

KCATM 2011
High School
Mathletics Test

School: _____

Question #1

(2 minutes – 2 points)

Question #1: Find the probability that when a fair coin is tossed five times, at most four heads are recorded.

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Question #2

(1 minute – 1 point)

Question #2: Find the sum of the solutions to the quadratic equation: $x^2 + 7x + 1 = 0$.

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Question #3

(3 minutes – 3 points)

Question #3: Compute $x^2 + y^2$

if $x^3 + y^3 = 124$ and $x^2 + 2xy + y^2 = 16$.

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Question #4

(2 minutes – 2 points)

Question #4: Region A is the region inside the graph

of $4x^2 + y^2 = 16$ **and** outside the graph $x^2 + y^2 - 2y = 1$.

Find the area of region A.

Express your answer in terms of pi.

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Question #5

(1 minute – 1 point)

Question #5: Find the measure of the acute angle formed by the hands of a clock at 7:48.

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Question #6

(1 minute – 1point)

Question #6: Find the sum of the sequence $1 + 2 + 3 + \dots + 100$.

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Question #7

(2 minutes – 2 points)

Question #7: George the farmer knows he has a barn consisting of only cows and chickens. If he has a total of 47 animals in the barn, and accurately counts 156 legs in the barn, how many **chickens** are in the barn?

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Question #8

(2 minutes – 2 points)

Question #8: Find the area of the region bounded by the

inequalities:
$$\begin{cases} 3x + 4y \leq 84 \\ 2x + 5y \leq 70 \\ x \geq 0; y \geq 0 \end{cases} .$$

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Question #9

(2 minutes -2 points)

Question #9: Suppose that $\csc \theta = x$, where θ is an angle in the first quadrant, and x is some positive number.

Compute $\cos \theta$. (Your answer will be in terms of x).

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Question #10

(1 minute – 1 point)

Question #10: How many different words can be formed using all the letters in the word HAWAII?

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Question #11

(2 minutes – 2 points)

Question #11: In Mrs. Smith's third hour Algebra class, an equal number of boys and girls passed an exam. If two-thirds of the boys passed the exam, and three-fourths of the girls passed the exam, what fraction of the entire class passed the exam?

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Question #12

(3 minutes – 3 points)

Question #12: In a 21-meter race between a tortoise and a hare, the tortoise leaves 9 minutes before the hare. The hare, by running an average speed of 0.5 meters per hour faster than the tortoise, crosses the finish line 3 minutes before the tortoise. What is the average speed of the HARE in meters per hour?

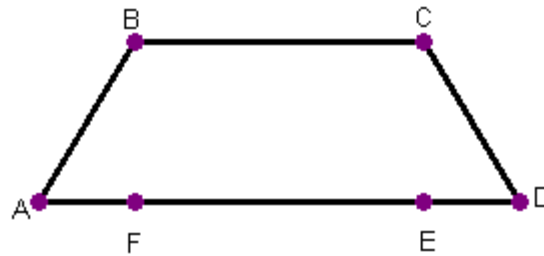
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Question #13

(2 minutes -2 points)

Question #13: Suppose that ABCD is a trapezoid, such that AB is equal to CD and BC is parallel to AD. Also, suppose that points E and F are on segment AD such that BC = FE and BC is parallel to FE. All of this information is represented in the diagram below. If BC = 6, BF = 3 and the area of trapezoid ABCD is 24, compute the measure of angle ABC, rounding your answer to the **nearest degree**.



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Question #14

(2 minutes – 2 points)

Question #14: Find the area of a regular hexagon with side length 2.

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Question #15

(1 minute – 1 point)

Question #15: Suppose $\log_A(8) = 3$ and $\log_2(\sqrt[11]{4}) = B$.

Compute $A - B$.

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Question #16

(1 minute – 1 point)

Question #16: Find the probability of selecting a random two-digit integer (10 to 99) that contains at least one 5. Express your answer as a fraction in lowest terms.

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Question #17

(2 minutes – 2 points)

Question #17: Calculate $\sum_{n=1}^{17} \left(\frac{3}{n} - \frac{3}{n+1} \right)$