



2023 Team Up Challenge

Instructions for Teachers: In-Person Setting

This document provides instructions for running the Team Up Challenge in person. The instructions should be used as a suggestion only; teachers should feel free to make modifications in order to suit their classes. Ideally there should be four students per team, however this matters more for the relay than the other three parts.

Preparing Materials

In advance of running the Team Up Challenge, we recommend teachers prepare each part as indicated below. Students may want to use scrap paper and calculators as well.

Part	Instructions
Team Paper	Print one copy of the problems per student and one answer sheet per team.
Crossnumber Puzzle	Print one copy of the puzzle sheet and clue sheets per team.
Logic Puzzle	Print one clue sheet and one answer sheet per student.
Relay	Print one copy of the problems and one answer sheet per team. Cut the problem sheets on the dotted lines.

Team Paper: Approximately 30 - 40 minutes

1. The paper contains 15 problems of increasing difficulty. Team members are encouraged to collaborate when solving the problems and should decide on a strategy for sharing the work. It is unlikely that there will be enough time for everyone to do every question.
2. Final answers are to be written on the Team Paper Answer Sheet.

Crossnumber Puzzle: Approximately 20 - 30 minutes

1. The team should divide themselves into two pairs; one pair will take the across clues and the other pair will take the down clues. The team will write their answers on the shared Crossnumber Puzzle sheet as they work through the puzzle.
2. The crossnumber puzzle is designed so that some clues make it possible to find a number directly, some clues rely on an answer from another clue, and other clues require a partially completed puzzle board. Since each pair within a team is working on a different set of clues, the pairs will need to work together to completely solve the puzzle.
3. If teams are struggling to start the puzzle, teachers can direct them to across clues 5, 10, 19, and 22, or down clues 3, 7, 12, and 27.



Logic Puzzle: Approximately 20 - 30 minutes

1. Students use the clues to solve the puzzle. Note that the clues are not given in a specific order, and at times students will need to combine the information given in several different clues.
2. Students can work through the puzzle individually, in pairs, or as a team. Answer sheets are provided for all students so team members have the option to work individually and then compare their work in order to find a solution they all agree with.
3. Students are encouraged to use the answer sheet to write any information they know from the clues in order to help them reach the final answer.
4. If students are struggling to start the puzzle, teachers can direct them to clues 1 and 6.
5. Teams hand in only one Logic Puzzle Answer Sheet.

Relay: Approximately 5 - 10 minutes per relay

1. The “Practice Relay” is intended to be used as a practice round so students can understand the way the relay works. The questions in the Practice Relay are easier than the rest of the relay questions. Also, Player 1’s questions are the easiest in all relays.
2. Each team member is assigned a number: 1, 2, 3, or 4. Each number corresponds to a specific problem in each relay. Players 2, 3, and 4 require the answer from Players 1, 2, and 3, respectively, to solve their problem. This is indicated in the problem with the phrase “Replace N below with the number you receive.” However, Players 2, 3, and 4 should be able to do some work on their problem while they’re waiting for the answer from their teammate.
3. The four team members should not see any of the relay problems in advance and should not talk to each other during the relay.
4. Before the relay starts, each student should have their relay problem face down in front of them. Player 1 should have the answer sheet.
5. Once the relay starts, all players can flip over their paper and start working on their problem. *Even Players 2, 3 and 4 should be able to do some work on their problem right away.*
6. When Player 1, Player 2, or Player 3 thinks they have the correct answer to their problem, they record their answer on the answer sheet and pass the sheet to the next player. Students should write only the numeric part of their answer and **not** include any units. When Player 4 thinks they have the correct answer to their problem, they record their answer on the answer sheet and wait for their teacher to check it.
7. If all four answers are correct, the relay is complete! Otherwise, the teacher will mark the relay as incorrect and pass the answer sheet back to Player 1 so the team can try again. The answer sheet has space for two attempts for each relay.



2023 Team Up Challenge

Team Paper



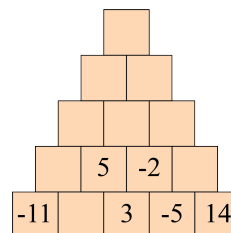
Tips to Get Started

- The questions in this paper increase in difficulty as you move through the paper. The last few questions require some careful thought.
- Each team member doesn't need to do every question. You can split the questions up, work together, or do a combination of both. Come up with a strategy that works for your team.

