BUILD-FLY-CODE
COMPETE

CONSTRUCTION

STUDENT WORKBOOK

NAME: _____

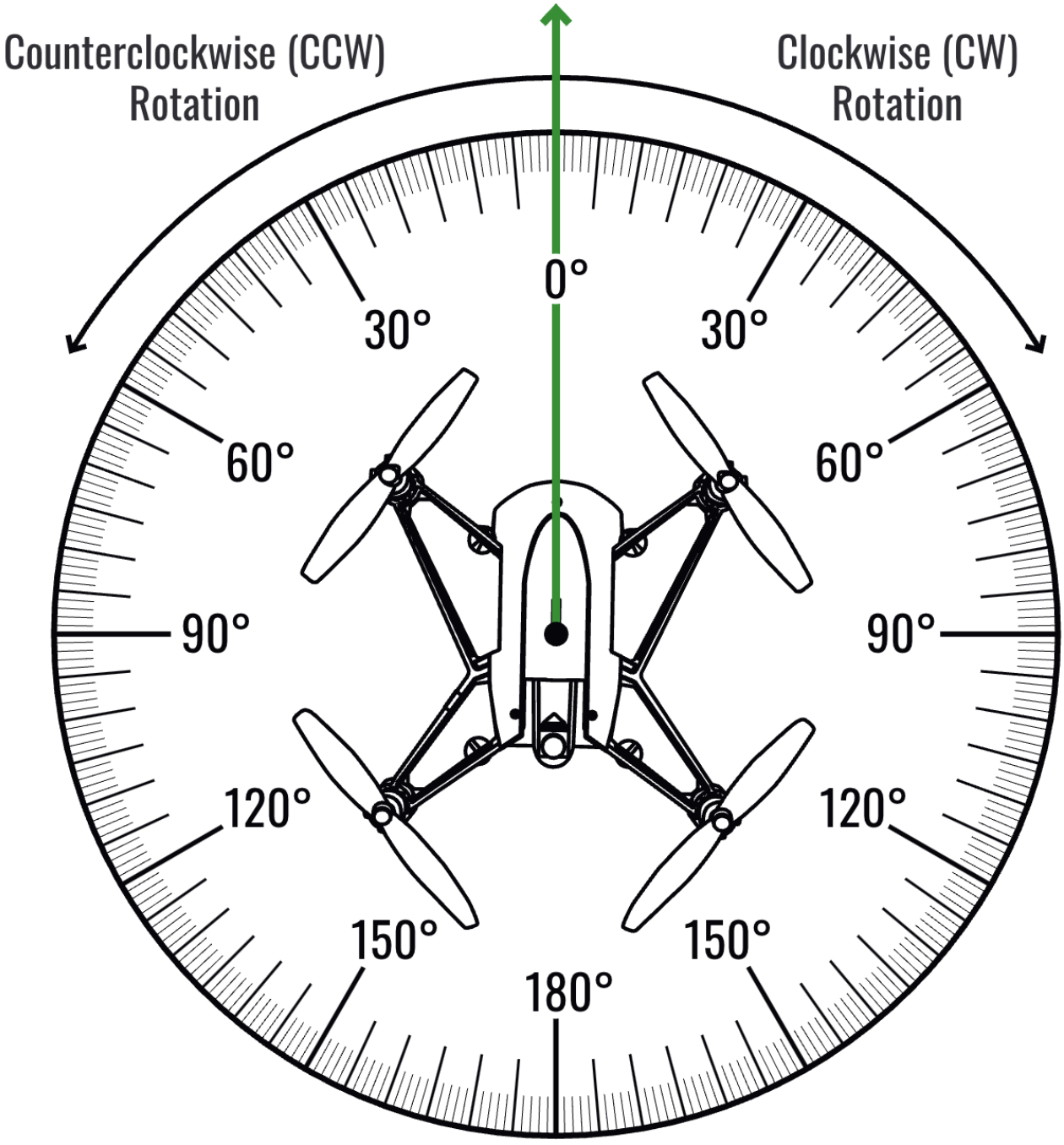
FOR THE WIN
ROBOTICS

2025 | VERSION 2

PILOT FLIGHT LOG

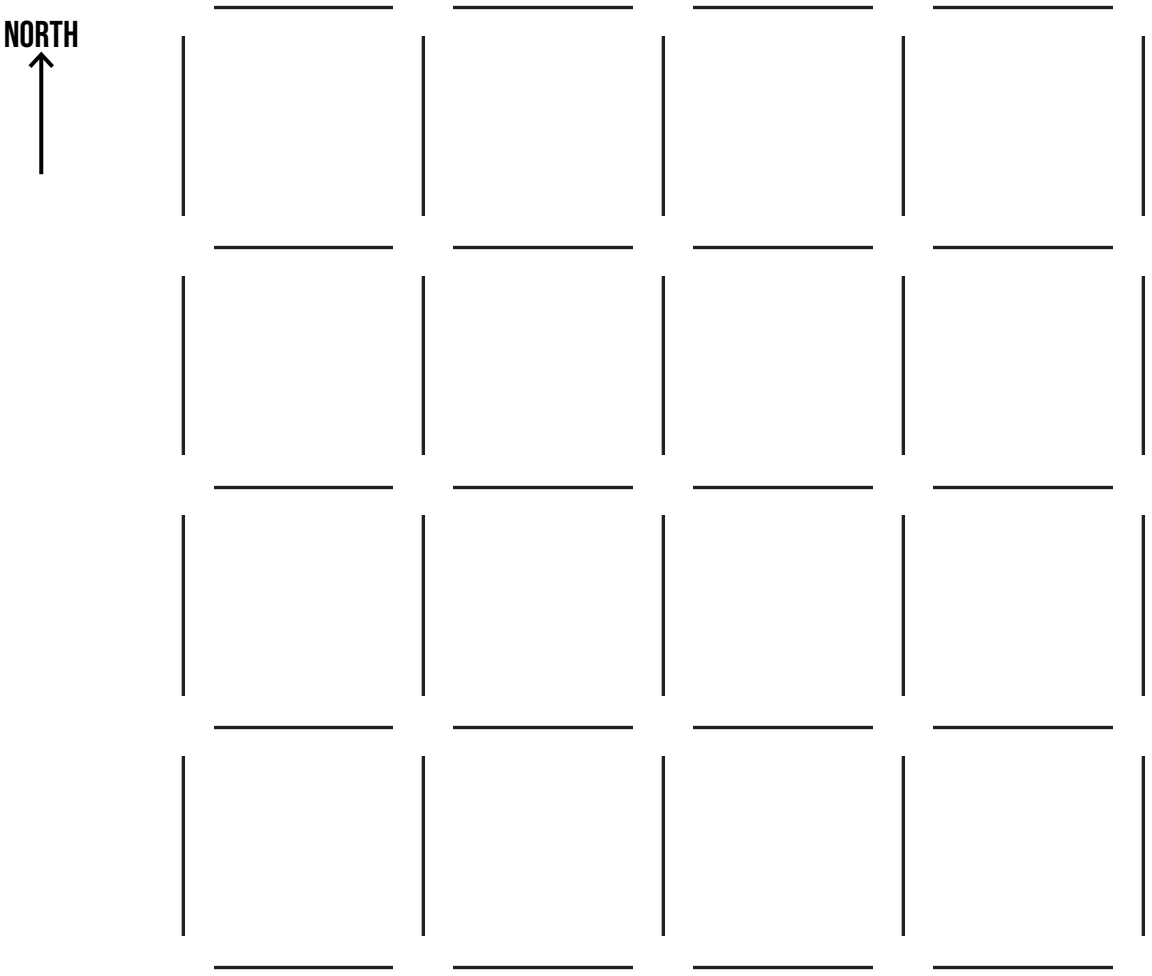
DATE	DRONE MODEL	LOCATION	FLIGHT TIME	NOTES

ANGLES REFERENCE



LESSON 1: AERIAL SURVEYING

1. Write the number of each manhole identified through Hopper's camera on the scaled diagram below. Each square below represents 5 square miles. (1 foot = 1 mile)



2. Draw an irregular polygon in your diagram above connecting all the manholes in numerical order. The engineers designing the flooding infrastructure need the area of land formed by this irregular polygon to determine how many materials to order.

