

## BUILD | FLY | CODE | COMPETE 2025–2026

### GAME OVERVIEW & TECHNICAL FIELD MANUAL

#### Introduction

This document provides a clear, competition-ready overview of the Build • Fly • Code • Compete (BFCC) challenges for the 2025–2026 season. It is written as a technical field manual intended for educators, event staff, coaches, judges, and facilitators who need a readable overview of each game followed by precise setup, gameplay, and scoring details.

BFCC features three workforce-aligned drone challenges:

- **Emergency Response**
- **Search and Rescue**
- **Package Delivery**

Each challenge simulates a real-world drone application and is designed for teams of 3–5 students using the Hopper® drone, combining manual flight, autonomous coding, spatial reasoning, and mission execution.

#### Competition Structure (Applies to All Games)

- **Teams:** 3–5 students
- **Drone:** Hopper® (FTW Robotics)
- **Flight Zone:** 20 ft × 10 ft taped rectangle
- **Match Length:** 10 minutes
- **Scoring:** Recorded live and displayed on the Leaderboard platform
- **Safety:** Visual observers remain outside the flight zone at all times

# CHALLENGE 1: EMERGENCY RESPONSE



## Challenge Overview

Emergency Response simulates a drone-assisted firefighting mission. Teams pilot Hopper through vertical towers to extinguish simulated fires. Each successful tower pass and precision landing removes a team cone and earns points. Towers are removed from play once fully cleared, adding a strategic race element.

This challenge emphasizes:

- Precision piloting
- Spatial awareness
- Controlled descents and landings
- Risk management in shared airspace

## Field Setup & Course Layout - See Appendix A

### Flight Zone

- Rectangle: 20 ft (length) × 10 ft (width)

### Starting Positions

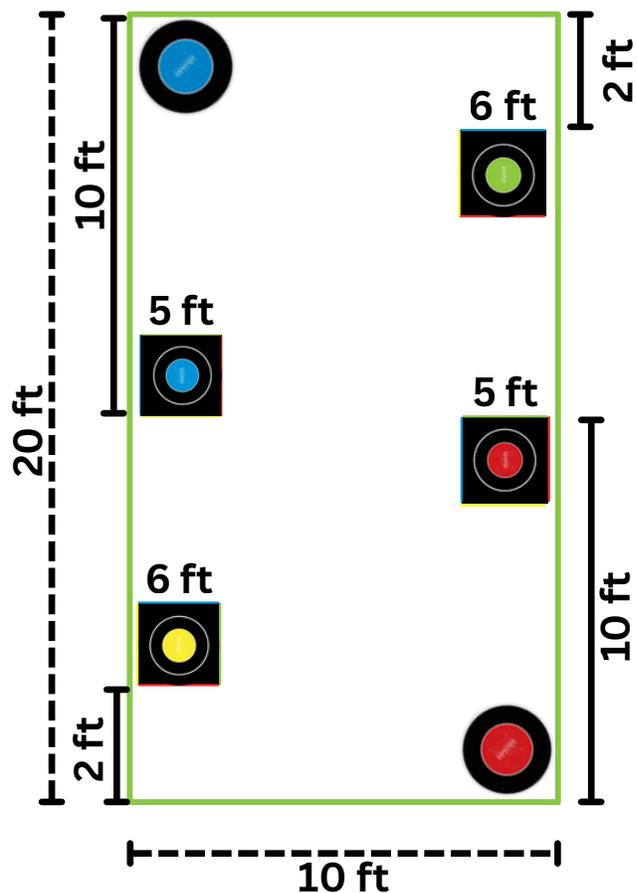
- 2 landing pads placed in opposite corners of the flight zone
- One landing pad per team

### Towers

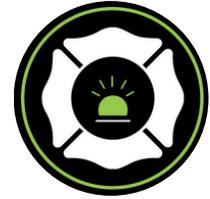
- 4 towers total
- Heights:
  - Two towers at 6 ft
  - Two towers at 5 ft

### Tower Placement

- Towers are positioned within the flight zone using the following spacing:
  - 10 ft horizontal separation
  - 2 ft offset from the short edges of the zone
- Towers must be oriented so that colored entry faces are clearly visible



# CHALLENGE 1: EMERGENCY RESPONSE

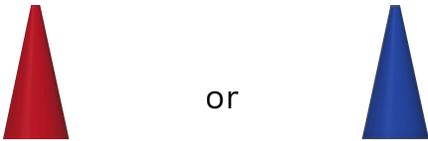


## Challenge Rules

Extinguish as many fires as possible by flying Hopper through towers and completing controlled landings.

