Oklahoma Math Day

November 16, 2016

Algebra I

INSTRUCTIONS:

1. Do not begin the test until told to do so.
2. Calculators are not permitted.
3. Be sure to enter your name and high school code on the answer sheet.
4. Use a number 2 pencil to fill out your answer sheet.
5. Please remain in your seat until time is called.

OU Math Day 2016

Algebra I Test

(with answers on the last page)

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1. If the sum of two numbers is 23, and their difference is 7, what is their product?

   (A) 132 (B) 130 (C) 120 (D) 60 (E) None of the above.

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2. If x and y are odd integers, which of the following is always an odd integer?

   (A) $x+y$ (B) $3xy$ (C) $x-3y$ (D) $(xy+1)/2$ (E) None of the above.

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3. One year from today, Jean will be two-thirds as old as Ann. Five years from today, Jean will be four-fifths as old as Ann. How old is Jean today ?

   (A) 5 (B) 4 (C) 3 (D) 2 (E) None of the above.

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4. Zach goes on a long drive. He travels the first 200 miles with a speed of 50 miles per hour, and the rest of the trip at 60 miles per hour. If his average speed for the entire trip is 55 miles per hour then how many miles did he travel?

   (A) 400 (B) 500 (C) 440 (D) 800 (E) None of the above.

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5. If $\sqrt{1}+\sqrt{9}=\sqrt{x}$, then x equals

   (A) 10 (B) 4 (C) 16 (D) 100 (E) None of the above.

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6. Parade Magazine often includes a puzzle where the goal is to fill in a 9×9 grid so that the numbers 1-81 are listed in sequence, with consecutive numbers following a horizontal or vertical path (no diagonals). Find the number to be inserted into the square marked 'X'.

(A) 77 (B) 39 (C) 40 (D) 57 (E) None of the above.

9	8	7	6	61	62	67	68	69
10								70
15								73
16								74
21				X				81
22								52
27								51
28								48
29	30	33	34	43	44	45	46	47

7. Today is a Wednesday. What day of the week will it be 2016 days from now?

(A) Thursday (B) Wednesday (C) Sunday (D) Monday (E) None of the above.

8. Suppose that the integer $11A1B$ is divisible by 3, where A and B represent distinct digits from $\{0, 1, 2, 3, \ldots, 9\}$. How many values of $A + B$ are possible?

(A) 5 (B) 6 (C) 7 (D) 8 (E) None of the above.

9. Let x and y be integers so that $3x + 7y = 1$. Among all possible solutions to this equation what is the smallest possible positive value for $x + y$?

(A) 5 (B) 7 (C) 4 (D) 3 (E) None of the above.

10. Which number is the double of 8^9?

(A) 16^9 (B) 8^{18} (C) 4^{14} (D) 2^{18} (E) None of the above.

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11. If m and n are positive integers such that $2/3 < m/n < 3/4$ then what is the smallest possible value of n ?

(A) 4 (B) 5 (C) 7 (D) 10 (E) None of the above.

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12. May wants to withdraw \$200 from the bank in \$5, \$10, and \$20 bills. She wants to have at least one of each bill and would like the same number of \$5's as \$10's. What is the fewest number of bills she can receive?

(A) 11 (B) 14 (C) 15 (D) 16 (E) None of the above.

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13. Let r be the sum of $2015/2016$ and its reciprocal. Which of the following holds:

(A) $r < 1$ (B) $1 < r < 2$ (C) $r = 2$ (D) $2 < r < 3$ (E) None of the above.

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14. Jeff's Algebra I test average will be a 88 if he gets a 72 on the next exam and a 91 if he gets a 90 on the next exam. If all exams are weighted the same, how many exams has Jeff taken so far?

(A) 3 (B) 4 (C) 5 (D) 6 (E) None of the above.

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15. The expression $\dfrac{1}{2-\dfrac{3}{4-\frac{5}{x}}}$ simplifies to

(A) $\dfrac{2x-3}{5(x-1)}$ (B) $\dfrac{3x+4}{2(x-5)}$ (C) $\dfrac{x+3}{2(x-4)}$ (D) $\dfrac{4x-5}{5(x-2)}$ (E) None of the above.

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16. Suppose that $2^a+2^b+2^c+2^d = 57$ where a, b, c, and d are four distinct integers. Determine the value of $a+b+c+d$.

(A) 9 (B) 10 (C) 11 (D) 12 (E) None of the above.

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17. If $\frac{x}{y} = 0.6$ and $\frac{y}{z} = 0.75$ what is the value of $\frac{x+z}{y}$?

(A) 29/15 (B) 27/20 (C) 7/8 (D) 2/3 (E) None of the above.

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18. Marie kept a journal, numbering each page by hand starting at 1. When the journal was completed she noticed that she had used twice as many digits in writing the page numbers as the page number appearing on the last page. How many pages does the journal contain?

(A) 108 (B) 120 (C) 79 (D) 80 (E) None of the above.

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19. If you count to 1 million, counting one number per second, how many days d will it take?

(A) $0 < d \leq 6$ (B) $6 < d \leq 8$ (C) $8 < d \leq 10$ (D) $10 < d \leq 12$ (E) None of the above.

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20. An unusual die has the numbers 2, 2, 3, 3, 5 and 8 on its six faces. Two of these dice are rolled and the two numbers on the top faces are added. How many different totals are possible?

(A) 8 (B) 9 (C) 10 (D) 11 (E) None of the above.

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21. Which of the following numbers is largest?

(A) 6^{100} (B) 5^{200} (C) 4^{300} (D) 3^{400} (E) 2^{500}

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22. A positive integer is a "palindrome" if its digits read the same from right to left as from left to right. (So, for example, 1374731 is a palindrome.) What is the smallest palindrome larger than 2016?

(A) 2002 (B) 2022 (C) 2222 (D) 3003 (E) None of the above.

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23. Thirty dollars is to be split among eight people. Each person gets at least $ 1; at least one person gets more than $ 5; at least four other people get more than $ 1. If all 8 people get an exact number of dollars, the largest amount (in dollars) that could be received by a person is:

(A) 13 (B) 17 (C) 19 (D) 23 (E) None of the above.

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24. Let $\dfrac{x^2+ax+6}{x+1} = x+b$ for all positive real numbers x. What is the value of $2ab$?

(A) 6 (B) 7 (C) 8 (D) 9 (E) None of the above.

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25. In how many different ways can 12 be written as the sum of two or more consecutive positive integers?

(A) 1 (B) 2 (C) 3 (D) 4 (E) None of the above.

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26. Three friends jog regularly in a park: Anna jogs every 10 days, Barbara jogs every 15 days, and Jo jogs every 14 days. One Sunday they happen to jog together. After how many days will the three friends jog together again?

(A) 150 (B) 210 (C) 350 (D) 420 (E) None of the above.

Answers for the 2016 Algebra I Test:

1-5:	CBCCC
6-10:	DBCDC
11-15:	CCDCD
16-20:	DAADB
21-25:	DECDA
26:	B