SANDIA PEAK AERIAL TRAMWAY

A TEACHER'S GUIDE FOR FIELD TRIPS TO THE TRAM

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Contents:

THE SANDIA PEAK AERIAL TRAMWAY

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OVERVIEW AND HISTORY OF THE SANDIA PEAK TRAM

The concept of the Tram was developed in the early 1960s by Robert Nordhaus and Ben Abruzzo, who were the original pioneers. The Tram has taken more than 13 million passengers to the top of Sandia Peak and back again. The 50th Anniversary of the Tram was celebrated in May 2016.

OPENING DAY : MAY 1966

50TH CELEBRATION: MAY 2016

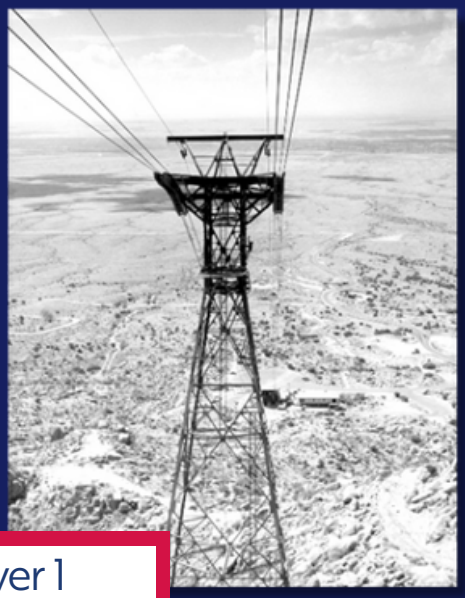
HISTORY

The Tram took two years to move from concept to construction project. Installing the Tram posed considerable problems because of the steep, rocky terrain. Bell Engineering of Lucerne, Switzerland, was contracted for the difficult project.

Tower one, located at an elevation of 7,010 feet, is 232 feet tall. Tower one leans at an 18 degree angle to evenly support the cables between the lower terminal and tower two.

Tower two is located at a breathtaking 8,750 feet, is 80 feet tall.

Holes were drilled and steel rods were anchored in the granite (many over 30 feet deep) to secure each of the footings for the towers and terminals of the Tram. Keeping the towers in alignment was of major concern and importance.



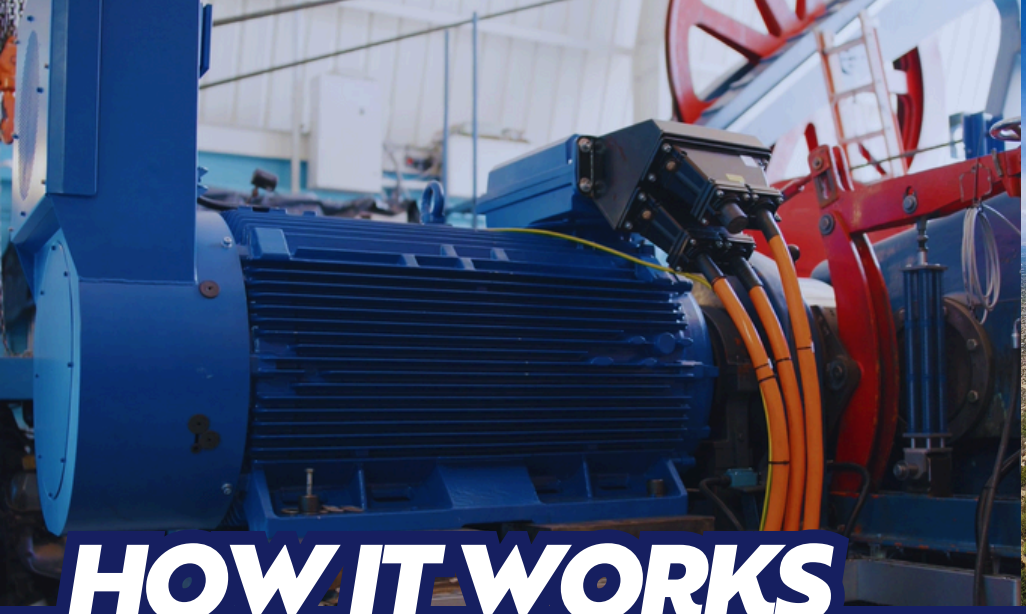
Tower 1

Tower 2

VIEWS & TERRAIN

Although the Tram is an engineering marvel, visitors come mainly for the spectacular view, 11,000 square miles of the Land of Enchantment. Passengers ascend 4,000 feet in about 15 minutes, gliding along the western face of the rugged Sandia Mountains. The granite rock faces, eroded into spires, cliffs, and pinnacles; the aspens, hardy pines, scrub oak, fir, and spruce are home to many different birds and other animals.