1. With 1 litre of cream, Sara can make 400 g of butter. How many litres of cream is needed to make 3200 g of butter?

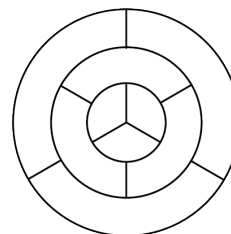
2. Yvan has 15 blocks which he stacks in a triangular arrangement. Six of the blocks are labelled with an integer, as shown.

The remaining blocks are to be labelled with an integer so that the sum of the integers in two adjacent blocks in a row is equal to the integer in the block above them. For example, $3 + (-5) = -2$. What integer label should be given to the block at the top of the stack?



3. Lia had her first swimming lesson on Tuesday, October 8th. She had a swimming lesson every Tuesday after that for a total of six lessons. What was the date of her last swimming lesson?

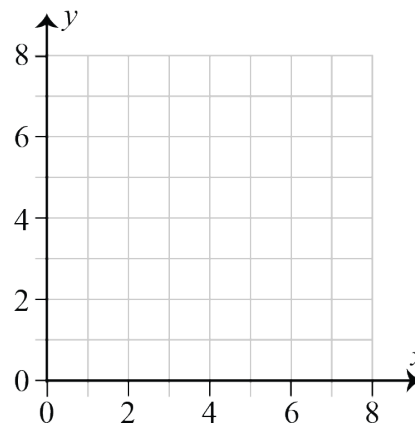
4. The diagram shown has nine different regions. Two regions are *bordering* if they share a common edge. Each region is to be coloured so that no two bordering regions are the same colour. What is the fewest number of colours needed?



5. Consider the grid shown. Penny draws a point on the grid with coordinates (x, y) so that

- x and y are integers,
- $x + y$ is even, and
- $x + y$ is less than 7.

How many possibilities are there for the coordinates (x, y) ?



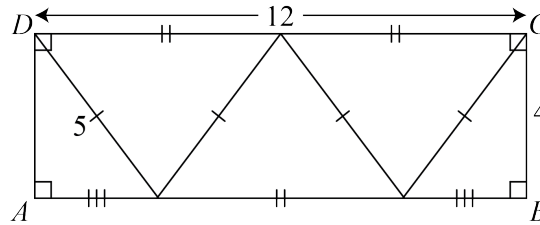


6. A three-dimensional figure was built using linking cubes. The figure, as well as its top view, are shown.

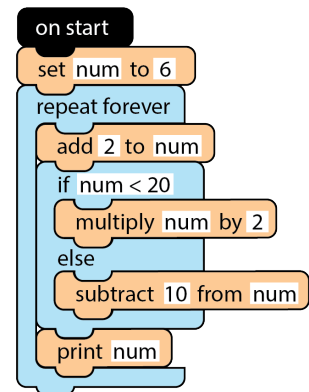


What is the maximum number of linking cubes in the three-dimensional figure?

7. Omar went to five different places yesterday. He went to the store after he went to both the pool and the forest. He went to the pool before he went to the forest. He went to the store after he went to the movies, but before he went to the library. He went to the movies after he went to the forest. Which place did he go to second?
8. Using the diagram below, Ming can draw connected paths from A to B by highlighting line segments. If Ming does not highlight the same line segment more than once, what is the length of the longest path that they can draw?



9. Aishah wrote a program using block coding to print a sequence of numbers. When her program is run, the first and second numbers printed are 16 and 36, respectively. What is the 2023rd number printed?



10. A game has red and blue tokens. All red tokens are worth the same number of points, and all blue tokens are worth the same number of points. Antwan knows the following:
- Six red tokens and five blue tokens are worth 54 points.
 - Two red tokens and three blue tokens are worth 26 points.

If Antwan has one red and one blue token, how many points does he have?



