**The CENTRE for EDUCATION
in MATHEMATICS and COMPUTING**
cemc.uwaterloo.ca

2026 Canadian Team Mathematics Contest

Summary of Scores in Individual Event

Team: ______________________________

Total Number Correct by Problem #

1	
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Individual Event Score by Competitor

Competitor	G	H	I	J	K	L
Score						

Grand Total: __________

Answer Sheet for Individual Questions

Team ______________________________

Competitor Name ______________________________

Competitor Label G

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Total ____________

The CENTRE for EDUCATION in MATHEMATICS and COMPUTING

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2026 Canadian Team Mathematics Contest

Individual Problems (45 minutes)

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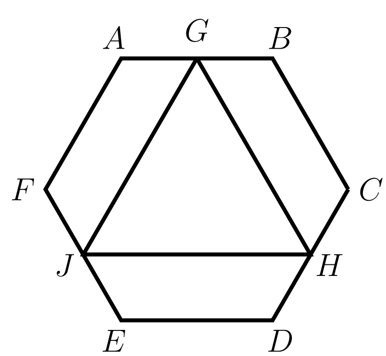
- Express answers as simplified exact numbers except where otherwise indicated. For example, $\pi + 1$ and $1 - \sqrt{2}$ are simplified exact numbers.

PROBLEMS:

1. What is the value of $3^2 + 2^3$?
2. Including 2026, how many different four-digit positive integers can be formed from the digits of 2026? Note each such positive integer should have one 6, two 2s, and one 0.
3. On the planet Cemtece, each Cemtece-day has 16 Cemtece-hours, and each Cemtece-hour has 15 Earth-minutes. How many Cemtece-days does one Earth-day have?
4. If $a^4 = 3$, what is the value of $\left(a^2 + \frac{1}{a^2}\right)^2$?
5. How many of the positive divisors of 900 are perfect squares?

   An integer is a *perfect square* if it is equal to the square of an integer. For example, 16 is a perfect square, and 7 is not a perfect square.
6. Real numbers x, y, and z satisfy $x = 11z - 2y$, $z = 2x - 3y$, and $xyz \neq 0$. What is the value of $\dfrac{x}{y}$?
7. In regular hexagon $ABCDEF$, trapezoids $AGJF$, $CHGB$, and $EJHD$ are congruent, with $GH = HJ = GJ = 3$. What is the area of the hexagon?



8. The parabola with equation $y = -2x^2 + 16x + k$ intersects the line with equation $y = kx + 14$ at points A and B. If the midpoint of AB is $\left(\frac{7}{2}, 21\right)$ what is the distance between A and B?

9. How many words of length 18 are there, consisting only of As and Bs such that

   - there are never 4 (or more) consecutive As, and
   - there are never 2 (or more) consecutive Bs, and
   - every two Bs have at least two As between them?

   For example, one such word is $BAABAAABAABAABAABA$.

10. The sequence $a_1, a_2, a_3, \ldots$ is an arithmetic sequence with common difference 45 and $a_1 = 8$. The sequence $b_1, b_2, b_3, \ldots$ is an arithmetic sequence with common difference d and $b_1 = 233$, where d is an integer. Among integers that appear in both of the sequences **and** are greater than 2026, the second smallest integer is 2258. What is the sum of all possible values of d?

Answer Sheet for Individual Questions

Team ______________________________

Competitor Name ______________________________

Competitor Label H

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Total ____________

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Individual Problems (45 minutes)

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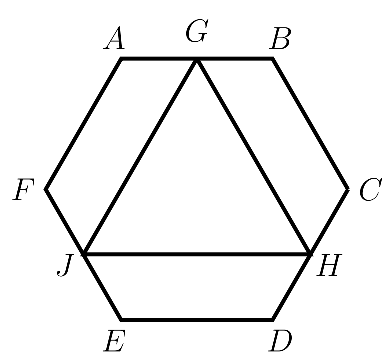

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Answer Sheet for Individual Questions

Team ______________________________

Competitor Name ______________________________

Competitor Label I

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Total ____________

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2026 Canadian Team Mathematics Contest

Individual Problems (45 minutes)

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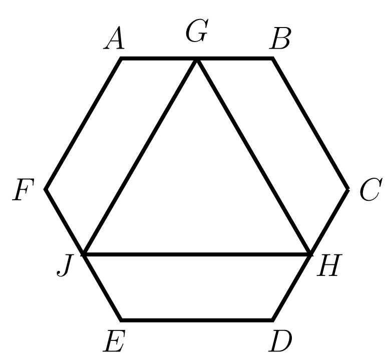

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Answer Sheet for Individual Questions

Team ______________________________

Competitor Name ______________________________

Competitor Label J

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Total ____________

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2026 Canadian Team Mathematics Contest

Individual Problems (45 minutes)

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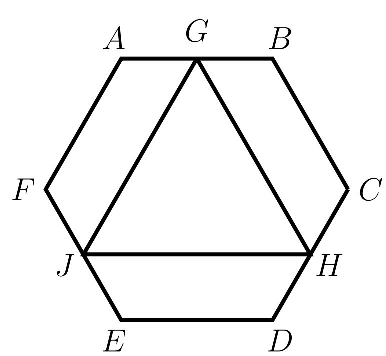

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Answer Sheet for Individual Questions

Team ______________________________

Competitor Name ______________________________

Competitor Label K

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Total __________

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2026 Canadian Team Mathematics Contest

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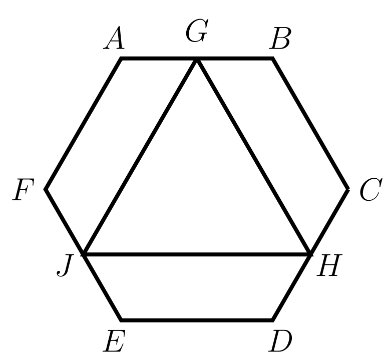

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Answer Sheet for Individual Questions

Team ______________________________

Competitor Name ______________________________

Competitor Label L

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Total ____________

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2026 Canadian Team Mathematics Contest
Individual Problems (45 minutes)

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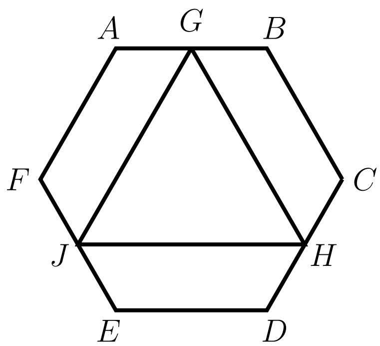

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Team ______________________________ Total __________

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Team Problems (45 minutes)

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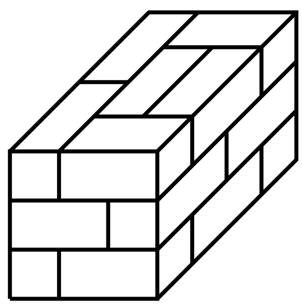
PROBLEMS:

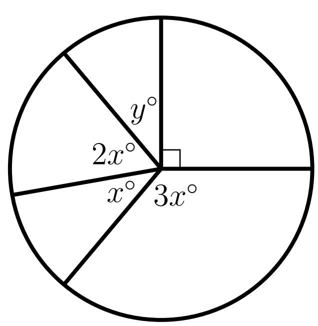
1. How many bricks with dimensions $1 \times 1 \times 2$ are stacked to form the solid rectangular prism shown?



2. If $4 \leq a \leq 20$, what is the maximum possible value of $\frac{100}{a}$?

3. A square and a circle have the same area. If the radius of the circle is 2, what is the side length of the square?

4. Consider angles x°, $2x^\circ$, $3x^\circ$, and y° in the diagram below.



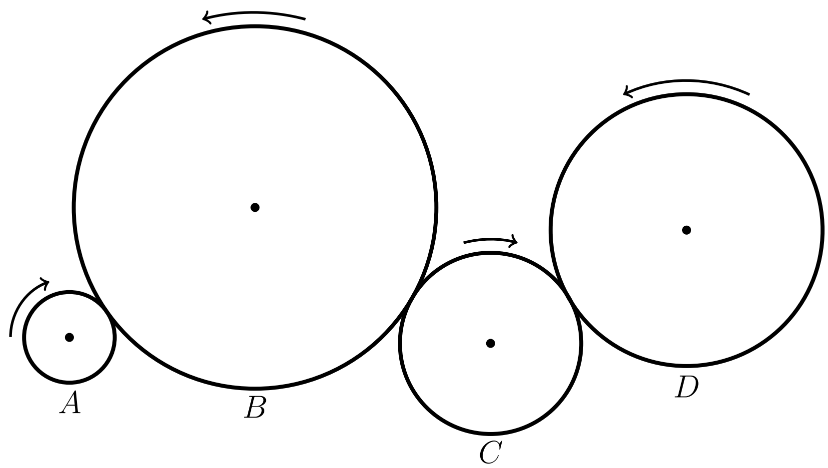
Given that $x^\circ + y^\circ = 60^\circ$, what is the value of y?

5. N is a three-digit positive integer with a middle digit of zero. The sum of the other two digits is 11. If the digits are reversed, the integer formed is greater than the original integer, N, by 495. What is the value of N?

6. Zendaya is drawing on graph paper. Starting at $(0,0)$, with a red pen, she repeatedly traces along grid lines 1 unit to the right and then 1 unit up. Starting at $(0,0)$, with a blue pen, she repeatedly traces along grid lines 2 units up and then 2 units right. Not counting the origin, the blue and red lines touch each other 2026 times. What is the area of the region enclosed by the red lines and blue lines?

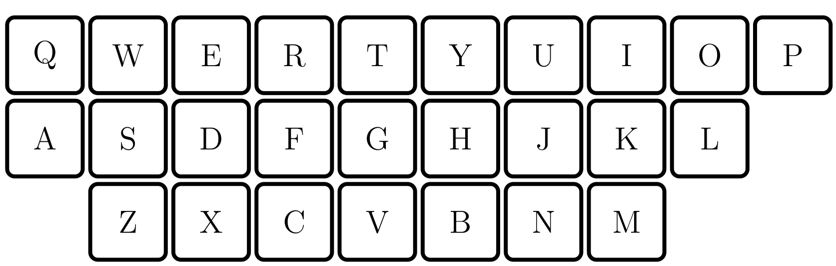
7. The fraction $\frac{65}{49}$ can be written in the form $1+\frac{1}{a+\frac{1}{b}}$, where a and b are positive integers. What are a and b?

8. Four circular wheels, A, B, C, and D turn around their centres. They have radii 1 cm, 5 cm, 2 cm and 3 cm respectively. When wheel A is turned, it turns B, which turns C, which turns D. There is no slipping throughout this process. If wheel D turns at 1 revolution per second, at how many revolutions per second does A turn?



9. The prime numbers a, b, and c have the property that $2a+5b+10c=155$ and $c-b=4$. What are the values of a, b, and c?

10. Using the keyboard below, sequences of letters can be formed starting at Q and ending at M where each letter in the sequence other than Q is either immediately below or immediately to the right (on the keyboard) of the letter before it in the sequence. For example, the only two letters that can follow D in a sequence are F and X. How many such sequences of letters can be formed?