West across the Rio Grande and a volcano field, Mount Taylor rises more than 100 miles away. To the north is Cabezon, a stump of an eroded volcano, along with other volcanic necks and plugs. To the north and west, Redondo Peak stands tall in the Jemez Mountains, rising from a caldera known as the Valle Grandea volcanic crater reported to be the largest in the world. To the east lies the heavily wooded backside of the Sandias and, on the far horizon, the Sangre de Cristo Mountains. Farther to the south, the Estancia Valley and the Manzano Mountains frame the view.



HOW IT WORKS

The Sandia Peak Tram is 2.7 miles in diagonal length and is a bi-cable double reversible jigback aerial passenger tramway. Both tramcars are attatched to the hauling cables and the weight of the downhill tramcar helps to pull the uphill tramcar to the top. When the tramcars pass at midway, they are almost 1,000 feet above ground. Top speed of the tramway is 24 feet per second, averaging 12 mph. The main drive is a 600 horse power AC motor. In case of a power failure, the tramcars can be returned to the terminals with an auxilary Ford industrial engine.

Each of the four 100,000-pound track cables is stronger than required to support one car, and, as an added safety precaution, each car travels over two such cables. The tramcars were designed with track cable brakes. These brakes would close automatically and hold the car firmly in place in the event of an emergency or haul cable failure.

The brakes on the main drive are electronically and hydraulically opened before the tramcars can move. If the power should fail, the brakes are applied automatically, stopping the moving cables and tramcars.
Each tramcar is capable of carrying 48 passengers or 10,000 pounds up the mountain at a maximum rate of 200 passengers per hour. On average, the tram makes 10,500 trips per year.

PLANNING FOR A VISIT

WHEN PLANNING YOUR VISIT TO THE TRAM, THERE ARE A FEW IMPORTANT THINGS TO CONSIDER:

When to Arrive at the Tram

Approximately 15 minutes before your scheduled arrival time. Please estimate 15-30 minutes after arrival before boarding.

What Time Will You Need to Be Back to the School?

A typical school field trip can take anywhere from 45 minutes to two hours (not including drive time to the tram). This is dependent on the number of students, chaperones, and other guests riding the Tram at the same time.

Determine Estimated Cost

Using the rates below, determine what the cost of your trip will be and whether it will require approval from your school, district, etc.

Method of Payment

Determine how you will pay for the trip (purchase order, school check, credit card, or cash). One method of payment for all guests is required at the time of service.

How Will Lunch Be Offered?

Sandia Peak Tramway allows sack lunches to be brought and eaten on the outdoor patio at the lower terminal or on the observation deck at the upper terminal.

***If you plan to bring lunch up the mountain, let our group coordinator know and be sure all food and drinks are in a sealed container**

Students	$10
Adults	$15

*All rates include tax and are subject to change

How Many Chaperones Will Need to Attend?

- Elementary School: Optionally, 1 chaperone for every 7 students
- Middle School: Optionally, 1 chaperone for every 10 students
- High School: Optionally, 1 chaperone for every 15 students

What Curriculum Will You Be Covering That Ties to the Tram?

- ☐ *History*
- ☐ *Life Zones*
- ☐ *Science*
- ☐ *Engineering*
- ☐ *Environmental*

WHAT-TO EXPECT

UPON ARRIVAL

- Depending on the day/time of the year, the Tram can be busy with other passengers. For safety of the students and others, be sure to keep all in sight and near chaperones at all times. The wait between arriving at the Tram and boarding the Tramcar can range between 15-45 minutes depending on the size of your group.
- When you arrive, one chaperone from the group can go to the Tram ticket counter to check in, make the payment and retrieve boarding passes. it is important that this chaperone knows the method of payment and the final headcount of all in attendance.

