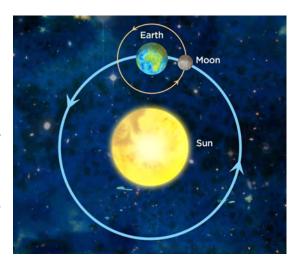# Satellites and CubeSats

What is a satellite? A **satellite** is an object that orbits, revloves, or flies around a larger object. The moon is a satellite because it flies around the Earth! And Earth is a satellite because it flies around the sun! But we can make satellites, too!

Companies and organizations like NASA make satellites to go to space and orbit around a lot of objects. They can do a lot of things like **take pictures**, let you **talk on the phone**, gather data to give your bus driver **directions** in the morning with Google Maps or let weather forecasters tell us the **weather**, and even let you listen to music on the **radio**! Here are some photos taken from space.

← This is a photo of **Bryant Denny Stadium** in Tuscaloosa, Alabama. This is where The University of Alabama's Crimson Tide plays football. (Google Maps)

This is a photo of **Disney World** in Orlando, Florida. If you look closely, you can see a "hidden mickey" that is only visible from an airplane or space! This is a solar farm that creates energy for Disney World and is on the left side of the image. (Google Maps) →

So what is a CubeSat? A **CubeSat** is a very small satellite. A single-unit CubeSat is only **10x10x10 centimeters**. However, many of these "units" can be **put together** to make one larger CubeSat. Common United States standard configurations range from one unit (or "1U") to a **54U**! On the "project worksheet" is a layout that, when cut and glued, will make the exact size of a 1U CubeSat. Many can be cut and glued together to build larger CubeSat sizes! **Suggestion:** Glue all of your students' units together to make a Class CubeSat! It is not recommended that they are colored if you do this, as they will not all show.
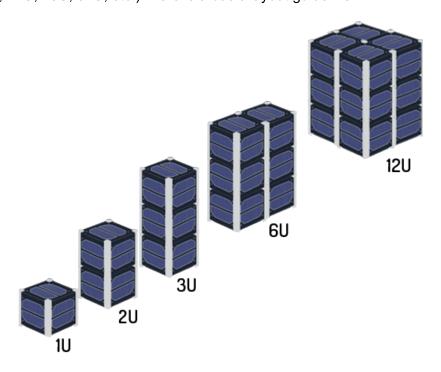
Building a 1U Paper CubeSat

Supplies needed for each student:
- Project worksheet (printed on 2 pages)
- Scissors
- Glue stick or tape
- Crayons or colored pencils (if desired)

Steps:
1. Hand out the worksheets (both pages) to each student. Explain to the students what a satellite and a CubeSat are (see first page) and that, after construction, these two pages will be the exact size of a single-unit CubeSat.
2. If desired, let the students use crayons or colored pencils to color their CubeSats. Make sure that they put their name somewhere on the outside because once they are glued together, the inside will not be visible.
3. Instruct the students to cut along the dotted lines. **Do not let them cut the solid lines!**
4. Tell the students to fold along the solid lines so that they make a crease, and then unfold them.
5. Next, tell the students to glue or tape the "1" flap to the **back side** of the "1" spot. Glue or tape should **only** be applied to the flap part, not the back side of the paper.
6. Instruct them to do this for the rest of the flaps in the order which they are numbered (1-8).
7. If desired, these cubes can be glued or taped together to make larger CubeSats (i.e. 2U, 3U, 6U, 12U, 18U, 54U, etc.). Here is a basic layout guideline:
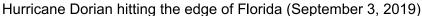
Satellites and Weather

SCI.K.10.1, K.10.4

We mentioned earlier that satellites can take photos. One of the things that satellites take photos of is the weather. Through photos and other data which the satellite collects and sends to ground stations on Earth, we are able to get an accurate weather **forecast**. While this is important every day, it can be critical in times of **severe weather**. This includes hurricanes, tornadoes, storms, volcano eruptions, dust storms, fires, tsunamis, and more!

> **Forecast:**
> Predict or estimate a future event or trend, such as weather

> **Severe Weather:**
> When the environment has the capability to cause a lot of damage.

Throughout history, many severe weather events have had photos taken by satellites. Here are a few examples of the event as seen from space. Explore more at https://worldview.earthdata.nasa.gov/.

