

OU Math Day 2018
Algebra I Test
(edited with answers on the last page)

1. What is the value of 2^{3^2} ?

- (A) 512 (B) 256 (C) 128 (D) 64 (E) None of the above
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2. In a class of 30 students, 20 students study history, 16 students study chemistry, and 3 students study neither. How many students study both history and chemistry?

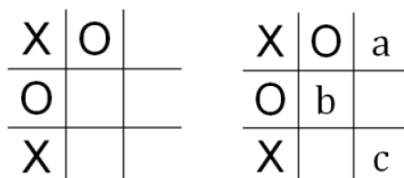
- (A) 4 (B) 6 (C) 9 (D) 12 (E) None of the above
-

3. Which of the following numbers is largest?

- (A) $6^{2018 \times 1}$ (B) $5^{2018 \times 2}$ (C) $4^{2018 \times 3}$ (D) $3^{2018 \times 4}$ (E) $2^{2018 \times 5}$
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4. The first diagram below shows the position in a tic-tac-toe game after four moves, with you being "X" and your opponent being "O". Referring to the second diagram, where should you place the next "X" in order to guarantee a victory? (Note: You win by getting three X's in a line before your opponent gets three O's in a line.)

- (A) b only (B) a or b only (C) b or c only (D) a, b, or c (E) None of the above



5. The sum of three numbers is 27. The largest minus the smallest is 6. The second largest minus the smallest is 3. What is the product of the three numbers?

- (A) 648 (B) 27 (C) 162 (D) 70 (E) None of the above
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6. Al's Diner has a breakfast special consisting of five items selected from {egg, muffin, yogurt, waffle}, with no more than two of the same item. How many different specials are possible?

- (A) 5 (B) 16 (C) 13 (D) 12 (E) None of the above
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7. If a timer is started at 11 AM, what time of day will it display after 2018 hours have elapsed?

- (A) 11 AM (B) 3 PM (C) 8 PM (D) 1 PM (E) None of the above
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8. Solve for x given that $\frac{x+7}{6} + \frac{2x-8}{2} = -4$

- (A) -14 (B) -1 (C) 15/7 (D) 13/7 (E) None of the above
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9. Maria earned \$40,000 in 2004. In 2005 her salary went up 5%, and in 2006 it went up 5% again. What was her salary at the end of 2006?

- (A) \$50,000 (B) \$44,100 (C) \$48,000 (D) \$44,000 (E) None of the above
-

10. How many integers between 10 and 99 inclusive do not contain any even digits?

- (A) 90 (B) 25 (C) 45 (D) 65 (E) None of the above
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11. Four numbers a , b , c and d satisfy the equations $a - 1 = b + 2 = c - 3 = d + 4$. Which of the four numbers is largest?

- (A) a (B) b (C) c (D) d (E) It cannot be determined
-

12. Find the greatest integer less than $(\sqrt{5} + \sqrt{2})^2$.

- (A) 10 (B) 3 (C) 13 (D) 14 (E) None of the above
-

13. The sum of the squares of two consecutive positive odd integers is 130. What is the value of the smaller integer?

- (A) 3 (B) 5 (C) 7 (D) 9 (E) None of the above
-

14. Which is the difference between the two integers closest to 2018 that are perfect squares?

- (A) 100 (B) 91 (C) 81 (D) 89 (E) None of the above
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15. A classroom has $\frac{1}{5}$ of its seats occupied. After 12 additional students enter and sit down, half of the seats are occupied. How many seats does the classroom have?

- (A) 50 (B) 60 (C) 35 (D) 40 (E) None of the above
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16. If one solution to the equation $5x^2 - 12x = b$ is $x = 3$, what is the other solution?

- (A) $x = -18/5$ (B) $x = 3/5$ (C) $x = 6$ (D) $x = 9$ (E) None of the above
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17. How many digits does the integer $25^8 8^7$ have?

- (A) 17 (B) 18 (C) 19 (D) 20 (E) None of the above
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18. All of the solutions to the equation $x + 1 = \frac{4 + x}{x}$ are

- (A) $x = 2$ (B) $x = 0$ (C) $x = 2$ and $x = -2$
(D) $x = -4$ and $x = 2$ (E) None of the above
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19. How many seconds are there in one week?

- (A) 3600 (B) 1440 (C) 604800 (D) 216000 (E) None of the above
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20. The weights of 11 people in John's class are averaged to be 94 pounds. When John removes one person's weight the average becomes 97 pounds. What weight was removed from the data set?

- (A) 33 pounds (B) 64 pounds (C) 97 pounds (D) 100 pounds (E) None of the above
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21. Sandra has a rectangular patio that measures 10 feet by 12 feet and wants to make its area 50% larger by increasing each dimension by the same length x . Which equation could be used to determine x ?

- (A) $(10 + x)(12 + x) = 120$
(B) $(10 + x)(12 + x) = 180$
(C) $(15 + x)(18 + x) = 180$
(D) $(15)(18) = 120 + x^2$
(E) None of the above
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22. If $-3(x + 4) + 2 \geq 7 - x$ then

- (A) $x \geq -17/2$ (B) $x \leq 17/2$ (C) $x \leq -17/2$ (D) $x \leq 3$ (E) None of the above
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23. Bees make honey by extracting water from nectar. Nectar contains 70% water, while honey contains only 16% water. How many pounds of nectar would be needed to produce 5 pounds of honey?

- (A) 14 (B) 25 (C) 20 (D) 12 (E) None of the above
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Answers for the 2018 Algebra I Test:

1-4: ACDC

5-9: ABDBB

10-14: BCCCD

15-19: DEBCC

20-23: BBCA