15

16. Another way to get from Toronto to Vancouver, (distance of $4200km$), is by express bus, whose normal speed is $84\frac{km}{h}$. At a point $\frac{2}{3}$ of the way the bus's engine broke down, and it took 13 hours and 20 minutes to repair it. The driver, then, resumed driving at a higher speed. Eventually, the bus arrived Vancouver 10 hours after its original scheduled arrival time.
What was the average speed of the bus, in $\frac{km}{h}$, on the last $\frac{1}{3}$ of the route? _____($\frac{km}{h}$)16

17. The weight of Canadian coins (in grams) are as follows: 5 cents - 3.95g, 10 cents - 1.75g, 25 cents - 4.40g, 1 dollar - 7.00g, and 2 dollars - 7.30g. You put on a scale some coins (at least one coin of each of the above denomination), and find out that their total combined weight is 64.40g. What is the maximum possible value of all of the coins combined, in dollars ($), correct to 2 decimal places? _____($) 17

18. The square in the figure below is divided into a shaded rectangle surrounded by 4 triangles. The measure of the side of the outer square is 2. Two corners of the shaded rectangle bisect two sides of the outer square. What is the ratio of the perimeter of the shaded rectangle to the perimeter of the square? Provide your answer as $\frac{a\sqrt{b}}{c}$ where a and b are primes, and c is an integer.



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19. The sum of all the members of the set $\{1,2,3,4,5,6,7,8,9\}$ is 45. For how many different subsets of this set is the sum of all the members of the equal to 9? (Note that $\{7\}$, $\{1,5\}$, and $\{2,5,7\}$ are subsets while $\{2,2,5\}$ is not). _____ 19

20. The boundary of the rectangle below consists of 6 matches $7cm$ in length each. You rearrange the matches to form a triangle consisting of two matches for each of its sides. What is the area, in cm^2, of the triangle?

Express your answer as $n\sqrt{m}$, where n is integer and m is prime.

_____(cm^2) 20

21. You can rearrange the matches of unit length of $7cm$ from Question 20 to form a regular hexagon. What is the total length, in cm, of all diagonals of the hexagon that do not pass through the centre of the hexagon?

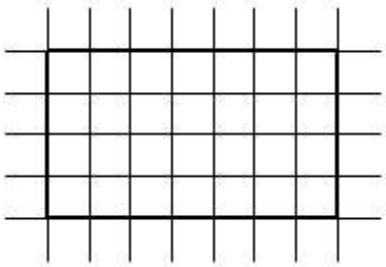
Express your answer as $n\sqrt{m}$, where n is integer and m is prime. _____(cm) 21

22. If you write $\frac{3}{7}$ as decimal, what is the 2017th digit after the decimal point? _____ 22

23. Let $F(x,y,z) = x + 2y + 3z$.

What is the value of $F(1,F(1,2,3),F(1,2,F(1,2,3)))$? _____ 23

24. The length of each line segment in the figure below is 1. How many rectangles, of all sizes, are there in the figure? Note that a square is also a rectangle.



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25. You toss a coin. If you get "heads" you throw two dice and write the absolute value of the difference of the two numbers on a piece of paper. Otherwise, (i.e. if you get "tails"), you write the number 4 on the piece of paper. What is the probability that you wrote the number 4? Express your answer as fraction in lowest terms? _____ 25

26. Let p_1, p_2, and p_3 be different primes such that the value of $p_1 + p_2 + p_3$ is smallest, while $p_1 \times p_2 \times p_3 > 2017$. What is the value of $p_1 \times p_2 \times p_3$? _____ 26