ROCKET PARK

LUNAR SURFACE

1. One formula used to estimate the energy, in Joules, needed to create a crater on the moon is $E=4.0x10^6D^3$, where D is the diameter of the crater in meters. Use this formula to estimate how much energy it would take to create a crater with a radius of 10 meters. [6.EE1, 6.EE.7]

$E = 4.0 \times 10^6 \times 20^3$ radius = 10

$E = 4.0 \times 1{,}000{,}000 \times 8000$ diameter = 20

$E = 32{,}000{,}000{,}000$ Joules

$E = 3.2 \times 10^6$

U.S. ARMY NIKE HERCULES ROCKET

2. The wing of a Nike Hercules rocket is the trapezoid shown below. Calculate the area by decomposing the figure into a triangle and a rectangle. [6.G.1]

triangle = 1/2 b h

1/2 (22) (48) = 528 in²

rectangle: l x w

48 x 23 = 1,104 in²

528 + 1104 = 1,632 in²

a. There are 4 trapezoid shaped wings on the rocket. What is the combined area of these wings?

4 x 1632 = 6528 in²

3. On a map, the A-12 Blackbird is located at (8,1).
Shuttle Park is located at (8,10).
Rocket Park is located at (1,10).
Represent the locations as points on the coordinate plane below. [6.G.3]

a. What shape is formed by the lines connecting these three points?

right triangle

b. What is the distance from Shuttle Park to Rocket Park?

8 - 1 = 7

SPACE CAMP TRAINING CENTER

VISIONS OF THE FUTURE

1. Endeavor spent 299 days in space over 25 missions. What was the average number of days for each Endeavor mission? [6.RP.2]

299/25 = 11.96 = 12 days

SPACE SCALE

2. Record your weight on:
Earth 100lbs Mars 39lbs Moon 16.66lbs

a. Find the difference between your weight on Mars and on the moon. [6.NS.3]

b. Write a ratio, in simplest form, which compares your weight on the moon to your weight on Earth. [6.RP.1]

ratio should simplify to 1/6 or 1:6

*answers will vary

SPACE SHUTTLE TIRES

3. The tires on a space shuttle increase in pressure when they are in space. The original pounds per square inch (psi) of the tires is 340psi. The psi they increase by in space is 14. By what percent does the tire pressure increase in space? [6.RP.3, 6.NS.2]

14/340 = x/100 340/340 = 1400/340 Round to nearest tenth.

x = 4.1%

INTERNATIONAL SPACESTATION

4. The International Space Station orbits the Earth at about 7.7 kilometers per second. How long would it take the space station to travel from Huntsville to Birmingham, which is about 160 kilometers? [6.EE.9]
(Recall: time = distance / speed). Include units.

T = 160/7.7 T = 20.78 seconds

5. The International Space Station orbits the Earth every 97 minutes. Convert this time from minutes to hours and minutes. Include units. [6.NS.2]

97
-60
37

1 hour & 37 minutes

MAIN ATRIUM

VISIONS OF THE FUTURE

1. Create a table listing the heights of the Aggregat rockets. [6.SP.5] According to Google:

Rocket	Height
A-1	55 in
A-2	63 in
A-3	265 in
A-4	551 in
A-4b	535 in
A-5	229 in
A-6	620 in
A-7	233 in
A-8	669 in
A-9	558 in
A-10	792 in

2. What is the mean height of the rockets?
[6.NS.2, 6.SP.3, 6.SP.4] 4570/11 = 415 5/10in

3. Create a dot plot comparing the heights of these rockets. [6.NS.6, 6.SP.2, 6.SP.4]

4. What is the median height of the rockets?
[6.SP.2, 6.SP.3, 6.SP.4]

55 63 229 233 265 535 551 558 620 669 792

5. Find the range of the rocket heights. [6.SP.2, 6.SP.3, 6.SP.4]

792
-55
737

6. Which of the following is a statistical question? [6.SP.1]
a. What is the height of an A-4b rocket?
b. What is the mean height of all the Aggregat rockets?