UP AND ON THE MOUNTAIN

- The Tram ride is about 15 minutes from the bottom to the top. Once you reach the top, you can hike, picnic, take pictures and visit the Four Seasons Visitors Center. If any students become inquisitive, we have staff available and ready to help!
- The weather at the top of the mountain can be anywhere between 15-30 degrees cooler than in the city of Albuquerque. It is always recommended to wear closed-toed shoes and bring or wear, long sleeves or a jacket.

*Other important items to consider, especially if you plan to hike: water, snacks, sunscreen, hats.
If they have an assignment to complete, they will need to bring a pen or pencil.

RETURNING BACK DOWN THE MOUNTAIN

- As your group decides to head back down, the Trams are loaded on a first come, first serve basis. They are no longer assigned by flights, like they were on your ride up
- The ride back down to the bottom is 15 minutes.

PRE-VISIT STUDENT INFORMATIVE HANDOUTS

1. Tram Statistics

2. Life on the Sandia Mountains

3. Rio Grande Rift

4. Four Ecological Life Zones

5. Evergreen Chart

6. Trip to Sandia Peak- Fill in the Blanks

7. Scavenger Hunt

TRAM STATISTICS

Track Ropes	40mm or 1 5/8 Inches in diameter 52 tons or 47,174 kg. each
Haul Rope	32 mm or 1 1/4 inches in diameter
Main Power Unit	600 HP AC Motor
Auxiliary Drive	429 cubic inch Ford industrial engine
Total Horizontal Length	2.7 miles or 4.5 km
Total Vertical Rise	3,819 feet or 2,137 meters
Elevation of Lower Terminal	6,559 feet or
Elevation of Tower One	7,010 feet or 2,137 meters
Height of Tower One	232 feet or 70.7 meters
Elevation of Tower Two	8,750 feet or 2,667 meters
Height of Tower Two	80 feet or 24.4 meters
Elevation of Upper Terminal	10,378 feet or 3,163 meters
Tramcar capacity (two cars)	10,000 lbs or 4,536 kg. (48 passengers)
Average # of Passengers Per Year	250,000
Water Tank Capacity	800 gal. or 3028 liters
Cable Span from Tower Two and the Top	1 1/2 miles or 7,720 feet or 2,414

