STEM CAREERS:
APPLIED ENGINEERING

Engineering Professionals

- Must be:
  - problem solvers
  - creative
  - analytical
  - attentive to details
  - inquisitive

ENGINEERS

What is an engineer?

An engineer is a person who uses technology and scientific knowledge to solve problems.

What Do Engineers Do?

- Research – Find solutions
- Design – **Drafting and AutoCad**
- Development – **Actual Construction**
- Supervise – Runs team of engineers

Fields of Engineering

Architectural Engineering

- **Structures** and safety of design

Electrical Engineering

- Deals with the use of **electronics** in various objects and fields

Automotive Engineering

- Design and build all types of **vehicles**:
  - Automobiles
  - Trucks
  - Tractors
  - Bulldozers
  - Motorcycles

Aeronautical Engineering

- Deals with **flight**

Civil Engineering

- Plan, design, and supervise the construction of facilities in both the public and private sectors
  - **bridges**
  - **buildings**
  - **highways**
  - **dams**

Drafting & Architecture

Roof trusses are common in residential and commercial building construction. Trusses are often manufactured off-site and then trucked in to a job site. Besides being very strong, trusses are generally cheaper than other roof designs. That's because they can be made from shorter lengths of 2x4s instead of more expensive 2x8s or 2x10s.

