

AVIATE, NAVIGATE, COMMUNICATE

LESSON OBJECTIVE:

- Learners will define the words “aviate”, “navigate”, and “communicate”.
- Learners will describe the importance of “aviate, navigate, and communicate” to safety in flight.
- Learners will explore mapping skills.
- Learners will apply mathematical ratios to determine flight time using distance traveled.

LESSON: Mankind has always been fascinated by the skies and flight. Throughout history, there are thousands of examples of our interest in taking to the skies. We quickly learned that the skies needed regulations to ensure the safety of budding aviators.

Today, students will perform 4 mapping tasks using the given **Flight Plan Cards**

MATERIALS LIST:

- **Student Map** (two per group)
- **Flight Plan Cards** (one per group)
- Four colored pencils (per group)
- Extra paper for calculations
- Metric Ruler (one per student)

INSTRUCTOR PREPARATION: This lesson consists of students exploring mapping skills through logging imaginary flight plans. **Flight Plan Cards** will guide the students through each flight plan. Optional: Cut and laminate **Flight Plan Cards**.

ACTIVITY DIRECTIONS:

1. Introduce lesson with accompanying Powerpoint Slides.
2. Divide the class into teams of 2-3 students.
3. Show the students the **Flight Plan Cards** they will be using for this activity.
4. Instruct the students to record their observations and results on their **Student Map**.

5TH GRADE CROSSWALK OKLAHOMA ACADEMIC STANDARDS AND OBJECTIVES

NUMBERS AND OPERATIONS (N)

5.N.1.2 DIVIDE MULTI-DIGIT NUMBERS BY ONE- AND TWO-DIGIT DIVISORS, USING EFFICIENT AND GENERALIZABLE PROCEDURES, BASED ON KNOWLEDGE OF PLACE VALUE, INCLUDING STANDARD ALGORITHMS

5.N.1.3 RECOGNIZE THAT QUOTIENTS CAN BE REPRESENTED IN A VARIETY OF WAYS, INCLUDING A WHOLE NUMBER WITH A REMAINDER, A FRACTION OR MIXED NUMBER, OR A DECIMAL AND CONSIDER THE CONTEXT IN WHICH A PROBLEM IS SITUATED TO SELECT AND INTERPRET THE MOST USEFUL FROM OF THE QUOTIENT FOR THE SOLUTION

5.N.1.4 SOLVE REAL-WORLD AND MATHEMATICAL PROBLEMS REQUIRING ADDITION, SUBTRACTION, MULTIPLICATION AND DIVISION OF MULTI-DIGIT WHOLE NUMBERS. USE VARIOUS STRATEGIES, INCLUDING THE INVERSE RELATIONSHIPS BETWEEN THE OPERATIONS, THE USE OF TECHNOLOGY AND THE CONTEXT OF THE PROBLEM TO ASSESS THE REASONABLENESS OF RESULTS

5.N.2.2 REPRESENT, READ AND WRITE DECIMALS USING PLACE VALUE TO DESCRIBE DECIMAL NUMBERS INCLUDING FRACTIONAL NUMBERS AS SMALL AS THOUSANDTHS AND WHOLE NUMBERS AS LARGE AS MILLIONS

