BC Exam

Texas A&M High School Math Contest

25 October, 2025

(NOTE: If units are appropriate, please include them in your answer. All answers must be simplified where possible.)

1. Find the x-intercepts for $y = 36x^2 + 81xa - 81a^2$ if constant $a > 0$.

2. Reveille decides to enter a doggy triathlon. Reveille dog-paddles 1 mile in 15 minutes, "revs" the bicycle at a rate of 10 mph for 30 minutes, and runs 4 miles at a rate of 20 mph. What is the average speed (in mph) for Reveille during the event?

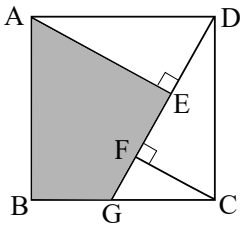
3. Teens are divided about the best commonly used AI platform. 83 percent like ChatGPT, 52 percent like Copilot, and 57 percent like Gemini. However, 25 percent like all 3 platforms, 16 percent like ChatGPT and Copilot only, and 20 percent like ChatGPT and Gemini only. If 2 percent exclusively use Copilot, what percentage of teens do not like any of the 3 AI platforms?

4. Given that all numbers in the equation below are in base 6, find the value of x (in base 6) which solves the equation:
$$\frac{5(x-24)}{4} = 14$$

5. In a triangle ABC with $AB = 5, BC = 6$, and $AC = 7$, points D and E lie on $\overline{AC}$ with $AD = 1$ and $EC = 2$. Find the area of $\triangle BDE$.

6. Five years ago, David was 4 times as old as Andrew and James was 6 times as old as Andrew. Today, David and Andrew's combined age is 4 years older than James. What will David, Andrew, and James's combined ages be in 2 years?

7. The figure below shows a square $ABCD$. Find the area of the shaded region if $EF = 3$ and $DG = 13$.



8. Among the 9 points with integer coordinates (x, y) with $0 \le x \le 2$ and $0 \le y \le 2$, how many distinct pentagons can be formed by choosing 5 of these points as vertices such that all interior angles are strictly less than $180°$?

9. If $3kx + 4y = 7$ intersects $(6 + k)x + y = 2$ when $y = 19$, find k.

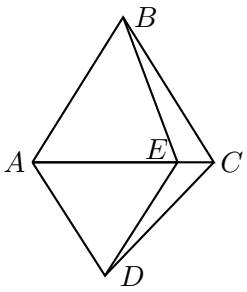
10. Four points A, B, C, D lie on a straight line in that order, such that $AB = BC = 1$ and $CD = 3$. Let E and F be the two intersection points of the circle with diameter $\overline{AC}$ and the circle with diameter $\overline{BD}$. Find the area of quadrilateral $EAFD$.

11. Find the largest value of n so that 27^n divides $(2025)^{25}$.

12. Let k be a positive constant. Given the system of equations below, find the value of k which makes $kx + y = 0$.

$$kx + 4y = 12$$
$$x + \frac{2}{k}y = 6$$

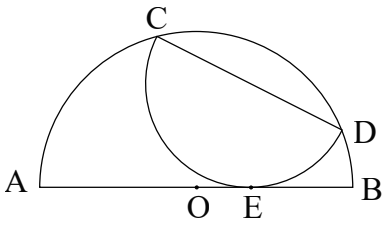
13. For two equilateral triangles $\triangle ABC$ and $\triangle ADE$, find $\angle BEC$ if $\angle CDE = 14°$.



14. Solve for x: $3 - \sqrt{3x + 10} = x$. If necessary, write your simplified answer(s) in the form of $a + b\sqrt{c}$

15. The **geometric mean** of two positive numbers a and b is a positive number x such that $x^2 = ab$. If the average of two numbers a and b (with $a > b > 0$) is twice as large as their geometric mean, what is $\frac{a}{b}$ rounded to the nearest whole number?

16. Points C and D lie on the arc of a semicircle with diameter $\overline{AB}$. Let O be the midpoint of $\overline{AB}$. The circle with diameter $\overline{CD}$ is tangent to the segment $\overline{AB}$ at a point E as in the figure below. Given $CD = 12$ and $OE = 1$, find the value of AB^2.



17. A line segment is drawn in the x-y plane from the point (500, 1000) to the point (1000, 2025). How many points on the line segment have integer coordinates?

18. Find the largest solution x of the equation $\big|3|x| - 2\big| = 1 - 2x$.

19. A cube moves along a straight line perpendicular to the front face, so that it collects rain only on its top and front faces—not on the lateral faces. The cube travels 12 meters with an initial speed of 1 m/s, while rain falls vertically at 6 m/s and is evenly distributed. If the cube's speed is increased by 50% to reduce the amount of rain collected, what is the percentage decrease in the total rain collected? Round your answer to the nearest tenth of a percent.

20. From a point A outside a circle C, two tangents are drawn to the circle, touching it at points P and Q. Through P, draw a line parallel to $\overline{AQ}$, which meets the circle again at R. Let the line $\overline{AR}$ intersect the circle again at S. If $AP : PR = 2 : 3$ and the area of $\triangle ASQ$ is 50, find the area of quadrilateral $APRQ$.