SATURN V HALL

SATURN V MODEL

12. The height of this model is $36\frac{1}{2}$ feet. A 6 foot tall man would be $7\frac{1}{4}$ inches tall using the same scale. Convert the fractions $36\frac{1}{2}$ and $7\frac{1}{4}$ to decimals. [7.NS.2]

36 1/2 = 36.5

7 1/4 = 7.25

13. The Saturn V model is $\frac{1}{10}$ the size of an actual Saturn Vrocket. If the model is $36\frac{1}{2}$ feet tall, how tall is the actual Saturn V rocket? [7.G.1]

36.5 x 10 = 365 ft. tall

APOLLO 16 COMMAND MODULE

14. The Apollo 16 Command module can weigh a maximum of 1,535 pounds including the crew, equipment, and moon rocks. The module itself weighs 455 pounds, the equipment and payload weighs 370 pounds, and the moon rocks weigh 206 pounds. Write an inequality to represent this. [7.EE.4]

1,535 ≥ 455 + 370 + 206

1,535 lbs ≥ 1031 lbs

15. The Apollo 11 astonauts brought back 21.7 kg of moon rocks. When these rocks were analyzed it was found that 44% were basalt, 5% were other igneous rocks, and 51% were breccia. A museum curator chose 20 random rocks from this group for a display. How many rocks in the display would you expect to be basalt? [7.SP.6]

44% of 20

.44 x 20 = 8.8   9 basalt rocks

MERCURY-REDSTONE ROCKET

16. Suppose during the design of the Mercury-Redstone rocket engineers decided that the fuel capacity needed to increased by 5%. If f represents the fuel capacity then the desired fuel capacity equals _____. [7.EE.2]

44% of 20

f + 5% of f

f + 0.05f - 1.05f

Astronauts Who Walked on the Moon

Name	Age
Neil Armstrong	38
Edwin "Buzz" Aldrin	39
Pete Conrad	39
Alan Bean	37
Alan Shepard	47
Edgar Mitchell	40
David Scott	39
Jim Irvin	41
John Young	41
Charlie Duke	36
Gene Cernan	38
Harrison Schmidt	37

Astronauts Who Flew to the Moon Without Walking on it

Name	Age
Frank Borman	40
Jim Lovell, Jr.	40
Bill Anders	35
Tom Stafford	38
John Young	38
Stu Roasa	37
Mike Collins	38
Dick Gordon	40
Jack Swigert	38
Fred Haise	36
Al Worden	39
Ken Mattingly	36
Ron Evans	39

LUNAR MODULE

17. Twelve astronauts walked on the moon between December 1968 and December 1972. Thirteen astronauts flew to the moon and never walked on it. Find the mean and median age for each group. Write an expression to compare the mean and median of both groups of astronauts. [7.SP.3]

The mean of the first group is 1 year greater than the mean of the second and it's median is also 1 year greater.

18. Use the measures of center from each column to compare the two groups of astronauts. Which measure was more accurate? Which group was older? [7.RP.4]

Both the median and the mode produced the same result so in this case they are both accurate. The first group is older.

LIFE ABOARD

19. Suppose the Apollo astronauts took three types of jellybeans on a mission with them - Grape, Cherry and Orange. If the probability of getting Grape is $\frac{3}{10}$ and the probability of getting Cherry is $\frac{1}{5}$, what is the probability of getting an Orange jellybean? [7.SP.5]

3/10 + 1/5 + x = 1

3/10 + 2/10 + x = 1

5/10 + x = 1   x = 5/10 = 1/2

LIFE ABOARD

20. Each Apollo astronaut ate three meals per day totaling about 2,800 calories. If a mission crew contained three astronauts and the mission lasted for four days, how many calories did the three astronauts eat during the entire mission? Write an equation to represent this and then solve the equation. [7.EE.3, 7.EE.4]

4 (3x2,800) = 4 (8400) = 33,600 calories

21. The Apollo Guidance Computer is the digital autopilot of Apollo. If you cut it with a plane perpendicular to the base it is sitting on, what face shape results? [7.G.3]

Since it starts as a rectangular prism, the resulting face woul dbe a rectangle.