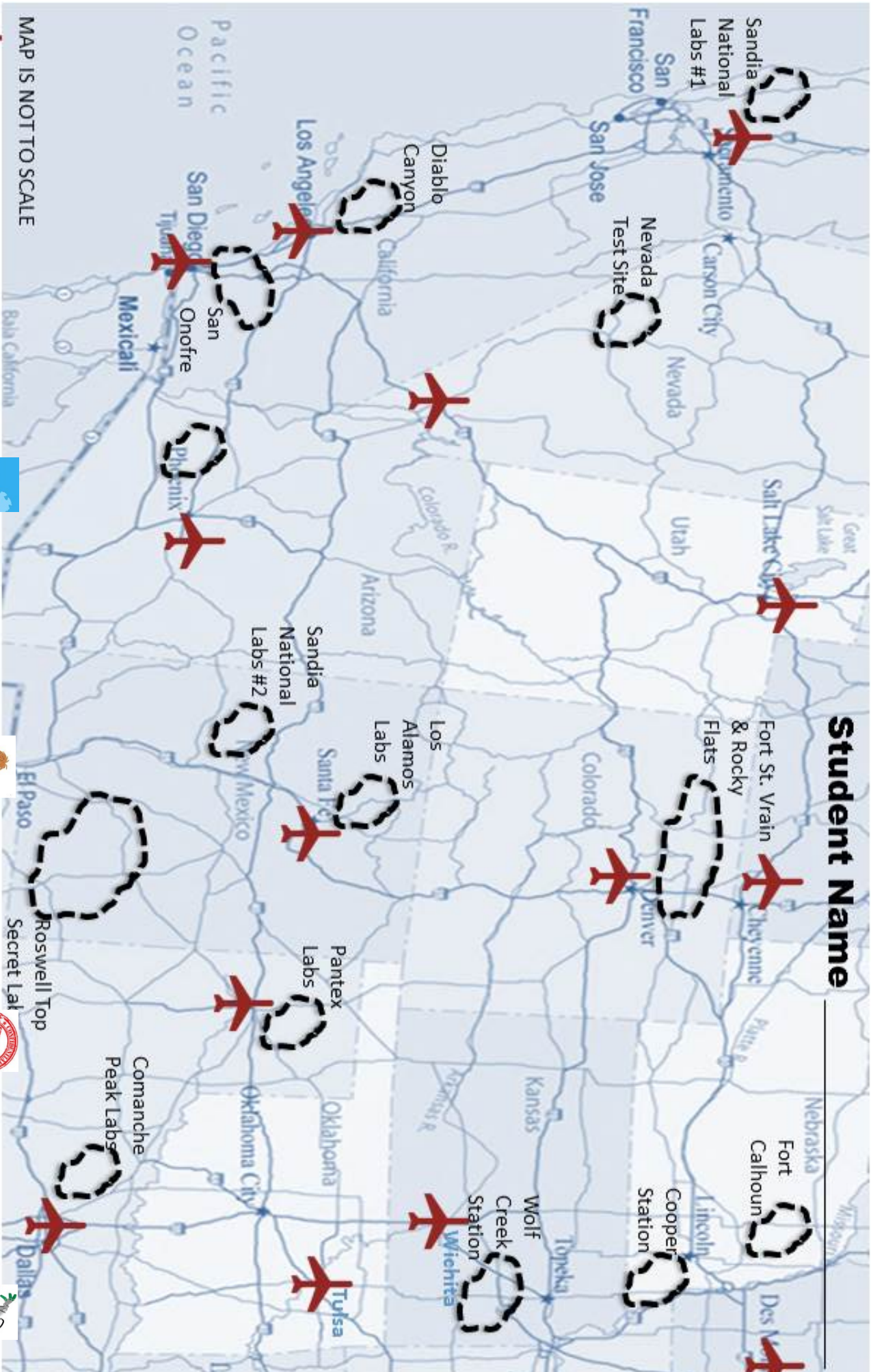
GEOMETRY AND MEASUREMENTS (GM)

5.GM.3.2 CHOOSE AN APPROPRIATE INSTRUMENT AND MEASURE THE LENGTH OF AN OBJECT TO THE NEAREST WHOLE CENTIMETERS OR 1/16" INCH

Science Process Standards:

1. Observe & Measure
2. Classify
3. Experimental Design
4. Interpret & Communicate
5. Inquiry

Student Name _____



MAP IS NOT TO SCALE



Airport



No Fly Zones

1 cm = 20 minutes

Flight Plan #1



Distance: _____ cm

Time: _____ hrs _____ min

Flight Plan #2



Distance: _____ cm

Time: _____ hrs _____ min

Flight Plan #3



Distance: _____ cm

Time: _____ hrs _____ min

Flight Plan #4

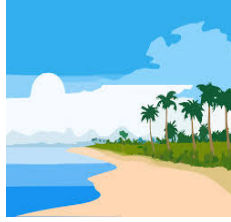


Distance: _____ cm

Time: _____ hrs _____ min

Flight Plan # 1

You live in Tulsa. It is winter and it has been snowing more than average. Your family would like to go visit the beach in San Diego. Your plane only holds enough fuel for a maximum 6 hour flight between refueling stops. Remember to avoid No-fly zones.



Map out your flight and indicate each of the stops you will need to make. Determine the total for flight time.

Flight Plan # 3

Los Alamos Labs does top secret research. They need you to fly information to government officials in major cities in the southwest United States. The first 4 stops should be Salt Lake City, Dallas, Sacramento, and Phoenix. Choose the shortest route to travel in order to visit all 4 cities after leaving Santa Fe.



Log your flight plan and draw it on your map. Record the total flight time.

Flight Plan # 2

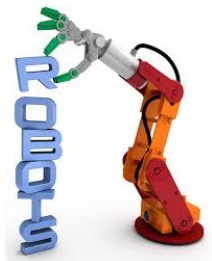


Taylor Swift is stranded in Dallas, TX. She has hired you to fly her luxury jet to various concerts in her recent tour. Her first stop is Denver. The next day she will need to be in Santa Fe. Two days later she has a concert scheduled in Sacramento. Her final stop is in Los Angeles.

Map out your flight plan and draw it on your map. Avoid No-fly zones. Determine your total flight time.

Flight Plan # 4

Los Angeles is hosting the annual national robotic competition. Your team from Wichita, KS has taken state. Determine the best flight plan. Remember, your plane only holds enough fuel for a maximum 6 hour flight between refueling stops. Find the quickest path to L.A.



Map out your flight plan. Determine the total flight time.

AVIATE, NAVIGATE, COMMUNICATE – RESOURCES

www.starbasedod.org

[HTTPS://FLIGHTAWARE.COM/](https://flightaware.com/) - TRACK LIVE FLIGHTS

[HTTP://WWW.PROP1.ORG/2000/NOFLYMAP.HTM](http://www.prop1.org/2000/noflymap.htm) - NO-FLY ZONE MAP

This site from NASA Ames Research Center gives students the opportunity to design a subsonic airplane on-line.

<http://quest.arc.nasa.gov/aero/background/tools/>

The Smithsonian Air and Space Museum has a web page devoted to “How Things Fly”, complete with lesson plans and reading list.

<http://howthingsfly.si.edu/>

Student Name _____



Airport

No Fly Zones

1 cm = 20 minutes

MAP IS NOT TO SCALE

Flight Plan 1



Distance: _____ cm

Time: _____ hrs _____ min

Flight Plan 2



Distance: _____ cm

Time: _____ hrs _____ min

Flight Plan 3



Distance: _____ cm

Time: _____ hrs _____ min

Flight Plan 4

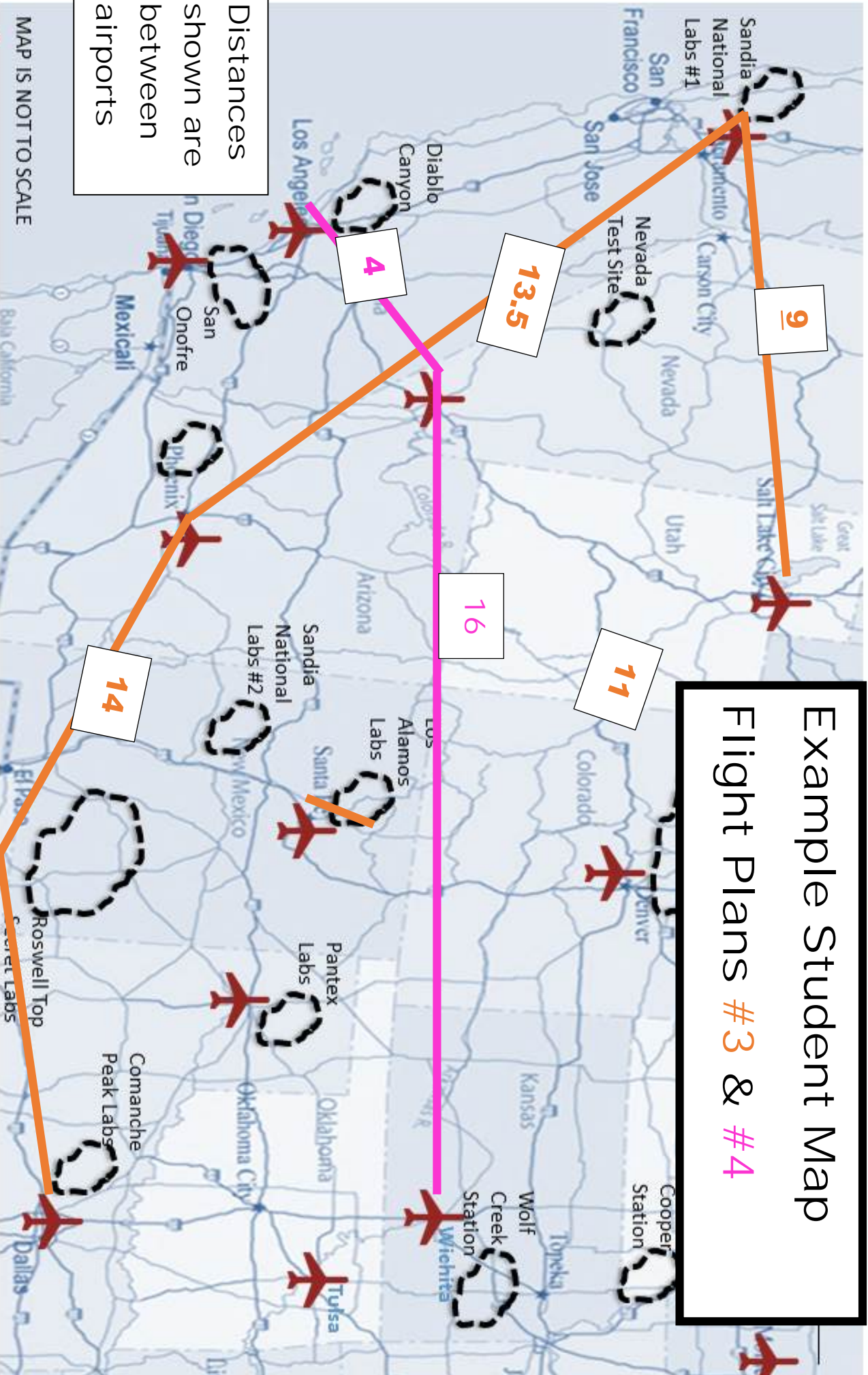


Distance: _____ cm

Time: _____ hrs _____ min

Example Student Map

Flight Plans #3 & #4



Distances shown are between airports

MAP IS NOT TO SCALE



Airport



No Fly Zones

1 cm = 20 minutes

Flight Plan # 1

Distance: _____ cm

Time: _____ hrs _____ min

Flight Plan # 2

Distance: _____ cm

Time: _____ hrs _____ min

Flight Plan # 3

Distance: _____ cm

Time: _____ hrs _____ min

Flight Plan # 4

Distance: _____ cm

Time: _____ hrs _____ min

Example Calculation Sheet*

Flight Plan #4:

$$16\text{cm} + 4\text{cm} = 20\text{cm}$$

6hrs 40min



- Student's flight paths and answers may vary.
- Plane holds enough fuel for a maximum of 6 hours of flight time.
- Plane can refuel at any airport shown on map. (6 hours flight time = 18 cm)
- Flight times given on Example Students Maps are between airports.



Flight Plan #1:

$$(7.5\text{cm} + 1.5\text{cm}) + 11.5\text{cm} = 20.5\text{cm}$$

$$9\text{cm} + 11.5\text{cm} = 20.5\text{cm}$$

$$20.5\text{cm} \times 20\text{min}/1\text{cm} = 410\text{ minutes}$$
$$6.833\text{hrs} = 6\text{hrs } 50\text{min}$$

Flight Plan #2:

$$12\text{cm} + 6\text{cm} + 16\text{cm} + 9\text{cm} = 43\text{cm}$$

14hrs 20min

Flight Plan #3:

$$11\text{cm} + 9\text{cm} + 13.5\text{cm} + 14\text{cm} = 47.5\text{cm}$$

15hrs 50min