### 3D Printed Cones (see section 3D printed elements for additional details)

- Each tower has a specific combination of red and blue team cones beside it
- Cones are removed as fires are extinguished



### Extinguishing a Fire (Single Action Cycle)

1. Take off from the team's landing pad
2. Fly to a tower
3. Enter the tower **through the team's assigned color**
4. Descend and exit through the bottom of the tower
5. Return to the starting landing pad
6. Land with **all four feet fully on the pad**

If all steps are completed successfully:

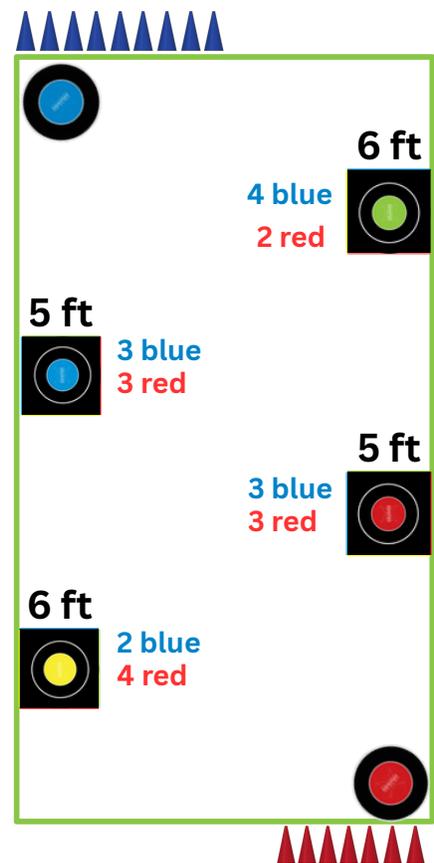
- **Remove one cone** from that tower

### Additional Rules

- Teams may exit towers in any direction
- Collisions with the opposing team must be avoided
- Once all one team's cones are removed from a tower:
  - That tower is cleared
  - The opposing team may no longer score on it

### Scoring – Emergency Response

Action	Points
Extinguishing a Fire	+5 points
Tower Cleared (Multiplier)	+10 points
Crash	-3 points



# CHALLENGE 2: SEARCH AND RESCUE



## Challenge Overview

Search and Rescue models post-disaster drone operations, where drones locate and retrieve stranded individuals. Teams use Hopper equipped with a hook to collect 3D printed elements from multiple landing pads and return them safely to base.

This challenge emphasizes:

- Controlled pickup and transport
- Navigation accuracy
- Efficient search strategies
- Fine motor piloting skills

## Field Setup & Course Layout - See Appendix B

### Flight Zone

- Rectangle: 20 ft (length) × 10 ft (width)

### Starting Positions

- 2 landing pads
- Centered on opposite long sides of the flight zone

### Towers

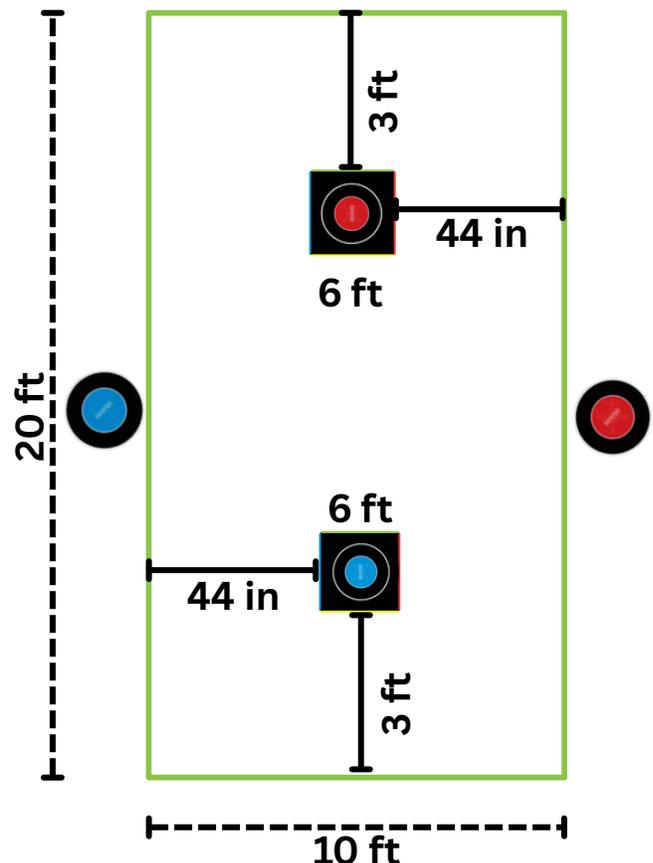
- 2 towers total
  - Heights: 6 ft

### Tower Placement

- Towers are positioned:
  - 44 inches from the long edges
  - 3 ft apart laterally

### Rescue Landing Pads

- 7 landing pads placed within the flight zone (see next page for diagram)
- Each pad:
  - Centered off a tower
  - Aligned with the edges of the zone



# CHALLENGE 2: SEARCH & RESCUE



## Challenge Rules

### Objective

Locate, retrieve, and return stranded individuals (3D printed elements) using Hopper.

### 3D Printed Elements

- Rescue elements (pyramids) placed on landing pads
  - Red landing pad - 2 red pyramids
  - Green landing pads -
    - one with 3 red pyramids
    - one with 1 red pyramid
  - Blue landing pad - 2 blue pyramids
  - Yellow landing pads -
    - one with 3 blue pyramids
    - one with 1 blue pyramid
  - Black landing pad - 1 red & 1 blue pyramid