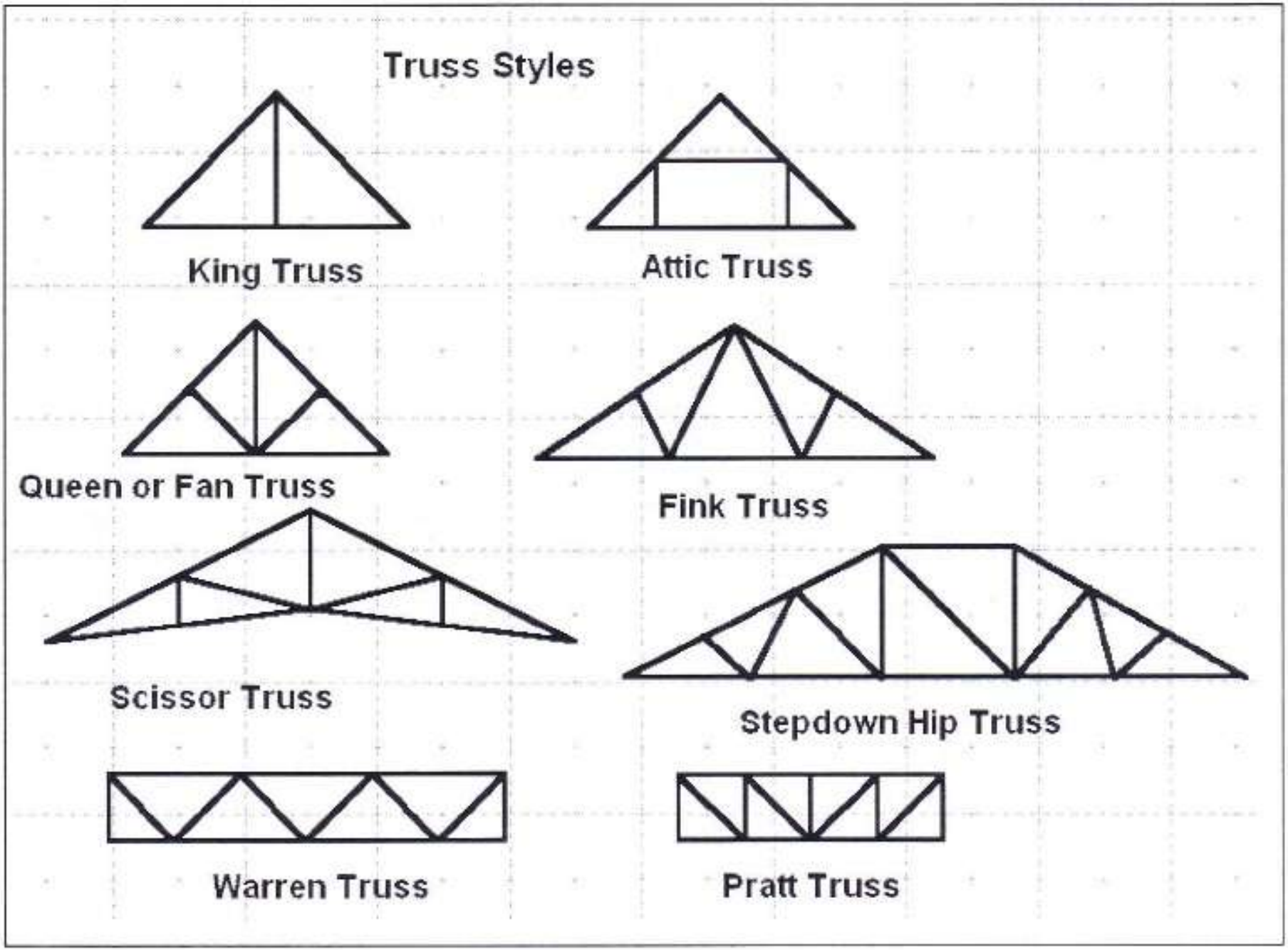
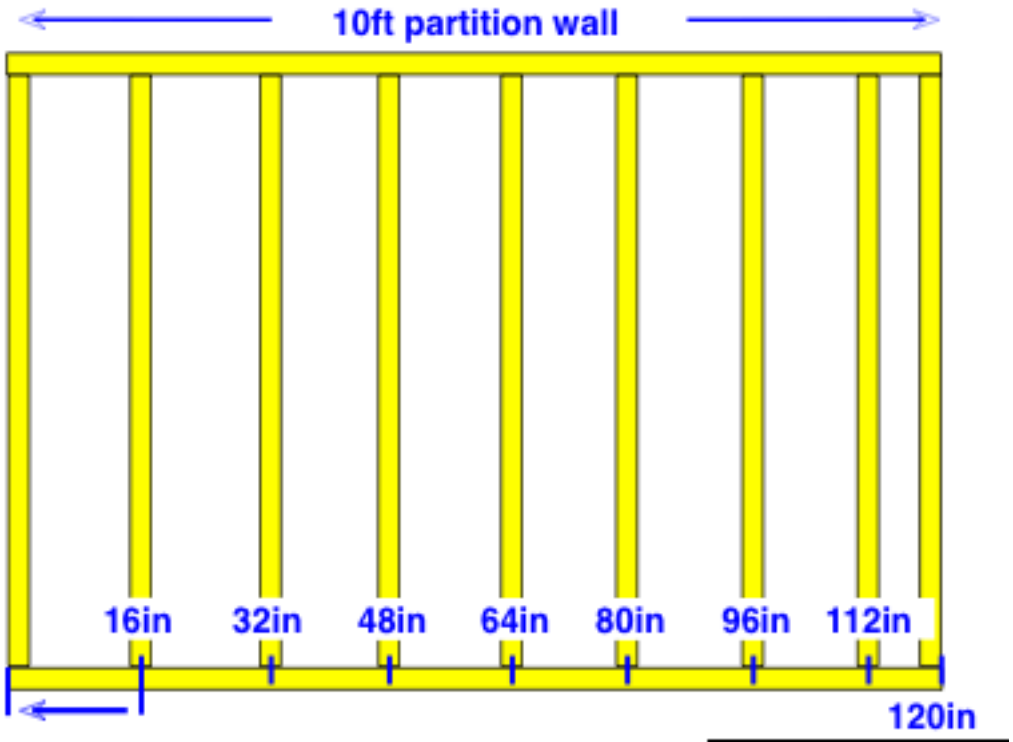

Truss Styles
King Truss
Attic Truss
Queen or Fan Truss
Fink Truss
Scissor Truss
Stepdown Hip Truss
Warren Truss
Pratt Truss

