

Activity 1:

A. What are three types of engineers mentioned in the video and what do they do?

Type of Engineer	What does s/he do?
_____	_____
_____	_____
_____	_____

B. What do all engineers do?

C. What main courses do you need focus on in school to become an engineer?

Activity 2:

Engineering Terms and Questions Worksheet

Define or explain each of the following terms: Use the Engineering Terms Power Point to assist you. (1 mark each = 17 marks total)

1. Loads: _____

2. Live Loads: _____

3. Dead Loads: _____

4. Dynamic Loads: _____

5. Tacoma Narrows Bridge: _____

6. Stress: _____

7. Compression: _____

8. Tension: _____

9. Sheer: _____

10. Sheer Strength: _____

11. Bending: _____

12. Torsion: _____

13. Arches: _____

14. Trusses: _____

15. Web Member: _____

16. Earthquake: _____

17. Piles: _____

Fill in the blanks: Use the Engineering Terms Power Point to assist you. (1/2 mark each = 18 marks total)

1. Another name for a dead load is _____
2. General masses on a structure and wind, impacts, vibrations, bending or internal twisting distortions transferred through the structure, are all examples of _____.
3. The weight of the bridge itself is an example of a _____ load.
4. Name the 5 types of stresses that can act on a bridge. _____
5. _____
6. The force that acts on a material to stretch it or to make it longer is called _____.
7. The force that acts on a material to make it more compact is called _____.
8. What type of material usually has more "shear strength"? _____

9. _____ occurs when a material is broken by two opposing forces.
10. This occurs when the top of a beam is in compression and the bottom of the beam is in tension.

11. What was the most dangerous force acting on the Tacoma Narrows bridge? _____
12. What is needed for a rectangle or a square to be considered a strong shape?

13. The two strongest shapes are _____ and _____.
14. Triangles strengthen towers by keeping them _____.
15. Generally speaking, the more Triangle shapes in a tower, the _____ the tower.
16. Arches support loads at _____ point along the curve, while triangles on support loads at the _____.
17. Trusses are _____, _____, and _____ than a solid beam of the same dimensions.
18. After the 1906 earthquake in California, engineers learned that _____ and _____ framed construction was superior to building made of brick and mortar.
19. The horizontal waves of an earthquake make _____ structures prone to collapse.
20. These two construction materials give a building more flexibility (less rigid) so they can survive earthquakes. _____
21. Building between _____ and _____ stories high are most at risk to earthquake damage.
22. Earthquakes cause soil to move or settle so it is best to build tall building on _____.
23. In Canada, frost heave causes us to use piles under _____ at our residence/house.
24. Wet soil tends to _____ in an earthquake.
25. Dry soil tends to _____ in an earthquake.
26. Tall building can _____ in an earthquake if they are built on dry, sandy soil or wet soil.

Activity 3:

1. What are the **three** biggest considerations in deciding the type of bridge to build according to the bridge engineer?

2. **Bridge Lab 1** - Identify each type of bridge:



Type: _____

One important Feature: _____



Type: _____

One important Feature: _____



Type: _____

One important Feature: _____



Type: _____

One important Feature: _____

Activity 5:



Record your Results!

1. 24 Meter Bridge Suspension Bridge:
 - Standard Abutment, no piers, two cable anchors
 - (Choose the Suspension – Warren Truss Template)

Cost: _____ **Teacher's Initials after seeing it:** _____

2. 24 Meter
 - Standard Abutment, no piers, no cable anchors
 - (Choose Pratt Through Trusses)

Cost: _____ **Teacher's Initials after seeing it:** _____

3. Design your own 24 meter bridge without any template (choose "none"). The bridge should cost less than \$100,000 and support a standard load.

Cost: _____ **Teacher's Initials after seeing it:** _____

Activity 6: Engineering Mistakes

List 6 engineering mistakes and indicate the reason for the failure.

1. Mistake: _____

Reason: _____

2. Mistake: _____

Reason: _____

3. Mistake: _____

Reason: _____

4. Mistake: _____

Reason: _____

5. Mistake: _____

Reason: _____

6. Mistake: _____

Reason: _____

Activity 7: Bridge Band Aids (Optional)

1. How are bridges like human bodies?
2. What is the problem with many bridges across North America?
3. What are some advantages (2) and disadvantage of using composite materials to repair bridges?