11. Jude has six containers. Their capacities in millilitres are shown, where N is an integer.



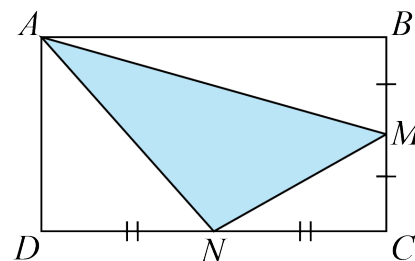
Jude conducts a series of tests to try and determine the value of N . For each test she chooses two containers, fills them each to the top with water, pours them both into the container with capacity N , and records whether or not it overflows. She then pours out the water and does another test using a different pair of containers until she has tested all 10 possible pairs. Only 4 of her tests resulted in the container overflowing. How many possible values of N are there?

12. The mass of 1 m^2 of a piece of paper measures its quality and is called its *weight*. For example, one piece of “300 weight” paper measuring 1 m by 1 m has a mass of 300 grams. What would be the mass, in grams, of a piece of “620 weight” paper measuring 25 cm by 30 cm?

13. A box contains some number of red marbles, some number of purple marbles, and exactly 75 yellow marbles. If the probability of selecting a red marble is 35% and the probability of selecting a purple marble is 50%, then how many purple marbles are there in the box?

14. In the diagram shown,

- $ABCD$ is a rectangle,
- M is on BC such that $BM = MC$, and
- N is on CD such that $CN = ND$.



If the area of rectangle $ABCD$ is 40 m^2 , what is the area, in m^2 , of $\triangle AMN$?

15. Frankie likes to think about interesting numbers. She learns that there is exactly one four-digit number whose digits reverse when it is multiplied by four. That is, if A , B , C , and D are the digits in the number then $ABCD \times 4 = DCBA$. What is the four-digit number $ABCD$?

$$\begin{array}{r} ABCD \\ \times \quad 4 \\ \hline DCBA \end{array}$$



2023 Team Up Challenge

Team Paper Answer Sheet

Team: _____

Question	Answer
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	



2023 Team Up Challenge

Crossnumber Puzzle

Team: _____

1				3			4	
5						6		7
		8	9		10			
11	12		13			14	15	
					16			
17		18		19			20	21
		22			23	24		
25	26			27		28		
			29					



Tips to Get Started

- This puzzle is like a crossword puzzle, except that the answers are numbers instead of words. Each empty square in the puzzle is to be filled with one digit.
- Your team will work together, with some of you solving the across clues and some solving the down clues. Start by looking for clues that can be solved right away. Then move on to the clues that rely on an answer from another clue.



2023 Team Up Challenge

Across Clues

2. A number whose digits have the same sum as the digits in 1 DOWN.
5. The number of centimetres in 2.9 metres.
6. This number appears in the sequence where the first term is 2 ACROSS and each term is 121 less than the previous term.
8. The sum of three consecutive even integers.
10. The number of days in nine weeks.
11. The product of two equal integers.
13. The number that should replace ■ when $\frac{3}{11} = \frac{\text{■}}{\text{19 ACROSS}}$.
14. A number whose digits multiply to 2 DOWN.
17. A number whose tens digit is the median of the other two digits.
19. The sum of the numbers from 1 to 10, inclusive.
20. The smallest prime number greater than 23 ACROSS.
22. The largest prime number less than 100.
23. The result of 19 ACROSS minus 3 DOWN.
25. One digit in this number is the sum of the other two digits.
28. The mode of the three digits in this number is 2.
29. The perimeter of a rectangle with length 17 ACROSS and width 18 DOWN.



2023 Team Up Challenge

Down Clues

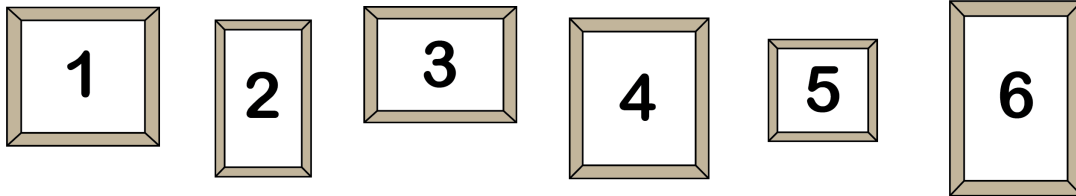
1. A number that is the same when the digits are written in reverse order.
2. The number that is 10 less than the sum of and .
3. The number of edges on a cube.
4. The width of a rectangle with perimeter and length .
6. A number whose digits are all different and all positive multiples of 3.
7. The number that is 80% of 195.
9. A number that is divisible by 4 and 13.
12. The number of quarters (worth \$0.25 each) needed to make \$31.75.
15. This number appears in the sequence where the first term is 5 and each term is more than the previous term.
16. A number whose digits have the same sum as the digits in .
17. The number that should replace when $\frac{8}{\text{10 ACROSS}} = \frac{104}{\text{■}}$.
18. A number whose digits are the same as the digits in , but not necessarily in the same order.
21. The volume of a rectangular prism with length , width , and height 9.
24. A multiple of .
26. The difference between the two digits in this number is 4.
27. The total number of dots on a standard die.