Figure 7

Building Codes

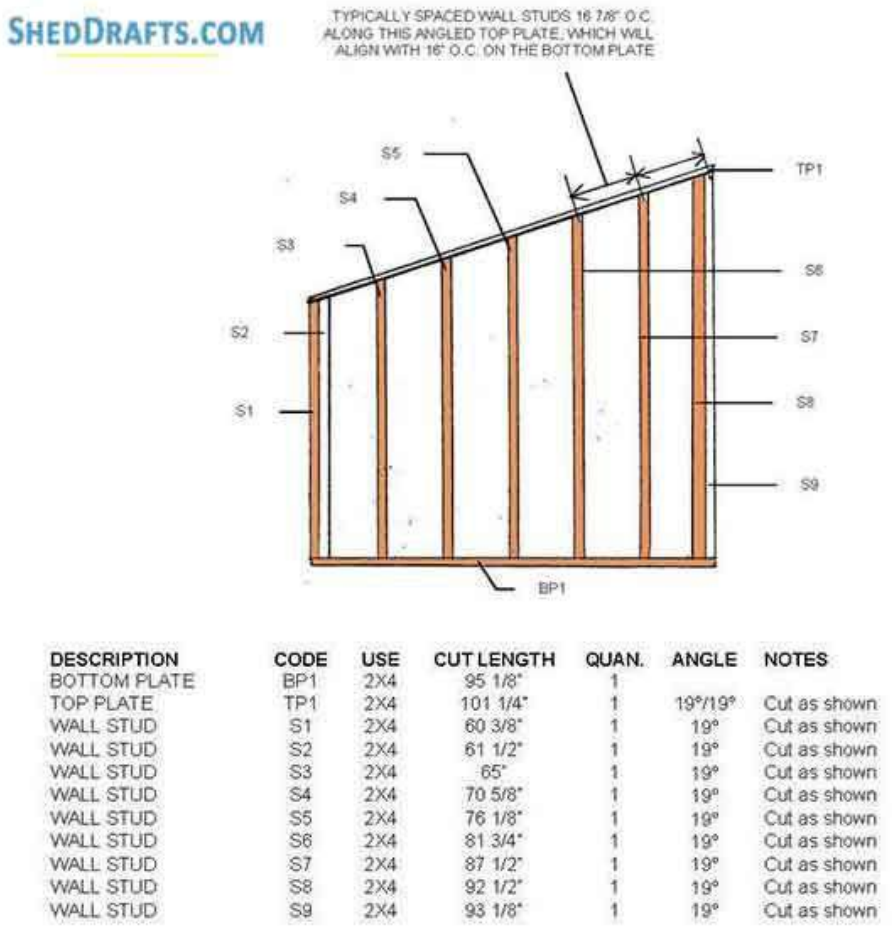
Building codes for residential home construction indicate that 2x4 studs on 16" centers are considered standard. This means that the centers of the studs will be 16" apart. The spacing is important because it determines how many vertical studs are in a wall. If one were to space studs at 32" increments, the wall would be essentially half as strong. Space the studs on 12" centers, and you have a wall that is stronger and more expensive to build because it will use 25% more wood. Engineers have determined that 16" centers gives enough vertical support for walls that are supporting a second story or roof. These types of walls are called load bearing. The 16" centers also makes hanging drywall easy because the 4'wide sheets span nicely from the center of one stud to another stud 4' along the wall.



The remains of the Sampoong Department store on the 29 June 1995 just hours after it collapsed, when air conditioning units on the roof crashed through to the floor.

Your Project

Draw 4 Blueprints



DESCRIPTION	CODE	USE	CUT LENGTH	QUAN.	ANGLE	NOTES
BOTTOM PLATE	BP1	2X4	95 1/8"	1		
TOP PLATE	TP1	2X4	101 1/4"	1	19°/19°	Cut as shown
WALL STUD	S1	2X4	60 3/8"	1	19°	Cut as shown
WALL STUD	S2	2X4	61 1/2"	1	19°	Cut as shown
WALL STUD	S3	2X4	65"	1	19°	Cut as shown
WALL STUD	S4	2X4	70 5/8"	1	19°	Cut as shown
WALL STUD	S5	2X4	76 1/8"	1	19°	Cut as shown
WALL STUD	S6	2X4	81 3/4"	1	19°	Cut as shown
WALL STUD	S7	2X4	87 1/2"	1	19°	Cut as shown
WALL STUD	S8	2X4	92 1/2"	1	19°	Cut as shown
WALL STUD	S9	2X4	93 1/8"	1	19°	Cut as shown