   Deconstruct the irregular polygon into more familiar shapes such as rectangles, triangles, or trapezoids. Then, find the area of the irregular polygon.

   _____

LESSON 2: BRIDGE INSPECTION (1)

1. Write the number or color of each viewpoint of the bridge you inspected ***before*** the earthquake.

OVER	UNDER
_____	_____
_____	_____
_____	_____

2. Write the number or color of each viewpoint of the bridge you inspected ***after*** the earthquake.

OVER	UNDER
_____	_____
_____	_____
_____	_____

LESSON 2: BRIDGE INSPECTION (2)

1. Fill in the chart below with any changes you discovered while comparing the inspection before the earthquake to the inspection after the earthquake.

Bridge Viewpoint (over/under)	Before Earthquake	After Earthquake

2. At how many total points (landing pads) did you stop Hopper to inspect?

_____

3. How many total points (landing pads) changed during the inspection after the earthquake?

_____

4. As a fraction, write the number of changed points out of the total number of points inspected.

_____

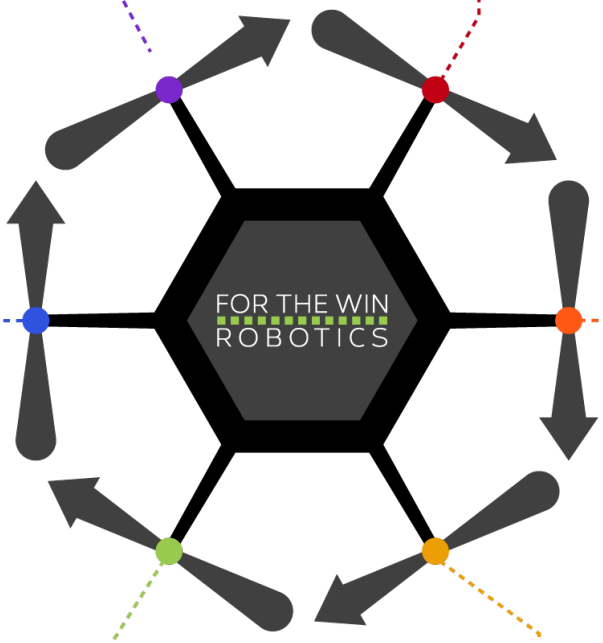
5. In a real-life scenario, what could the fraction found in exercise #4 represent?

_____

LESSON 3: 3D PRINTER DRONE

Use this page for any drawings, notes, or calculations during the 3D Printer Drone activity.

ENGINEERING DESIGN PROCESS



MODIFICATION
Refine & enhance your thinking. Scrap ideas, prototypes, & research that is not helpful. **Start process again.**

CHALLENGE
Understand the need or challenge & define what needs to be solved.

TEST/ANALYZE
Check prototype's performance with real users and go for broke. Identify all concerns.

RESEARCH
Gather information from all angles. Explore existing solutions & learn all you can about the challenge.

PROTOTYPE
Communicate your best idea with simulations & models (digital or physical) to show how it works.

IMAGINE
Capture all ideas quickly. Brainstorm, sketch, discuss, & get feedback before prototyping.

ENGINEERING DESIGN PROCESS NOTES

Challenge:

Research:

Imagine:

Prototype:

Test/Analyze:

Modification:

GLOSSARY

Function – a written block of code that can be used multiple times in the code

Inspection – an extensive examination of a structure to ensure safety, quality, and regulation compliance

Irregular Polygon – a 2-dimensional shape with straight sides, unequal side lengths, and unequal interior angle measurements

Loop – a command that directs the code it covers to repeat until certain conditions are met

Navigator – the person responsible for giving the RPIC (remote pilot in command) directions on where to fly

Remote Pilot in Command (RPIC) – the person flying the drone

Visual Observer (VO) – the person maintaining visual contact with the drone and in communication with the RPIC

MATH FORMULAS:

Area of a Rectangle Formula – area = length × width

Area of a Trapezoid Formula – area = $\frac{1}{2}$ × base × height

Area of a Triangle Formula – area = $\frac{\text{base}_1 + \text{base}_2}{2}$ × height

Distance Formula – distance = rate × time