



2024 Team Up Challenge

Instructions for Teachers

This document provides instructions for running the Team Up Challenge. 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, 8, 13, 21, and 23, or down clues 7, 10, 20, and 22.



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 4 and 8.
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.



2024 Team Up Challenge

Team Paper

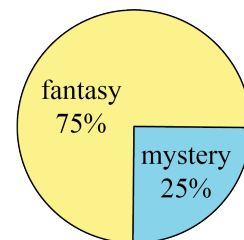


Tips to Get Started

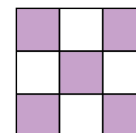
- The questions in this paper increase in difficulty as you move through the paper. The last few questions require some careful thought.
- Each team member doesn't need to do every question. You can split the questions up, work together, or do a combination of both. Come up with a strategy that works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

1. If $a + b = 6$, and $a = b$, then what is the value of $a \times b$?

2. A group of librarians were asked to choose between a mystery or a fantasy book. The results are shown in the circle graph. If 12 people chose mystery, how many people chose fantasy?

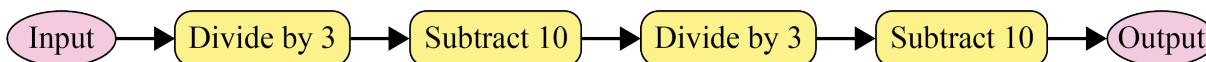


3. A large square is divided into nine identical smaller squares. Five of the smaller squares are shaded, as shown. If the total area of the shaded squares is 20 m^2 , what is the area, in m^2 , of the large square?



4. Antonio, Britt, and Caitlin are swimming laps in the pool. For every lap Antonio swims, Britt swims two laps. For every lap Britt swims, Caitlin swims three laps. If Antonio swam 5 laps, what is the total number of laps swum by all three people?

5. A function machine does the four operations shown, in order.



If the output is 8, what was the input?

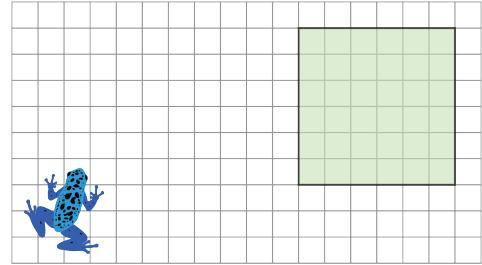
6. Three inhabitants of planet Magu named Alpha, Beta, and Gamma, met in a crater and counted each others eyes. Alpha saw exactly 9 eyes, Beta saw exactly 11 eyes, and Gamma saw exactly 8 eyes. No one could see their own eyes. How many eyes does Alpha have?



7. In the product shown, A, B and C are digits. What is the value of $A + B + C$?

$$\begin{array}{r} 6A \\ \times B \\ \hline 3C4 \end{array}$$

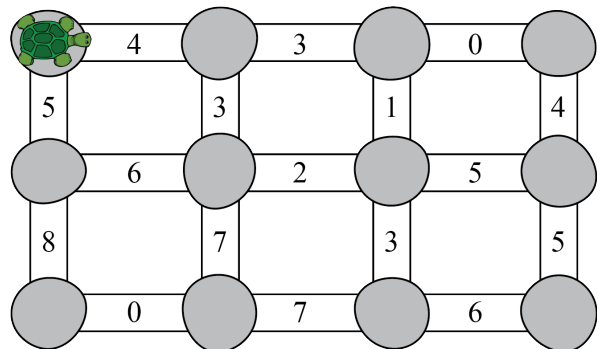
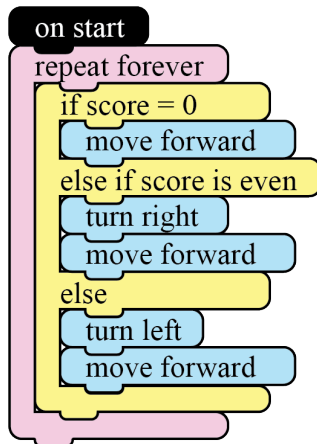
8. A frog and a square are placed on a grid as shown. The frog is then translated 5 units up and x units to the right so that it lands completely inside the square. If x is an integer, how many different values of x are possible?



