

Structures and Forces
Topic 3-7 Test Topics

REVIEW

(some topics covered again from Topic 3)

Topic 3: Mass and Forces

Gravity
Gravitational force
Newton
1kg = 10N

Topic 4 : Forces, Loads and Stresses

External forces
Internal forces
Deformation
Dead load
Live load

Tension forces
Tensile strength
Compression
Compressive strength

Shear force
Shear strength
Torsion forces
Torsion strength
bending force

Topic 5: How Structures Fail

Lever	Bend or Buckle
Fulcrum	Torsion
Shear	Metal Fatigue

Topic 6: Designing with Forces

Three key methods to help structures withstand forces
Strong shapes
Arch
Cantilever
Brace
Beams (I, L, T, box, cylindrical)
Corrugations
Flying Buttress
Using Friction in structures

Topic 7: Stable Structures

Stable

Center of Gravity

Thrust line

Unbalanced structures

3 ways to insure a firm foundation

pilings

Footing

Gyroscope

Spin stabilization

Review questions:

1. Forces, Loads and Stresses- Define each of the following terms *and* give an example

External Forces:

1. Dead load:

2. Live load:

Internal Forces:

1. Tension forces:

Tensile strength:

2. Compression forces:

Compressive strength:

3. Shear Forces:

Shear strength

4. Torsion Forces:

Torsion strength:

5. Bending force:

2. Refer to page 314!

Steel has a high _____ . The particles inside of it have _____ pulling it together – giving it _____ tensile strength.

Graphite has a low _____. Its particles are arranged in _____, but the _____ between the layers are relatively _____. Because the layers _____ over one another _____, graphite is _____.

Rubber is an example of a substance that has _____
strength. Each _____ is _____ in ALL
directions. The _____ hold together even when it is
_____ out of shape.

3. What are three key methods to help structures withstand forces (page 321)

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* Read Problems 1 – 3 and the possible solutions!

* Read ALL of Page 323 a few times!

4. What are the types of beams? What advantage do they provide?

5. Indicate the advantage of using:

a. Arches

b. Cantilever

c. Braces

5. What is friction and how can you use it to help hold together structures?

* Read page 328.

6. What is the Centre of Gravity?

* Read Unbalanced Structures and the Photos beneath (Figures 4.67 A,B,C, & D)

Thrust line

Counter weight

7. Read page 336 – 337. Summarize how each of the following is important in building a **Firm Foundation**.

Find something solid

Make a solid layer

Spread the load