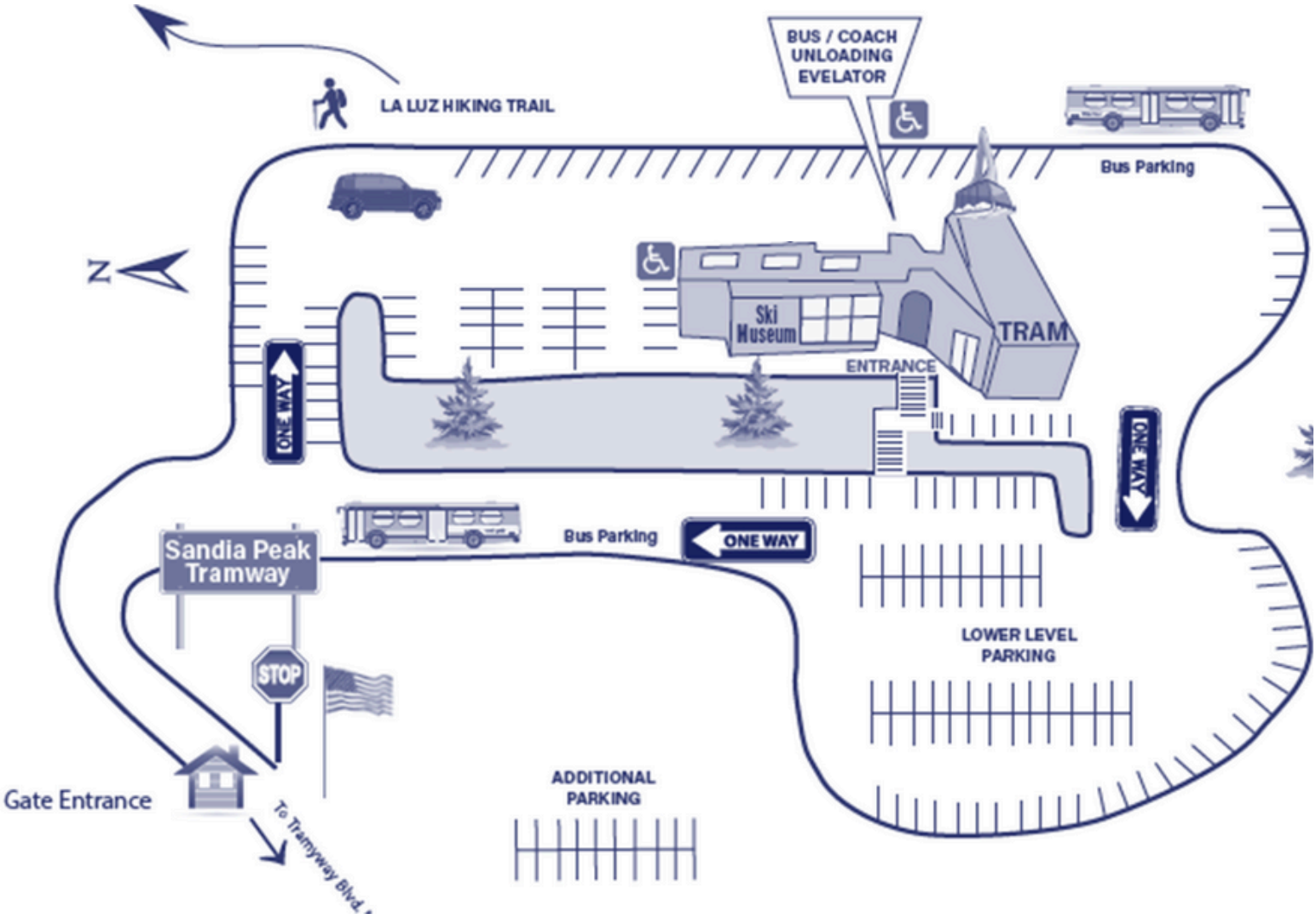
BOOKING YOUR VISIT

NEXT STEPS

1. Once you are ready to book your trip, please complete the form at: sandiapeak.com/educational.
2. Confirm the day and time you are planning to visit, and how many students and chaperones will be attending.
3. Choose your method of payment (purchase order, credit card, school check, or cash).
4. Provide the name and phone number of the lead chaperone who can be contacted in case of any changes.

AMENITIES

- Accessible parking and an elevator are available on the Upper Parking level.
- Tram tickets are available on the second floor. Tram cars depart every 20 to 30 minutes. The ride is about 15 minutes each way.
- The Sandia Tram Gift Shop, located on the second floor, is open daily.


LA LUZ HIKING TRAIL
BUS / COACH
UNLOADING
EVELATOR
Bus Parking
N
Ski
Museum
TRAM
ENTRANCE
ONE WAY
ONE WAY
Sandia Peak
Tramway
Bus Parking
ONE WAY
LOWER LEVEL
PARKING
STOP
Gate Entrance
To Tramyway Blvd.
ADDITIONAL
PARKING

SANDIA PEAK TRAM AND CIBOLA NATIONAL FOREST

PLANTS

The Sandias are filled with an abundance of plant life with over 890 species. Variations of temperature, percipitation, slope, soils, elevation, fire and the impact of humans have combined to form many plant environments that vary with the elevation. Plants include trees, shrubs, cactus, grasses, ferns, mosses and many wild flowers.

ANIMALS

The Sandias provide a home for mule deer, mountain lions, foxes, raccoons, squirrels, chipmunks, black bears, rabbits, skunks, and many other animals. There are about 2500 mule deer on the mountain and they are the most frequently seen animal.

BIRDS

The Sandias host over 200 species of bird including golden eagles, numerous hawks, turkey vultures, falcons, ravens, woodpeckers, jays, flickers, wrens and many kinds of songbirds. Spring and Fall are prime bird-viewing times as birds use the thermals generated by steep mountain cliffs to migrate along the mountain ridge

REPTILES AND AMPHIBIANS

The Sandias are home to 33 species of reptiles, six species of amphibians, 14 species of lizards and 18 species of snakes. Some of the more common ones are bull snakes, rattlesnakes, garter snakes, horned toads and blue-tailed lizards.

FOSSILS

Fossils are abundant in the limestone rocks that cover the top of the mountain. Fossils tell a story about the geologic history of the Sandia Mountains. In the limestone rocks, 300 million years old, fossils of horn corals, crinoids, and brachiopods tell of a time when the area was covered by a shallow sea. These rocks were formed at the bottom of the ocean. The hard parts of these ancient animals settled to the bottom of the sea and became a part of the limey muds covering the ocean floor. Eventually, the sea disappeared. About five million years ago, the Sandia Mountains began to rise. Today, these ancient sea beds are exposed again on top of the mountain.

