Practice Run

1. A 1965 Ford Mustang has a length of 181.6 inches, a width of 68.2 inches, and a height of 51.1 inches.

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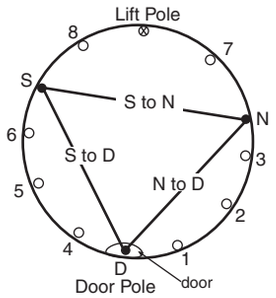
What would be the dimensions, to the nearest tenth of an inch, of a 1965 Ford Mustang if it was reduced in size to fit on a 1.5 inch wide toy car track?

2. Tipis were used for homes by the Plains Indians because of their nomadic life styles. The tripod poles were set up before the rest of the tipi could be assembled. In the diagram, *S* represents the south tripod pole, *N* represents the north tripod pole, and *D* represents the door tripod pole. A large family would fit in a tipi about 26 feet tall with the tripod poles placed in an isosceles triangle with two of the tripod poles placed in the south to north direction. The height of the tipi and distances between the poles are given in the table below.



Tipi height	*S* to *D*	*N* to *D*	*S* to *N*
26'	23' 10"	23' 10"	22' 3"

Will a small scale model of one of these tipis fit on a museum table top of diameter 8' 4", with a ceiling clearance of 5 feet if the scale factor is $\frac{1}{3}$? Show your work.

Compare your answers.

1. A 1965 Ford Mustang has a length of 181.6 inches, a width of 68.2 inches, and a height of 51.1 inches.

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What would be the dimensions, to the nearest tenth of an inch, of a 1965 Ford Mustang if it was reduced in size to fit on a 1.5 inches wide toy car track?

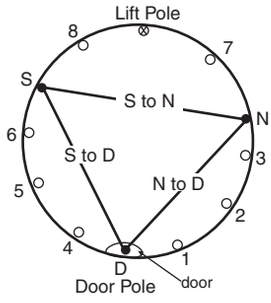
Since the width of the toy track is 1.5 inches and the original width of the Mustang is 68.2 inches, the scale factor can be determined as follows:

- Scale factor: $k = \frac{1.5}{68.2} = 0.0219941349$

Original Dimensions	Use the scale factor to determine the dimensions of the toy car	Scale Model Dimensions (to the nearest tenth)
Length 181.6"	$k = \frac{\text{scale length}}{\text{length}}$ $\frac{1.5}{68.2} = \frac{\text{scale length}}{181.6}$ $\frac{1.5 \times 181.6}{68.2} = \text{scale length}$ $3.99 = \text{scale length}$	Length 4.0 inches
Width 68.2"	$k = \frac{\text{scale width}}{\text{length}}$ $\frac{1.5}{68.2} = \frac{\text{scale width}}{68.2}$ $\frac{1.5 \times 68.2}{68.2} = \text{scale width}$ $1.5 = \text{scale width}$	Width 1.5 inches
Height 51.1"	$k = \frac{\text{scale height}}{\text{length}}$ $\frac{1.5}{68.2} = \frac{\text{scale height}}{51.1}$ $\frac{1.5 \times 51.1}{68.2} = \text{scale height}$ $1.12 = \text{scale height}$	Height 1.1 inches

- The dimensions of the scale model of the Mustang would be 4.0" long by 1.5" wide by 1.1" tall.

2. Tipis were used for homes by the Plains Indians because of their nomadic life styles. The tripod poles were set up before the rest of the tipi could be assembled. In the diagram, *S* represents the south tripod pole, *N* represents the north tripod pole, and *D* represents the door tripod pole. A large family would fit in a tipi about 26 feet tall with the tripod poles placed in an isosceles triangle with two of the tripod poles placed in the south to north direction. The height of the tipi and distances between the poles are given in the table below.



Tipi height	*S* to *D*	*N* to *D*	*S* to *N*
26'	23' 10"	23' 10"	22' 3"

Will a small scale model of one of these tipis fit on a museum table top, of diameter 8' 4", with a ceiling clearance of 5 feet if the scale factor is $\frac{1}{3}$? Show your work.

- Convert all of the given tipi measurements to inches.

	Feet and inches	Inches
Tipi Height	26'	26' × 12" = 312"
S to *D*	23' 10"	23' 10" = (23 × 12") + 10" = 286"
N to *D*	23' 10"	23' 10" = (23 × 12") + 10" = 286"
S to *N*	22' 3"	22' 3" = (22 × 12") + 3" = 267"

- Apply the scale factor to find the scale model measurements.

	Inches	Scale factor	Scale measurements
Tipi Height	312"	$k = \frac{\text{scale model}}{\text{tipi height}}$ $\frac{1}{3} = \frac{\text{scale model}}{312}$ $\frac{312}{3} = \text{scale model}$ $104 = \text{scale model}$	104"

	Inches	Scale factor	Scale measurements
S to D	286"	$k = \frac{\text{scale } S \text{ to } D}{S \text{ to } D}$ $\frac{1}{3} = \frac{\text{scale } S \text{ to } D}{286}$ $\frac{286}{3} = \text{scale } S \text{ to } D$ $95\frac{1}{3} = \text{scale } S \text{ to } D$	$95\frac{1}{3}$"
N to D	286"	$k = \frac{\text{scale } N \text{ to } D}{N \text{ to } D}$ $\frac{1}{3} = \frac{\text{scale } N \text{ to } D}{286}$ $\frac{286}{3} = \text{scale } N \text{ to } D$ $95\frac{1}{3} = \text{scale } N \text{ to } D$	$95\frac{1}{3}$"
S to N	267"	$k = \frac{\text{scale } S \text{ to } N}{S \text{ to } N}$ $\frac{1}{3} = \frac{\text{scale } S \text{ to } N}{267}$ $\frac{267}{3} = \text{scale } S \text{ to } N$ $89 = \text{scale } S \text{ to } N$	89"

- Convert the table top clearance and table top diameter to inches.

	Feet and inches	Inches
Table top to ceiling	5'	5' × 12" = 60"

- Compare to see if the scale model will fit.

Since the scale model of the tipi is 104 inches tall and the clearance is only 60 inches, the model will not fit on the table.

Scale factors allow individuals working in many different professions to visualize large projects on a smaller scale or tiny projects on a larger scale. Time and money can be saved by identifying design flaws prior to commencing work on the actual projects themselves. *Lesson 5.3* will explore scale factors in relation to the area of shapes and the surface area and volume of objects.