2023 Team Up Challenge

Logic Puzzle

For an art display, Mr. Yu would like to show the different types of art his students study. He chooses a watercolour painting, an acrylic painting, an oil painting, a pencil sketch, a pastel drawing, and a photograph. Each piece of art was created by a different student. The six art pieces are displayed in a row, numbered from 1 to 6, as shown.



Use the clues below to match each student with the title and type of art they created, as well as its position in the display.

- (1) The piece titled *Traffic*, which is not a photograph, is next to Maggie's piece.
- (2) Aria's piece titled *Yellow* is next to the photograph.
- (3) The title of Petr's piece is not *Friday*.
- (4) The acrylic painting is next to both the photograph titled *Snowfall*, and the oil painting titled *Happiness*.
- (5) Dhruv's piece is next to both Aria's piece and a pencil sketch titled *Quiet*.
- (6) Leyla's piece was placed in position 6 next to a piece titled *Traffic*.
- (7) The photograph was not taken by Dhruv or Maggie.
- (8) The piece titled *Friday*, which is not a watercolour painting, is next to Finn's piece.



Tips to Get Started

- You are encouraged to use the answer sheet to write any information you know from the clues in order to help you solve the puzzle.
- Note that the clues are not given in a specific order, and at times you will need to combine the information given in several different clues.



2023 Team Up Challenge

Logic Puzzle Answer Sheet

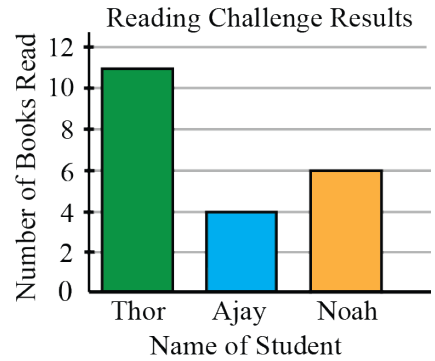
Team: _____

Complete the table below to match each student with the title and type of art they created, as well as its position in the display.

	Position Number					
	1	2	3	4	5	6
Student's Name						
Title of Art Piece						
Type of Art						

Practice Relay - Player 1

Thor, Ajay, and Noah counted the number of books they read last month for their school's reading challenge. Their results are shown in the bar graph. How many books did Noah read?



Practice Relay - Player 2

Replace N below with the number you receive.

Sabrina makes necklaces using 5 purple beads and 7 black beads on each necklace. After making N necklaces, how many beads has she used in total?



You can start working on this question while you're waiting for Player 1's answer.

Practice Relay - Player 3

Replace N below with the number you receive.

Zoe sold her old bicycle, skateboard, and ice skates for a total of $\$N$. If she sold the bicycle for $\$35$ and the skateboard for $\$25$, how much did she get for the ice skates?



You can start working on this question while you're waiting for Player 2's answer.

Practice Relay - Player 4

Replace N below with the number you receive.

Kai has a square garden with side length 5 m. If he walks around his garden N times, how many metres does he walk in total?



You can start working on this question while you're waiting for Player 3's answer.

Relay A - Player 1

To get from their house to school, Ari walks north for 7 minutes and then west for 10 minutes. To get from their house to the library, Ari walks east for 12 minutes. How many more minutes does it take Ari to walk to school than to the library?

Relay A - Player 2

Replace N below with the number you receive.

Gabe creates a sequence using toothpicks. In the sequence, Figure 1 is formed using 4 toothpicks. Each figure after Figure 1 has 3 more toothpicks than the previous figure. The first three figures are shown.