Math Exploration Grade 6

your journey starts here

U.S. Space & Rocket Center®

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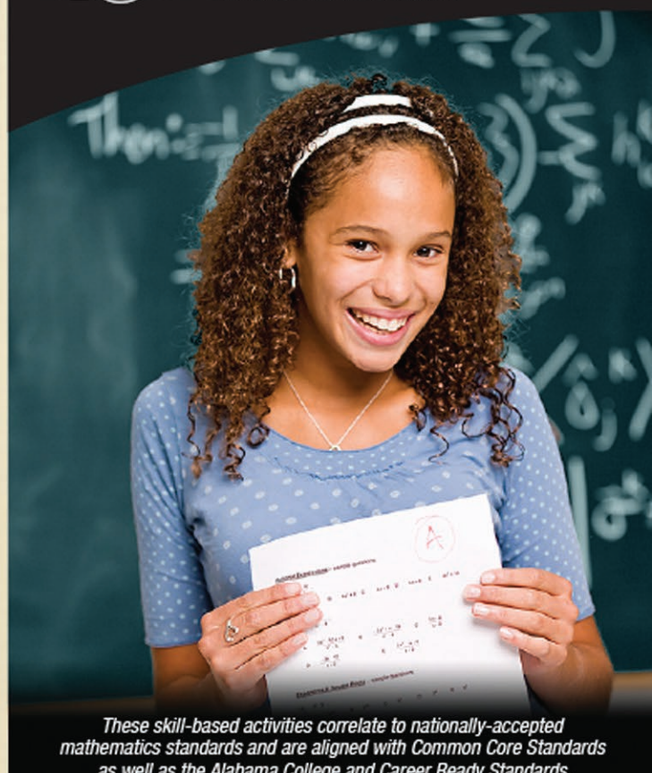


These skill-based activities correlate to nationally-accepted mathematics standards and are aligned with Common Core Standards as well as the Alabama College and Career Ready Standards.

SATURN V HALL

GIFT SHOP

1. You purchase a space shuttle model at a cost of $17. Tax is 9%. Calculate the final cost of your purchase. [6.NS.3]

17.00
X1.09
18.53

APOLLO/SATURN V MODEL

2. Find the total thrust of all three stages of the Saturn V rocket.

First Stage Thrust 5 x 1,500,000 = 7,500,000lbs.
Second Stage Thrust 5 x 200,000 = 1,000,000lbs.
Third Stage Thrust 1 x 200,000 = 200,000lbs.
Total Thrust 8,700,000 lbs

a. Write an equation to determine the thrust of the third stage if given the thrust of the first two stages.[6.EE.5, 6.EE.6]

7,500,000 + 1,000,000 + x = 8,700,00
8,500,000 + x = 8,700,000

H-1 ENGINE

3. How many H-1 engines does the first stage of the Saturn IB rocket use?

8 engines

4. Given that the volume of one H-1 engine is equal to v, write an expression for the volume of all first stage engines for the Saturn IB Rocket. [6.EE.2, 6.EE.4]

8 • V = 8v

RL-10 ENGINE

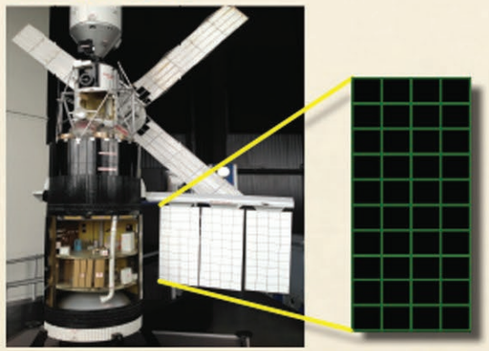
4. In the RL-10 engine the temperature of the LH2 is -420°F and the temperature of the combustion gases is 6,000° F. What is the difference in temperature between these two substances. 6,000 - (1420) = 6000 + 420 = 6420°F temp difference

a. Convert -420 °F to degrees Celsius. [6.NS.1, 6.NS.5]

$°C = (°F - 32) \cdot 5/9$ °C = (-420°F - 32) • 5/9
= (-452) • 5/9
= -2260/9 = -251.1°C

b. Write a statement of inequality using the two temperatures stated above. [6.NS.7, 6.EE.8]

SKYLAB MODEL



5. Each section of the rectangular Skylab solar panel is divided into solar cells. If each rectangular section is divided into a 4 by 10 grid how many solar cells are in one section of the solar panel? [6.G.1]

(4x10) - 40 solar cells per section.

