<Proficiency Test (1) (Answer)>

Choose the best word or phrase from the choices about construction management.

Construction management usually covers the management of (**A: construction process**), (**B: quality**), (**C: works**), human power, equipment and material, work facility, (**D: safety**) and others. In road construction work, (**E: process control**), (**F: quality control**) and (**G: work management**) are particularly important.

Works shall be carried out according to (**H: the progress chart**), and when there is (**I: a delay in progress**) during the work, it is important to (**J: investigate its cause**) and (**K: accelerate the work**) as soon as possible. For this reason, process control is necessary.

For quality control in road construction, it takes (**L: considerable work capacity**) to find faulty points and fix them after work completion, which significantly impedes (**M: work progress**).

<Choices> safety, work management, process control, a delay in progress, quality control, accelerate the work, works, construction process, quality, considerable work capacity, investigate its cause, work progress, the progress chart

<Proficiency Test (2) − 1 (Answer)>

Choose the best word or phrase from the choices about facility machinery.

Due to the nature of the work, (A: cost estimates), (B: plans), and (C: supervision and guidance) has (D: a direct and significant impact) on the success or failure of the work, and the leader should make the most effective use of (E: the machine's capabilities) based on the operation.

The work environment, work scale, and (F: characteristics of machinery) are taken into consideration, and careful preparation, including (G: selection of machines to be used) and formulation of (H: work procedures).

Provide timely and appropriate (I: supervision and guidance) to ensure the (J: safe and reliable) completion of the work.

<Choices> supervision and guidance, characteristics of machinery, a direct and significant impact, the machine's capabilities, plans, cost estimates, selection of machines to be used, work procedures, safe and reliable

Choose the best word or phrase from the choices about mechanical execution,.

- It can reduce (**A: labor**) and complete the work quickly.
- It can maintain the (**B: uniformity**) of work and improve (**C: the quality of construction**).
- It can improve (**D: work capability**) by partially using human-powered construction.
- It is significantly affected by (**E: weather**), terrain, and (**F: soil properties**).
- Work efficiency varies significantly depending on (**G: the types of machines**) used and their combination guidelines.
- It is greatly influenced by (**H: supply**), (**I: maintenance**) and (**J: the skills of the operator**).

uniformity, the quality of construction, work capability, the skills of the operator, weather, labor, soil properties, the types of machines, maintenance, supply

Choose the best word or phrase from the choices about volume change of soil.

When it is in the natural ground (natural state), when it is (A: **loosened**), and when it is (B: **compacted**) after being loosened, soil has a different (C: **volume**).

For the three states of volume of soil, the soil volume in the natural ground is called (D: **kiritsubo**), the volume of loosened soil is called (E: **agetsubo**) and soil volume after compaction is called (F: **shimetsubo**).

<Choices> kiritsubo, compacted, agetsubo, loosened, volume, shimetsubo
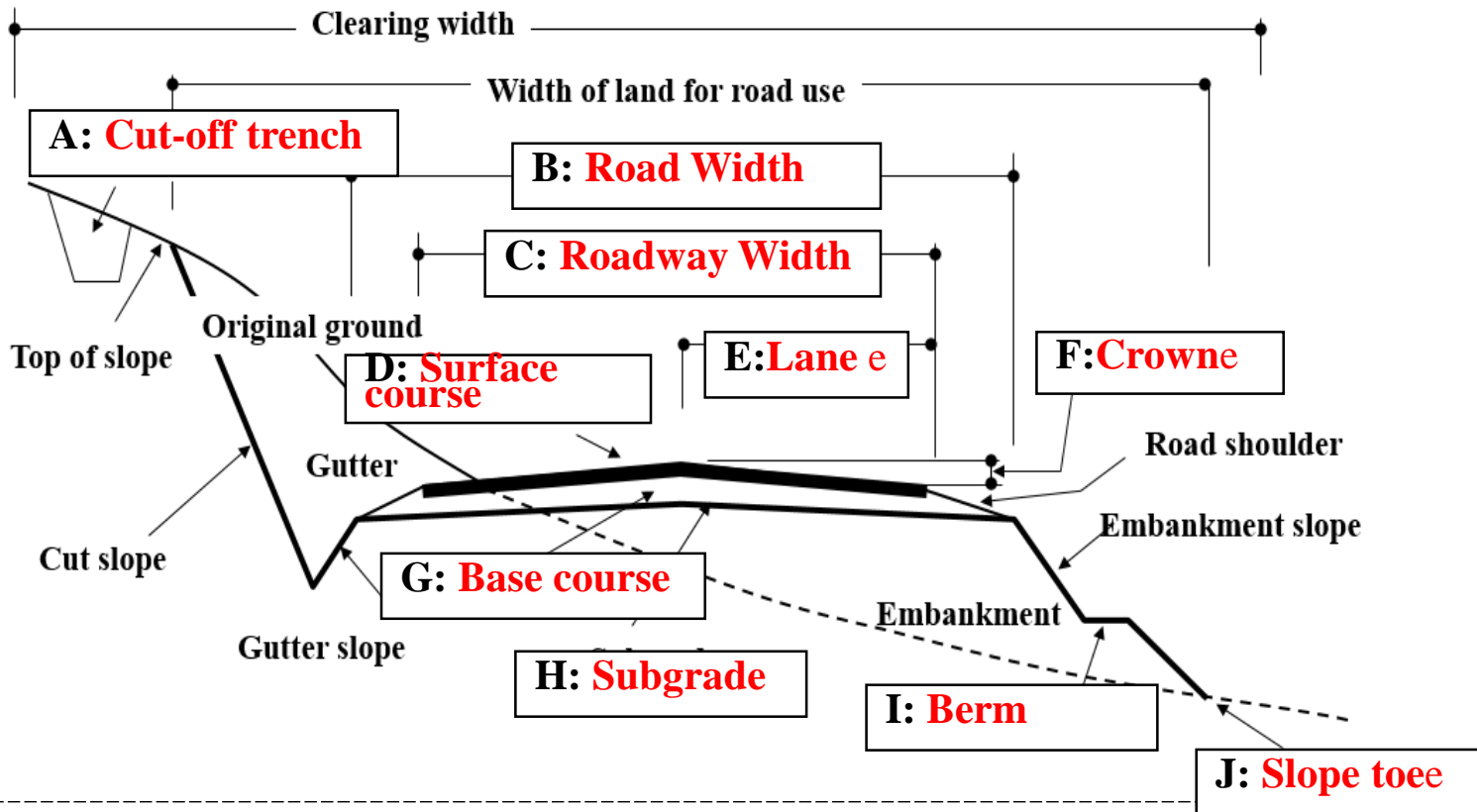
Answer the following questions on bulking factors of soil (Round up to the nearest whole number). The value of soil conversion factor "f" is shown below.