9. Ahmed created a program to move a turtle along paths that connect 12 large rocks. Each path contains a number, which represents the number of points that are added to your score when you use that path. The turtle starts on the rock in the top-left corner of the diagram, facing to the right, with a score of zero points. The following three blocks are used to move the turtle.

Block	Description
	moves the turtle forward to the next rock
	rotates the turtle a quarter turn clockwise
	rotates the turtle a quarter turn counterclockwise

If the turtle is directed to move forward when there is no path in front of it, the program will crash. Ahmed's program and the diagram are shown.

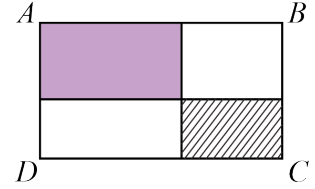


Ahmed ran his program and it crashed. What was Ahmed's score right before his program crashed?

10. What is the largest number of blocks with dimensions $1 \times 1 \times 2$ that can fit inside a box with dimensions $3 \times 3 \times 3$?



11. Rectangle $ABCD$ has integer side lengths and is divided into four rectangles, as shown. The largest of these four rectangles is shaded and has a perimeter of 28 cm. The smallest rectangle is striped and has a perimeter of 12 cm. What is the perimeter, in cm, of rectangle $ABCD$?



12. Keoni writes the positive integers, in order, starting from 1. He writes the integers in rows, each with 9 integers. Keoni writes the first row from left to right, but once he reaches the end of a row, he writes the next row in the opposite direction, placing each integer directly below an integer in the previous row, as shown.

1	2	3	4	5	6	7	8	9
18	17	16	15	14	13	12	11	10
19	20	...						

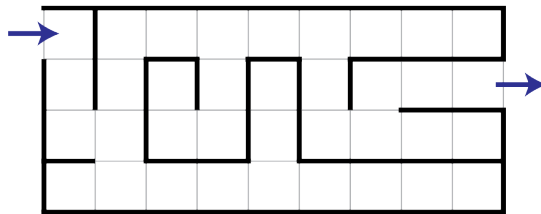
If Keoni continues writing positive integers in this way, which integer will be directly above 2024?

13. When 857 is divided by a positive integer n , the remainder is 17. When 908 is divided by the same positive integer n , the remainder is 26. What is the largest possible value of the integer n ?
14. Four points $W, X, Y,$ and Z are placed along a number line such that WX is two-thirds of XZ and WY is twice YZ .



If $WX = 12$, what is the value of XY ?

15. A robot is placed at the entrance on the left side of the following maze.



The robot moves through the maze one square at a time. Before it moves, the robot looks left, forward, and right; each time seeing either an opening or a wall. At each square, it is possible for the robot to see a total of 0, 1, or 2 openings.

- If the robot sees 0 openings, that is, it sees three walls, it stops moving.
- If the robot sees 1 opening, it moves through it to the next square.
- If the robot sees 2 openings, the probability of it moving through either of the openings is equal.

What is the probability that the robot will reach the exit on the right side of the maze?



2024 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	



2024 Team Up Challenge

Crossnumber Puzzle

Across Clues

1. The number that is halfway between $\boxed{20 \text{ DOWN}}$ and $\boxed{25 \text{ ACROSS}}$.
3. A number whose digits multiply to 200.
5. The number of eggs in 6 dozen.
6. The value of $4 + \boxed{9 \text{ DOWN}} + 0.5 \times 90$.
8. The number of seconds in 11 minutes.
10. The positive difference between the two digits in this number is 3.
11. The area of a triangle with base $\boxed{10 \text{ DOWN}}$ and height $\boxed{23 \text{ ACROSS}}$.
13. The number of days needed to collect \$87, if \$3 is collected each day.
14. An odd multiple of 5.
17. The mean and the median of the three digits in this number are equal.
19. The number of positive integers less than $\boxed{17 \text{ ACROSS}}$ that are multiples of 5.
20. The number that is $\frac{2}{5}$ of $\boxed{8 \text{ ACROSS}}$.
21. The smallest 3-digit prime number.
23. The smallest positive integer whose digits multiply to 40.
24. The mode of the digits in this number is 4.
25. A number whose digits are the same as the digits in $\boxed{11 \text{ DOWN}}$, but are written in descending order.



2024 Team Up Challenge

Crossnumber Puzzle

Down Clues

1. A number that is the same when the digits are written in reverse order.
2. A composite number that is not divisible by 3.
3. A number whose digits have the same sum as the digits in 10 ACROSS.
4. The mode of the three digits in this number is 2.
7. The number of months in 13 years.
9. The product of two equal integers.
10. The largest prime number that is a factor of 2024.
11. This number appears in the sequence where the first term is 85 and each term after the first is 21 ACROSS more than the previous term.
12. A number whose digits are three consecutive integers that are arranged, in order, to form the smallest possible number.
15. A number that lies between 23 ACROSS and 9 DOWN on the number line.
16. A number that is a factor of 7 DOWN.
18. When this number is divided by the sum of its digits, the result is 14 ACROSS.
19. A number that is greater than 3785 and is less than 3915.
20. The perimeter of an equilateral triangle with side length 79.
21. A number whose digits sum to 9.
22. The length of a rectangle with area 95 and width 5.



2024 Team Up Challenge

Crossnumber Puzzle

Team: _____

	1		2		3			4
5			6	7				
						8	9	
10			11		12			
		13			14			15
	16		17	18			19	
20								
			21		22		23	
24					25			



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.



2024 Team Up Challenge

Logic Puzzle

Eight friends went to see a movie last Friday night. However, the theatre was a lot busier than they expected, so they weren't able to all sit together. In the end, they split into four pairs and found two seats together for each pair. At the snack bar, each person bought a different snack for the movie.

Using the clues below, determine who sat in each seat, and which snack they bought.

- (1) Carlo sat next to Edison, who had gummy bears.
- (2) The person with the chocolate bar sat in an aisle seat (i.e. the first or last seat in a row) and did not sit next to the person with the hot dog or the person with the popcorn.
- (3) Yun sat in an even-numbered seat next to Vasilije.
- (4) Allie sat in seat A6.
- (5) Katja sat in an aisle seat next to her friend who had popcorn.
- (6) Five of the friends are Edison, Dita, Katja, Neeraj, and Vasilije. The other three friends are the person with the nachos, the person in seat A15, and the person with the pretzel.
- (7) The friends with the nachos and the licorice sat together, and were not in the front row.
- (8) Dita had chips and sat next to Allie.



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.



2024 Team Up Challenge

Logic Puzzle Answer Sheet

Team: _____

Fill in the seating chart below with the name of the person who sat there, and the snack they had.

The seating chart consists of a grid of 10 rows and 15 columns of seats. A horizontal line labeled "Screen" is positioned above the grid. There are 10 boxes for recording names and snacks, each with an arrow pointing to a specific seat:

- Seat: A6** (Name: _____, Snack: _____) points to row 1, column 11.
- Seat: A7** (Name: _____, Snack: _____) points to row 1, column 14.
- Seat: H2** (Name: _____, Snack: _____) points to row 4, column 1.
- Seat: H1** (Name: _____, Snack: _____) points to row 5, column 1.
- Seat: K10** (Name: _____, Snack: _____) points to row 10, column 10.
- Seat: K11** (Name: _____, Snack: _____) points to row 10, column 14.
- Seat: A15** (Name: _____, Snack: _____) points to row 3, column 15.
- Seat: A14** (Name: _____, Snack: _____) points to row 6, column 15.

Practice Relay - Player 1

If $x = 1$, what is the value of $x + 10$?

Practice Relay - Player 2

Replace N below with the number you receive.

Sebastian made 5 bracelets on Tuesday, 4 bracelets on Thursday, and N bracelets on Saturday. How many bracelets did he make 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.

Kati has the following collection of umbrellas.



If the plain umbrellas cost \$10 and the spotted umbrellas cost $\$N$, what is the total cost of the umbrellas in dollars?



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.

