St. Louis Community College Department of Mathematics &
St. Louis Community College Foundation

Present the 54th Annual

EXCELLENCE IN MATHEMATICS COMPETITION

St. Louis Area High School Mathematics Contest
November 7, 2026

With Special Thanks to

WOLFRAM AND TEXAS INSTRUMENTS

Instructions:

- You have 63 minutes to complete the items in this packet.
- Record all your responses on the answer sheet in spaces labeled # 1 through 20.
- Use the last page of this packet for scratch paper.
- No electronic or mechanical calculators are allowed.
- Each page has five items and every participant answers the same set of items.
- Each correct response is worth 5 points, no response earns 0 points, and every incorrect response earns -1 point.
- Do not mark your answer sheet during the first 60 minutes. Instead, write your responses down in this packet. You will receive clear instructions to mark your answer sheet with your final responses during the final three minutes. This will help you minimize erasures, which can affect your score negatively.

Scoring Note: In the event of a tie score, item #20 is used as a tie-breaker. If ties still remain, item #19 will be used a tie-breaker, etc. A tie is resolved/won only with a correct response. Team ties are resolved based on the highest individual scorer for each team.

ITEM 1. The digit in the units place of 2^{91} is:

A) 2 B) 4 C) 6 D) 8 E) none of these

ITEM 2. I have twenty 3 cent stamps and twenty 5 cent stamps. Using one or more of these stamps, how many different amounts of postage can I make?

A) 148 B) 152 C) 156 D) 160 E) none of these

ITEM 3. The Pi Theta Kappa (PTK) club of STLCC meets every third day starting on January 1, 2025, which was a Wednesday. How many times will the PTK meetings take place on a Sunday of the year 2025.

A) 17 B) 122 C) 7 D) 120 E) none of these

ITEM 4. 116 students in classes composed of only juniors and seniors take an exam. ¼ of the seniors and 1/7 of the juniors earn an "A" on the exam. 23 students earn an "A" on the exam; how many of the students are juniors?

A) 7 B) 8 C) 9 D) 10 E) none of these

ITEM 5. Marcus makes a slight mistake in computing pi and obtains the repeating decimal 3.14141414… and then changes this to the fraction 311/d. What is the value of d?

A) 10 B) 11 C) 89 D) 99 E) none of these

ITEM 6. At a certain high school, 25% of all students are involved in student government. It is known that only students who participate in extracurricular activities are allowed to join student government, and 60% of students participate in at least one extracurricular activity. What percentage of students who participate in extracurricular activities are involved in student government?

A) 35% B) 42% C) 53% D) 61% E) none of these

ITEM 7. Let $f(x) = x^2 + ax + b$ where a and b are real constants. Suppose that for all real numbers x, $\frac{f(x)}{x-2} = x + 3 + \frac{5}{x-2}$. What is the value of b?

A) 1 B) 5 C) 6 D) 7 E) none of these

ITEM 8. An object detected on radar is 5 miles to the east 4 miles to the north, and 1 mile above the tracking station. What is the closest approximation to the distance, in miles, that the object is from the tracking station?

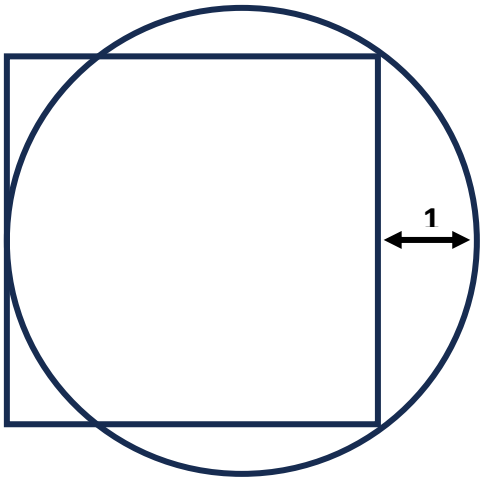
A) 6.5 B) 7.2 C) 8.3 D) 9.0 E) none of these

ITEM 9. What value of P makes the following equation true?

$$\frac{(4.25 \times 10^{2p+4})\,(2 \times 10^{p-1})^2\,(3 \times 10^{3-p})}{(1.7 \times 10^{p+2})} = 300$$

A) 12 B) -1 C) 7 D) -8 E) none of these

ITEM 10. Find the area of the square in the figure (not shown to scale).



A) $4\ units^2$ B) $9\ units^2$ C) $12\ units^2$ D) $16\ units^2$ E) none of these

ITEM 11. If $x + y = 4$ and $xy = 5$, then $x^3 + y^3 = ?$

A) 3 B) 4 C) 5 D) 9 E) none of these

ITEM 12. The sides of a right triangle form a geometric progression (for example, 2,4,8,16 is a geometric progression) and the length of the shortest side has length 1. Find the length of the hypotenuse.

A) $\frac{1+2\sqrt{5}}{2}$ B) $\sqrt{5}-1$ C) $\frac{1+\sqrt{5}}{2}$ D) $\sqrt{5}-1$ E) none of these

ITEM 13. The sequence of digits 123456789101112131415… is found by writing the counting numbers 1,2,3,… in ascending order. What would be the 2026th digit from the left?

A) 0 B) 1 C) 7 D) 8 E) none of these

ITEM 14. If $x + \frac{1}{x} = 3$, then what is the value of $x^3 + \frac{1}{x^3}$?

A) 16 B) 17 C) 18 D) 27 E) none of these

ITEM 15. How many 8-digit whole numbers with no digits repeated are multiples of 9? Note that a number cannot start with 0 in this situation.

A) 12,624 B) 68,932 C) 104,682 D) 162,668 E) none of these

ITEM 16. Solve for x: $9 = 3^{4^{\sqrt{2}^{x}}}$

A) -2 B) -1 C) $\sqrt{2}$ D) 2 E) none of these

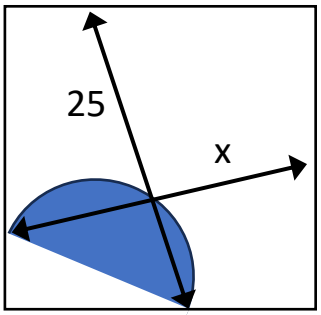
ITEM 17. There are eight seats at a rectangular table: three at each of the longer sides and one at each of the shorter sides. Six adults and two children sit around the table, with each seating configuration equally likely . What is the probability that two children will end up sitting next to each other at one of the longer sides of the table?

A) 1/4 B) 1/5 C) 3/14 D) 1/7 E) none of these

ITEM 18. In a convex quadrilateral ABCD, we know that the diagonal AC is the angle bisector of BAD. The measures of angles ADB, ACB, and ACD are 50, 25, and 35, respectively. What is the measure of BAD?

A) 55 B) 60 C) 65 D) 70 E) none of these

ITEM 19. A semicircle is drawn as shown inside a square. What is the length marked "x"?



A) 21 B) 22 C) 24 D) 25 E) none of these

ITEM 20. The polynomial $y = x^4 + Ax^3 + Bx^2 + Cx + D$, where A, B, C, and D are rational numbers has $2 + i\sqrt{3}$ and $3 + \sqrt{2}$ as its zeros. Find $A + B + C + D$.

A) 0 B) 167 C) 186 D) 193 E) none of these