

Scientific Balloons?

Altitude

Apex

FLOAT

stratosphere

Antarctica

Troposphere

?

Ascend



Helium

?

Launch

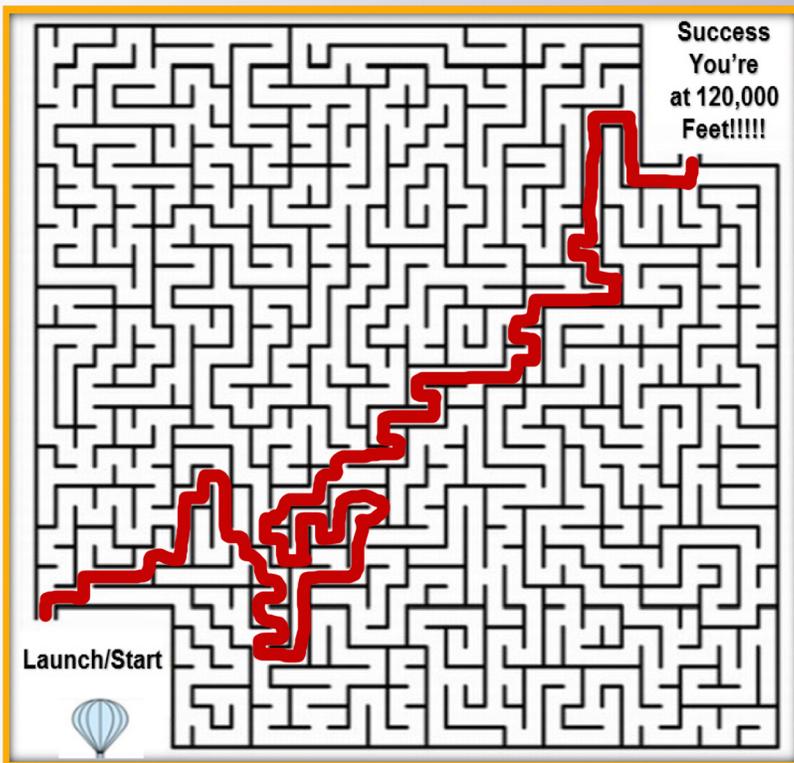
Polyethylene

Base

Gore

DID YOU KNOW?

- BALLOON MISSIONS CAN VARY FROM FEW HOURS TO SEVERAL WEEKS.
- THE MATERIAL IN ONE BALLOON CAN COVER MORE THAN 20 ACRES OF LAND; THAT IS ABOUT 16 FOOTBALL FIELDS.
- A BALLOON CAN HAVE OVER 200 GORES, EACH GORE IS SHAPED LIKE A BANANA PEEL WITH LENGTH OF 500 FEET (150 METERS) AND MAXIMUM WIDTH AT THE CENTER OF APPROXIMATELY 100 INCHES (2.5 METERS). THE GORES ARE HEAT SEALED TOGETHER ON A SPECIAL LONG TABLE. THE TOTAL LENGTH OF SEALS IN ONE BALLOON IS OVER 20 MILES (32 KM).

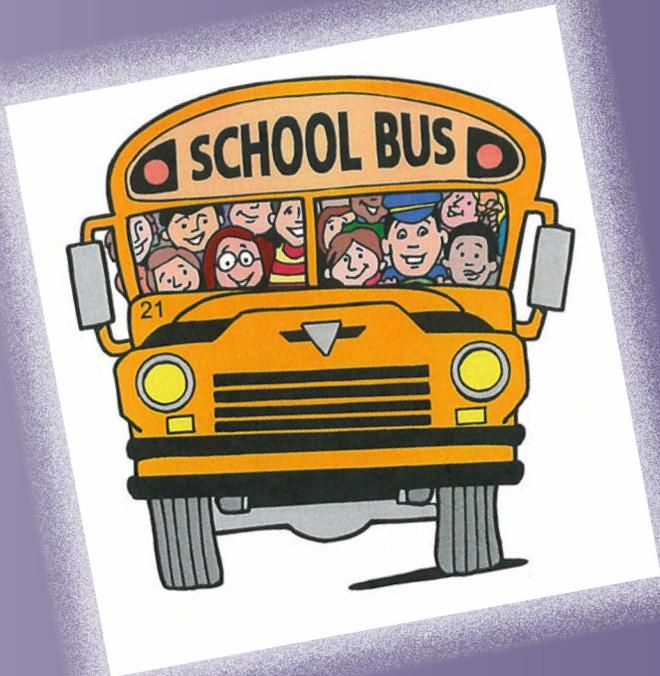


HELP THE BALLOON GET TO FLOAT!