BIGELOW BA-330

(Inflatable Space Station)

6. If the dimensions of a payload container in the Bigelow BA-330 habitat are 5 ½ x 7 ¾ x 6 ¼ inches. What is the volume of the container? [6.G.2]

5 1/2 x 7 3/4 x 6 1/4 = 11/2 x 31/4 x 25/4 = 8525/32

8525/32 = 266 13/32m³

APOLLO 16 COMMAND MODULE

7. Fully loaded the Apollo 16 Command Module weighed a total of 13,000 pounds including the crew, supplies and Lunar samples. The Astronauts weigh a total of 504 pounds, the moon rocks weigh 208 pounds and the supplies weigh 370 pounds. Write an inequality to compare the total possible weight with the total of the weights given. [7.EE.4]

13,000 > 504 + 208 +370
13,000 lbs. > 1,082 lbs.

LIFE ABOARD

8. Each space shuttle astronaut consumes approximately 2800 calories per day. If these calories are distributed equally over the three meals, how many calories will an astronaut consume at each meal? [6.NS.2]

2800/3 = 933 1/3 calories

9. Three astronauts travel to the ISS. Each astronaut takes three 200 gram apples and two 100 gram Moon Pies. Write two equivalent expressions to represent the total weight of the snacks and then solve to determine the total weight. [6.EE.3]

x = # of apples each astronaut brings
y = # of moon pies each astronaut brings
3 (200x + 100y)
or
600x + 300y
x=3 y=2
(600 x 3) + (300 x 2)
1800 + 600 = 2,400 grams

LUNAR MODULE

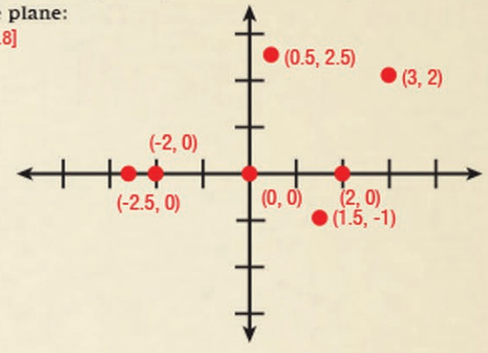
10. The Apollo 11 astronauts walked on the moon for approximately 20 hours. The Apollo 12 astronauts walked approximately 30 hours on the moon. Find the least common multiple and the greatest common factor of the number of hours they walked on the moon. [6.NS.8]

20 = 2 10 = 5 2 = 2 x 2 x 5
30 = 2 15 = 5 3 = 2 x 3 x 5

GCF = 5 x 2 = 10
LCM 2 x 2 x 3 x 5 = 60

11. Listed below are the approximate coordinates of the Apollo Lunar landings. Graph and label these points on the coordinate plane: [6.NS.6, 6.NS.8]

(0, 0)
(2, 0)
(-2.5, 0)
(-2, 0)
(0.5, 2.5)
(1.5, -1)
(3, 2)

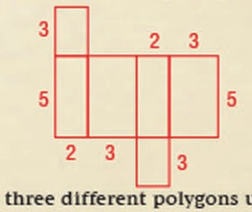


LUNAR ROVER

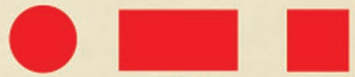
12. The lunar rover has a volume of about 30 cubic feet when folded for storage in the lunar module. Determine the dimensions of one possible right rectangular prism with a volume of 30 cubic feet. [6.G.2]

* answers may vary.
l x w x h = volume
l x w x h = 30 ft³
2' x 5' x 3' = 30 ft³

a. Draw the net of a right rectangular prism. [6.G.4]



b. Draw at least three different polygons used in the Lunar Rover model or lunar excursion model. [6.G.3]



* answers will vary.