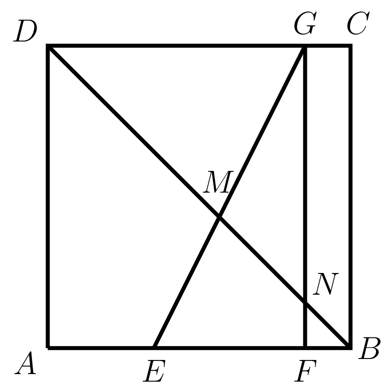
11. A command called `swap` switches two letters in a word. For example, using the input `TABLE`, the command `swap(1,4)` switches the 1st and 4th letters in the word, to obtain the output `LABTE`. Using the input `CANDY`, the following program is run. What is the output?

```
Input word
Repeat 2026 times:
    swap(1,2)
    swap(3,5)
    swap(2,4)
Output final result
```

Note that each of the three `swap` commands is executed 2026 times.

12. For a positive integer n, let S_n be the sum of the digits of n. There is exactly one positive integer c that satisfies $c = 11 \times S_c$. What is c?

13. In square $ABCD$, which has side length 12, FG is parallel to BC, EF is half of AB, and BD divides $\triangle GEF$ into two regions with the same area. What is the exact value of $\dfrac{AB}{AE}$?



14. The integer $d > 1$ has the property that 332, 456, and 549 have the same remainder when divided by d. What is the value of d?

15. A chemist has 3 beakers, each containing a (well-mixed) mixture of acid and water:

- Bottle A contains 40 mL, 10% of which is acid.
- Bottle B contains 50 mL, 20% of which is acid.
- Bottle C contains 50 mL, 30% of which is acid.

She uses some of the mixture from each of the bottles to create a mixture with volume 60 mL, 25% of which is acid. She then mixes the remaining contents of the three bottles to create a new mixture. What percentage of the new mixture is acid?

16. The geometric sequence with n terms t_1, t_2, $\ldots$, t_n satisfies $t_1 t_n = 3$. The product of all n terms of the sequence is equal to 6561. What is the value of n?

    A *geometric sequence* is a sequence in which each term after the first is obtained from the previous term by multiplying it by a non-zero constant, called the common ratio. For example, 3, 6, 12, 24 are the first four terms of a geometric sequence with common ratio 2.

17. The integer x is randomly generated from the range $0 \leq x < 360$, with each of the 360 integers equally likely to be chosen. What is the probability that $4\sin x\cos x + 2\sin x > 2\sqrt{3}\cos x + \sqrt{3}$?

    We take x to be in degrees and not radians for this question.

18. Among integers N of the form $N = 42xyz + 21yz + 14xz + 6xy + 2x + 3y + 7z + 1$, where x, y, z are distinct positive integers, what is the smallest value of N that is a product of distinct primes?

    30 is a product of distinct primes, since $30 = 2 \times 3 \times 5$, while 20 is not a product of distinct primes, since $20 = 2 \times 2 \times 5$.

19. In $\triangle ABC$, $AB = AC$, and M is the midpoint of BC. Point D is chosen on AM such that $MD = 1$, $AD = 10$, and $\angle BDC = 3\angle BAC$. What is the perimeter of $\triangle ABC$?

20. Given that

$$(\log_2 3)(\log_{3^2} 2) + (\log_{2^2} 3)(\log_{3^3} 2) + (\log_{2^3} 3)(\log_{3^4} 2) + \ldots + (\log_{2^n} 3)(\log_{3^{n+1}} 2) = \frac{7}{8},$$

    what is the value of n? (The sum has n terms.)

21. One ant is located at $(1, 2)$ and another ant is located as $(6, 5)$. Each minute, both ants move simultaneously 1 unit in the plane. The ant initially at $(1, 2)$ moves 1 unit to the right or 1 unit up, each with probability $\frac{1}{2}$. The ant initially at $(6, 5)$ moves 1 unit to the left or 1 unit down, each with probabilty $\frac{1}{2}$. What is the probability that, after each ant has moved 4 times, they are at the same point?

22. Paula writes n consecutive positive integers that have a sum of 475, where $n > 1$. How many possible values are there for n?

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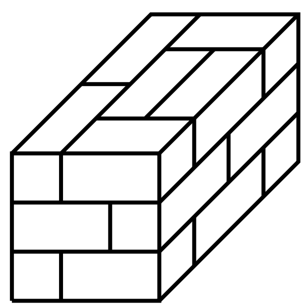

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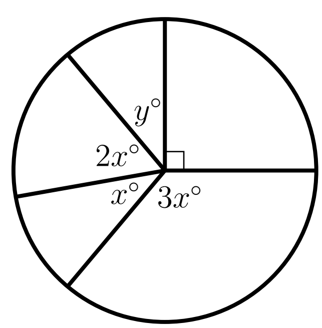

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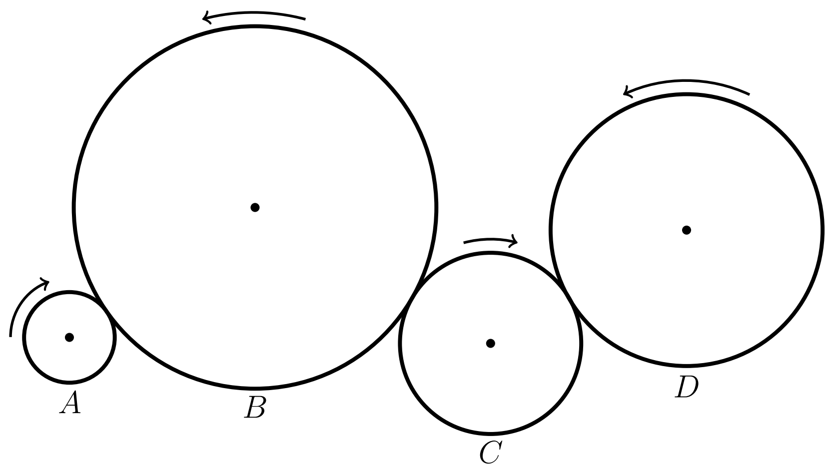

