



Math Around the Zoo



As you visit the zoo today, stop at the exhibits and solve the following math problems using algebra and geometry concepts. Good luck and have fun!

Flamingos

Flamingos are very gregarious birds living in flocks ranging from a few individuals to tens of thousands, all feeding and nesting close together. Flamingos can swim and fly well. Groups may migrate great distances in skeins (V-formations), extending their long necks and legs in flight. A flamingo may eat 10% of its weight in tiny food particles every day, straining its food from the water through filters along the edge of its bill. If a female Chilean flamingo weighs 5.5 lbs. and the male weighs 6.7 lbs., how much more food does the male eat?

$$6.7(.1) - 5.5(.1) = .12 \text{ lbs}$$

In the spring, the female flamingo lays a single large, white egg. To hold the egg, flamingos build a cone-shaped nest out of mud and stones, which may reach 18 inches in height. What would be the volume of the nest if it is 14 inches across? (hint: $V = \frac{1}{3}\pi r^2 h$)

$$\frac{1}{3}\pi(7)^2(18) = \frac{1}{3}\pi(49)(18) = 984 \text{ in.}^3$$

Asian Elephants

Asian elephants are herd animals and display complex social behavior. A herd is a matriarchal family group consisting of mothers, daughters, and sisters. Movements are initiated by the oldest and usually largest female. They require a large home range in order to find food, water, and shade in all seasons. According to the American Zoo and Aquarium Association, exhibit yards must have at least 1,800 sq. ft for a single adult individual and an additional 900 sq. ft must be added for each additional animal. Write an equation to solve for exhibit area.

$$\text{If } y = \text{yard area and } n = \text{number of elephants, then } y = 900(n - 1) + 1800$$

What variables did you use? What do they stand for? Which is the independent variable? Which is the dependent variable?

$$y = \text{yard area and } n = \text{number of elephants, } n \text{ is independent and } y \text{ is dependent}$$

Use your equation to calculate the minimum space requirement for five Asian elephants.

$$Y = 900(5 - 1) + 1800 = 900(4) + 1800 = 3600 + 1800 = 5400 \text{ sq. ft}$$

Giraffe

The giraffe is the tallest living terrestrial animal. The color pattern varies but consists essentially of dark reddish to chestnut brown blotches of various shapes and sizes on a buff background color. The under parts are generally light and unspotted. The long, flexible purplish tongue can be up to 18 inches long and can be used to pluck leaves from trees. Like most mammals, including humans, giraffes have seven neck vertebrae; each is about 12 inches long making the neck about 84 inches in length. Estimate your neck length and make a proportion to solve for the average size of your neck bones.

$$12: 84 = x: 9; 84x = 108; x = 1.28 \text{ inches}$$

The giraffe exhibit is a rectangle. Estimate the length of each side, and record it on the diagram. Solve for perimeter and area of the exhibit.

Various answers



The Zoo considered making the exhibit a square. If they wanted to maintain the same perimeter, what would be the length of each side? What would the area be?

Various answers

Lastly, the Zoo may want to increase the giraffe exhibit. If they doubled the length and the width of the current exhibit, how would the area change?

The area would be four times as much.

Mona Monkey

The Mona monkey lives in large packs ranging from five to fifty. There is usually only one adult male in a social group, but if the group gets large enough, there may be several adult males. These monkeys are known to be loud and noisy, with calls that sound like expressive moans. Their alarm call sounds like little sneezes. In the Houston Zoo, they are housed in the Wortham World of Primates (or WWP), one of the most popular exhibits. Complete the following table for the percent of guests that see the Mona Monkeys.

