CALIFORNIA STATE UNIVERSITY, BAKERSFIELD
Lee Webb Math Field Day 2015
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. Simplify $|4-2x|+|-5+x|$ if $-3<x<2$.

   1. $9-3x$ 2. $-x-1$ 3. $|-x-1|$
   4. $9+3x$ 5. $|1+3x|$

2. On a standard 12-hour digital clock, what is the greatest sum of the digits possible?

   1. 16 2. 17 3. 20
   4. 23 5. 24

3. For a list of 8 integers, the mean, median, range, and mode all equal 10. What is the largest possible integer in this list?

   1. 15 2. 16 3. 17
   4. 18 5. 19

4. In hexagon ABCDEF, angles A and D are right. The other four angles are all congruent to each other. Sides AB and FA have length $\sqrt{2}$. Side BC = 7. What is the area of the hexagon?

   1. 16 2. 20 3. 21
   4. $14\sqrt{2}$ 5. $28\sqrt{2}$

5. A stop sign in the shape of a regular octagon has side-length 12 inches. In inches what is the height of the stop sign (approximately)

   1. 24.0 2. 28.9 3. 36.0
   4. 27.5 5. 30.4

6. The list of whole numbers {4,6,8,10,A,B} has range 6 and the mean and median are both 7. What is maximum possible value of A ?

1. 7 2. 8 3. 9
4. 10 5. 17

7. Two squares, one with side-length $\sqrt{10}$ and one with side-length $\sqrt{11}$, are such that they overlap in a square with side-length $\sqrt{5}$? What is the total area covered by these two squares?

1. 15 2. 16 3. 18
4. 19 5. 20

8. A and B are two 5 digit numbers. Together every digit is used once. How many possible pairs (A,B) are there that maximize A+B?

1. 8 2. 10 3. 12
4. 16 5. 32

9. What is the last non-zero digit of $64^{25}25^{64}$?

1. 2 2. 4 3. 6
4. 8 5. 9

10. The interior angles of a regular polygon have degree measure 179. How many sides does the polygon have?

1. 179 2. 180 3. 360
4. 540 5. 720

11. Solve for x: $\frac{3}{x}+\frac{5}{x}=1\frac{1}{3}$.

1. 3
2. 4
3. 5
4. 6
5. 8

12. The set $\{1,2,3,4,5,6\}$ has how many non-empty subsets containing only primes?

1. 4
2. 7
3. 8
4. 10
5. 12

13. How many of the factors of $2^5 3^6$ are squares?

1. 8
2. 10
3. 12
4. 13
5. 15

14. Circle A has radius 1 and center at (5,0). Circle B has radius 5 and center (17,0). A line is tangent to both circles and crosses the x-axis between them. What is the x-intercept of this line?

1. 7
2. 8
3. 9
4. 10
5. 12

15. How many six person squads can be made from a team with ten people?

1. 60
2. 100
3. 200
4. 210
5. 225

16. Simplify $\sqrt[5]{x\sqrt[3]{x\sqrt{x}}}$ (assume $x>0$)

1. $x\sqrt[30]{x}$
2. $\sqrt[30]{x}$
3. $\sqrt[10]{x}$
4. $\sqrt[30]{x^4}$
5. $\sqrt[10]{x^3}$

17. What is the largest prime factor of 9! + 11!

1. 7
2. 11
3. 17
4. 37
5. 111

18. In a 4x4 array of tiles, how many pairs can be chosen so that no two are in the same row or column?

1. 24
2. 32
3. 36
4. 48
5. 72

19. Lines *m* and *n* have slopes 3/4 and 7/8, respectively. They intersect at (48,45). What is the x-intercept of *m* minus the y-intercept of *n*?

1. 9
2. 12
3. 15
4. -12
5. -15

20. Regular hexagon ABCDEF has side length 2. What is the area of triangle ACE?

1. $3\sqrt{3}$
2. $\frac{3\sqrt{3}}{2}$
3. $\frac{3\sqrt{6}}{4}$
4. $\frac{3\sqrt{6}}{2}$
5. 6

21. What is the probability that a list of 5 different single digit numbers, whose sum is 31, will contain exactly 3 primes?

1. 1/2
2. 1/3
3. 1/4
4. 1/5
5. 31/120

22. A circle with center O has radius 10. Point P is 6 units away from O. How many chords of the circle are there that go through P and have integer length (one such chord is a diameter)?

1. 7
2. 8
3. 10
4. 12
5. 13

23. Point P is inside square ABCD that has side-length = 12. The distance from P to the side CD is the same as the distance to each of vertices A and B. What is this common length, to the nearest tenth?

1. 6.8
2. 7.2
3. 7.5
4. 8.1
5. 8.3

24. A solid cube has side-length 5. In the center of each face there is a square hole with side-length 2 that goes all the way through to the other side of the cube. What is the volume of this solid?

1. 69
2. 73
3. 75
4. 80
5. 81

25. What is the perimeter of a dodecagon inscribed in a unit circle?

1. $12(\sqrt{3}-\sqrt{2})$
2. $5\sqrt{6}/2$
3. $12(2-\sqrt{3})$
4. $2(2\sqrt{6}-\sqrt{3})$
5. $12(2-\sqrt{3})^2$