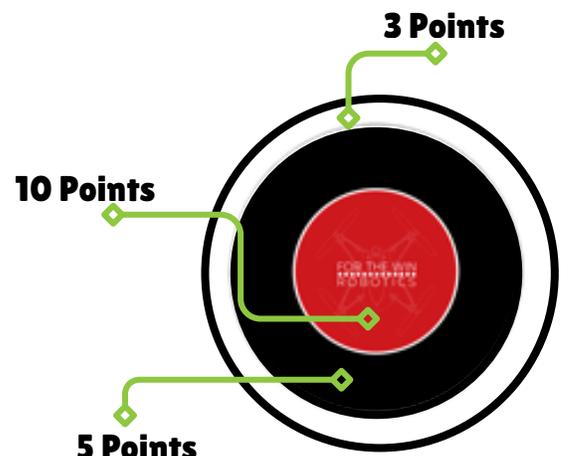
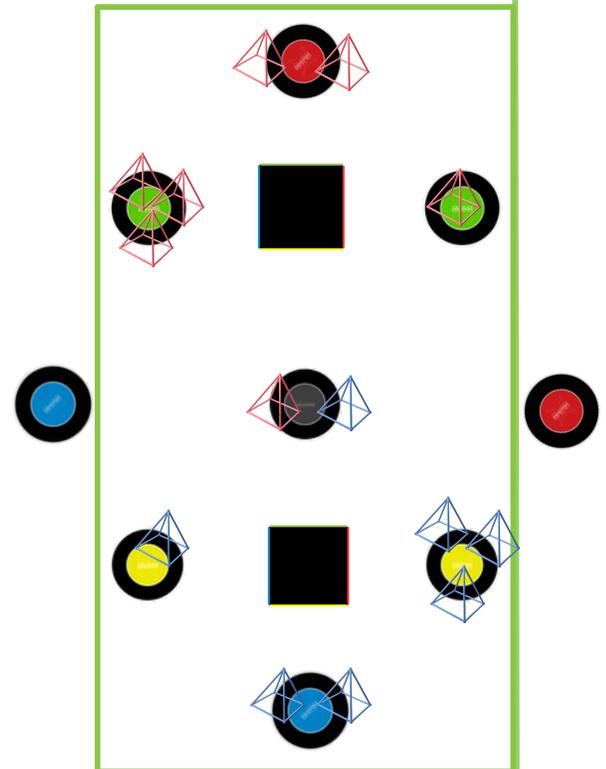
### Completing a Rescue

1. Take off from the starting landing pad with the hook attached
2. Navigate to a landing pad
3. Pick up a 3D printed element
4. Return to the starting landing pad
5. Release the element successfully

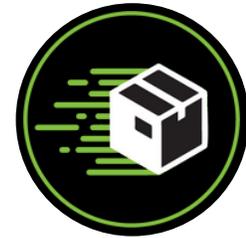
### Scoring – Search & Rescue

Points are scored based on rescue element (pyramid) placement on the landing pad as shown.

Action	Points
Successful Rescue (Primary Pad)	+10 points
Successful Rescue (Secondary Pad)	+5 points
Partial / Low-Difficulty Rescue	+3 points



# CHALLENGE 3: PACKAGE DELIVERY



## Challenge Overview

Package Delivery simulates urban and commercial drone logistics. Teams use FTW Code to program Hopper for autonomous flight and precision landings. Each successful landing represents a completed delivery.

This challenge emphasizes:

- Autonomous coding
- Route planning
- Precision landings
- Systems thinking

## Field Setup & Course Layout - See Appendix C

### Flight Zone

- Rectangle: 20 ft (length) × 10 ft (width)

### Starting Positions

- 2 landing pads
- Placed on the opposite ends of the flight zone

### Towers

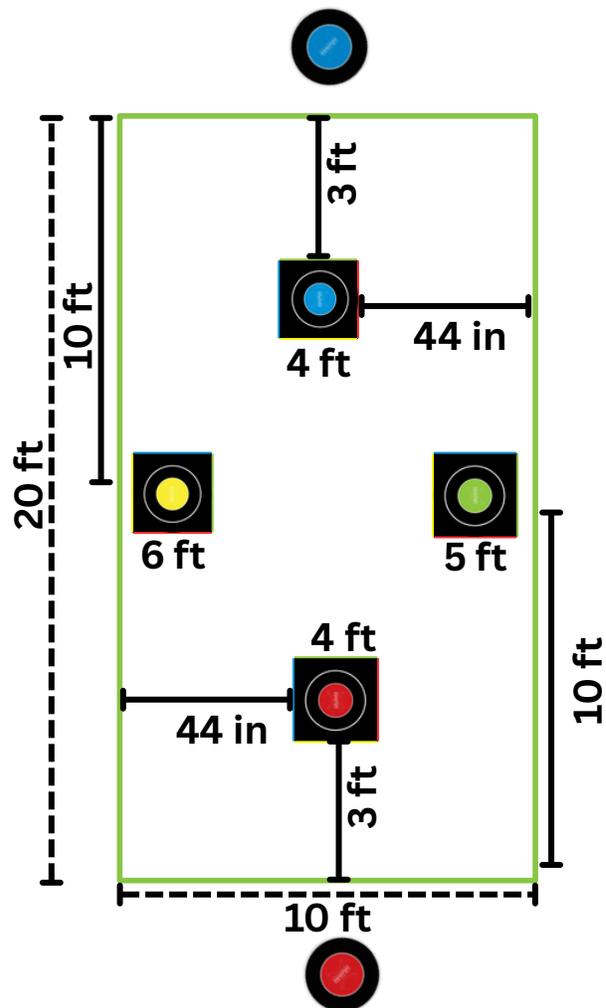
- 4 towers total
  - One tower at 6 ft
  - One tower at 5 ft
  - Two towers at 4 ft

### Tower Placement

- Towers are spaced:
  - 44 inches apart laterally
  - 10 ft separation longitudinally

### Delivery Landing Pads

- 7 landing pads positioned throughout the flight zone
- Each pad aligned off a tower and square to zone edges



# CHALLENGE 3: PACKAGE DELIVERY



## Challenge Rules

Use autonomous code to deliver packages to multiple locations within the city.