GIFT SHOP

22. The Space and Rocket Center is giving away ten packages of Astronaut Ice Cream to students who visit on a special day. They have determined two different ways to select students to receive the ice cream. Identify the type of sampling used in each survey option.

a. OPTION 1: Give each student who comes to the Space and Rocket Center that day a numbered ticket and draw from a hat to determine who gets asked.

random sample

b. OPTION 2: Ask the first 10 students who enter the Space and Rocket Center about the ice cream.

comvenience sample

c. Which survey option should the Space and Rocket Center use and why? [7.SP.1]

Random sample because it is more likely to provide an accurate representation of the diversity of students attending the U.S. Space & Rocket Center.

23. A Space Camp t-shirt is on sale in the gift shop for $12.24. The t-shirt was marked originally down 20% and then two weeks later marked down an additional 15%. What was the original price of the t-shirt? [7.RP.3]

12.24/x = 85/100   14.40/x = 80/100

85x = 1224   80x = 1440

x = $14.40   x = $18.00 original price
before 15% mark down

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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 / APOLLO MODEL

1. The second stage of the Saturn V (S-II) rocket uses ___5___ J-2 engines. Each engine requires 83,000 gallons of liquid oxygen (LOX). Complete the table and create a line graph to display. [7.RP.2]

Number of Engines	Pounds of Liquid Oxygen
1	83,000
2	166,000
3	249,000
4	332,000
5	415,000

Saturn V Engine

(line graph — Pounds of Liquid Oxygen (thousands) vs Number of Engines)
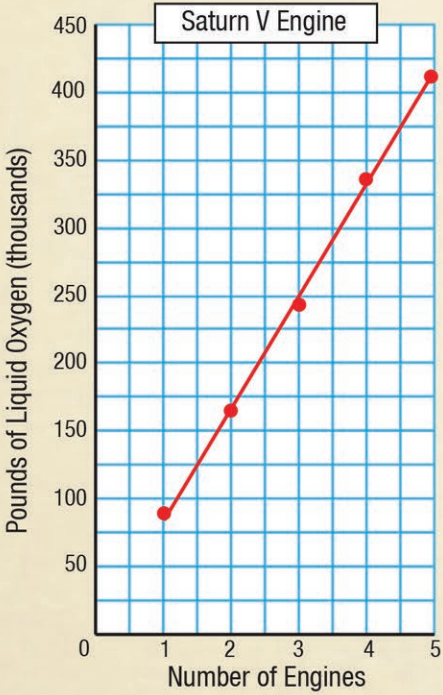
**2.** Is this a proportional relationship?   yes

The diameter of the Apollo Service Module (SM) is ___12___ feet ___10___ inches. If NASA needed to reduce the diameter by 1/3 of a foot, what would be the new diameter of the service module? [7.RP.1]

12ft 10in. - 154in.
1/3ft. = 4in.
154-4 = 150in = 12ft. 6in.

H-1 ENGINE

3. The H-1 rocket engine was used in the first stage of the Saturn IB rocket. The diameter of the H-1 is 8.8 feet. Calculate the circumference of the H-1. [7.G.4]   Round to the nearest hundredth

Recall: C = πd
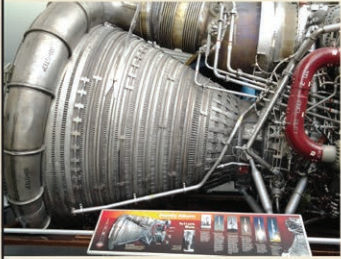
C = π x 8.8
C = 3.14 x 8.8
C = 27.63 feet

INSTRUMENT UNIT

4. If the area of the instrument unit on the Saturn V is 9.9π m^2, what is the circumference? [7.G.4]

Recall: A = πr^2 and C = 2πr

A = πr^2 C = 2πr^2
9.9π = πr^2 C = 2π (3.15)
$\sqrt{9.9\pi} = \sqrt{r^2}$ C = 6.3π m
r = 3.15

INSTRUMENT UNIT

5. The Launch Vehicle Digital Computer (LVDA), the computer behind the Saturn V, was quite small for its time.
The shape of the LVDC memory module is a ___rectangle___. The dimensions for one LVDC memory module are 5.5 in x 3 in x 2.5 in. What is the surface area of the memory module? [7.G.6]
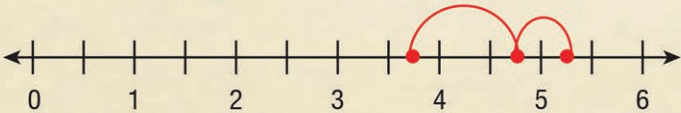
[2(5.5x3)]+[2(5.5x2.5)]+[2(3x2.5)]