Hurricane Dorian hitting the edge of Florida (September 3, 2019)

Bush Fires on the East Coast of Australia (September 14, 2019)
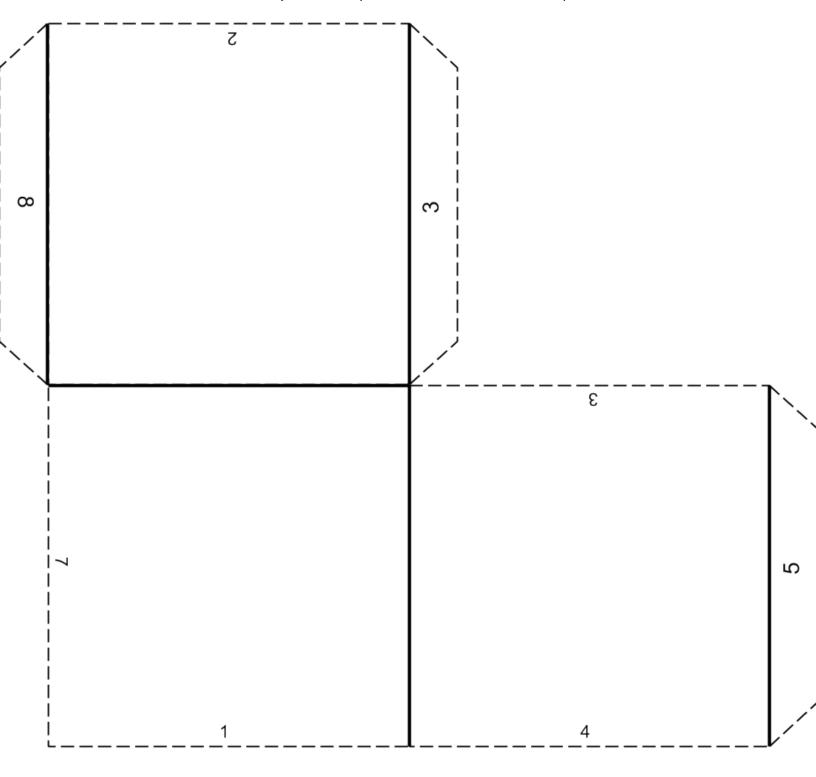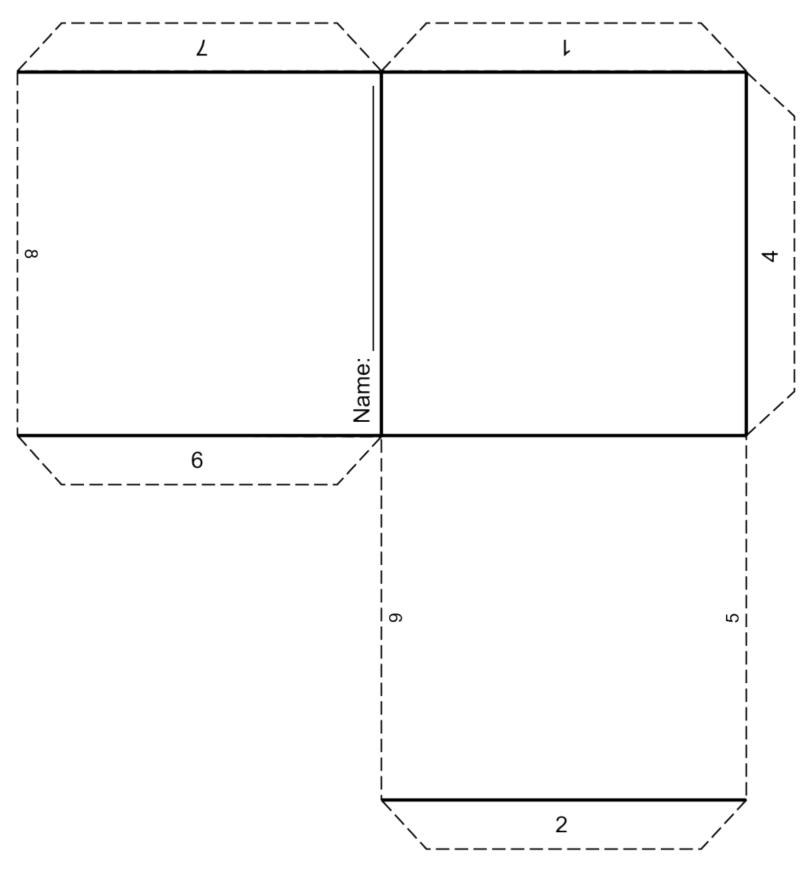
Sinabung Volcano Eruption in Indonesia (February 19, 2018)