## Delivering a Package

1. Write and upload autonomous flight code using FTW Code
2. Launch Hopper from the starting landing pad
3. Fly autonomously to a target landing pad
4. Land successfully with all 4 feet on landing pad
5. Place a marker to indicate delivery
  - a. pyramids or cones can be used as markers
6. Repeat until time expires

## Additional Rules

- Teams may bring device with saved codes to modify and use during game play.
- If two teams have landed on a landing pad the last team to land on that landing pad will receive a “Capture Multiplier” meaning they were the last one to capture the pad.

## Scoring – Package Delivery

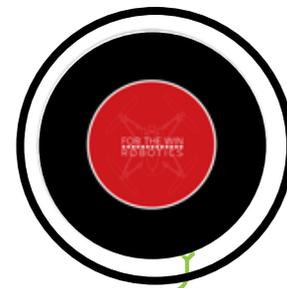
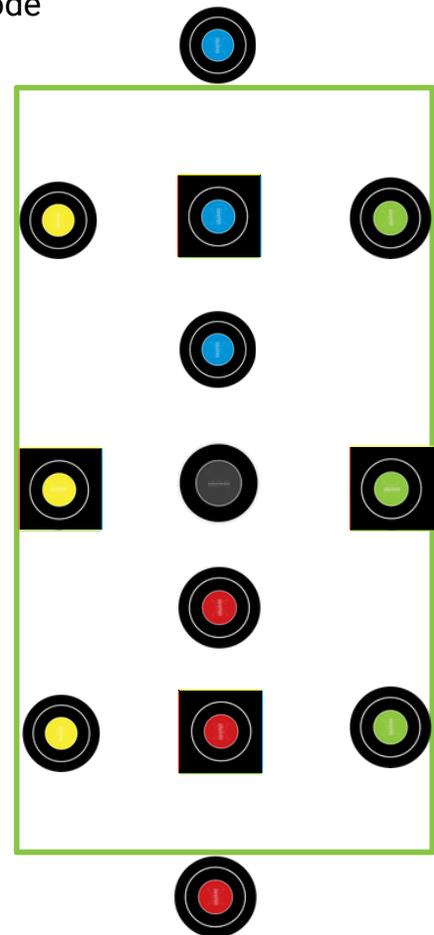
- Teams earn 5 points for each successful landing on a landing pad.
- A team may only land on a pad once until the other team lands on that same pad.
- If a team lands on a pad after the other team, they earn 5 points and place their pyramid on top of the other team’s pyramid.
- Teams may continue alternating landings, stacking pyramids each time.
- At the end of the match, the team with their pyramid on top earns a 10-point capture multiplier per pad.

### Action

Successful Delivery  
Capture Multiplier  
Crash

### Points

+5 points  
+10 points  
-3 points



**All 4 of Hopper’s feet must land on the landing pad to score.**

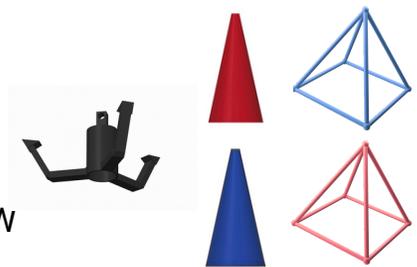
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### 3D Printed Elements

Teams and event hosts may choose to 3D print their own gameplay assets to support practice, local events, or expanded competition setups. FTW Robotics provides access to official STL files for approved game elements used across Build • Fly • Code • Compete challenges.

### Available 3D Printable Assets

- Search & Rescue Pyramid Elements (rescue markers)
- Search & Rescue Hook (compatible with Hopper)
- Emergency Response Cones
- Additional approved game elements as released by FTW



All files are provided in STL format and are optimized for standard desktop 3D printers.

### Practice Samples

Each team may request:

- A sample pyramid rescue element
- A sample rescue hook for Search & Rescue practice
- A sample cone for Emergency Response

These samples allow teams to train consistently while ensuring alignment with official competition specifications.

To request sample assets reach out to FTW Robotics

### Closing Notes

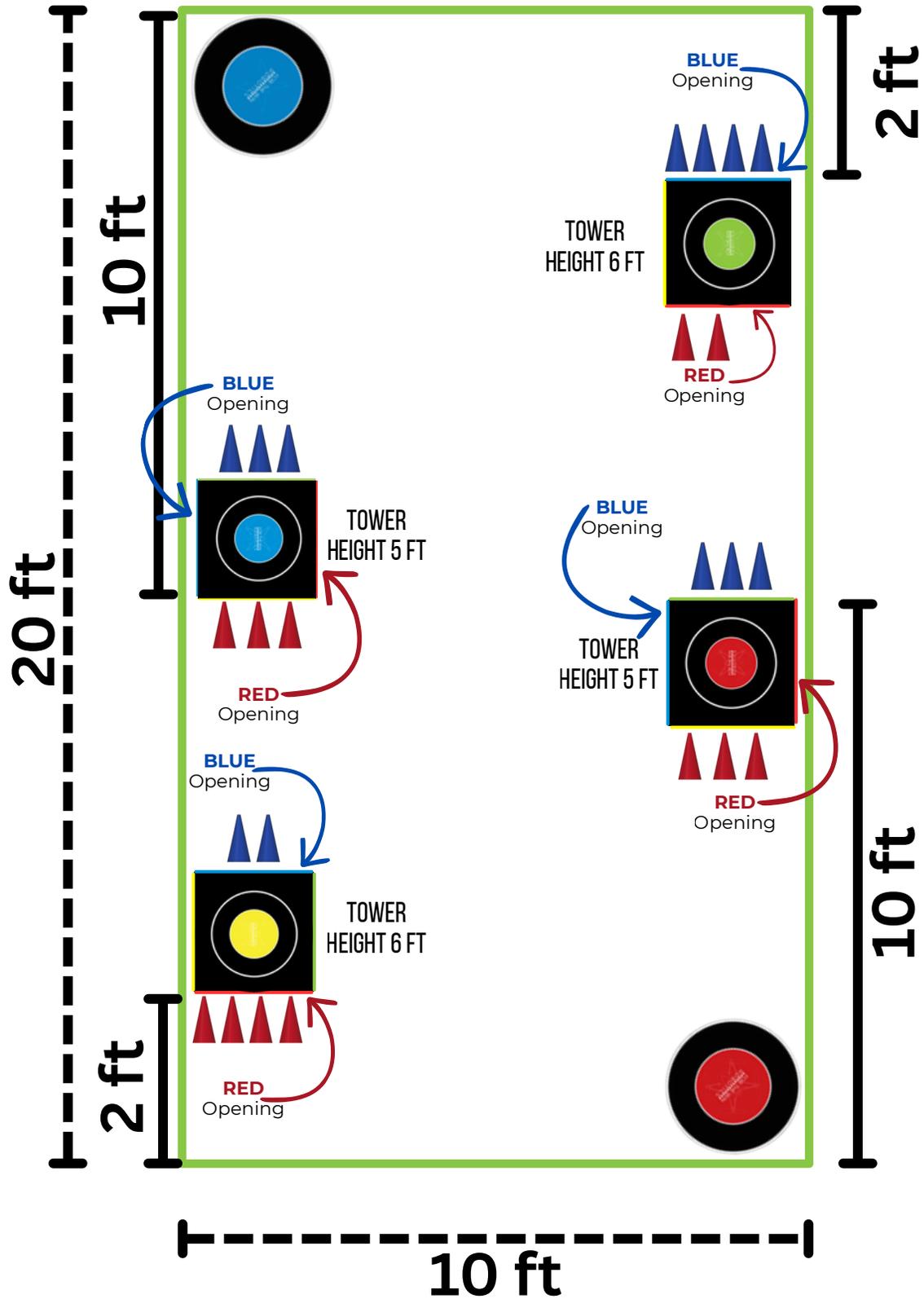
The Build • Fly • Code • Compete challenges are designed to scale from classroom use to full competitive events. Consistent field setup, clear enforcement of entry conditions, and standardized scoring are essential for fair play and meaningful comparison across teams and sites.

This guide may be used as:

- A coach and facilitator reference
- A judge training document
- A pre-event team orientation resource

