

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

Present the 53rd Annual

EXCELLENCE IN MATHEMATICS COMPETITION

St. Louis Area High School Mathematics Contest
November 8, 2025

With Special Thanks to



AND



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 as 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.** When I was 4, my brother was half my age. Now I am 20, and my sister is half my age. When was my sister half my brother's age?
- A) Last Year B) Two Years Ago C) Three Years Ago D) Four Years Ago
E) none of these
- ITEM 2.** At a high school, 60% of the students participate in at least one extracurricular activity. Of those students, 25% are involved in student government. The student government has 33 total students. How many students attend the high school?
- A) 5 B) 55 C) 132 D) 220 E) none of these
- ITEM 3.** Sponge Bob Square Pants makes pizzas in square pans. He charges \$10 for a 10 inch by 10 inch pizza and \$30 for a 20 inch by 20 inch pizza. What is the largest total area of pizza you can buy for \$100? Fractional pizzas are not allowed.
- A) 1000 B) 1300 C) 1600 D) 2025 E) none of these
- ITEM 4.** The lines with equations $ax + 2y = c$ and $bx - 3y = d$ are perpendicular. Find $a \cdot b$.
- A) -6 B) -1.5 C) 6 D) 1.5 E) none of these
- ITEM 5.** Four suspects of a crime made statements to the police as follows:
Andy: Carl Did it.
Bob: I did not do it.
Carl: Dave did it.
Dave: Carl lied when he said I did it.
Given that exactly one of these four statements is true and exactly one of the four is guilty, the criminal is
- A) Andy B) Bob C) Carl D) Dave E) none of these

ITEM 6. A square is inscribed in a circle of radius 10. A smaller circle is inscribed in the square. What is the area of the region inside the larger circle but outside the smaller circle?

- A) 50π B) 10π C) 25π D) 60π E) none of these

ITEM 7. At a summer camp, there are 100 campers in the recreation hall. Amazingly, 99% of them are left-handed. Some of the left-handed campers decide to go outside to play basketball. How many left-handed campers must leave the hall so that only 98% of the campers remaining inside are left-handed?

- A) 45 B) 98 C) 49 D) 50 E) none of these

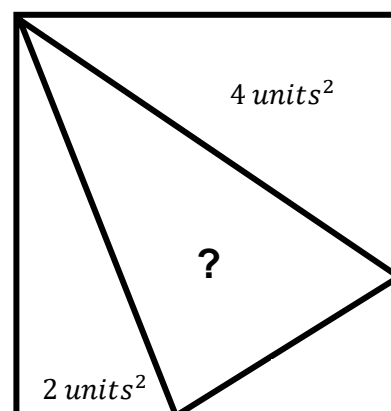
ITEM 8. You're cruising down Kingshighway at 21 m/s, on your way to the Excellence in Math Competition at STLCC. Suddenly, a deer darts onto the road just 35 meters ahead of you. It takes you 0.5 seconds to react before slamming the brakes, and your car can decelerate at a maximum rate of 10 m/s^2 . After coming to a complete stop, how close will you be to the deer?

- A) 6.3 m B) 2.45 m C) 3.45m D) 2.55m E) none of these

ITEM 9. If $3x-2y = 5$, then the value of $\sqrt{\frac{27^{x+2}}{3^{2y+5}}}$ is

- A) 125 B) 81 C) 27 D) 18 E) none of these

ITEM 10. In the figure of a square shown here, what is the missing area?



- A) 5 B) 6 C) 7 D) 8 E) none of these

ITEM 11. You have a metal band running tightly around the equator of the earth (ignoring mountains and valleys) so that the band forms a circle that is the length of the equator. You cut through it and add a two-foot section to it. If you could uniformly lift the band off the ground at this point, how high off the ground would it be?

A) Not Enough Information B) $2\pi ft$ C) $2 ft$ D) $1 ft$

E) none of these

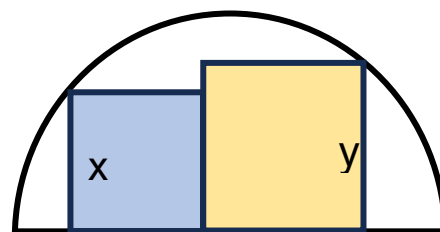
ITEM 12. The unit's digit of 7^{2025} is:

A) 1 B) 3 C) 7 D) 9 E) none of these

ITEM 13. There are only two rectangles with integer length sides such that their perimeter and their area are equal. What is the sum of the perimeters of those rectangles?

A) 12 B) 16 C) 32 D) 112 E) none of these

ITEM 14. Two squares are inscribed in a semicircle as shown, so that they share a line segment and touch the outer edge of the semicircle once each. What is the total area of the two squares?



A) 49 B) $49\sqrt{2}$ C) 64 D) ϵ

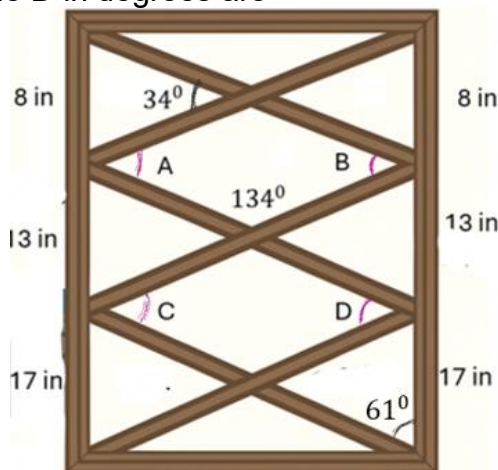
ITEM 15. The fraction $\frac{a}{b} = 0.455$ when rounded to 3 decimal places. If $\frac{a+1}{b+1} = 0.467$ when rounded to 3 decimal places, find $a + b$.

A) 63 B) 64 C) 65 D) 66 E) none of these

- ITEM 16.** A domino is a 1×2 rectangle. When 8 dominos are formed into all possible rectangles with no spaces or gaps, let P be the greatest possible perimeter and p the least possible perimeter. Find $\frac{P}{p}$:

A) 2.125 B) 2.25 C) 2.5 D) 2.625 E) none of these

- ITEM 17.** In the given window (not drawn to scale) the measurements of angle A, angle B, angle C and angle D in degrees are



A) 40,40,50,50 B) 20,40,50,52 C) 40,40,52,52
D) 42,42,50,50 E) none of these

- ITEM 18.** How many ways are there to connect from the set $\{A, B, C, D, E, F, G\}$ to the set $\{X, Y, Z\}$ so that every connection between the sets includes *all* elements of the set $\{X, Y, Z\}$?

A) 1764 B) 1806 C) 1900 D) 2187 E) none of these

- ITEM 19.** If the letters of the word **STLOUIS** are used to form different words (with or without meaning), and these words are arranged in **dictionary order**, what will be the **rank** (position) of the word **STLOUIS** in this arrangement?

A) 1535 B) 1595 C) 1465 D) 1495 E) none of these

- ITEM 20.** How many four digit numbers $xyzz$, in base 10, are divisible by 35, where x, y, z are digits, with $x \neq 0$?

A) 20 B) 22 C) 24 D) 26 E) none of these