-1 Wall with Studs 1.4 inches apart

-1 Wall with studs 1.4 inches apart and a door that is 3 inches wide and 7 inches tall

-1 Wall with studs 1.4 inches apart and a window that is 2 inches by 3 inches

-1 Truss

Drawing and Building to Scale

When working with models, it's important to understand the concept of scale. Scale is the size of the model relative to the size it would actually be if it were built. A 1" = 1' scale means that each inch in the model is equal to 1 foot of actual size. This kit uses 3/4" scale. That means that every 3/4" is equal to 1'. So, every 1' of full size measurement takes up 3/4" on the scale model. (See figure 12.) The front and back walls of this model are built using 10' scale 2x4s. That is the real-world size. To figure out the length in inches for the scale size, one simply takes the real-world length and multiplies it by the scale—for example:

10 x 3/4" = 30/4 **30/4 = 7.5**

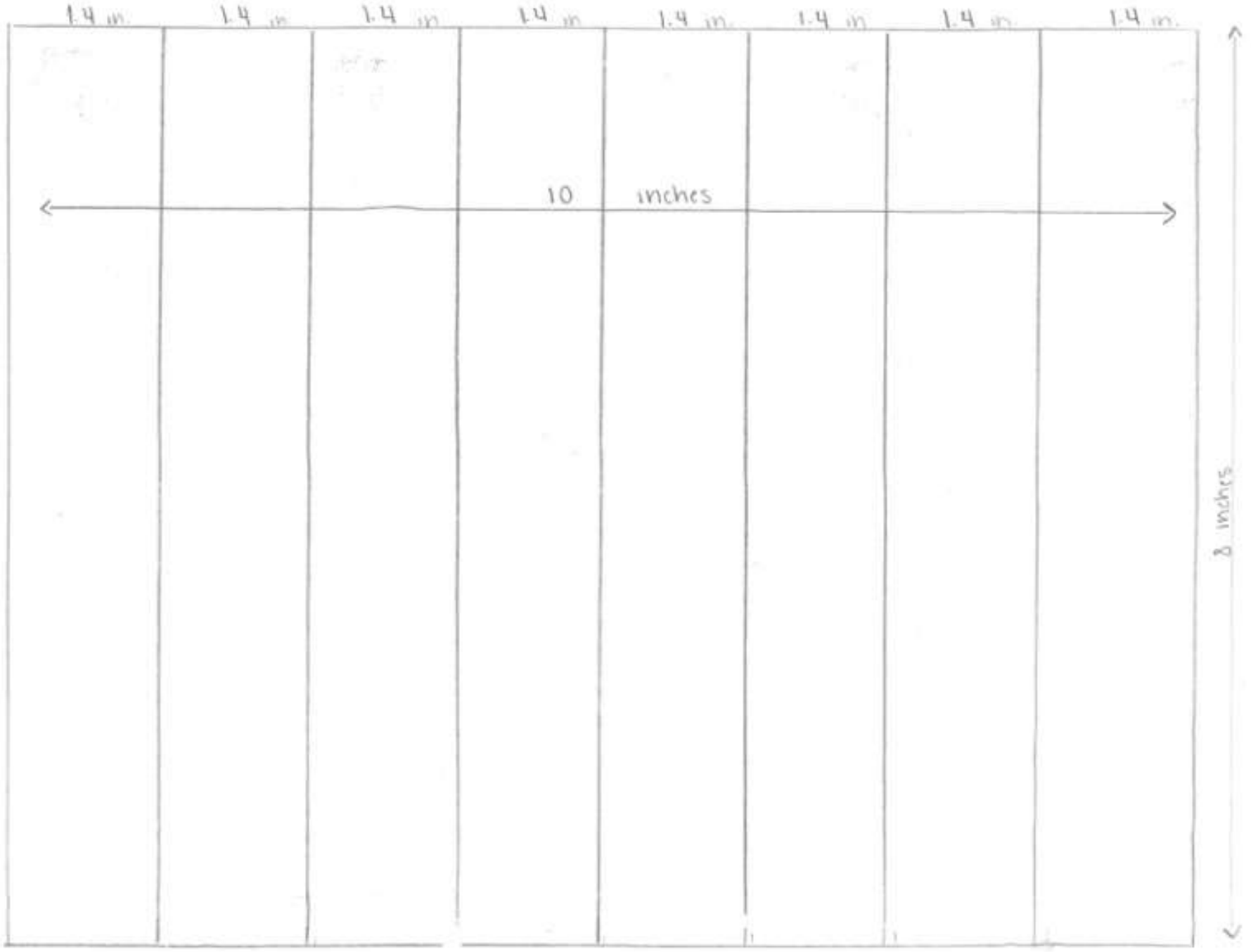
So, a 10' long 2x4 in scale is 7.5" long

