

CALIFORNIA STATE UNIVERSITY, BAKERSFIELD
Lee Webb Math Field Day 2014
Individual Medley, Freshman- Sophomore Level

For each of the following questions, blacken the appropriate circle on the answer sheet. Each correct answer is worth four points. **One point is deducted for each incorrect answer.** An unanswered question is given zero points. Note that random guessing may adversely affect your score.

You have 50 minutes to complete the examination. If you finish early, review your answers. When the exam is over, give your answer sheet to the proctor.

All calculators, cell phones, music players, and other electronic devices should be put away in backpacks, purses, pockets, etc. Leaving early or otherwise disrupting other contestants may be cause for disqualification.

1. Mr. Gresk averaged his algebra students' tests. The twenty papers had an average score of 83. Then he found two more papers that had slipped behind his desk. The average with these new papers was 77. What is the average score of the two papers that were behind the desk?

- A. 6 B. 17 C. 51
D. 71 E. 77

2. What is the value of x in the following equation: $\frac{5x+6}{7x+8} = \frac{9}{10}$

- A. 1 B. $\frac{3}{4}$ C. $-\frac{7}{8}$
D. $-\frac{12}{13}$ E. $\frac{24}{25}$

3. A line goes through the point (7,9) and it has slope $-\frac{3}{7}$. What is the y-intercept of this line?

- A. 4 B. 7 C. 10
D. -8 E. 12

4. What is the area of a triangle that has side lengths of 5, 5, and 8?

- A. 6 B. 8 C. 10
D. $\sqrt{40}$ E. 12

5. The equations of two lines are given, but the coefficient of y of one of the equations is illegible. The equations are $3x+4y=23$ and $2x+ay=0$. On a graph, it is shown that the two lines intersect at the point $(5,2)$. What is the value of a ?

- A. -5 B. 6 C. 8
D. -3 E. -4

6. Suppose $f(x) = 2x + 3$. Calculate $f \circ f \circ f(4)$.

- A. 11 B. 25 C. 43
D. 53 E. 109

7. Solve for x : $(x+2)^2 - 10(x+2) + 25 = 0$

- A. 0 B. 2 C. 3
D. 5 E. 7

8. What is the sum $9 + 11 + 13 + 15 + \dots + x$, where x is the 25th positive odd number?

- A. 100 B. 310 C. 311
D. 609 E. 625

9. What is the largest prime factor of $5^{99} + 5^{100} + 5^{101}$?

- A. 3 B. 5 C. 7
D. 31 E. 101

10. Suppose $x + y + z = 50$ and $3x + 2y + z = 70$ and $y = 6$. What is the value of x ?

- A. 7 B. 8 C. -4
D. -6 E. Cannot be determined from the given information

11. Reduce the following fraction: $\frac{a^3+a^2+a+1}{a^2-1}$.

A. $\frac{a^2+1}{a+1}$

B. $\frac{a^2+1}{a-1}$

C. $\frac{a^2+a}{a+1}$

D. a

E. $\frac{a^3+a^2}{a-1}$

12. Ella has some dimes and nickels that total 85 cents. If all the dimes magically turned into nickels and all the nickels magically turned into dimes, she would have 95 cents. How many coins does she have?

A. 10

B. 11

C. 12

D. 13

E. 14

13. Kerner, the Kern River Sea Monster, can swim upstream from the Chester Avenue Bridge to the dam at Lake Isabella at 4.0 feet per second. Coming back she swims downstream at 6.0 feet per second. In feet per second, what is her average speed for the round trip?

A. 4.2

B. 4.8

C. 5.0

D. 5.2

E. 5.4

14. Pocahontas shoots an arrow at you and then rides forward for 10 seconds at 9 feet per second and then shoots another arrow. If both arrows fly at 90 feet per second and both whiz by your head, how much time is there, in seconds, between the arrows that fly by your head?

A. 1

B. 6

C. 8

D. 9

E. 10

15. How many five person squads can be made from a team with nine people?
- A. 9 B. 45 C. 48
D. 96 E. 126
16. The sum of the solutions for the equation $\frac{7}{x-3} + \frac{6}{x+2} = 2$ is
- A. 6 B. $\frac{7}{3}$ C. $\frac{15}{2}$
D. 10 E. $\frac{23}{5}$
17. If two standard dice are thrown, what is the probability that the two dice will show different values?
- A. $\frac{1}{2}$ B. $\frac{11}{36}$ C. $\frac{13}{36}$
D. $\frac{3}{4}$ E. $\frac{5}{6}$
18. Your ship sends messages by hoisting flags on a line. You have four distinct flags. Assuming a message must have at least one flag, how many different messages can you send?
- A. 64 B. 360 C. 680
D. 780 E. 1728
19. In the x-y plane, the solution set to $|x+y|=2$ consists of two components. What is the shortest distance between these two components?
- A. 1 B. 2 C. $\sqrt{2}$
D. $2\sqrt{2}$ E. $\sqrt{5}$

20. An equiangular hexagon has sides that alternate 2, 1, 2, 1, 2, 1. What is the area of the hexagon?

- A. $4\sqrt{3}$ B. $\frac{5\sqrt{3}}{2}$ C. $\frac{13\sqrt{3}}{4}$
D. $\frac{55\sqrt{3}}{4}$ E. 6

21. Five coins are flipped onto the floor. Four of the them are randomly picked up and observed to be heads. What is the probability that all of the coins are heads?

- A. $1/2$ B. $1/3$ C. $1/4$
D. $1/5$ E. $1/6$

22. At one end of a see-saw, 10 feet from the fulcrum, sits a 200 pound man. Two 150 pound men want to sit on the other side, two feet apart, and balance the see-saw. How far, in feet, from the fulcrum should the closer man be?

- A. 5 B. 6 C. 7
D. $5\frac{2}{3}$ E. $6\frac{1}{2}$

23. The front end of a hot rod has wheels that have radius 10 inches. The back wheels have radius 18 inches. While racing down the strip, the back wheels spun 100 full revolutions. How many revolutions did the front wheels spin?

- A. 100 B. 120 C. 150
D. 160 E. 180

24. A square and an equilateral triangle have the same area. The side length of the square is 5. What is the side length of the triangle?

- A. $5\sqrt{3}$ B. $10\sqrt{3}$ C. $8\sqrt[3]{9}$
D. $\frac{10\sqrt[4]{27}}{3}$ E. $\frac{25\sqrt[4]{3}}{9}$

25. Suppose ABCD is a square, with side-length 1. The midpoints of BC and CD are Q and R, respectively. AQ and BR meet at P. What is the area of triangle BPQ?

- A. $1/20$ B. $1/10$ C. $5/18$
D. $\sqrt{5}/20$ E. $3\sqrt{3}/10$