Date	Zoo Attendance	WWP Attendance	Percentage of Visitors in WWP
1/24	6,775	5,420	80%
3/9	5,232	3,924	75%
7/19	10,750	8,170	76%
10/30	13,550	12,466	92%

Kipp Aquarium

In the large round tank within the aquarium, there are a number of fish including nurse sharks. The nurse shark is a large, sluggish shark that is generally yellow-brown to grey-brown in color. The nurse shark has a stout body, a blunt head, and two barbels between its nostrils. The nurse shark has a rectangular shaped mouth and thousands of small, serrated teeth that are designed for cracking open shellfish. The tail fin is long and slender and makes up 1/4 of the shark's total length. With this in mind, determine the following measurements:

The total length of a shark with a tail that is 20 inches long.

$$20/(1/4) = 80 \text{ inches}$$

The tail length of a shark that is 114 inches to the tail.

$$114/(3) = 38 \text{ inches}$$

The tail length of the shark that has a total length of 156 inches.

$$156(1/4) = 39 \text{ inches}$$

The nurse shark has two dorsal fins along its back. Each fin nearly forms a right triangle with the two legs along the body and the back edge. If there was a fin that was 4 inches along the body and three inches straight up, how long would the third side be?

$$A^2 + B^2 = C^2, 4^2 + 3^2 = C^2, 16 + 9 = C^2, 25 = C^2, 5 = C$$

A large nurse shark could have a fin that is 10 inches on the front edge and 6 inches towards the back, how long would the fin be along its body?

$$A^2 + B^2 = C^2, A^2 + 6^2 = 10^2, A^2 + 36 = 100, A^2 = 100 - 36, A^2 = 64, A = 8$$

This tank is basically a cylinder in shape. Estimate the height and radius of the tank and figure out its volume. If the Houston Zoo wanted to increase the volume of the tank times 4 without making it taller, what would the new radius be?

The radius would be doubled.

Meerkats

In meerkat colonies, most pack members forage at the same time. However, some act as sentries especially for birds like hawks. Sentries will stand at vantage points such as on mounds and in bushes, and chirp or cluck warnings. Sharp barks or growls urge others to dive for cover. Write a ratio of the number of meerkats that are sentries to the number of meerkats that are not.

Various ratios

Reptile House

Panther Chameleon

Like all chameleons, the Panther chameleon is capable of changing the color of its skin to display a stunning array of colors. It has independently moving, bulging eyes that permit it to see 360 degrees around. Its elastic tongue can extend up to 1-1/2 times the length of its body and has a sticky tip. This permits the chameleon to capture prey that it would otherwise not be able to catch. How far away could an 18 inch chameleon be from an insect it wants to eat?

$$18 (3/2) = 27 \text{ inches}$$

Reticulated Python

The reticulated python is the longest snake in the world. The record holder was 33 ft long. If that snake formed a circle, what would be the circumference?

$$33\text{ft}$$

What would be the diameter to the nearest foot?

$$33/\pi = 10.5 \text{ ft, rounded to 11ft}$$

If the snake formed a square, how long would each side be?

$$33/4 = 8.25 \text{ ft}$$

What would be the length of the diagonals (distance between opposite corners)?

$$8.25\sqrt{2} = 11.66 \text{ ft}$$

Komodo Dragon

The Komodo dragon is the largest lizard in the world. The Komodo dragon is not venomous or poisonous; however, its saliva contains a number of toxic strains of bacteria which often infect the wounds inflicted on its prey, causing death. A dragon can eat up to 80% of its body weight in a single meal. If our Komodo dragon weighs 180 lbs., how much could it eat at one time?

$$180(.8) = 144 \text{ lbs.}$$

If a dragon ate 75 lbs. of meat, what would you estimate as its weight?

$$75/ (.8) = 93.75 \text{ lbs.}$$

Laughing Kookaburra

The Laughing Kookaburra is the largest member of the kingfisher family. It is a thick-set bird with a large head, short neck and medium length tail. Its head is mostly whitish, with a dark brown crown and a brown stripe through the eye. Kookaburras employ a "sit and wait" technique of hunting, surveying their surroundings from an advantageous perch, then swooping down to seize prey. In the wild, Kookaburras live about 12 years. In a zoo, they live about 20 years. What percent longer do Kookaburras live in captivity?

$$(20 - 12)/12 * 100 = 8/12 * 100 = 66.6\%$$