Q sought / Reference q	Soil volume in the natural ground	Loosened soil volume	Compacted soil volume
Soil volume in the natural ground（Kiritsubo）	1	L	C
Loosened soil volume（Agetsubo）	1/L	1	C/L
Compacted soil volume（Shimetsubo）	1/C	L/C	1

◆ Calculate the volume of loosened soil required to build an embankment of 100 m³
  <Bulking factor: L=1.25, C=0.9>
  100 x 1.25 ÷ 0.9 = 138.888 ≒ 139 m³

◆ Calculate the volume of loosened soil required to build a slope with the scale of 16500m3
  <Bulking factor: L=1.3, C=0.9>
  16500 x 1.3 ÷ 0.9 = 23833.333 ≒ 23834m³

◆ Calculate the extension of the fill (width:10m, height:1.2m) that can be created with the soil of 6500m² of Agetsubo?
  (6500 x 0.93 / 1.43) ÷ (10 x 1.2) = 352.27 ≒ 353m

◆ Calculate the total number of dump trucks used to transport 7,800 m³ of soil from a borrow pit (natural ground) using 2.54-meter dump trucks.
  <Bulking factor: L=1.3, C=0.93>
  (7800 x 1.3 ÷ 0.93) ÷ 2.54 = 4292.608 ≒ 4293 vehicles

<Proficiency Test (4) (Answer)>

Choose the best word from the choices about structure and function of roads

Clearing width

Width of land for road use

A: Cut-off trench

B: Road Width

C: Roadway Width

Original ground

Top of slope

D: Surface course

E:Lane e

F:Crowne

Road shoulder

Gutter

Cut slope

Embankment slope

G: Base course

Gutter slope

Embankment

H: Subgrade

I: Berm

J: Slope toee

<Choices>Surface course, Road width, Lane, Crown, Slope toe, Roadway width, Base course, Berm, Cut-off trench, Subgrade

Choose the best word or phrase from the choices about the structure of roads.

The structure of roads consists of subgrade, (A: base course), (B: surface course), road shoulder and (C: drainage system). Depending on the situation, some of them, such as base course may be omitted

<Choices>drainage system, base course, surface course

<Proficiency Test (5) (Answer)>

Choose the best word or phrase from the choices about the basic procedure for preparing a work cost estimation chart.

Procedure	Action
Step 1	Analyze the work and classify it into work items and details, and arrange them in order of implementation.
Step 2	Summarize (A: **the operating procedure**) for each work item (detail).
Step 3	Calculate (B: **required work volume**) for each work item (detail).
Step 4	Calculate (C: **the unit work volume**) for required each work item (detail).
Step 5	Calculate (D: **required work capacity**) for each work item (detail).

<Choices> required work volume, the unit work volume, required the work capacity, the operating procedure

Complete the work cost estimation chart. (For each answer, round down the decimals)

[Assumption] Daily work time: 7 hours

Conversion factor: Large-size bulldozer: 80 man-day,
Middle-size bulldozer: 60 man-day,
Hydraulic Excavator: 60 man-day

Work item	Work detail	Required work volume	Machinery to be used	Unit work volume	Required work capacity	Man-hour (machinery)
Earthwork	Cut soil	2,000m³	Medium-size bulldozer	25m³/h	**E: 80** (Machine-hour)	**H: 685** (Man-hour)
	Filled soil	1,500m³	Large-size bulldozer	30m³/h	**F: 50** (Machine-hour)	**I: 571** (Man-hour)
	Formation of slope	3,000m²	Hydraulic excavator	80m²/h	**G: 37** (Machine-hour)	**J: 317** (Man-hour)

○ $2,000 \div 25 = 80$ $80 \div 7 \times 60 = 685.71 \fallingdotseq 685$

○ $1,500 \div 30 = 50$ $50 \div 7 \times 80 = 571.42 \fallingdotseq 571$

○ $3,000 \div 80 = 37.5 \fallingdotseq 37$ $37 \div 7 \times 60 = 317.14 \fallingdotseq 317$