CONNECTICUT STATE ASSOCIATION OF MATH LEAGUES
State Match, 2026

Please write your answers on the answer sheet provided.

Round 1: Arithmetic and Number Theory

1-1 Twelve kids earn \$278 in 5 days. At the same rate, how many dollars will 15 kids earn in 8 days? (Do not include a unit in your answer.)

1-2 Suppose that $2.1_4 + n = 71.2_8$, where the subscripts denote the bases of the numeral systems. Find the value of n, expressing your answer in base 2.

1-3 The positive integer N has exactly four positive divisors (including 1 and N), and the sum of these positive divisors is 180. Find the sum of the possible values of N.

CONNECTICUT STATE ASSOCIATION OF MATH LEAGUES
State Match, 2026

Please write your answers on the answer sheet provided.

Round 2: Algebra I

2-1 If $\sqrt{x+4}-1=\sqrt{x+2}$, then $x=(-1)^n\cdot\frac{a}{b}$, where a and b are relatively prime positive integers and n is 0 or 1. Find $a+b+n$.

2-2 If $\frac{3a+4b}{4a-3b}=2$, then $\frac{4a+3b}{3a-4b}=(-1)^n\cdot\frac{p}{q}$, where p and q are relatively prime positive integers and n is 0 or 1. Find $p+q+n$.

2-3 Define the function $f(x)=\left(x-\frac{1}{2}\right)^3+\frac{1}{4}$. The value of

$$f\left(\frac{1}{2026}\right)+f\left(\frac{2}{2026}\right)+f\left(\frac{3}{2026}\right)+\ldots+f\left(\frac{2024}{2026}\right)+f\left(\frac{2025}{2026}\right)$$

is $\frac{a}{b}$, where a and b are relatively prime positive integers. Find $a+b$.

CONNECTICUT STATE ASSOCIATION OF MATH LEAGUES
State Match, 2026

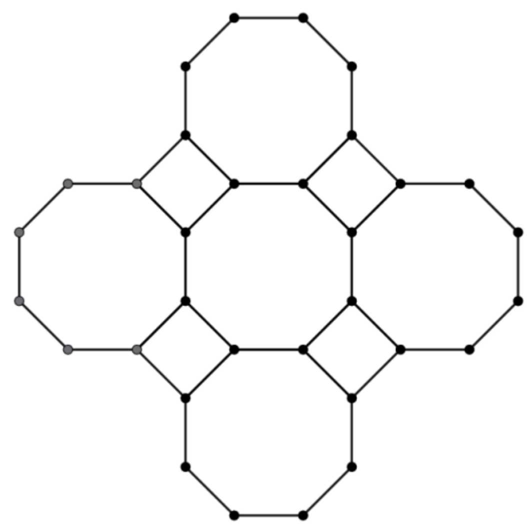
Please write your answers on the answer sheet provided.

Round 3: Geometry

Diagrams are not drawn to scale.

3-1 The points A, B, C, and D are consecutive vertices of a regular polygon. Sides $\overline{AB}$ and $\overline{DC}$ are extended, and intersect at point P. The measure of $\angle BPC$ is 132°. How many sides does the polygon have?

3-2 A tiling pattern consists of squares and regular octagons, as shown in the diagram. If the area of one of the squares is 2 square centimeters, the area of one of the octagons is $a + b\sqrt{c}$, where a, b, and c are positive integers and c is not divisible by the square of any prime number. Find $a + b + c$.



3-3 A regular tetrahedron (a triangular pyramid where all the faces are equilateral triangles) is inscribed in a sphere (meaning that all the vertices of the tetrahedron lie on the sphere). The tetrahedron has edges of length 6. The volume of the sphere is $a\pi\sqrt{b}$, where a and b are positive integers and b is not divisible by the square of any prime number. Find $a + b$.

CONNECTICUT STATE ASSOCIATION OF MATH LEAGUES
State Match, 2026

Please write your answers on the answer sheet provided.

Round 4: Algebra II

4-1 The zeros of the polynomial function $f(x) = x^3 + px^2 + qx + r$ are -4, 1, and 2. Find $|p| + |q| + |r|$.

4-2 For $x > \frac{7}{3}$, the function f is defined by $f(x) = 3x^2 - 14x - 3$. The function g is defined by $g(x) = x^3 + 62$ for all real numbers x. Find $f^{-1}(g^{-1}(70))$.

4-3 Let a and b be those real numbers such that $60^a = 3$ and $60^b = 5$. Let $p = \frac{1+a+b}{2(1-b)}$. Find 12^p.

CONNECTICUT STATE ASSOCIATION OF MATH LEAGUES
State Match, 2026

Please write your answers on the answer sheet provided.