The chart below shows the real-world measurements for the shed model along with their size in 3/4" scale.

Shed	
Real-World Size of Walls	**Size of Scale Model Walls**
10' long x 9' 4" wide x 8' high	7.5" long x 7" wide x 6" high

Scale

- 10 ft = 10 inches (Length)
- 8 ft = 8 inches (Height)
- Studs are 1.4 inches apart
- Window (26 x 36 = 2 in x 3 in)
- Door (36 x 84 = 3 in x 7 in)
- Truss make 10 inches long and measure 30 degree angle to center of truss.


1.4 in.
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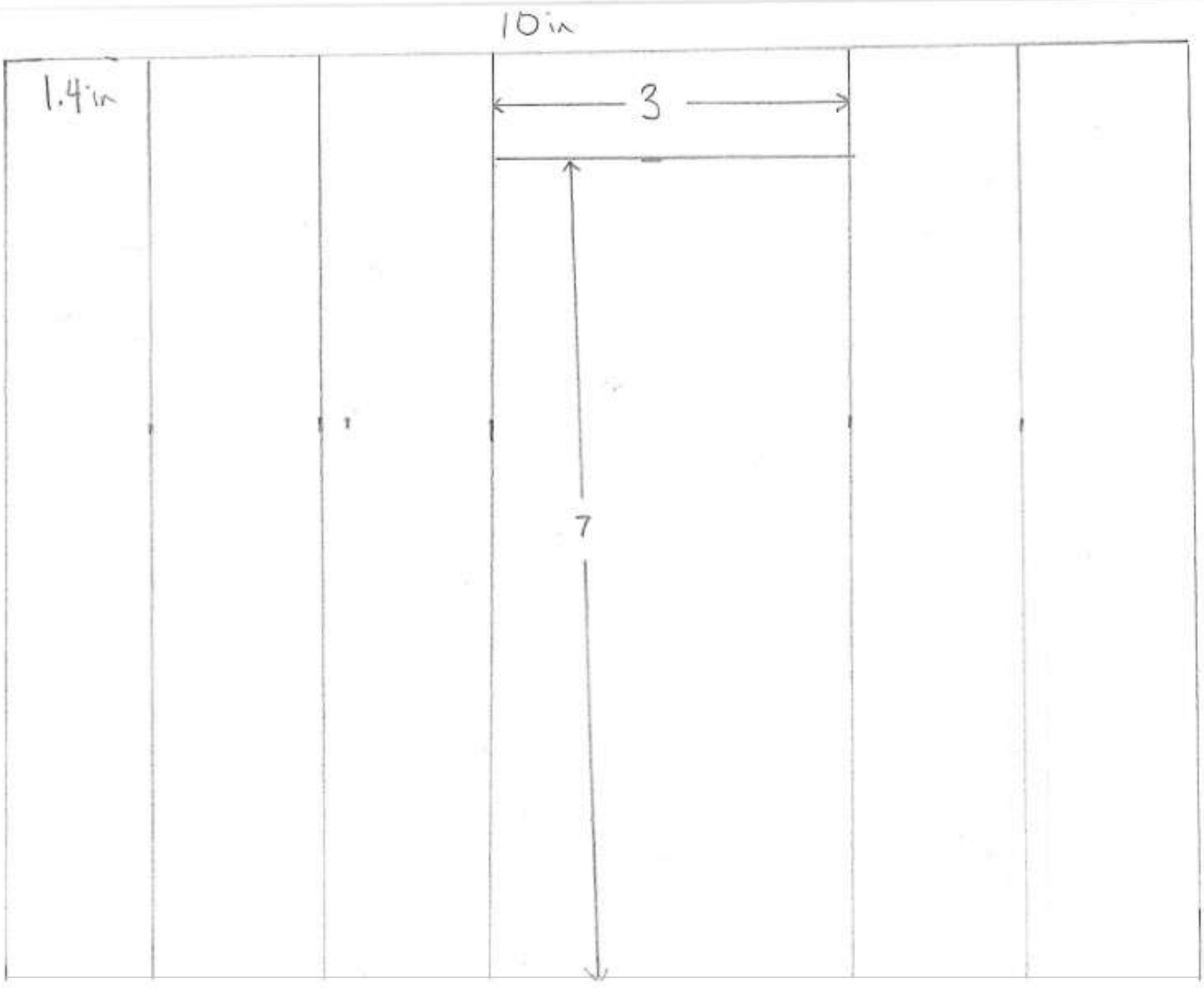
1.4 in.
1.4 in.
10 inches
8 inches