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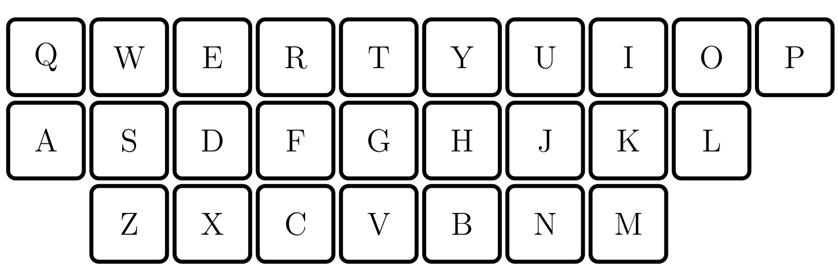

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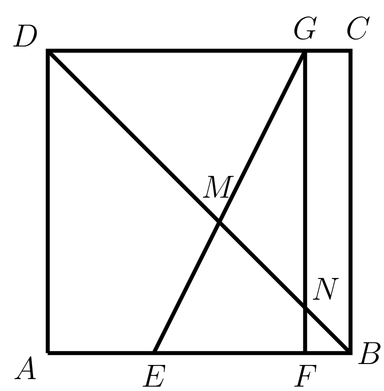

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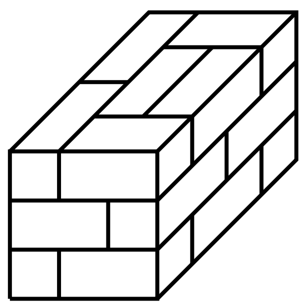

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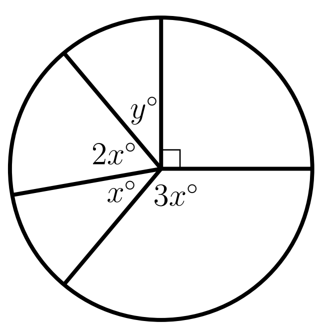

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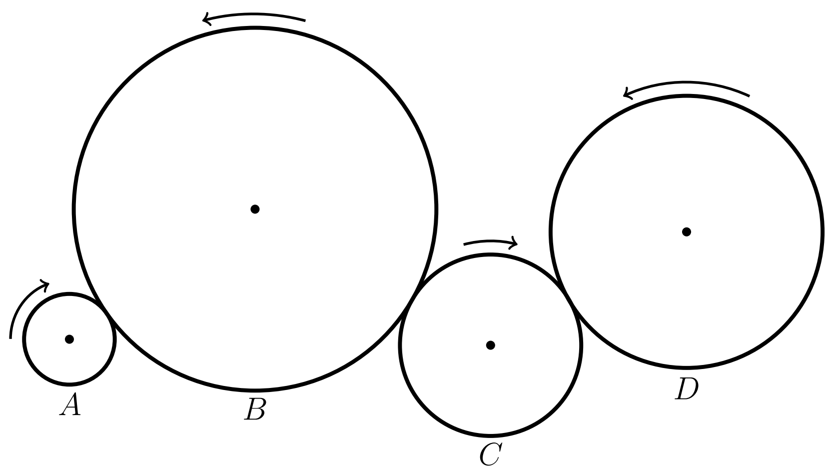

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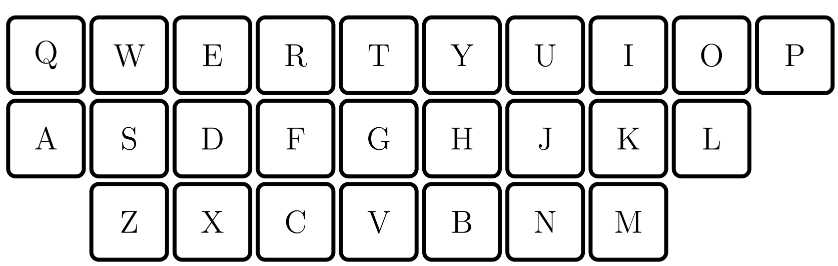

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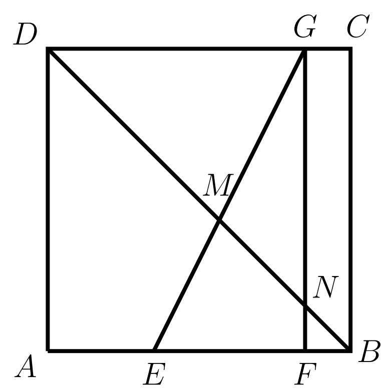

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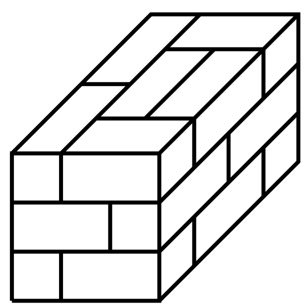

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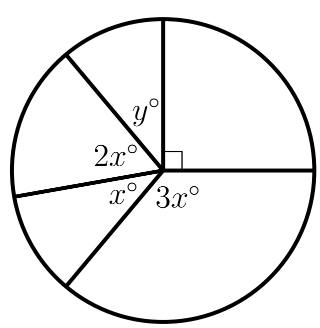