Round 5: Analytic Geometry

5-1 The points $A(1,2)$ and $B(7,12)$ are given. Let M be the midpoint of line segment $\overline{AB}$, and let l be the line through M perpendicular to $\overline{AB}$. The x-coordinate of the point where l intersects the x-axis is $\frac{p}{q}$, where p and q are relatively prime positive integers. Find $p+q$.

5-2 A hyperbola has vertices at $(-6,0)$ and $(6,0)$ and a focus at $(7,0)$. The line $x=7$ intersects the hyperbola at the points M and N. The length $MN=\frac{p}{q}$, where p and q are relatively prime positive integers. Find $p+q$.

5-3 The point P lies in the same plane as square $ABCD$, where $AB=1$. Let $AP=u$, $BP=v$, and $CP=w$, and suppose that $u^2+2v^2=2w^2$. The maximum possible value of the distance DP is $p+\sqrt{q}$, where p and q are positive integers.
Find $p+q$.

CONNECTICUT STATE ASSOCIATION OF MATH LEAGUES
State Match, 2026

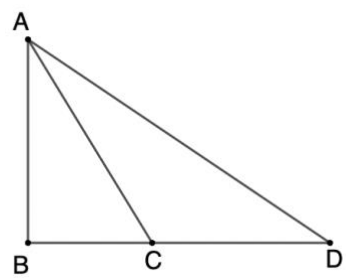
Please write your answers on the answer sheet provided.

Round 6: Trigonometry and Complex Numbers

Diagrams are not drawn to scale.

6-1 Let A and B be acute angles, where $\sin A = \frac{3}{5}$ and $\sin B = \frac{5}{13}$. Then $\tan(A + B) = \frac{p}{q}$, where p and q are relatively prime positive integers. Find $p + q$.

6-2 The diagram below shows triangle ABD, with C lying on $\overline{BD}$. If $\overline{AB} \perp \overline{BD}$, $m\angle BCA = 60°$, $m\angle BDA = 30°$, and $DC = 100$, then $AB = p\sqrt{q}$, where p and q are positive integers and q is not divisible by the square of any prime number. Find $p + q$.



6-3 In triangle ABC, $BC = 27$, $AB = 48$, and $m\angle C = 3(m\angle A)$. Find the length AC.

CONNECTICUT STATE ASSOCIATION OF MATH LEAGUES
State Match, 2026

Please write your answers on the answer sheet provided.

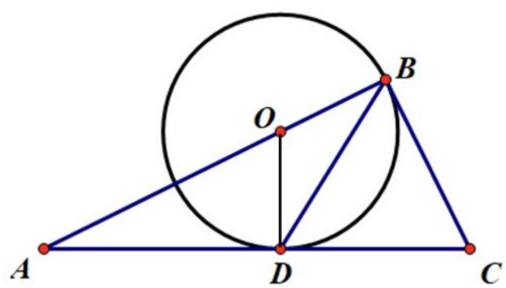
Team Round

Diagrams are not drawn to scale.

T-1 How many positive integers less than or equal to 155 leave a remainder of 1 when divided by 3 and a remainder of 2 when divided by 4?

T-2 A function f is defined so that if n is an odd integer, then $f(n) = n - 1$, and if n is an even integer, then $f(n) = n^2 - 1$. Determine the sum of the squares of all integers n for which $f(f(n)) = 3$.

T-3 Circle O, shown in the diagram below, has radius 8. $\overline{AC}$ is tangent to the circle at D, $\overline{BC}$ is tangent to the circle at B, and $AD = 15$. The area of ΔBDC is $\frac{p}{q}$, where p and q are relatively prime positive integers. Find $p + q$.



T-4 Evaluate

$$\frac{(1!)(2!)(3!)\cdots(10!)}{(1!)^2(3!)^2(5!)^2(7!)^2(9!)^2}$$

T-5 An ellipse has equation $7x^2 + 12y^2 + 28x - 24y - 44 = 0$. The eccentricity of the ellipse is $\frac{\sqrt{p}}{q}$, where p and q are positive integers and p is not divisible by the square of any prime number. Find $p + q$.

T-6 Find the number of integers k, with $0 < k < 18$, such that

$$\frac{5\sin(10k^\circ) - 2}{\sin^2(10k^\circ)} \geq 2$$

CONNECTICUT STATE ASSOCIATION OF MATH LEAGUES
State Match, 2026

Answers

Round 1

1-1	556
1-2	110111
1-3	263

Round 2

2-1	12
2-2	13
2-3	2029

Round 3

3-1	15
3-2	10
3-3	33

Round 4

4-1	19
4-2	5
4-3	30

Round 5

5-1	50
5-2	16
5-3	9

Round 6

6-1	89
6-2	53
6-3	35

Team Round

T-1	13
T-2	10
T-3	4051
T-4	3840
T-5	21
T-6	13