MATH CHALLENGE!!!

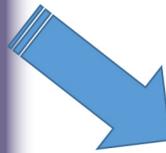
FILL IN THE MISSING NUMBERS
 USE THE NUMBERS 1 THROUGH 16 ONLY
 EACH NUMBER IS ONLY USED ONCE
 EACH ROW IS AN EQUATION
 EACH COLUMN IS AN EQUATION
 HINT: MULTIPLICATION AND DIVISION
 ARE PERFORMED BEFORE ADDITION AND
 SUBTRACTION

3	x	11	-	1	+	14	46
+		x		-		x	
2	x	8	+	9	+	13	38
x		+		x		+	
16	x	10	+	15	-	12	163
-		+		+		-	
6	+	7	x	4	+	5	39
29		105		-130		189	

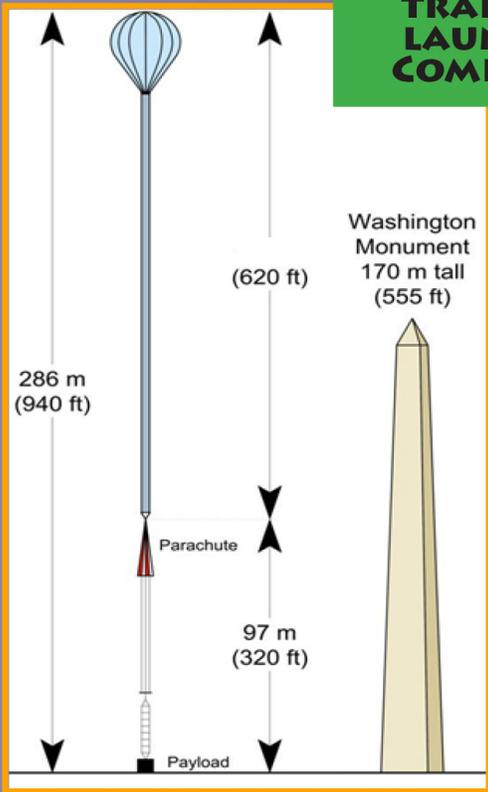


THE VOLUME OF ONE OF THE NASA STANDARD BALLOONS IS 39 MILLION CUBIC FEET; THE VOLUME OF A SCHOOL BUS IS APPROXIMATELY 2000 CUBIC FEET. HOW MANY SCHOOL BUSES CAN YOU FIT IN A BALLOON? (ROUND YOUR ANSWER) **1,300 BUSES**

WHAT ARE THE DIFFERENT COMPONENTS (FLIGHT TRAIN) OF A BALLOON SYSTEM?



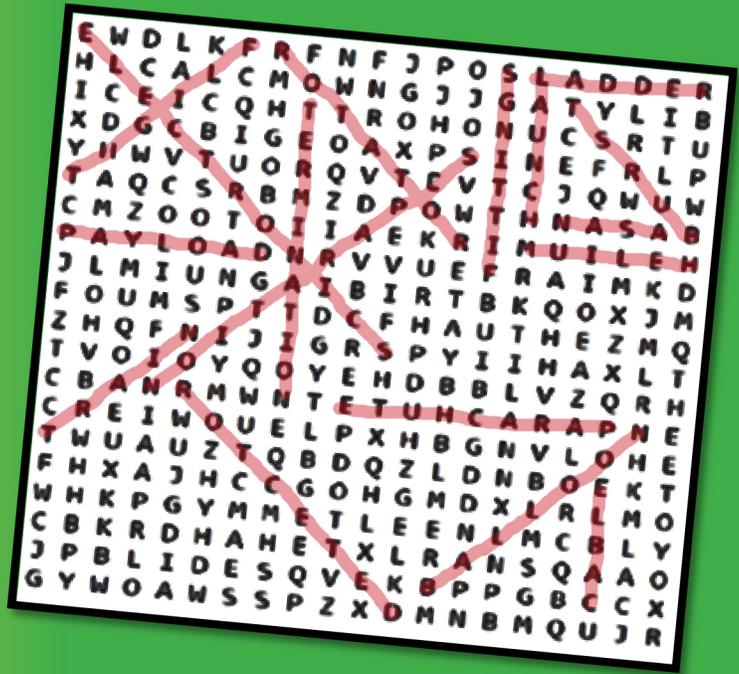
HOW TALL IS THE FLIGHT TRAIN AT LAUNCH? COMPARE!



