

## SCIENCE ON ORBIT

1. While on a mission in space, astronauts grew cabbage and lettuce in the Destiny Laboratory aboard the International Space Station. The plants were fed the following nutrients each week: cabbage got  $3\frac{3}{4}$  cups of plant food and carrots got  $2\frac{1}{6}$  cups of plant food. How much plant food were both plants given in a week? Explain your reasoning. [5.NF.1, 5.NF.2]

$$3\frac{3}{4} + 2\frac{1}{6} = \frac{15}{4} + \frac{13}{6} = \frac{45}{12} + \frac{26}{12} = \frac{71}{12} = 5\frac{11}{12}$$

2. Calculate the total width of a Space Shuttle's four main landing gear tires if one tire is  $44\frac{1}{62}$  inches wide. [5.NF.1, 5.NF.2]

$$44\frac{1}{62} \quad 2729/62 \times 4/1 = 10916/62 = 176\frac{4}{62} = 176\frac{2}{31}\text{in.}$$

## ROCKET PARK

1. Compare the heights of the US Army Juno II, the German V-1 and NASA Atlas.



a. Which rocket is the tallest? [5.NB.7]

Juno II - 77.1 feet

V-1 - 27.1 feet

Atlas - 71.21 feet feet

b. How much taller is the tallest rocket than the shortest rocket? Include units. [5.NBT.7]

Juno II - 77.1 feet

V-1 - 27.1 feet

50 feet

2. The Crew Exploration Vehicle can carry up to six astronauts to and from the International Space Station. How many missions would be needed to transport 50 astronauts to the station? [5.NBT.5, 5.NBT.6, 5.NF.3]

$$50/3 \quad 3 \times 16 = 48$$

17 missions required.



## POWER OF ZERO

1. How Much Trash Do You Make In A Day?



2. Seven billion humans populate the earth and create 32,900,000,000 pounds of trash in one day. Write this number in expanded notation. [5.NBT.3]

$$30,000,000 + 2,000,000,000 + 9,000,000,000$$

3. One person creates around 1715.5 pounds of trash in one year. Round this number to the nearest whole number. [5.NBT.1, 5.NBT.4]

.5 or above - round up

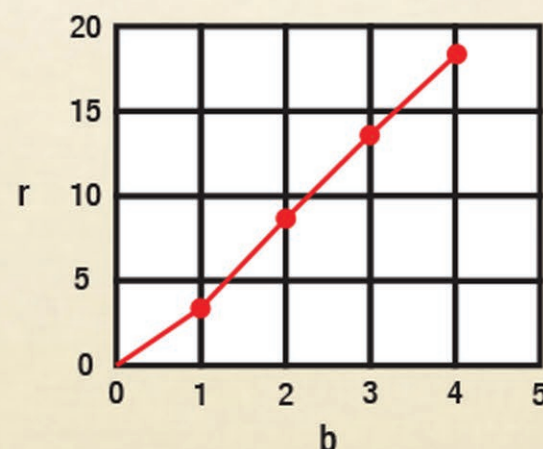
1716 pounds

4. How does the 5 in the one's place compare to the 5 in the tenths place in the above number? Explain your answer. [5.NBT.1, 5.NBT.4]

The one's place is 10x greater than the tenths place.

5. Complete the table to show how the amount of trash created daily, r, depends on the number of people, b. Function:  $r = b \times 4.7$ . Graph your findings. [5.OA.3, 5.G.2]

b	r
1	4.7
2	$2 \times 4.7$ 9.4
3	$3 \times 4.7$ 14.1
4	$4 \times 4.7$ 18.8



## SHUTTLE PARK

1. The External Tank provided fuel for 36 test firings of the Shuttle's Main Propulsion System with a total test time of 10,813 seconds (equivalent to about 20 flights). The External Tank fuels the Orbiter's Main Engines during the first 9 minutes of flight. [5.OA.1, 5.OA.2]

$$10,813/540 = 20.0$$

$$60 \text{ sec} = 1 \text{ min}$$

$$9 \text{ min} = 540 \text{ sec}$$

2. Write an expression to represent the number of test flights equivalent to the test firings that the External Tank fueled. [5.OA.1, 5.OA.2]

No info?