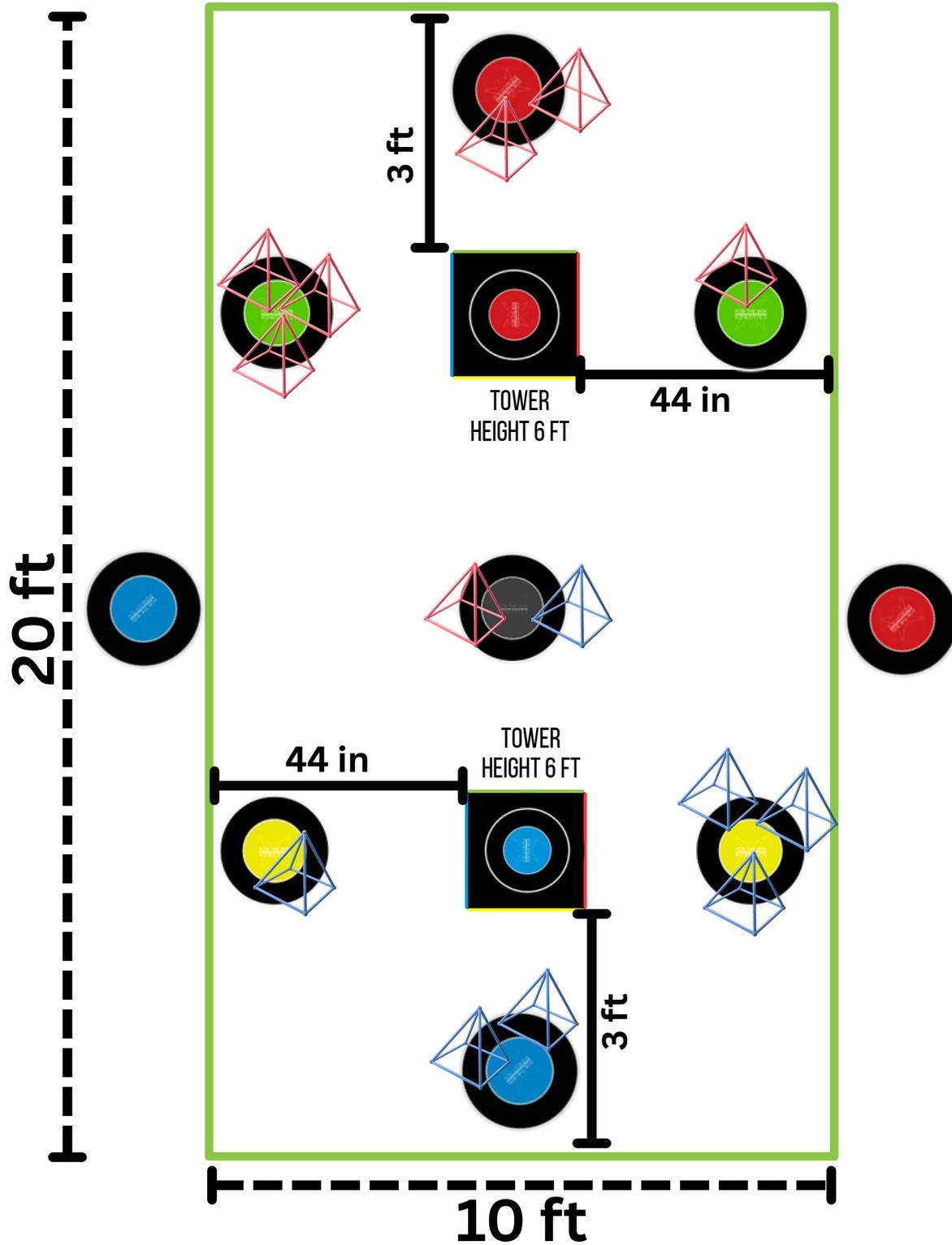
# APPENDIX A: EMERGENCY RESPONSE

## EVENT SETUP & LAYOUT



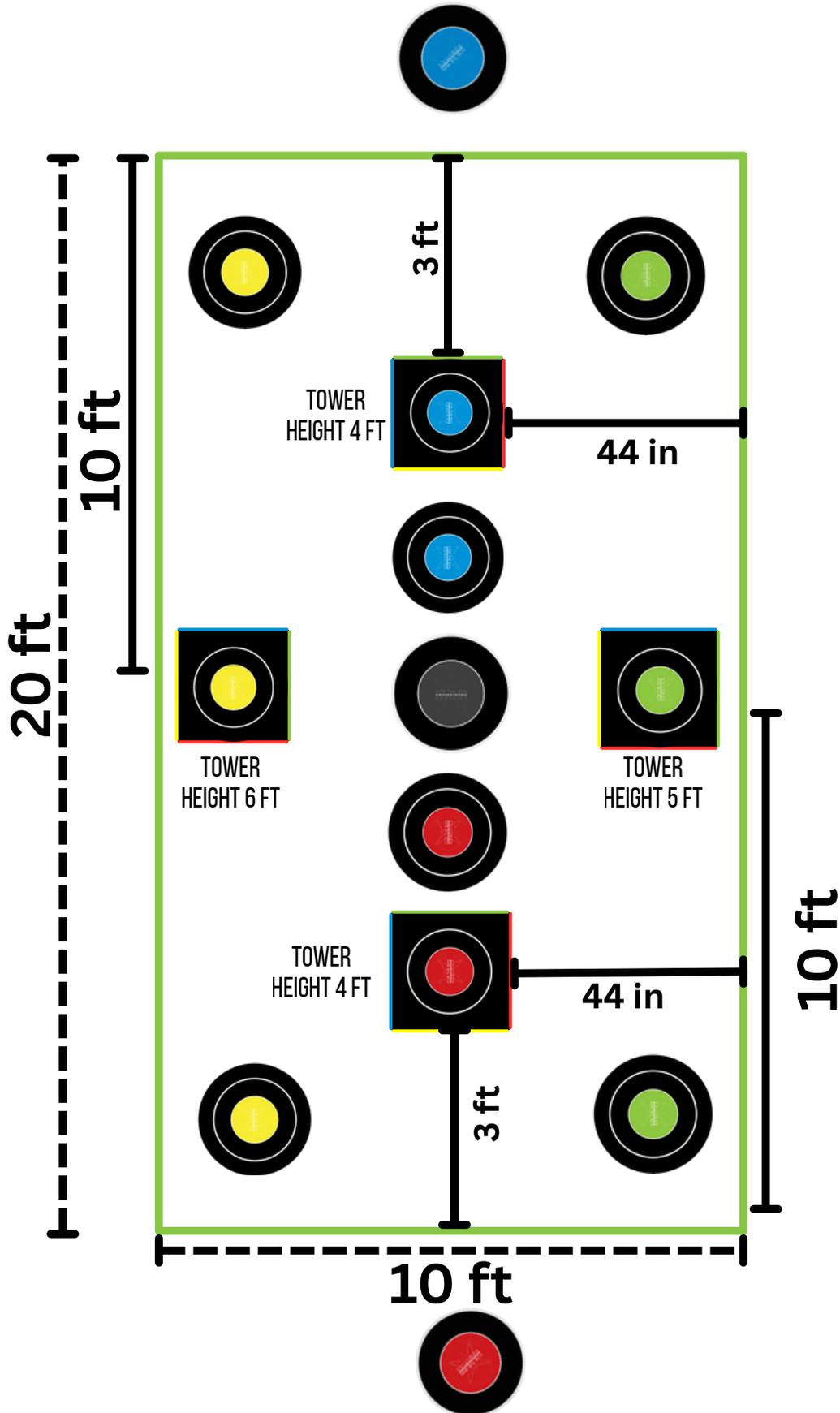
# APPENDIX B: SEARCH & RESCUE

## EVENT SETUP & LAYOUT



# APPENDIX C: PACKAGE DELIVERY

## EVENT SETUP & LAYOUT