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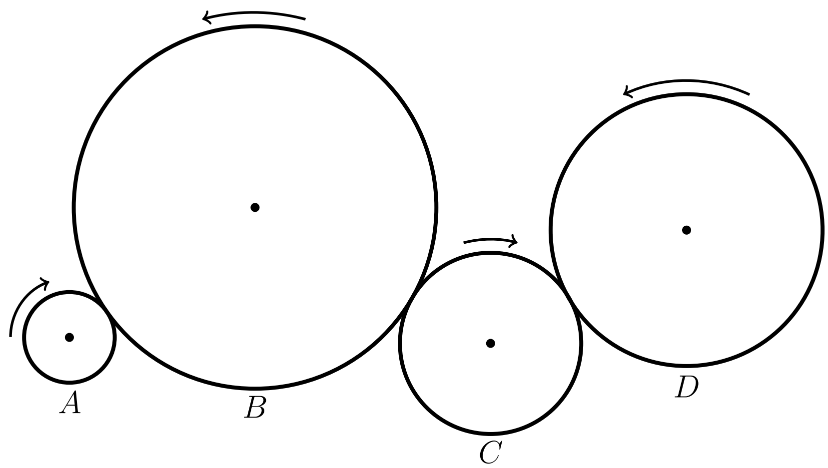

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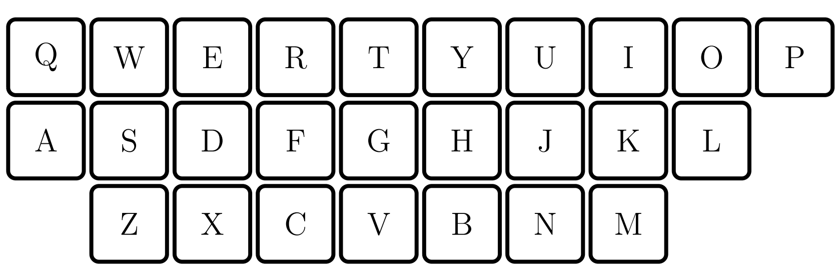

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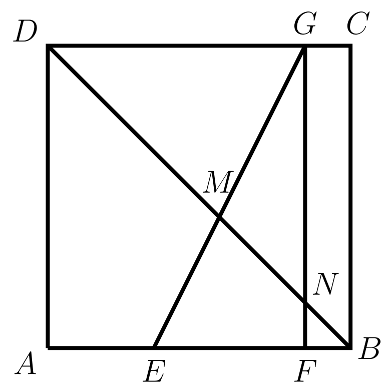

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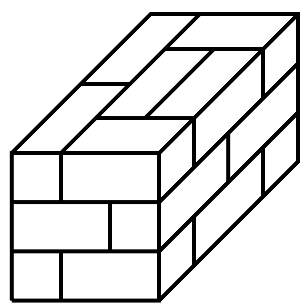
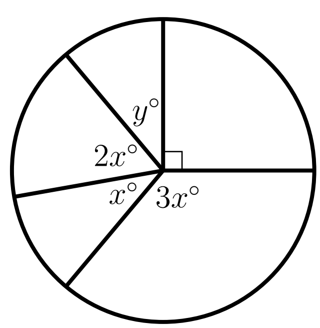


2. If $4 \leq a \leq 20$, what is the maximum possible value of $\frac{100}{a}$?
3. A square and a circle have the same area. If the radius of the circle is 2, what is the side length of the square?
4. Consider angles x°, $2x^\circ$, $3x^\circ$, and y° in the diagram below.



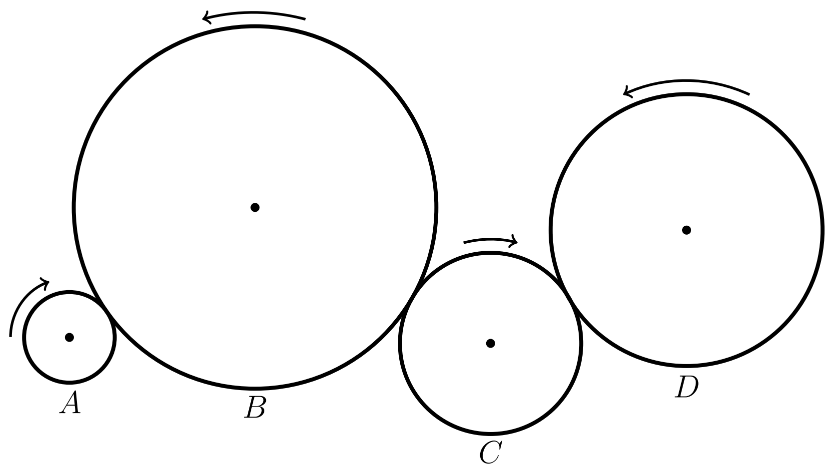
Given that $x^\circ + y^\circ = 60^\circ$, what is the value of y?

5. N is a three-digit positive integer with a middle digit of zero. The sum of the other two digits is 11. If the digits are reversed, the integer formed is greater than the original integer, N, by 495. What is the value of N?

6. Zendaya is drawing on graph paper. Starting at $(0, 0)$, with a red pen, she repeatedly traces along grid lines 1 unit to the right and then 1 unit up. Starting at $(0, 0)$, with a blue pen, she repeatedly traces along grid lines 2 units up and then 2 units right. Not counting the origin, the blue and red lines touch each other 2026 times. What is the area of the region enclosed by the red lines and blue lines?