SANDIA MOUNTAIN AND RIO GRANDE RIFT

The Sandia Mountains are a large block of Earth's crust that has been uplifted and tilted on edge. The eastern side of the mountain block shapes gently into the plains. The western side drops off abruptly to the Rio Grande Rift. The highest point along the crest of the Sandia stands 10,678 feet above sea level and a mile above Albuqerque.

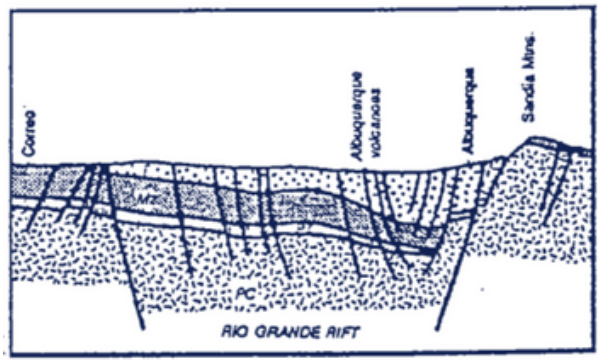
The Sandia Mountains are composed of ancient granite, 1.4 billion years old. A thin veneer of limestone only 300 million years old, caps the granite and forms the gentle eastern slope. The limestone contains abundant fossils that indicate that is was deposited in a shallow sea.

The Rio Grande Rift is a great fracture in the earth's surface which extends from Leadville, Colorado to Las Cruces. The rift was formed when a large block of the Earth's crust subsided forming a low spot bounded by mountains on either side. This provides a trough for rivers to flow, such as the Rio Grande.

Albuquerque lies in the central part of the Rio Grande Rift. The same marine limestones that cap the Sandias are 15,000 feet below sea level in the Albuquerque area. That translates to almost 5 miles of movement, making the Rio Grande Rift one of the greatest troughs on Earth. Erosion of the Sandias has slowly filled the rift valley with thousands of feet of porous sediment and with time, this sediment has soaked up rain and river water to become a huge underground reservoir.

The Mountain:

The Sandia granite was formed from magma deep beneath the Earth's crust, it slowly cooled and solidified 1.4 billion years ago. It is composed of mica, feldspar, and quartz. These combine to make the mountains appear pink at sunset. About 300 million years ago, most of New Mexico was covered by shallow-ocean. Limey deposits settled and hardened over time to become the well-layered, fossil-bearing limestone that caps the Sandias.



SANDIA PEAK TRAM AND CIBOLA NATIONAL FOREST

WHILE RIDING THE TRAM, YOU WILL PASS THROUGH FOUR ECOLOGICAL LIFE ZONES:

1

UPPER SONORAN ZONE

The base of the Tram is in the desert foothills. You will see chamisa, pinon-juniper, apache plum. The elevation is 6,500 feet above sea level.

2

TRANSITION ZONE

This begins at Tower One. Where you will begin to see a lot of ponderosa pine and the elevation is 7,010 feet above sea level.

3

CANADIAN ZONE

This begins at Tower Two. You will begin to see aspen, scrub oak, and mixed conifer. The elevation here is 8,750 feet above sea level.

4

HUDSONIAN ZONE

This is at the top of the Sandia Peak Mountains. Here you will see douglas fir, aspen, limber pine, Engelmann Spruce. The elevation here is 10,378 feet above sea level.