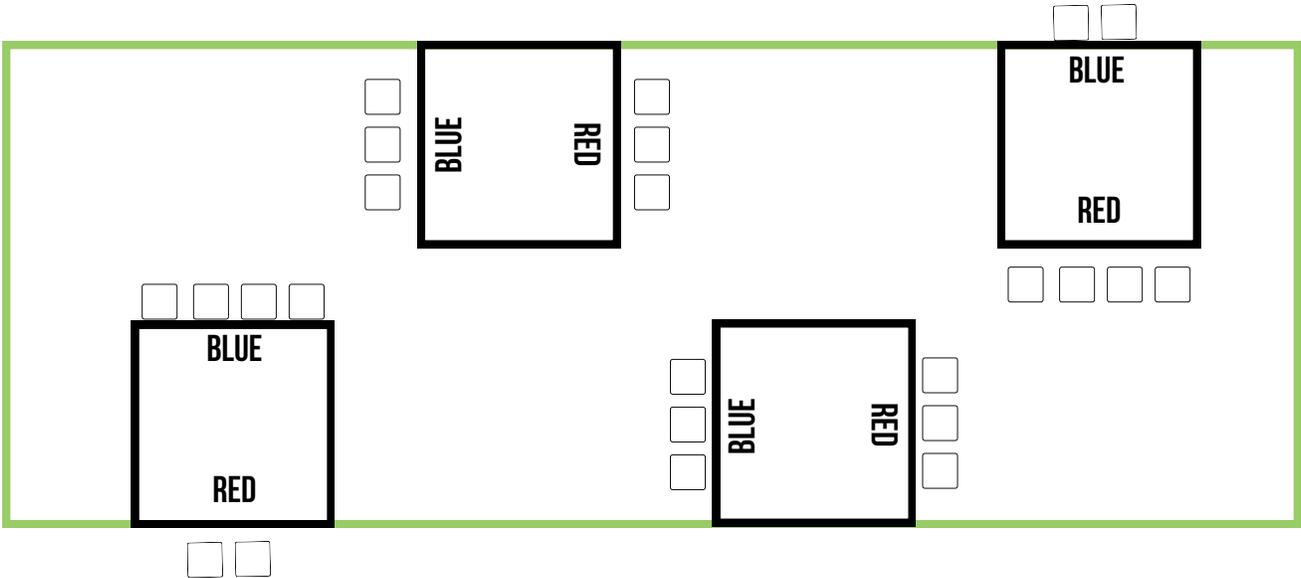
# EMERGENCY RESPONSE

**BLUE TEAM NAME:**

**TIME:**

**RED TEAM NAME:**

**TIME:**



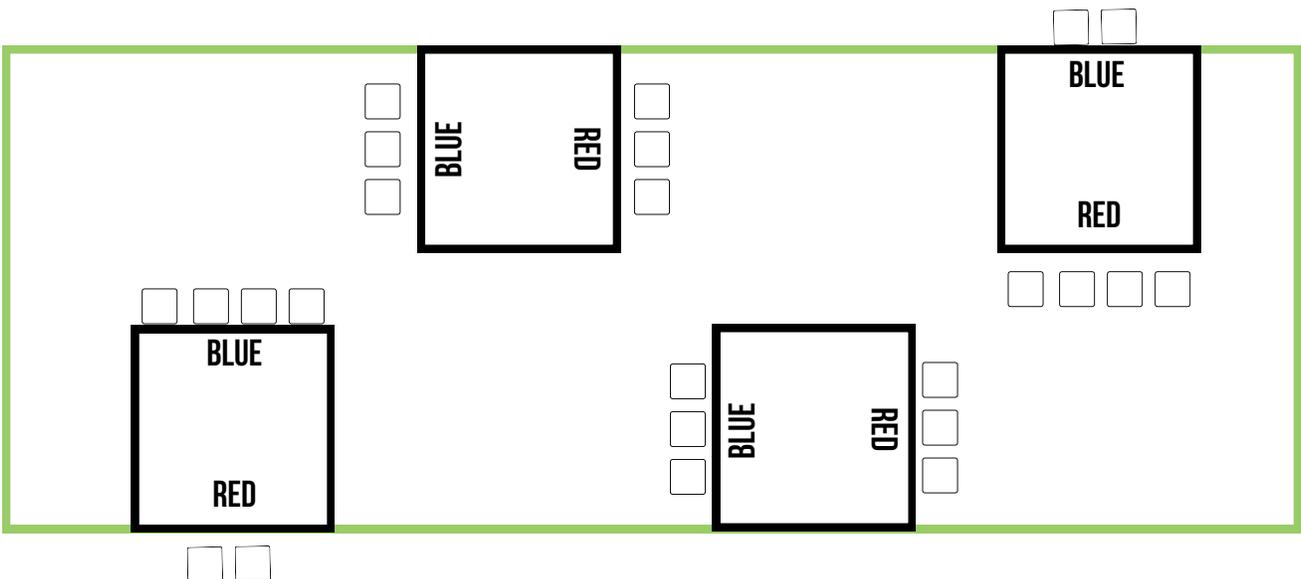
Extinguishing a Fire +5 points  
 Tower Cleared (Multiplier) +10 points  
 Crash -3 points