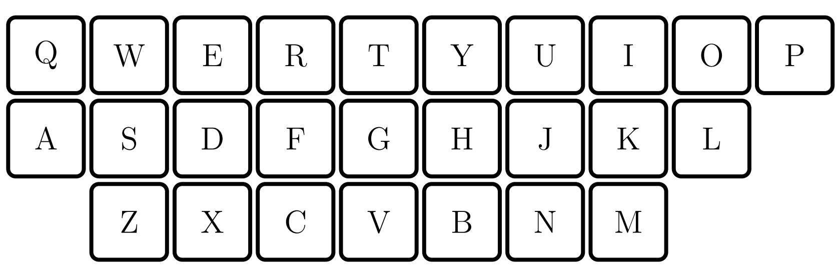
7. The fraction $\frac{65}{49}$ can be written in the form $1 + \frac{1}{a+\frac{1}{b}}$, where a and b are positive integers. What are a and b?

8. Four circular wheels, A, B, C, and D turn around their centres. They have radii 1 cm, 5 cm, 2 cm and 3 cm respectively. When wheel A is turned, it turns B, which turns C, which turns D. There is no slipping throughout this process. If wheel D turns at 1 revolution per second, at how many revolutions per second does A turn?



9. The prime numbers a, b, and c have the property that $2a + 5b + 10c = 155$ and $c - b = 4$. What are the values of a, b, and c?

10. Using the keyboard below, sequences of letters can be formed starting at Q and ending at M where each letter in the sequence other than Q is either immediately below or immediately to the right (on the keyboard) of the letter before it in the sequence. For example, the only two letters that can follow D in a sequence are F and X. How many such sequences of letters can be formed?



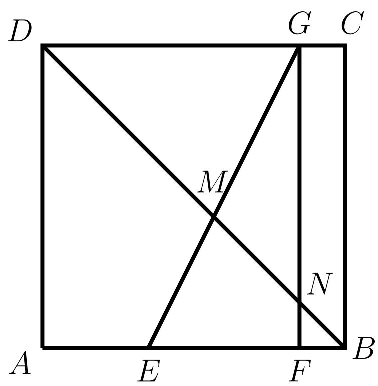
11. A command called swap switches two letters in a word. For example, using the input TABLE, the command swap(1,4) switches the 1^{st} and 4^{th} letters in the word, to obtain the output LABTE. Using the input CANDY, the following program is run. What is the output?

```
Input word
Repeat 2026 times:
    swap(1,2)
    swap(3,5)
    swap(2,4)
Output final result
```

Note that each of the three swap commands is executed 2026 times.

12. For a positive integer n, let S_n be the sum of the digits of n. There is exactly one positive integer c that satisfies $c = 11 \times S_c$. What is c?

13. In square $ABCD$, which has side length 12, FG is parallel to BC, EF is half of AB, and BD divides $\triangle GEF$ into two regions with the same area. What is the exact value of $\frac{AB}{AE}$?



14. The integer $d > 1$ has the property that 332, 456, and 549 have the same remainder when divided by d. What is the value of d?

15. A chemist has 3 beakers, each containing a (well-mixed) mixture of acid and water:

- Bottle A contains 40 mL, 10% of which is acid.
- Bottle B contains 50 mL, 20% of which is acid.
- Bottle C contains 50 mL, 30% of which is acid.

She uses some of the mixture from each of the bottles to create a mixture with volume 60 mL, 25% of which is acid. She then mixes the remaining contents of the three bottles to create a new mixture. What percentage of the new mixture is acid?

16. The geometric sequence with n terms t_1, t_2, $\ldots$, t_n satisfies $t_1 t_n = 3$. The product of all n terms of the sequence is equal to 6561. What is the value of n?

    A *geometric sequence* is a sequence in which each term after the first is obtained from the previous term by multiplying it by a non-zero constant, called the common ratio. For example, 3, 6, 12, 24 are the first four terms of a geometric sequence with common ratio 2.

17. The integer x is randomly generated from the range $0 \leq x < 360$, with each of the 360 integers equally likely to be chosen. What is the probability that $4\sin x\cos x + 2\sin x > 2\sqrt{3}\cos x + \sqrt{3}$?

    We take x to be in degrees and not radians for this question.

18. Among integers N of the form $N = 42xyz + 21yz + 14xz + 6xy + 2x + 3y + 7z + 1$, where x, y, z are distinct positive integers, what is the smallest value of N that is a product of distinct primes?

    30 is a product of distinct primes, since $30 = 2 \times 3 \times 5$, while 20 is not a product of distinct primes, since $20 = 2 \times 2 \times 5$.

19. In $\triangle ABC$, $AB = AC$, and M is the midpoint of BC. Point D is chosen on AM such that $MD = 1$, $AD = 10$, and $\angle BDC = 3\angle BAC$. What is the perimeter of $\triangle ABC$?

20. Given that

    $$(\log_2 3)(\log_{3^2} 2) + (\log_{2^2} 3)(\log_{3^3} 2) + (\log_{2^3} 3)(\log_{3^4} 2) + \ldots + (\log_{2^n} 3)(\log_{3^{n+1}} 2) = \frac{7}{8},$$

    what is the value of n? (The sum has n terms.)

21. One ant is located at $(1, 2)$ and another ant is located as $(6, 5)$. Each minute, both ants move simultaneously 1 unit in the plane. The ant initially at $(1, 2)$ moves 1 unit to the right or 1 unit up, each with probability $\frac{1}{2}$. The ant initially at $(6, 5)$ moves 1 unit to the left or 1 unit down, each with probabilty $\frac{1}{2}$. What is the probability that, after each ant has moved 4 times, they are at the same point?

22. Paula writes n consecutive positive integers that have a sum of 475, where $n > 1$. How many possible values are there for n?

23. For which range of real numbers $k > 0$ do the equations $x^2 + 2x + y^2 = (k-1)(k+1)$ and $x^2 - 2x + y^2 = \left(\frac{1}{k} - 1\right)\left(\frac{1}{k} + 1\right)$ have a common real solution (x, y)?

