**Вариант 7.**

**FOUNDATIONS**

Why does the Learning Tower of Pisa lean? The answer is that its foundations were not soundly laid. From the earliest times, architects and engineers have been aware of the problems involved in laying a building’s

foundations. But they have not always realized what extent the earth can be pressed down by the weight of a building. Too little allowance has sometimes been made for the possibility of a heavy structure’s sinking

unevenly. (Though the Leaning Tower is 14 feet out of the perpendicular, it has never toppled. As the building began to lean over, the builders altered the design of the upper stories to balance it. At the same time as

one side of it sank into the ground, the earth beneath was compressed until it became dense enough to prevent further movement.)

The foundation supports a house. If the earth is stable, laying the foundations of small buildings possess few problems. But in a tall modern structure the load may be very heavy indeed. That’s why the foundation

engineer has an extremely important job to do. To begin with, he must have a thorough understanding of soil mechanics, which entails a scientific study of the ground to see what load it can bear without dangerous movement.

First construction workers begin excavating, or digging holes or trenches for the footings, the lowest part of the foundation. Trial pits are dug, or holes are bored, in order to collect undisturbed samples of earth from

various depths. By examining these, the engineer can forecast the probable shifts in the earth during and after building, according to the sort of foundation he designs. Thus he comes to the most important decision of

all in the building’s construction: he decides whether the earth is of the type that can best support each column on a separate solid block, or the building on″float″whether he must aim at lightness and, as it were,

hollow foundations. The footings support each wall load. They are made by pouring concrete into wood or steel forms that workers place below the frost line or the depth to which the ground freezes. This is done so that the footings will not freeze and shift. Footings usually extend from 1 to 6 feet (30 to 180 centimeters)

beneath ground level. Builders generally use concrete or concrete block for the house’s foundation. The foundation may extend from 8 inches to 3 feet (20 to 91 centimeters) above the ground.

If firm ground has been found only at great depth, the foundation engineer may use piles. These are solid shafts made either by driving reinforced, precast concrete deep into the ground, or by boring holes in the earth and pouring in the concrete. Each pile supports its load in one or both of two ways. It may serve as a column with its foot driven into solid earth or rock or it may stand firm because friction along its sides ″grips″

 the column and prevents it from sinking.

The area within the foundation below the first story is the basement.

Basements add to the cost of building a house, but they provide extra room. In other words, when it is a question of floating a building, the foundations take the form of a vast, hollow concrete box. This box is

divided into separate chambers for the home’s heating unit, ventilating plants and laundry equipment, and for storage space for the building.

Some basements also have a recreation room. Only about 40 per cent of the houses, built today, have basements. In many low or damp regions, houses are raised above the ground on concrete piers, or supports.

Sometimes a slab foundation is laid directly on the ground, especially if the earth beneath a house is hard. The ground must first be leveled. Workers then spread a filler, usually stone, and cover it with a moistureproof

paper. The filler and the paper prevent moisture from coming through the slab that is made by pouring concrete, about 4 inches (10 centimeters)thick, directly on top of the paper.

Luckiest of all are those foundation engineers whose buildings stand on hard rock like granite or ironstone. For them neither piles nor flotation need to be used.

1. **Answer the following questions:**
2. Were the foundations of the Tower of Pisa soundly laid?
3. What were the problems of a building’s foundations from the earliest times?
4. What was difficult to realize for architects and engineers at that time?
5. Has the Tower toppled down?
6. What has been done to prevent the Leaning Tower of Pisa from this?
7. Why is it difficult to lay foundation of a tall modern structure?
8. What supports a house?
9. What is most important for the foundation engineer to know?
10. What must engineer learn before deciding what type of foundation is necessary for that soil?
11. What is necessary to do first?
12. What is necessary to do to collect undisturbed samples of earth from various depths?
13. What can the engineer forecast?
14. What is the most important decision of all in the building’s construction?
15. Each wall load is supported by wood, isn’t it?
16. What are the footings made by?
17. Why do workers place the footings below the frost line?
18. What is used for the house’s foundation?
19. In what cases the piles are used?
20. What are piles?
21. Each pile supports its load in one or both of two ways, doesn’t it?
22. In what functions a pile may serve?
23. What is a basement?
24. When do the foundations take the form of a vast, hollow concrete box?
25. Why is this box divided into chambers?
26. When a filler is used?
27. What prevents moisture from coming through the slab?
28. **Complete the sentences according to the text:**
29. The Learning Tower of Pisa lean because … .
30. Laying a building’s foundation was a problem for … .
31. Too little allowance has sometimes been made for … by architects and engineers.
32. The Tower of Pisa has never toppled in spite of the fact that … .
33. the builders altered the design of … as the building began … .
34. The earth beneath was compressed … .
35. … the foundations of small buildings possess few problems.
36. The foundation engineer has an extremely important job to do if … .
37. The knowledge of soil mechanics, which entails … without dangerous movement.
38. First construction workers begin excavating, … .
39. In order to collect undisturbed samples of earth from various depths it is necessary …. .
40. … that workers place below the frost line or the depth to which the ground freezes.
41. Footings usually extend from … .
42. The foundation engineer may use piles if … .
43. A pile may stand firm because … .
44. … , but they provide extra room.
45. The foundations take the form of a vast, hollow concrete box when … .
46. … above the ground on concrete piers, or supports.
47. … especially if the earth beneath a house is hard.
48. Workers then spread a filler, … , and cover it with a moistureproof paper.
49. The filler and the paper prevent … that is made by pouring concrete, about 4 inches (10 centimeters) thick, … .
50. Neither piles nor flotation need to be used if … .
51. **Choose a word to put into each gap:**

Sinking, a slab foundation, hollow, to prevent, soil mechanics, concrete piers, column, the foundations, concrete, the design, trial pits, solid, sank,extent, toppled, the load, basements, floating, dense, pile, thick, sinking a building, to lean, the paper, a filler, undisturbed, moistureproof,″grips″

1. Architects and engineers have not always realized what … the earth can be pressed down by the weight of … .
2. They paid little attention for the possibility of a heavy structure’s … unevenly.
3. The Tower has never … though it is 14 feet out of the perpendicular.
4. To balance it the builders altered … of the upper stories when the building began … over.
5. One side of the Tower … into the ground that’s why the earth beneath was compressed until it became … enough … further movement.
6. In a tall modern structure … may be very heavy indeed.
7. The foundation engineer must have a thorough understanding of … .
8. To collect … samples of earth from various depths it is necessary to dig … .
9. The engineer decides whether the earth is of the type that can best support each … on a separate … block.

 10. Each … supports its load in one or both of two ways.

11. A pile may stand firm because friction along its sides … the column and prevents it from … .

12. But when it is a question of … a building, … take the form of a vast, … concrete box.

 13. Some … also have a recreation room.

14. In many low or damp regions, houses are raised above the ground on… , or supports.

15. Sometimes … is laid directly on the ground.

16. Workers then spread … , usually stone, and cover it with a … paper.

 17. The filler and ... prevent moisture from coming through the slab that is made by pouring… , about 4 inches (10 centimeters) … , directly on top of the paper.