KCATM Mathletics 2013

Question #1

2 minutes, 2 points

Team # _____

1) Find the distance between the points (5, 8, 9) and (1, -4, 6). If necessary, round your answer to the nearest thousandth.

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Question #2

3 minutes, 3 points

Team # _____

2) Find the area of a regular pentagon with a side length of 5 centimeters. If necessary, round your answer to the nearest thousandth.

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Question #3

2 minutes, 2 points

Team # _____

3) Compute 632 base 7 + 281 base 5.

Give your answer in base 8.

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Question #4

2 minutes, 2 points

Team # _____

4) Suppose $f(x) = \sum_{n=1}^{4} \frac{n^x}{n+2}$.

Compute $f(-1)$, expressing your answer as a fraction in simplest terms.

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Question #5

2 minutes, 2 points

Team # _____

5) Let Z represent the coefficient of the $x^{10}y^{9}$ term in the binomial expansion of $(2x+3y)^{19}$.

Compute log(Z). If necessary, round your answer to the nearest thousandth.

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Question #6

2 minutes, 2 points

Team # _____

6) A cone has a radius of 2 inches and a height of 8 inches. The cone is filled with water until the water level is 6 inches high. Find the volume of the water in the cone. Express your answer in terms of π.

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Question #7

2 minutes, 2 points

Team # _____

7) March 16, 1983 was a Wednesday. What day of the week was September 8, 1983?

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Question #8

2 minutes, 2 points

Team # _____

8) Suppose $\log_2 A = \frac{1}{4}$, $\log_4 B = \frac{3}{8}$, $\log_8 C = \frac{1}{3}$.

Compute $\log_{16}\left(\frac{A^2 B^3}{\sqrt{C}}\right)$.

Express your answer as a fraction in simplest terms.

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Question #9

2 minutes, 2 points

Team # _____

9) Suppose $x + y = 8$ and $x^3 + y^3 = 200.$

Find the value of *xy*.

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Question #10

1 minute, 1 point

Team # _____

10) Compute the value of $\frac{10!6!}{7!9!}$.

Express your answer as a fraction in lowest terms.

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Question #11

2 minutes, 2 points

Team # _____

11) Give the coordinates of the removable discontinuity for the function, $f(x) = \dfrac{6x^2 + x - 2}{15x^2 - 2x - 8}$.

Express both your x and y coordinates as fractions in lowest terms.

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Question #12

2 minutes, 2 points

Team # _____

12) A right-circular cylinder has a surface area equal to the value of its volume. If the height of the cylinder is 7 centimeters, find the radius of the cylinder. Express your answer as a fraction in lowest terms.

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Question #13

2 minutes, 2 points

Team # _____

13) If $f(x)=\begin{cases}.2x & 0\le x\le 1\\ .2 & 1\le x\le k\end{cases}$ represents a probability distribution function, find the value of k.

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Question #14

2 minutes, 2 points

Team # _____

14) Suppose $f(x) = \cos\left(\frac{2x}{3}\right)$ where $0 \le x \le 10$.

Determine where $f(x) < 0$.

Your answer must be exact.

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Question #15

3 minutes, 3 points

Team # _____

15) Suppose $f(x)=\begin{cases} 2x+3 & 0\le x<2 \\ 7 & 2\le x<5 \\ 12-x & 5\le x\le 12 \end{cases}$.

Find the value of x that makes the area between $f(x)$ and the x-axis equal to 50. Your answer must be exact.

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Question #16

2 minutes, 2 points

Team # _____

16) Find the area of quadrilateral ABCD if point A is (0, 2), point B is (5, 0), point C is (4, 10) and point D is (10, 6).