10 in
1.4 in
3
7


1.4 in.
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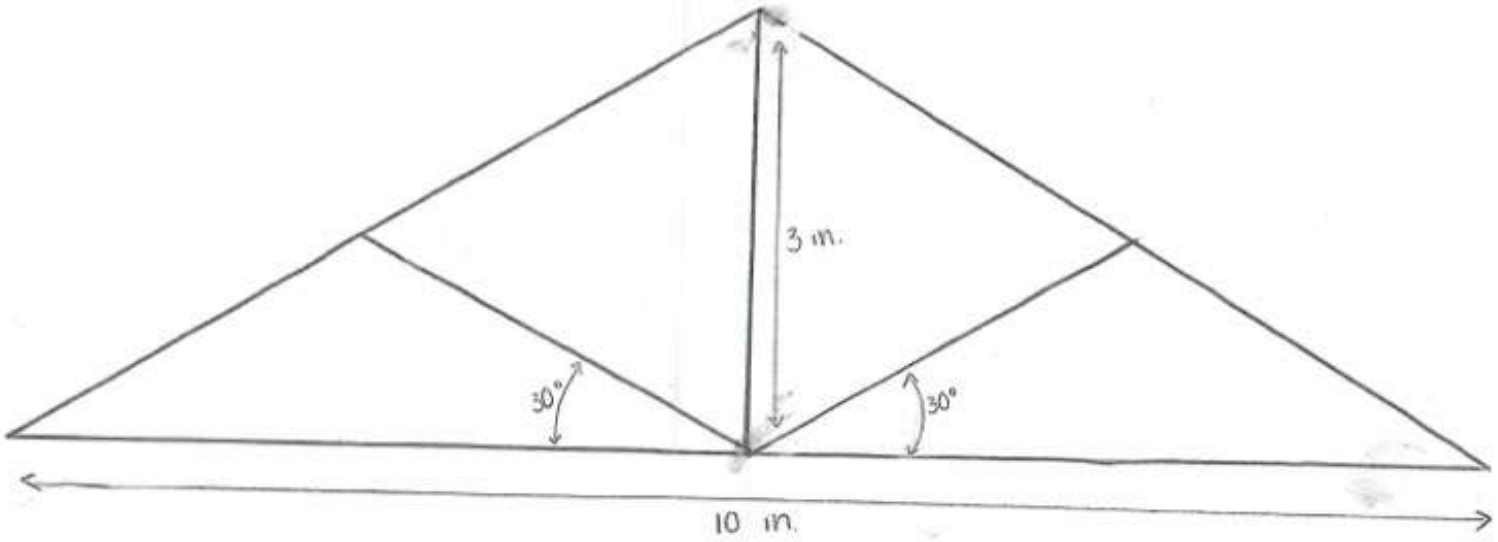
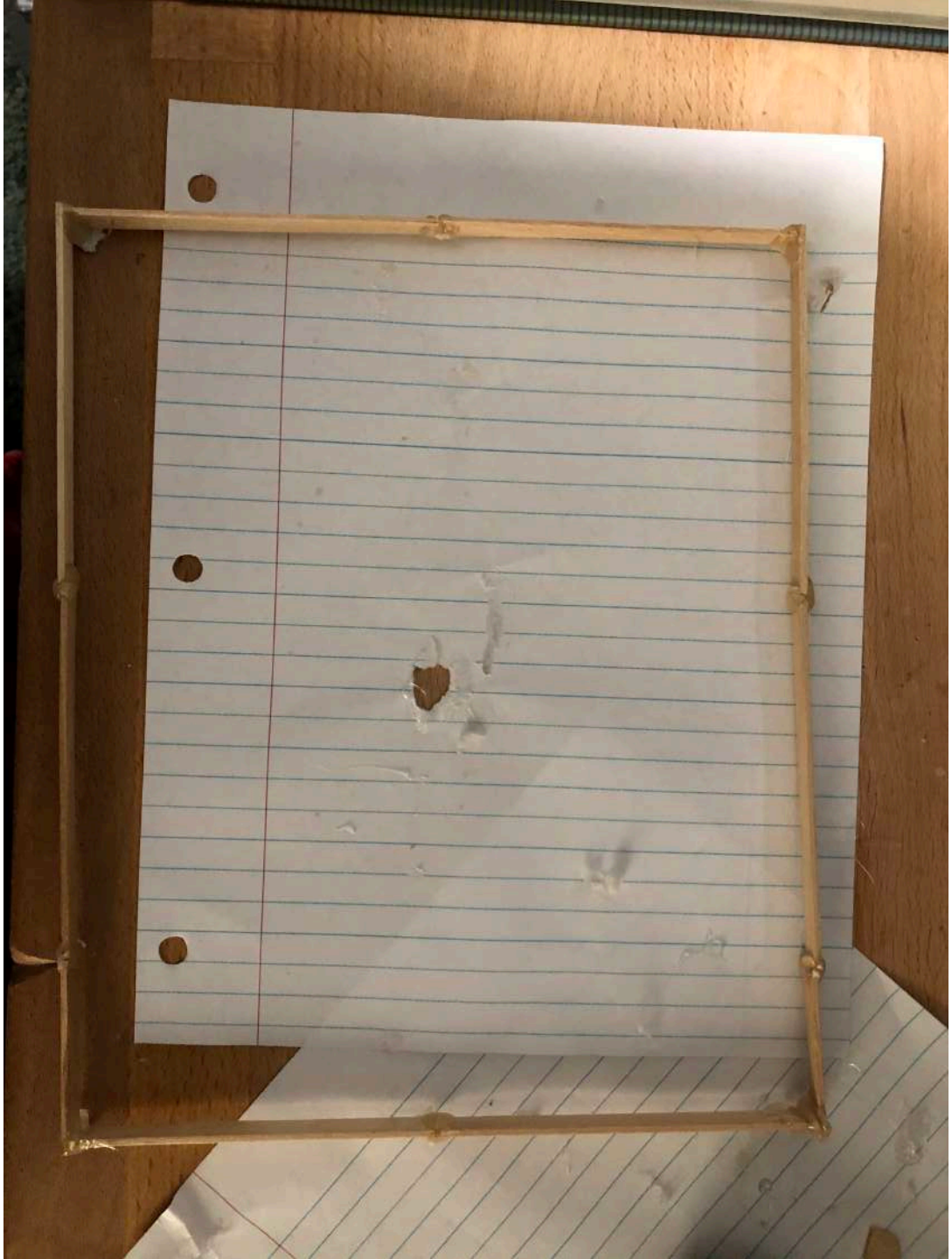