3. The tail of the orbiter can best be described by which of these polygons: triangle, quadrilateral, parallelogram, trapezoid, rectangle, square, ellipse. [5.G.5]

Trapezoid

4. The External Tank contains 1,361,936 lbs of liquid oxygen and 227,641 lbs of liquid hydrogen and has a gross lift-off weight of 1,655,000 lbs. Write these numbers in scientific notation. Round to hundredths place. [5.NBT.2]

$$\frac{1.36}{2.28} \times 10^{-6} \text{ lbs of liquid oxygen}$$

$$\frac{2.28}{1.655} \times 10^{-5} \text{ lbs of liquid oxygen}$$

$$1.655 \times 10^6 \text{ lbs} - \text{lift-off weight}$$



# Math Exploration Grade 5

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.



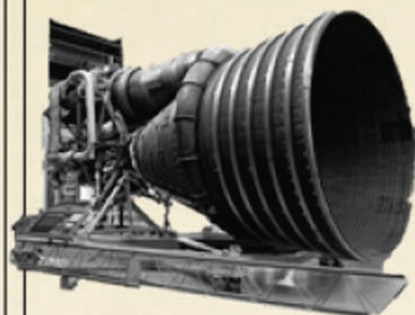
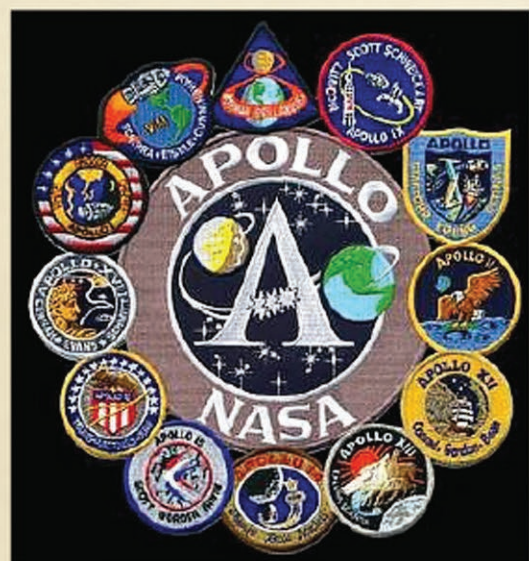
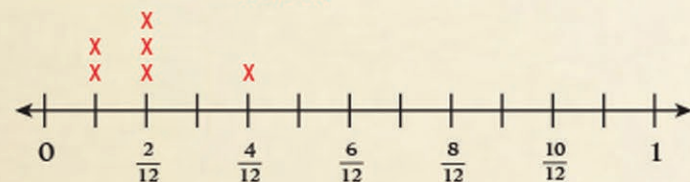
# APOLLO COURTYARD

# SATURN V HALL

Twelve (12) manned Apollo missions occurred between 1969 and 1972. Complete the table below showing the number of manned missions occurring each year. [5.MD.2]

YEAR	TALLY	NUMBER	FRACTION OF TOTAL MISSIONS
1967	I	1	1/12
1968	II	2	2/12 = 1/6
1969	IIII	4	4/12 = 1/3
1970	I	1	1/12
1971	II	2	2/12 = 1/6
1972	II	2	2/12 = 1/6

Use the above table to create a line plot to illustrate the fractional representation of how many Apollo mission occurred per year. [5.MD.2]