How many toothpicks does Gabe need **in total** to make the first N figures?

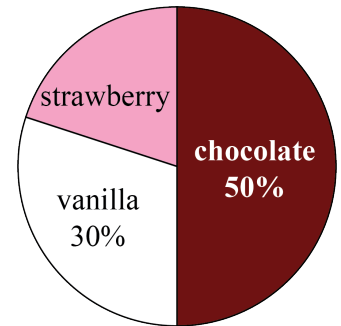


You can start working on this question while you're waiting for Player 1's answer.

Relay A - Player 3

Replace N below with the number you receive.

An ice cream truck sells chocolate, vanilla, and strawberry ice cream cones. The circle graph shows the percentage of each flavour sold one day. If N ice cream cones were sold in total that day, how many of them were strawberry?



You can start working on this question while you're waiting for Player 2's answer.

Relay A - Player 4

Replace N below with the number you receive.

Vijay has four \$20 bills and six \$10 bills. He also has N \$5 bills. If he closes his eyes and chooses a bill at random, what is the probability (as a fraction) that he chooses a \$10 bill?



You can start working on this question while you're waiting for Player 3's answer.

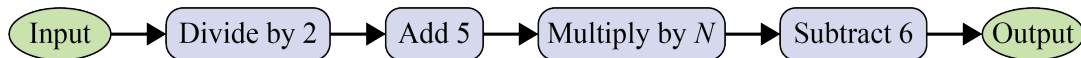
Relay B - Player 1

At a market, one apple costs \$0.50, a basket of six apples costs \$2.50, and a basket of twelve apples costs \$4.50. In dollars, what is the least expensive total price for 20 apples?

Relay B - Player 2

Replace N below with the number you receive.

When 16 is input into the flowchart below, what is the output?



You can start working on this question while you're waiting for Player 1's answer.

Relay B - Player 3

Replace N below with the number you receive.

A rope is N cm long. Rishi cuts off two pieces measuring 350 mm and 32 cm. How long, in centimetres, is the remaining piece of rope?



You can start working on this question while you're waiting for Player 2's answer.

Relay B - Player 4

Replace N below with the number you receive.

Santiago is 5 years old. He lives with his older sister, his father, and his grandmother. His older sister is 8 years old, his father is N years old, and the average (mean) of all the four ages is 25. How old is Santiago's grandmother?



You can start working on this question while you're waiting for Player 3's answer.

Relay C - Player 1

Aminah created a playlist with 35 different songs and set it to shuffle mode, where it randomly selects the next song. If the probability that the next song is one of her favourite songs is $\frac{1}{5}$, how many of her favourite songs are on the playlist?

Relay C - Player 2

Replace N below with the number you receive.
How many **seconds** are in 2 hours and N minutes?



You can start working on this question while you're waiting for Player 1's answer.

Relay C - Player 3

Replace N below with the number you receive.
Elsie's apartment number is a three-digit number that is less than 200. None of the digits in her apartment number are 0. The units digit is a multiple of 4 and the tens digit is a multiple of 3. If the sum of all three digits is the same as the sum of the digits in N , what is Elsie's apartment number?



You can start working on this question while you're waiting for Player 2's answer.

Relay C - Player 4

Replace N below with the number you receive.
Emil delivers N newspapers every Saturday. One day he was sick, so his brother delivered $\frac{1}{8}$ of the papers, his sister delivered $\frac{1}{4}$ of the papers, his cousin delivered $\frac{1}{2}$ of the papers, and his dad delivered the remaining papers. How many papers did Emil's dad deliver?



You can start working on this question while you're waiting for Player 3's answer.



2023 Team Up Challenge

Relay Answer Sheet

Team: _____

Practice Relay					
	Player 1	Player 2	Player 3	Player 4	Teacher
1 st Attempt					
2 nd Attempt					

Relay A					
	Player 1	Player 2	Player 3	Player 4	Teacher
1 st Attempt					
2 nd Attempt					

Relay B					
	Player 1	Player 2	Player 3	Player 4	Teacher
1 st Attempt					
2 nd Attempt					

Relay C					
	Player 1	Player 2	Player 3	Player 4	Teacher
1 st Attempt					
2 nd Attempt					