33 + 27.5 + 15 = 75.5 in^2

MARS GRILL

6. You borrowed $3.75 from a friend to buy lunch at the Mars Grill. Your mother gave you $5.25 to pay your friend back. Use the number line to determine how much you will have left over after paying back your friend. [7.NS.1]

$1.50

(number line from 0 to 6)

THE FORCE

7. As you view the model of the Saturn V test stand, you will observe supplementary, complementary, vertical, and adjacent angles. Use the information you know about these types of angles to solve the following problems. [7.G.5]
supplementary angles = add up to 180°
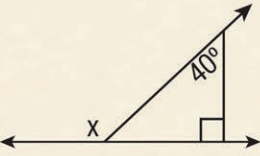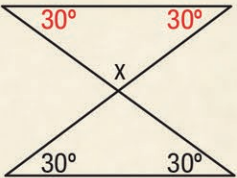complementary angles = add up to 90°
vertical angles = angles opposite eachother when two lines cross
adjacent angles = common side, common vertex (corner point) and don't overlap

8. Write and solve an equation to find the measure of angle x.

Because of vertical angles, x = 180 - (30+30)
x = 120°

(diagram with 30°, 30°, x, 30°, 30°)

(diagram with 40°, x)

180 - (40+90) = 50
180 - 50 = 130°
Because of supplementary angles

9. If an equilateral triangle on the test stand has a perimeter of 6x+ 15, write an equivalent expression. [7.EE.1]

6x + 15 = 3(2x+5)

SWING ARM

10. This arm is one of nine swing arms that forms the Apollo Launch Unbilical Tower (LUT). The dimensions of the swing arm are 8.2 feet x 5.25 feet x 43.75 feet. What would the volume of the swing arm be? (round to the nearest hundredth) Recall: V$_{rect}$ = lwh [7.G.6]
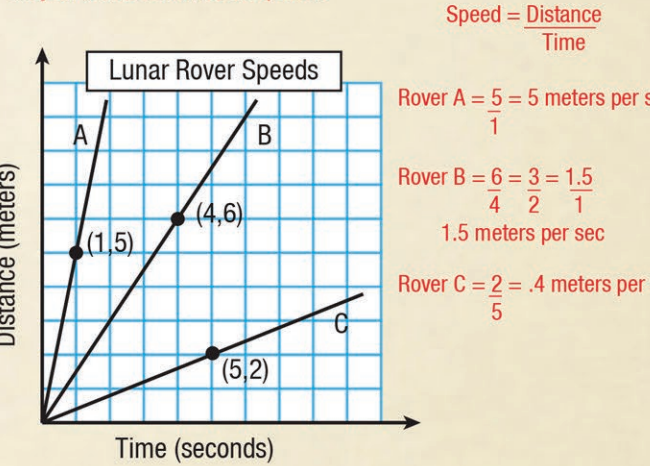
v = 8.2 x 5.25 x 43.75
v = 1883.44 feet

LUNAR ROVER

11. Apollo 16 astronauts Charlie Duke and John Young drove the lunar rover on three different paths on the moon. The graphs below are all line segments that show the distance d, in meters, that the lunar rover traveled after t seconds. [7.RP.2]

a. Each graph has a point labeled on the path it took. What does the point tell you about how far that rover has traveled?
The point tells you how far the rover has traveled at a specific point in time.

b. Charlie Duke said that the ratio between the number of seconds each rover travels and the number of meters it has traveled is constant. Is he correct? Explain.
Each rover individually traveled at a constant rate becuase the graph makes a straight line. The constant rate varried for each rover as evident by the fact they have different slopes.

c. How fast is the lunar rover traveling? How did you compute this from the graph?
They all traveled at different speeds.

Speed = $\frac{Distance}{Time}$

Rover A = $\frac{5}{1}$ = 5 meters per sec

Rover B = $\frac{6}{4}$ = $\frac{3}{2}$ = $\frac{1.5}{1}$
1.5 meters per sec

Rover C = $\frac{2}{5}$ = .4 meters per sec

Lunar Rover Speeds

(graph — Distance (meters) vs Time (seconds); points A, B, (4,6), (1,5), (5,2), C)

d. The lunar rover on Apollo 17 traveled 35.9 km in 4.5 hours on the moon. What was the average rate of speed rounded to the nearest hundredth? [7.NS.3]

Speed = $\frac{Distance}{Time}$

$\frac{35.9}{4.5}$ = 7.98 km/hr