**BLUE TEAM NAME:**

**TIME:**

**RED TEAM NAME:**

**TIME:**



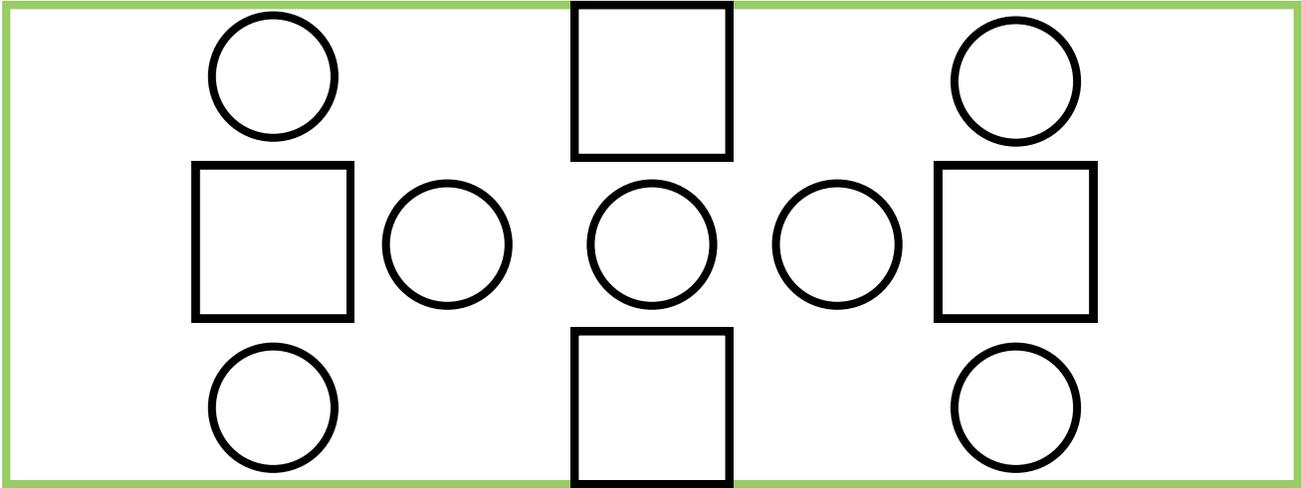
# PACKAGE DELIVERY

**BLUE TEAM NAME:**

**RED TEAM NAME:**

**TIME:**

**TIME:**



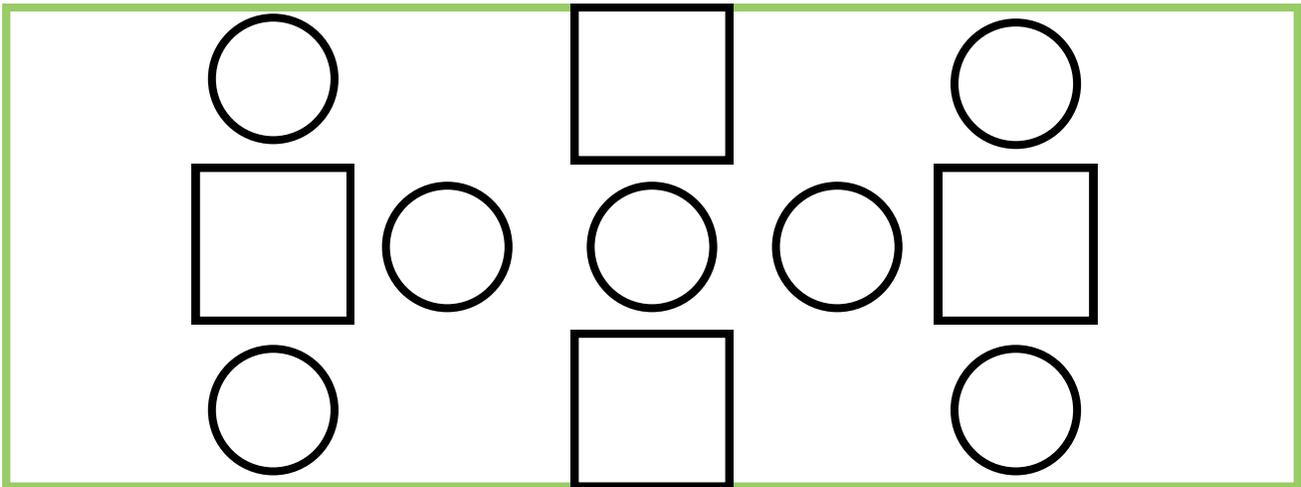
Scoring:  
 Successful Delivery +5 points  
 Capture Multiplier +10 points  
 Crash -3 points

**BLUE TEAM NAME:**

**RED TEAM NAME:**

**TIME:**

**TIME:**



# SEARCH & RESCUE

TEAM NAME:

10 PTS  
5 PTS  
3 PTS

TIME:

TEAM NAME:

10 PTS  
5 PTS  
3 PTS

TIME:

TEAM NAME:

10 PTS  
5 PTS  
3 PTS

TIME:

TEAM NAME:

10 PTS  
5 PTS  
3 PTS

TIME: