

Structures and Forces Practice Quiz

Topic 7 - Stable Structures

1. Stability in a structure is dependant on a number of factors. One of these factors is whether or not a structure could fail if an extreme force was applied to the structure that was not in the original design specifications. The World Trade Center Tower's collapse is example of a structure failing because it encountered a force beyond what it was designed to withstand. The Empire State building is a steel frame building that survived the crash of a USAF Bomber hitting it between the 78th and the 79th floors. The design component that likely enabled the Empire State building to withstand this incredible force was its ...
reinforced concrete

mass

central location

lack of glass materials used

2. The Leaning Tower of Pisa is an example of a mass structure. The Tower was built with a lean originally and it had been getting worse, because of the foundation on which it was built. The structure has not fallen over yet, because its center of gravity still keeps it relatively stable. Once it started to lean more, engineers knew that the center of gravity shifted. The reason that the Tower is moving is because ...
it is very windy in Pisa

Pisa has many earthquakes

the thrust line is inside the foundation

the thrust line is outside the foundation

3. Observe each of the situations below and identify which structure will not likely fail.



4. A firm foundation is necessary to support a structure. Solid ground is not always firm and stable. There are environmental and man-made conditions which make the soil loosen and become compact, which makes the soil relatively unstable. Three strategies are use to ensure a structure is built on a firm foundation. The three strategies include all of the following, **EXCEPT ...**

find something solid

make a soil layer

spread the load

utilize pressure and density

5. Sometimes if a new invention comes along, it is based on a scientific principle. Again that is the case with 'Ginger', or 'It' as it was called. The one person motorized vehicle that was recently unveiled uses the principle - **to gain stability of a forward moving object, you need to increase its speed**. This new invention utilizes this principle with one of its components, a ...

gymnosperm

gyroscope

spinacre

rotator disk

Check your Answers

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reinforced concrete

mass (Text p. 329) Off The Wall

central location

lack of glass materials used

2. The Leaning Tower of Pisa is an example of a mass structure. The Tower was built with a lean originally and it had been getting worse, because of the foundation on which it was built. The structure has not fallen over yet, because its center of gravity still keeps it relatively stable. Once it started to lean more, engineers knew that the center of gravity shifted. The reason that the Tower is moving is because ...
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Pisa has many earthquakes

the thrust line is inside the foundation

the thrust line is outside the foundation (Text p. 321) As soon as the center of gravity moves, the trust line moves outside of the foundation and when it gets to a certain point, the structure will fail

3. Observe each of the situations below and identify which structure will likely fail.



This structure is likely the most stable structure because it is built on a firm foundation of rock. Each of the other situations could cause the structure to fail because of the layer of clay below the cement.

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find something solid

make a soil layer

spread the load

utilize pressure and density (Text p. 337) To create a firm foundation this is not identified

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gymnosperm

gyroscope (Text p. 340) Figure 4.69B Spin stabilization keeps the gyroscope pointing in the same direction

spinacre

rotator disk