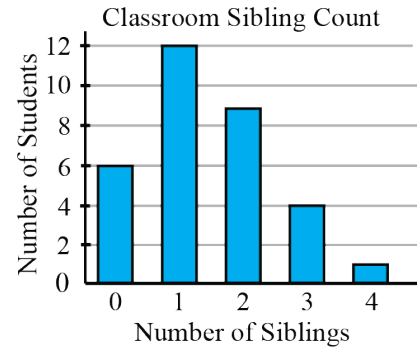
Kiran is thinking about his age. He determines that six years from today, he will be 11 years old. How old will Kiran be N years from today?



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

Relay A - Player 1

The students in Narayan's class were each asked how many siblings they have. The results are shown in the bar graph. How many students have at least one sibling?



Relay A - Player 2

Replace N below with the number you receive.

Safiya started a run at 1:40 p.m. and finished at 2:30 p.m. She ran with her friend for the first N minutes, then ran alone for the remaining time. How many minutes did she spend running alone?

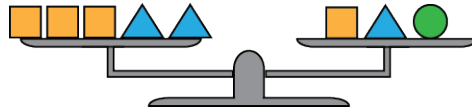


You can start working on this question while you're waiting for Player 1's answer.

Relay A - Player 3

Replace N below with the number you receive.

The scale shown is balanced.



Each  has a mass of N g, and each  has a mass of $\frac{N}{2}$ g. What is the mass, in grams, of the ?

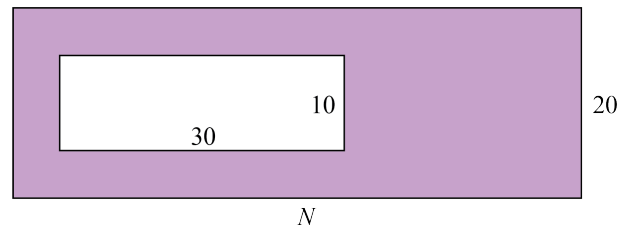


You can start working on this question while you're waiting for Player 2's answer.

Relay A - Player 4

Replace N below with the number you receive.

The diagram shows a white rectangle inside a shaded rectangle. The white rectangle is 10 m by 30 m and the shaded rectangle is 20 m by N m. What is the area of the shaded region, in m^2 ?



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

Relay B - Player 1

There are fewer than 20 students in Mr. Patel's class. He can arrange the students in 4 equal-sized groups. He can also arrange the students in 6 equal-sized groups. How many students are in Mr. Patel's class?

Relay B - Player 2

Replace N below with the number you receive.
How many of the following numbers are divisible by 3?

99, 64, 57, 26, 30, N



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.
What is the sum (as a fraction) of the three smallest fractions in the following list?

$\frac{2}{5}$, $\frac{3}{4}$, $\frac{1}{2}$, $\frac{1}{5}$, $\frac{1}{N}$



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.
The number 7 is inputted into a number machine. The machine then does the following steps:

- Step 1: Multiply input number by itself.
- Step 2: If the result is even then add 6, otherwise add 5.
- Step 3: Divide the result by 2.
- Step 4: Subtract 7.
- Step 5: Multiply the result by N .
- Step 6: Output the result.

What is the output?



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

Relay C - Player 1

When fifteen is written in numeric form, it is 15.

When the following number is written in numeric form, what is the sum of its digits?

two million five hundred sixty-four thousand fourteen

Relay C - Player 2

Replace N below with the number you receive.

Noemi has N marbles. Of these, 5 are blue, and the rest are either red or yellow. If Noemi takes a marble at random without looking, the probability that it is yellow is 50%. How many of the marbles are red?



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.

The 1st term in a sequence is 4, and the 2nd term is 3. Each term after that is equal to the sum of the two previous terms in the sequence.

For example, the 3rd term is equal to the sum of the 1st and 2nd terms, which is $4 + 3 = 7$.
What is the N^{th} term in the sequence?



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.

A food truck has the following menu.

Item	Price (incl tax)
Hamburger	\$1.75
Hot dog	\$1.25
Box of Fries	\$1.50
Drink	\$0.75

Iacob buys 2 hamburgers, 3 hot dogs, 2 boxes of fries, and 2 drinks for his family. If he had $\$N$ in cash before buying the food, how much does he have left afterwards (in \$)?



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



2024 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					