

CALIFORNIA STATE UNIVERSITY, BAKERSFIELD
MATHEMATICS FIELD DAY 2025

Individual Medley, Junior Varsity Level

There are 25 problems. You will have 50 minutes. You will only have to turn in the answer sheet – you may keep the test. Each correct answer is worth four points. Each incorrect answer will receive a one point penalty. If you believe there is an error of some sort in a particular problem, please quietly discuss it with one of the proctors. For each of the questions, fill in the appropriate circle on the answer sheet. When the exam is over, give your answer sheet to the proctor.

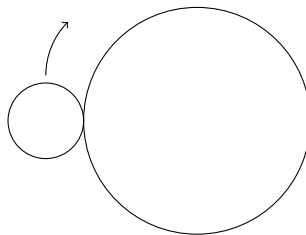
Calculators of any kind are not allowed.

GOOD LUCK!

1. A triangle has side lengths of 10, 14, and 17. What type of triangle is it?
(A) Acute (B) Isocles (C) Obtuse (D) Right (E) None of these
2. What is the remainder when 7^{2025} is divided by 100?
(A) 1 (B) 7 (C) 43 (D) 49 (E) 51
3. A circle has an inscribed square of area 32. What is the circumference of the circle?
(A) 2π (B) 4π (C) 6π (D) 8π (E) 10π
4. What's the smallest factorial divisible by 2025?
(A) $5!$ (B) $10!$ (C) $25!$ (D) $81!$ (E) $2025!$

5. A rhombus has diagonals of lengths 30 and 40. What is the height of the rhombus?
- (A) 22 (B) 24 (C) 25 (D) 26 (E) 28
6. Let a_n be a geometric sequence with $a_1 = 3$ and $a_4 = 24$. What is the sum of the first 6 terms?
- (A) 93 (B) 189 (C) 381 (D) 729 (E) None of these
7. There are $52!$ possible arrangements for a standard deck of cards. How many zeros are at the end of this number?
- (A) 8 (B) 12 (C) 16 (D) 52 (E) None of these
8. What is the sum of all 2 digit numbers that are not divisible by 5?
- (A) 3960 (B) 4000 (C) 4905 (D) 4950 (E) None of these
9. In Cardistan, the locals use a base 52 number system and the numbers $0, 1, 2, \dots, 51$ all have their own symbols. However, when transcribing into English, we simply use the base 10 representation of each digit, with different digits separated by a semi-colon (;). Then the Cardistan number **20;30;40** is equal to what base 10 number?
- (A) 525200 (B) 203040 (C) 65430 (D) 55680 (E) None of these
10. If $\angle A$ is 55° more than 4 times $\angle B$, and the two angles are supplementary, what is the absolute value of the difference of the two angles?
- (A) 76° (B) 87° (C) 90° (D) 130° (E) 155°
11. A large equilateral triangle is divided into 16 smaller equilateral triangles of equal size. If the perimeter of the large triangle is 48, what is the perimeter of one of the smaller triangles?
- (A) 3 (B) 6 (C) 8 (D) 9 (E) 12

12. How many 3 digit numbers have the property that their digits are written in strictly increasing order?
- (A) 80 (B) 81 (C) 82 (D) 83 (E) 84
13. Find the measure of the angle swept by the hour hand between noon and 8:25pm.
- (A) $212^{\circ}45'$ (B) $232^{\circ}30'$ (C) $252^{\circ}30'$ (D) $262^{\circ}25'$ (E) None of these
14. In a 5-team round-robin tournament, each team plays every other team exactly once. If a win is worth 3 points, a draw is worth 1 point for each team, and a loss is worth 0 points, what is the maximum possible total number of points awarded across all teams?
- (A) 20 (B) 30 (C) 36 (D) 45 (E) 60
15. A small circle of radius 2 is rotating around a larger circle of radius 6, as in the figure. The larger circle remains static. At the end of how many revolutions will the smaller circle return to its starting point?



- (A) 1.5 (B) 3 (C) 3.5 (D) 4 (E) 6
16. A square is drawn inside a right triangle such that one side of the square lies on the hypotenuse, and the other two vertices of the square touch the legs of the triangle. If the legs of the right triangle have lengths 3 and 4, what is the side length of the square?
- (A) 1 (B) $\frac{6}{5}$ (C) $\frac{60}{37}$ (D) $\frac{12}{7}$ (E) 5

17. Suppose you randomly arrange the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9 in a row. What is the probability that the number 1 appears before the number 9?
- (A) $\frac{1}{9}$ (B) $\frac{1}{6}$ (C) $\frac{1}{3}$ (D) $\frac{1}{2}$ (E) None of these
18. A fair six-sided die is rolled three times. What is the probability that the sum of the three rolls is 10?
- (A) $\frac{1}{9}$ (B) $\frac{1}{8}$ (C) $\frac{1}{6}$ (D) $\frac{1}{5}$ (E) $\frac{1}{4}$
19. The Fibonacci Sequence starts 1, 1, 2, 3, 5, 8, 13, $\dots$, where starting from the third term, each term in the sequence is the sum of the previous two terms. How many of the first 2025 Fibonacci numbers are even?
- (A) 365 (B) 405 (C) 555 (D) 625 (E) None of these
20. With a standard deck of cards, how many "3-card straights" can be made? (Note that an ace counts high and low, but not simultaneously. So (Ace, 2, 3) is a 3-card straight; (Queen, King, Ace) is a 3-card straight, but (King, Ace, 2) is NOT a 3-card straight.)
- (A) 768 (B) 867 (C) 844 (D) 678 (E) None of these
21. Two concentric circles have radii 5 and 13. A chord of the larger circle is tangent to the smaller circle. What is the length of the chord?
- (A) 12 (B) 15 (C) 18 (D) 24 (E) None of these
22. A regular hexagon is inscribed in a circle of radius 6. What is the area of the hexagon?
- (A) $54\sqrt{3}$ (B) $72\sqrt{3}$ (C) $108\sqrt{3}$ (D) $144\sqrt{3}$ (E) None of these

23. With a standard deck of cards, how many ways can 4 cards be chosen to make a two-pair? (A two-pair is two pairs of values that are different, for example (5,5,7,7) or (9,9, Jack, Jack) are each two-pairs, while (7,7,7,7) is not).
- (A) 400 (B) 416 (C) 424 (D) 444 (E) None of these
24. In how many ways can the letters of the word "MIRROR" be arranged so that no two R's are adjacent?
- (A) 24 (B) 48 (C) 60 (D) 72 (E) 90
25. Let S be the set of integers $\{1, 2, 3, \dots, 100\}$. A subset T of S is chosen at random, with each number having an equal chance of being included or not being included. What is the probability that T contains exactly one multiple of 10?
- (A) $\frac{99}{512}$ (B) $\frac{25}{256}$ (C) $\frac{10}{99}$ (D) $\frac{10}{11}$ (E) $\frac{5}{512}$