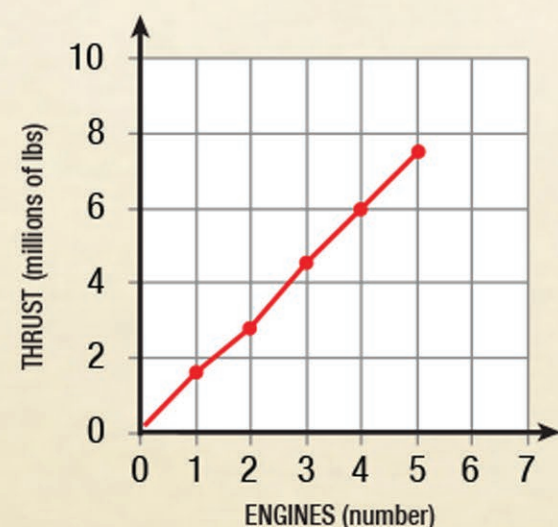
## F-1 ENGINE

How many engines are on the first stage of the Saturn V? [5.OA.3]

5 engines

Complete the table below to determine the total amount of thrust provided by the number of engines specified. Graph the data below. [5.OA.3]

NUMBER OF ENGINES	THRUST (millions of lbs)
1	1.5
2	3
3	4.5
4	6
5	7.5



## SATURN V

The second stage of the Apollo/Saturn V rocket consists of five J-2 engines. Without calculating, complete the inequality below using  $<$ ,  $>$  or  $=$ . [5.NF.5]

$$5 \times 4/5 \underline{<} 5$$

## LUNAR MODULE

Which of the following polygons can you identify in the lunar module: triangle, square, rectangle, trapezoid and rhombus? Draw the shapes you find below and list their properties. [5.G.3]

rectangle = 4 sides (opposites equal) 4 right angles

triangle = 3 sides 3 angles

square = 4 sides (all same size - 2 parallel sides) 4 right angles

trapezoid = 1 pair of parallel side

rhombus = 4 equal sides, 2 pairs of parallel sides



## APOLLO 12 MOON ROCK

The lunar rock on display weighs about 453 grams. Convert the number of grams to kilograms. [5.MD.1]

$$1g = .001 kg$$

$$\begin{array}{r} 453 \\ \times .001 \\ \hline .453kg \end{array}$$



## LIFE ABOARD

An astronaut aboard the Saturn V Rocket consumes 2800 calories per day. If he or she eats three meals per day, how many calories does he consume at each meal. Write your answer as a fraction. [5.NF.7]

$$2800/3 = 933 \frac{1}{3} \text{ calories}$$



## BIGELOW BA-330 (Inflatable Space Station)

The dimensions of a payload container in the Bigelow BA-330 habitat are 8 in. by 6 in. by 4 in. What unit of measure is used when stating the volume of the container? Include units in your answer. [5.MD.3, 5.MD.4]

Cubic inches

Calculate the volume of the container? [5.MD.5]

$$v = l \times w \times h$$

$$8in \times 6in \times 4in = 192 in^3 \text{ or } 192 \text{ cubic inches}$$

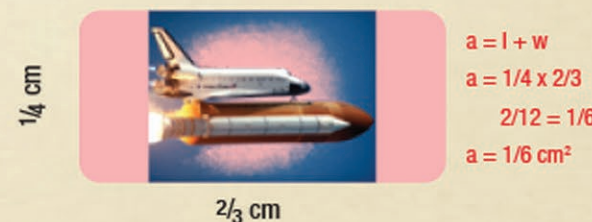
## GIFT SHOP

Your teacher wants to buy t-shirts for each of the 24 students in your class. One third ( $1/3$ ) of the shirts will be small, one-third ( $1/3$ ) of the shirts will be medium and one-third ( $1/3$ ) of the shirts will be large. If the teacher wants half ( $1/2$ ) of the shirts to be red and half ( $1/2$ ) of the shirts to be blue, how many small red t-shirts must be purchased? Include units in your answer. [5.NF.6, 5.NF.7]

$$24 \times 1/3 = 24/3 = 8 \text{ small} \quad 8 \text{ medium} \quad 8 \text{ large}$$

half	half	half
4 blue	4 blue	4 blue
4 red	4 red	4 red
		4 small red

What is the area of the eraser shown below? [5.NF.4]



$$a = l + w$$

$$a = 1/4 \times 2/3$$

$$2/12 = 1/6$$

$$a = 1/6 \text{ cm}^2$$