24. In a 4×4 grid consisting of 16 unit squares, 4 squares are coloured red, while the other 12 are coloured white. Two colourings are said to be equivalent if one can be obtained from the other by doing a sequence of 90° rotations. How many inequivalent colourings are there?

25. What is the maximum value of the expression

    $$1 - \frac{32}{\left(1+\sqrt{1+\sqrt{1+x}}\right)^3} - \frac{32}{\left(1-\sqrt{1+\sqrt{1+x}}\right)^3} - \frac{16}{\left(1+\sqrt{1+\sqrt{1+x}}\right)^4} - \frac{16}{\left(1-\sqrt{1+\sqrt{1+x}}\right)^4}$$

    as x ranges over all real numbers for which the expression is defined?

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2026 Canadian Team Mathematics Contest

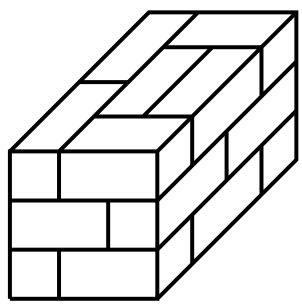
Team Problems (45 minutes)

IMPORTANT NOTES:

- Calculating devices are not permitted.
- Express answers as simplified exact numbers except where otherwise indicated. For example, $\pi + 1$ and $1 - \sqrt{2}$ are simplified exact numbers.

PROBLEMS:

1. How many bricks with dimensions $1 \times 1 \times 2$ are stacked to form the solid rectangular prism shown?



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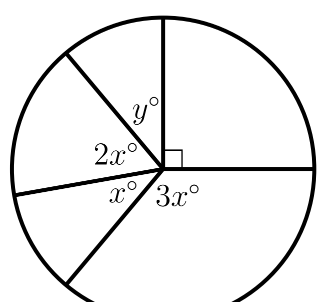

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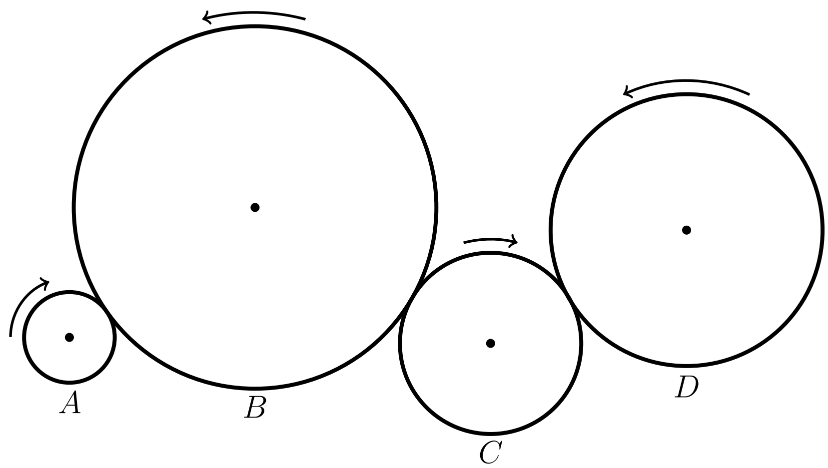

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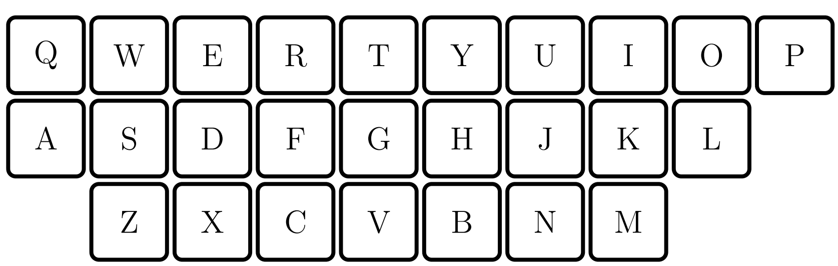

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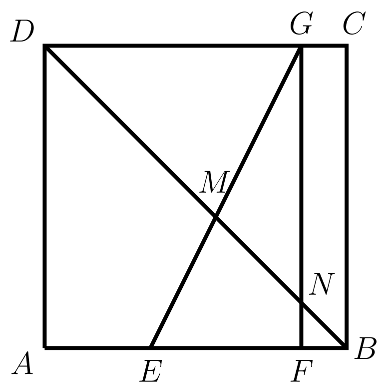

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Relay Problem #0 (Seat 1a)

Evaluate $\dfrac{2+5\times 5}{3}$.

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Relay Problem #0 (Seat 1a)

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Relay Problem #0 (Seat 1b)

Let t be TNYWR.
What is the area of a triangle with base $2t$ and height $2t - 6$?

FOLD HERE

Relay Problem #0 (Seat 1b)

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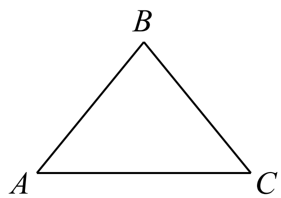
Relay Problem #0 (Seat 1c)

Let t be TNYWR.
In the diagram, $\triangle ABC$ is isosceles with $AB = BC$. If $\angle ABC = t^\circ$, what is the measure of $\angle BAC$, in degrees?



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Relay Problem #0 (Seat 1c)

Answer Sheet for Relay #0, Seat 1c

Team ______________________________

Early Answer	
Final Answer	

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Relay Problem #0 (Seat 2a)

Evaluate $\dfrac{2+5\times 5}{3}$.

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Relay Problem #0 (Seat 2a)

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Relay Problem #0 (Seat 2b)

Let t be TNYWR.
What is the area of a triangle with base $2t$ and height $2t - 6$?