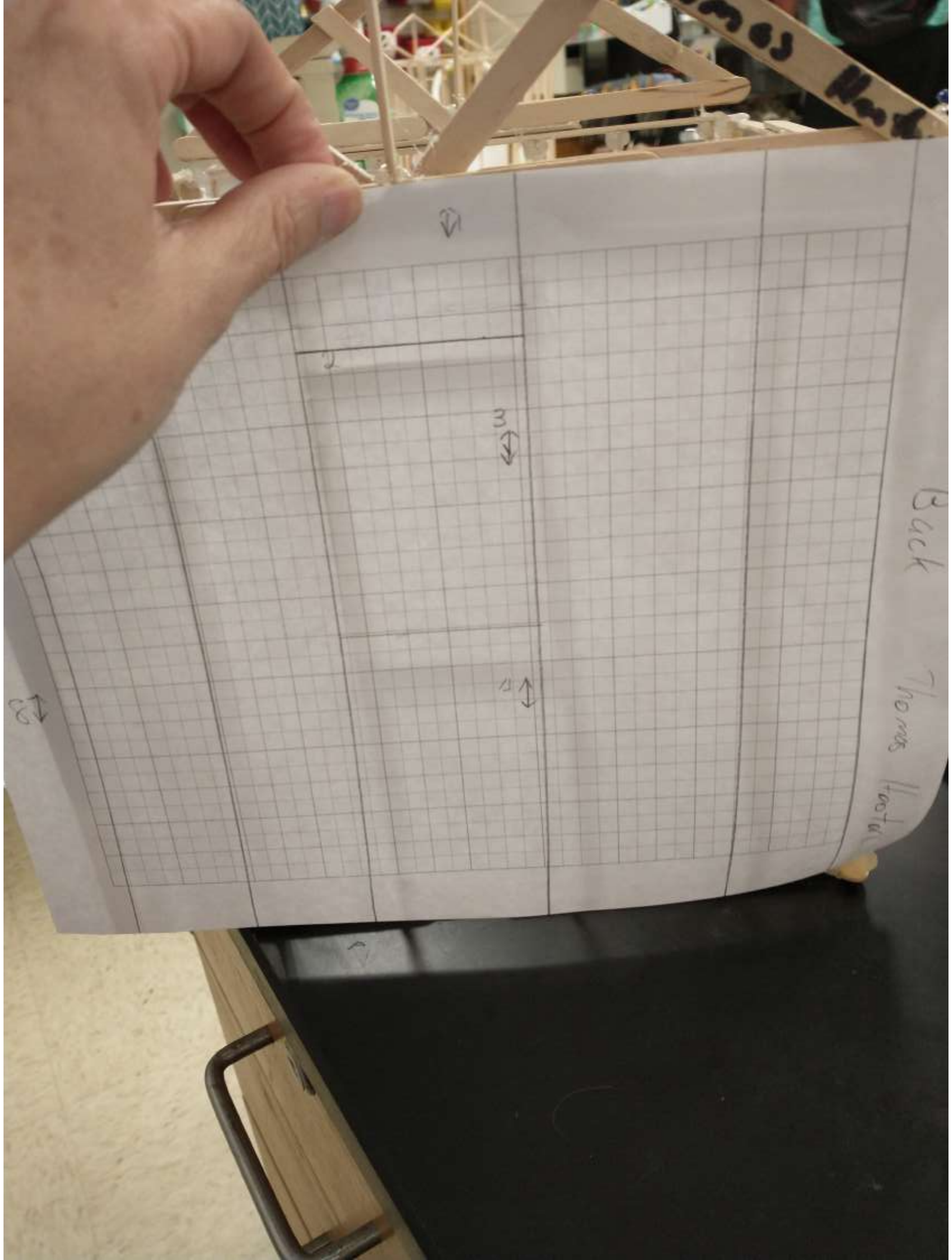
1.4 in.
10 inches
3 inches
2 inches
8 inches


3 in.
30°
30°
10 in.



Build the frame first


Back
Thomas