

# Design For Disaster Relief

Scaled Prototype Extension

(Student Name Here)

(Group Name Here)

# Extension 1: Scale Up To Full Size

## Scaling

For your prototype to be scaled up to full size, we will need to decide on a conversion that will be large enough to provide actual shelter for a family in need while still fitting on the back of a flatbed truck for transport.

Most flatbed trucks in the U.S.A. are 11 feet long and 8.5 feet wide. In this section, we will convert from metric to U.S. customary units and then scale up your design to full size.

## Conversions

When you evaluated your prototype, you made careful measurements of the dimensions. Your measurements were made in millimeters, but the dimensions of the truck used for transport are in U.S. customary. Convert your metric measurements in millimeters to inches using the conversion factors below (for help, try this [guide](#) or use [this online calculator](#)). Show all work on conversions and enter your results in the worksheet.

# Conversion Tables

## Conversions

When you evaluated your prototype, you made careful measurements of the dimensions. Your measurements were made in millimeters, but the dimensions of the truck used for transport are in U.S. customary. Convert your metric measurements in mm to inches using the conversion factors below.

### U.S. Customary System

1 foot = 12 inches

1 yard = 3 feet

1 mile = 5280 feet

1 mile = 1760 yards

### Metric System

1 centimeter = 10 millimeters

1 meter = 100 centimeters

1 kilometer = 1000 meters

## Converting between the Metric and U.S. customary systems

1 inch = 2.54 centimeters

1 foot = 0.3048 meters

1 mile = 1.61 kilometers

1 centimeter = 0.394 inches

1 meter = 3.281 feet

1 kilometer = 0.62 miles

# Extension 1: Fully Assembled Conversions

Directions: Use the table below to make your calculations.

Fully Assembled Original Measurements and Conversions							
Prototype Height		Prototype Length		Prototype Width		Conversion Rate	
						1 inch is equal to _____ Millimeters	
Convert Height		Convert Length		Convert Width			
_____mm	_____mm	_____mm	_____mm	_____mm	_____mm		
X inches	1 inch	X inches	1 inch	X inches	1 inch		

Will your fully assembled prototype fit on a standard flatbed?

# Extension 1: Packed Flat Conversions

Directions: Use the table below to make your calculations.

Packed Flat Original Measurements and Conversions				
Prototype Height	Prototype Length	Prototype Width	Conversion Rate	
			1 inch is equal to	_____ Millimeters

Convert Height		Convert Length		Convert Width	
_____mm	= _____mm	_____mm	= _____mm	_____mm	= _____mm
X inches	1 inch	X inches	1 inch	X inches	1 inch

Will your prototype fit when packed flat on a standard flatbed?

# Extension 1, Continued:

## Scale Up

Using proportions, determine an appropriate scale for your structure (here's a [guide to scale factors](#) help you). Remember, your scaled up structure must fit onto a flatbed truck when folded flat. Use the worksheet to compute the scaled length, width, and height.

Determine the scale factor needed in order to fit the your prototype in its **fully assembled size here.**

Determine the scale factor needed in order to fit the your prototype in its **packed flat size here.**

# Additional Helpful Resources For Conversions And Scale

Conversion chart: <https://www.mathsisfun.com/metric-imperial-conversion-charts.html>

Converting units: <https://www.mathsisfun.com/measure/unit-conversion-method.html>

Scale: <https://www.mathsisfun.com/definitions/scale-drawing.html>

Scale in detail: <https://www.mathsisfun.com/numbers/ratio.html>

How to solve ratios and proportions:

<https://www.mathplanet.com/education/algebra-1/how-to-solve-linear-equations/ratios-and-proportions-and-how-to-solve-them>