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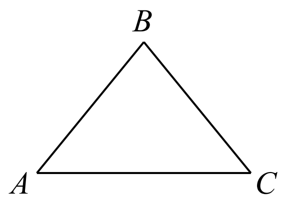

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Relay Problem #0 (Seat 2c)

Answer Sheet for Relay #0, Seat 2c

Team ______________________________

Early Answer	
Final Answer	

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Relay Problem #1 (Seat 1a)

Given that $x + 3 = 5$, what is the value of $2x + 4$?

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Relay Problem #1 (Seat 1a)

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Relay Problem #1 (Seat 1b)

Let t be TNYWR.
A triangle has vertices $A(-5, 3)$, $B(3, 3)$, and $C(2, t)$. What is the area of $\triangle ABC$?

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Relay Problem #1 (Seat 1b)

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Relay Problem #1 (Seat 1c)

Let t be TNYWR.
The quadratic function $f(x) = (x - b)(x - 3)$ satisfies $f(1) = t$, where b is a fixed real number.
What is the value of $f(5)$?

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Relay Problem #1 (Seat 1c)

Answer Sheet for Relay #1, Seat 1c

Team ______________________________

Early Answer	
Final Answer	

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Relay Problem #1 (Seat 2a)

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Relay Problem #1 (Seat 2b)

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Relay Problem #1 (Seat 2c)

Answer Sheet for Relay #1, Seat 2c

Team ______________________________

Early Answer	
Final Answer	

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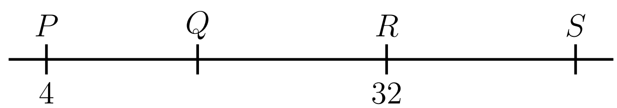
Relay Problem #2 (Seat 1a)

S is a point on the number line shown such that $PS = \left(\frac{3}{2}\right) PR$ and $QR = RS$. What number is located at point Q?



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Relay Problem #2 (Seat 1a)

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Relay Problem #2 (Seat 1b)

Let t be TNYWR.
Line l_1 has equation $6x - 3y + t = 0$ and line l_2 has equation $ax - 2y + 24 = 0$. Lines l_1 and l_2 have the same x-intercept. What is the slope of l_2?

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Relay Problem #2 (Seat 1b)

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Relay Problem #2 (Seat 1c)

Let t be TNYWR.
What is the largest solution of $2(x-3)\sqrt{x} = tx$?

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Relay Problem #2 (Seat 1c)

Answer Sheet for Relay #2, Seat 1c

Team ______________________________

Early Answer	
Final Answer	

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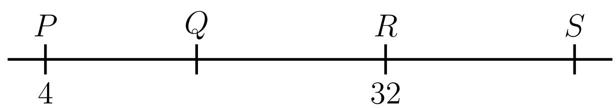

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Relay Problem #2 (Seat 2a)

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Relay Problem #2 (Seat 2c)

Answer Sheet for Relay #2, Seat 2c

Team ______________________________

Early Answer	
Final Answer	

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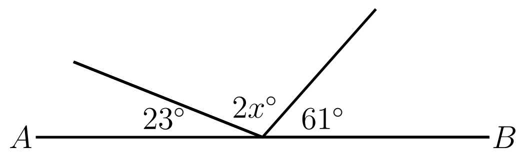
2026 Canadian Team Mathematics Contest

Relay Problem #3 (Seat 1a)

Given that AB is a straight line, what is the value of x?



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Relay Problem #3 (Seat 1a)

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Relay Problem #3 (Seat 1b)

Let t be TNYWR.
Gurpreet initially has $\$d$. Gurpreet lends $\frac{1}{2}$ of his money to his sister, and donated $\frac{1}{5}$ of the original amount to charity. If he then has $\$t$ remaining, what is the value of d?

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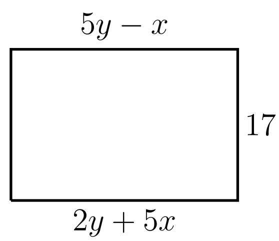
Relay Problem #3 (Seat 1b)

2026 Canadian Team Mathematics Contest

Relay Problem #3 (Seat 1c)

Let t be TNYWR.
If the perimeter of the rectangle shown is t, what is the value of x?



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Relay Problem #3 (Seat 1c)

Answer Sheet for Relay #3, Seat 1c

Team ________________________________

Early Answer	
Final Answer	

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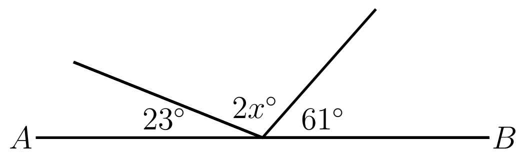
Relay Problem #3 (Seat 2a)

Given that AB is a straight line, what is the value of x?



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Relay Problem #3 (Seat 2a)

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Relay Problem #3 (Seat 2b)

Let t be TNYWR.
Gurpreet initially has \$$d$. Gurpreet lends $\frac{1}{2}$ of his money to his sister, and donated $\frac{1}{5}$ of the original amount to charity. If he then has \$$t$ remaining, what is the value of d?

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Relay Problem #3 (Seat 2b)

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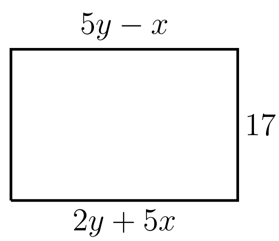
Relay Problem #3 (Seat 2c)

Let t be TNYWR.
If the perimeter of the rectangle shown is t, what is the value of x?



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Relay Problem #3 (Seat 2c)

Answer Sheet for Relay #3, Seat 2c

Team ______________________________

Early Answer	
Final Answer	