1. Identify the type of force being described
a. The load is applied to the top of a structure is $\qquad$
b. The load is applied along the structure in a pulling action is $\qquad$
c. A bookshelf loaded down with heavy books is like $\qquad$
d. When forces are exerted on the same plane but opposite directions is $\qquad$
e. Forces that try to twist the structure apart are $\qquad$
2. Identify the force being described in each picture

3. Identify the type of bridge below:

4. Be familiar with at least two different types of truss designs, you will need to be able to sketch them for free response questions

## Scale Problems - Station 2

Complete to find each unknown measure.

1. A map scale is 1 in . $=75 \mathrm{mi}$. The map distance between two towns is 3.5 in . Find the actual distance $x$ between the towns.
$\frac{\text { actual distance }}{\text { map distance }}=\frac{\text { actual distance }}{\text { map distance }}$

$$
\begin{aligned}
\frac{75 \mathrm{mi}}{\mathrm{in} .} & =\frac{x \mathrm{mi}}{\mathrm{in} .} \\
x & =
\end{aligned}
$$

actual distance $=$
3. An archway in a $\frac{1}{2}$ in. scale drawing is 4.5 in . tall. Find the actual height $x$. $\frac{\text { actual height }}{\text { scale height }}=\frac{\text { actual height }}{\text { scale height }}$

$$
\frac{1 \mathrm{ft}}{0.5 \mathrm{in.}}=\frac{\mathrm{ft}}{\mathrm{in.}}
$$

$\qquad$
$\qquad$
actual height $=$
2. The actual distance between two towns is 175 km . If the distance between them on a map is 7 cm , what is the map scale?

$$
\frac{x \mathrm{~km}}{1 \mathrm{~cm}}=\frac{\mathrm{km}}{\mathrm{~cm}}
$$

$$
x=
$$

$\qquad$
map scale: $1 \mathrm{~cm}=$ $\qquad$
4. Under a 7:1 magnification, this letter $F$ appears to be 84 points high. Find the actual height $x$. $\frac{\text { actual height }}{\text { scale height }}=\frac{\text { actual height }}{\text { scale height }}$

$$
\frac{1}{7}=\frac{\text { points }}{\text { points }}
$$

actual height $=$ $\qquad$

A goofy postal clerk thinks that postage for packages is charged by the mile. He wants you to find the actual distance for each distance on the map so that he can sell you the right amount of stamps. The scale of the map is $1 \mathbf{i n} .=25 \mathrm{mi}$.

The clerk has a riddle for you. Match your answers with the numbers in the riddle, then fill in the letter for each answer to solve the riddle.

1. 3 in. $=$ $\qquad$ 0
2. 4.5 in . $=$ $\qquad$ T
3. 7.5 in. $=$ $\qquad$ L
4. 15.3 in. $=$ $\qquad$ H
5. 2 in. $=$ $\qquad$ V
6. 11.25 in . $=$ $\qquad$ S
7. 6.5 in. $=$ $\qquad$ N
8. 5 in. $=$ $\qquad$ A
9. 25 in . $=$ $\qquad$ P
10. 7.9 in. $=$ $\qquad$ M

A girl bought two stamps at the post office and asked the person behind her in line for help in applying the stamps. Why didn't she put the stamps on herself?
She didn't want the stamps on herself, she wanted

112.5
E

$$
162.5
$$


E


## Scale Problems Part II - Station 3

1. Convert the following scales to unitless scales
a) $\frac{1}{4} \mathrm{in}=15 \mathrm{ft}$
b) 1 in $=20 \mathrm{in}$
c) $4 \mathrm{~cm}=1$ meter

d) 1 inch $=1$ mile
2. The scale of a drawing is $1 \mathrm{in}=20$ feet. Find the length each measurement would be on a scale drawing.
a) 200 ft
b) 490 ft
c) 95 ft
d) 260 ft
3. The scale of a drawing is $1 / 4$ in $=10$ feet. Find the actual measurement.
a) 1 in
b) 3.5 in
c) $1 / 8$ in
d) 3 in
4. A bridge consisting of 10 tons of cement can carry up to 303000 -pound cars. For this scenario, what is the live load, dead load and structural efficiency? (1 ton = 2000 lbs )
5. A bridge is made of three 4 gram sticks of balsa wood and 9 grams of hot glue. If the bridge holds 10 pounds, what is the live load, dead load and structural efficiency? (1 pound = 454 grams)
6. For the following scenarios, find the structural efficiency:
7. Live Load $=20,000 \mathrm{~kg}$

Dead Load $=10,000 \mathrm{~kg}$
$S E=$ $\qquad$
2. Live Load $=15 \mathrm{lbs}$

Dead Load $=25$ grams
$S E=$ $\qquad$
3. Live Load $=100,000 \mathrm{~kg}$

Dead Load $=2000$ kg
$S E=$ $\qquad$

Identify Parts of a Bridge - Station 5

| Word Bank: | Beam | Deck | Girder | Pier | Span |
| :--- | :--- | :--- | :--- | :--- | :--- |



1. A transit level which is 4 feet and 3 inches tall is situated on the East side of a 100-yard field. If a surveyor reads 5 feet and 1 inch on a surveying rod on the West side of the field, then what is the change in elevation of the field? Which side is higher in elevation?
2. A surveyor is trying to determine the grade of a ramp which spans a horizontal distance of 50 feet. A transit level is set to exactly 5 feet tall at the bottom of the ramp and reads 1 feet 6 inches on a surveying rod at the top of the ramp, then what is the grade of the ramp?
3. If a road spans a 300 -foot horizontal distance and goes down an elevation of 12 feet, what is the grade of the road?
4. What tall is the ant hill below?

5. Florida man is concerned that his beach-side home may become flooded during the upcoming hurricane season. To determine how many feet of storm water his home can withstand, he sets a transit-level on his front door and a surveying rod at sea level 200 feet away. If the transit level is 4 feet and 8 inches tall and he reads 12 feet and 4 inches on the surveying rod, then how many feet of a storm surge can his home withstand before flooding?