- Flight Termination Fitting & Burst Detector
- Parachute
- Termination Electronics & Chute Separation Fitting
- Cable Ladder
- Launch Fitting & Rotator
- Payload

Balloon Flight Train!

BALLOON
BURST DETECTOR
CABLE LADDER
CHUTE SEPARATION
ELECTRONICS
FITTINGS
LAUNCH
FLIGHT TRAIN
HELIUM
NASA
PARACHUTE
PAYLOAD
TERMINATION
ROTATOR



HINT: EACH WORD IS FOUND SEPERATELY

Q & A

How big is the balloon?

THE VOLUME OF ONE OF THE NASA STANDARD BALLOONS IS 39 MILLION CUBIC FEET (1.1 MILLION CUBIC METERS). WHEN IT IS FULLY INFLATED, A FOOTBALL STADIUM COULD FIT INSIDE THE BALLOON.

What is the maximum altitude of the balloon?

SCIENTIFIC BALLOONS TYPICALLY FLOAT AT 120 TO 130 THOUSAND FEET (36-39 KM).

How much can the balloon lift?

SCIENTIFIC BALLOONS CAN LIFT UP TO 8000 LBS. (3600 KG), WHICH IS APPROXIMATELY THE WEIGHT OF THREE SMALL CARS.

Where are the balloons launched from?

DEPENDING ON THE TIME OF THE YEAR AND THE SCIENCE BEING INVESTIGATED, BALLOONS ARE LAUNCHED FROM THE USA, AUSTRALIA, EUROPE, NEW ZEALAND, OR ANTARCTICA. HISTORICALLY, BALLOONS HAVE ALSO BEEN FLOWN FROM OTHER LOCATIONS AROUND THE WORLD.

Why are balloons used for scientific investigations?

BALLOONS PROVIDE FLEXIBILITY IN THE MASS AND DIMENSIONS OF THE PAYLOAD. THEY CAN BE READIED IN SHORT TIME. THE PAYLOAD IS USUALLY RECOVERED AND RE-FLOWN. THEY REACH THE EDGE OF SPACE. THEY ARE VERY ECONOMICAL COMPARED TO OTHER PLATFORMS.

What gas is used to inflate scientific balloons?

HELIUM

What material is the balloon made of?

THE BALLOON IS MADE OF THIN POLYETHYLENE FILM SIMILAR TO THE STANDARD SANDWICH WRAP MATERIAL. THE THICKNESS OF THE FILM VARIES FROM 0.8 TO 1.5 MILS (0.2 TO 0.38 MM) DEPENDING ON THE TYPE OF THE BALLOON, A STRAND OF HAIR IS APPROXIMATELY 2-3 MILS. (1 MIL=1/1000 INCH=25.4 MICRON)

What is the difference between scientific balloons, weather balloons, and hot air balloons?

SCIENTIFIC BALLOONS ARE VERY LARGE STRUCTURES USED FOR SCIENTIFIC INVESTIGATIONS. THEY ARE LAUNCHED FROM SELECTED LOCATIONS AROUND THE WORLD AND CAN FLOAT FOR DAYS OR WEEKS. WEATHER BALLOONS ARE SMALL HAND LAUNCHED RUBBER BALLOONS USED FOR WEATHER RELATED MEASUREMENTS. THEY ARE LAUNCHED DAILY FROM THOUSANDS OF LOCATIONS. THEY RISE IN THE ATMOSPHERE UNTIL TEY POP. HOT AIR BALLOONS ARE USED FOR RECREATIONAL PURPOSES AND TYPICALLY FLY AT LOWER ALTITUDES. SCIENTIFIC BALLOONS CAN ACCOMMODATE MORE THAN 600 HOT AIR OR 1500 WEATHER BALLOONS INSIDE.

Want to know more or have difficulty solving one of these puzzles?

PLEASE VISIT US AT [HTTP://SITES.WFF.NASA.GOV/CODE820/](http://sites.wff.nasa.gov/code820/) OR SCAN THE QR CODE TO THE RIGHT.