Identification Chart for Evergreens

Pines

needles in bundles with thin "sheath" holding needles together

cone scales thick

cones woody

PINUS
KEY A

Spruces

needles single sharp stiff square

twigs rough after needles fall off

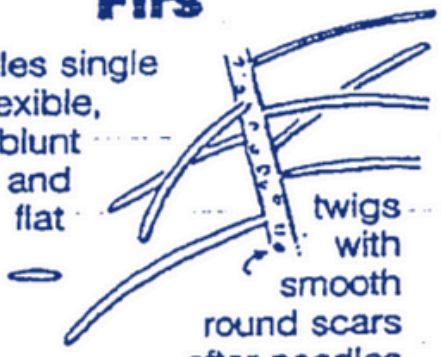
cone-scales thin, papery

cones always hang down

PICEA
KEY B

Firs

needles single flexible, blunt and flat



twigs with smooth round scars after needles fall off

central axis of cone stays after scales drop off

cones always erect

ABIES
KEY C

Douglas-fir

needles single flat and narrowed at base

identifying feature: the 3-pointed bract on cone

PSEUDOTSUGA
KEY C

SANDIA PEAK TRAM: WORKSHEET

1. What is the temperature at the lower terminal of the Tramway at 6,559 feet? _____

2. What is the temperature at the upper terminal at 10,378 feet? _____

3. When was the Tram completed? _____. How much did it cost to build? _____

4. Does the atmospheric pressure increase or decrease as you ascend the mountain? _____

5. How many life zones do you experience when riding the Tram? _____

6. Which of the four life zones is most similar to the life zone of your backyard? _____

7. Would you expect to find spruce trees above the Timber line? _____

8. Rio Grande Rift stretches from _____ to _____.

9. Name three animals living in the Biome of the Sandia Peak Mountains.
_____, _____, _____

10. Name three plants living in the Sandia Peak Biome.
_____, _____, _____

11. Why are marine fossils common on the Sandia Peak Mountains? _____

12. How old are the fossils in the limestone rocks? _____

13. The Sandia Mountains turn _____ at sunset.

14. What does "Sandia" mean in Spanish? _____

15. The lower terminal of the tram is at 6,559 feet, the upper terminal of the tram is at 10,378 feet. What is the vertical climb? _____

16. Coronado and Winrock malls are said to be exactly one mile high above sea level. About how many feet is that? _____

17. What is the direction of the flow of the Rio Grande River? _____

18. At what elevation did you first see aspen trees? _____

19. How many square miles of panoramic views from the top of the mountain? _____

20. What was your favorite part about coming to the Sandia Peak Tramway?

_____

NATURE SCAVENGER HUNT

☐ 

COLORED LEAVES

☐ 

PINE TREES

☐ 

RABBIT

☐ 

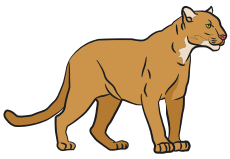
WILD FLOWERS

☐ 

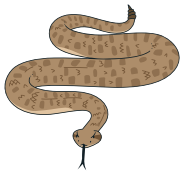
DEER

☐ 

BUTTERFLY

☐ 

MOUNTAIN LION

☐ 

SNAKE

☐ 

BEAR

☐ 

PINECONE

☐ 

GREEN MOSS

☐ 

CACTUS

How many boxes did you check? _____

What did you not find? _____

ADDITIONAL NOTES

ANSWER SHEET

1. What is the temperature at the lower terminal of the Tramway at 6,559 feet? Dependent on day

2. What is the temperature at the upper terminal at 10,378 feet? Dependent on day

3. When was the Tram completed? May 1966. How much did it cost to build? 2 Million Dollars

4. Does the atmospheric pressure increase or decrease as you ascend the mountain? Decreases

5. How many life zones do you experience when riding the Tram? Four life zones.

6. Which of the four life zones is most similar to the life zone of your backyard? Dependent in person

7. Would you expect to find spruce trees above the Timber line? Yes.

8. Rio Grande Rift stretches from Leadville to Las Cruces.

9. Name three animals living in the Biome of the Sandia Peak Mountains.
Mule deer, mountain lions, foxes, raccoons, squirrels, chipmunks, black bears, rabbits, skunks.

10. Name three plants living in the Sandia Peak Biome.
Trees, shrubs, cactus, grasses, ferns, mosses and many wild flowers.

11. Why are marine fossils common on the Sandia Peak Mountains? The Sandia Mountains were once the ocean bed.

12. How old are the fossils in the limestone rocks? 300 Million Years Old

13. The Sandia Mountains turn Pink at sunset.

14. What does Sandia mean in Spanish? Watermelon.

15. The lower terminal of the tram is at 6,559 feet, the upper terminal of the tram is at 10,378 feet. What is the vertical climb? 3,819 feet

16. Coronado and Winrock malls are said to be exactly one mile high above sea level. About how many feet is that? Average of 6,000 feet; 5,280 feet exactly.

17. What is the direction of the flow of the Rio Grande River? North to South.

18. At what elevation did you first see aspen trees? 8,750 feet

19. How many square miles of panoramic views from the top of the mountain? 11,000 miles

20. What was your favorite part about coming to the Sandia Peak Tramway?