Building a 1U Paper CubeSat with UASpace

8

2

3

7

3

1

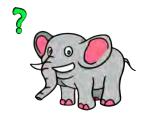5

4

7

1

8

4

Name:

6

9

5

2

Name: _____

Teacher: _____

Date: _____

Counting and CubeSats

Big Al™ is building a CubeSat but has forgotten how many units he put in each of his satellites! Will you count how many units are in each of his satellites? (M. K.1.4, K.3.1, K.3.3, K.3.8, K.4.3, K.4c.2)

1.

__1__ unit

2.

_____ units

3.

_____ units

4.

_____ units

5.

_____ units

6.

_____ units

7.

_____ units

8.

_____ units

9.

_____ units

UASPACE

Big AI™ needs help again! **Circle** which one of his CubeSats is **larger!** (M. K.4c.1, K.5.1, K.6.1, K.6.3, K.7.1, K.8.3, K.8.4, K.8.5, K.9.1, K.9.2, K.9.3, K.9.4)

1.

⊠   or   ⊠⊠⊠

How many units are in this CubeSat?   How many units are in this CubeSat?

_____ unit   _____ units

How many units are in these CubeSats all together?   _____ units

Draw what the CubeSat would look like if you combined all of the units together:

2.

⊠⊠⊠
⊠⊠⊠   or   ⊠⊠
                              ⊠⊠

How many units are in this CubeSat?   How many units are in this CubeSat?

_____ unit   _____ units

How many units are in these CubeSats all together?   _____ units

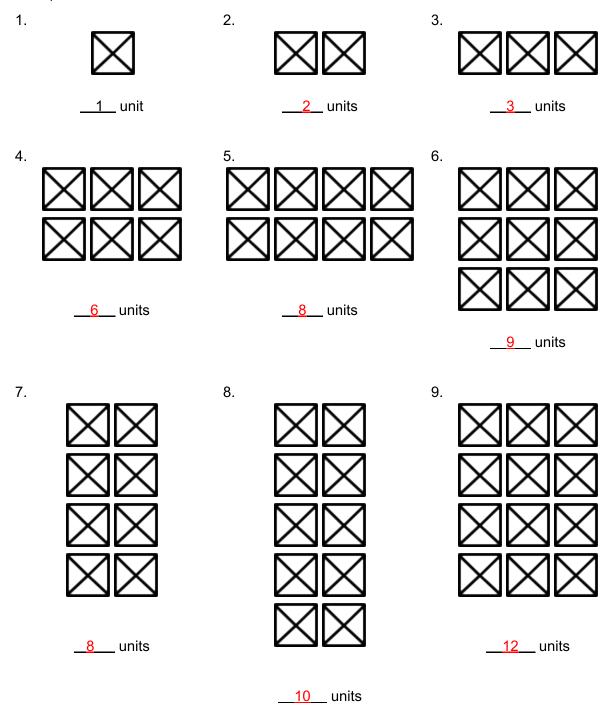Draw what the CubeSat would look like if you put combined of the units together:

UASPACE

KEY: Counting and CubeSats

Big Al is building a CubeSat but has forgotten how many units he put in each of his satellites! Will you count how many units are in each of his satellites? (M. K.1.4, K.3.1, K.3.3, K.3.8, K.4.3, K.4c.2)

1.

___1___ unit

2.

___2___ units

3.

___3___ units

4.

___6___ units

5.

___8___ units

6.

___9___ units

7.

___8___ units

8.

___10___ units

9.

___12___ units

Big Al needs help again! **Circle** which one of his CubeSats is **larger**! (K.4c.1, K.5.1, K.6.1, K.6.3, K.7.1, K.8.3, K.8.4, K.8.5, K.9.1, K.9.2, K.9.3, K.9.4)

1.

or

How many units are in this CubeSat?   How many units are in this CubeSat?

___1___ unit   ___3___ units

How many units are in these CubeSats all together?   ___4___ units

Draw what the CubeSat would look like if you combined all of the units together:

        or

2.

or

How many units are in this CubeSat?   How many units are in this CubeSat?

___6___ unit   ___4___ units

How many units are in these CubeSats all together?   ___10___ units

Draw what the CubeSat would look like if you put combined of the units together: