```
def add5 x
    return x+5

def dotwrite ast
    nodename   getNodename
    label symbol sym name get int ast
    print      %s label %s % nod
    if isinstance ast l   str
        if ast l   strip
            print      %s      % ast l
        else
            print
    else
        print
        children
        for n   child in enumerate ast l
            children append dotwrite child
        print      %s / ( % nodename
        for name in children
            print      %s % name
```

apparatus level

syntax level

keystroke level

user interface

cognitive view

Chapter 10

User Interface Design

Engineers use **conceptual models** to optimize their systems for ease of use. In order to do this, they study the **user interface** carefully. Various views help engineers see different aspects of a design.

Engineers begin by considering the user's **mental model** of a system. This is closely tied to the **cognitive view** of a system. This view considers what information a user will need to know in order to operate a system. **Linguistic view** helps engineers imagine the ways a user will interact with a system. **Design view** lets them examine screen layouts and other elements of user interface design.

CLG (Command Language Grammar) divides a system into even more specific views. These views encompass all elements of interaction between the system and the user. CLG views a system according to three components: the **conceptual component**, the **communication component**, and the **material component**.

Each of these components is made up of two levels, each focusing on different information. The conceptual component includes the **semantic level** and the **task level**. The material component includes the **spatial layout level** and the **apparatus level**. The communications component includes the **keystroke level** and the **syntax level**.

4

Get ready!

❶ Before you read the passage, talk about these questions.

1 How do engineers optimize user interface designs?

2 What are the levels of CLG?

Reading

❷ Read the textbook excerpt. Then, choose the correct answers.

1 Why do engineers use conceptual models?
   A to make software easier to use
   B to eliminate mistakes in software
   C to provide information for software users
   D to update a system's software

2 Which of the following is NOT a division of CLG?
   A conceptual   C linguistic
   B material   D communication

3 What do engineers use design view for?
   A to divide components into levels
   B to consider what information a user needs
   C to consider the mental model of systems
   D to examine elements of the system's user interface

Vocabulary

❸ Place the correct phrases from the word bank under the correct headings.

WORD BANK

apparatus level   keystroke level
semantic level   spatial layout level
syntax level   task level

Conceptual Component Views	Communication Component Views	Material Component Views

4 **Read the sentence pairs. Choose where the words best fit the blanks.**

1 communication component / conceptual component

   A The _____ concerns the dialog between systems and users.

   B The _____ concerns the functions the systems will perform for users.

2 mental model / conceptual model

   A A _____ is rendered in terms of system's reactions to user actions.

   B A _____ concerns the way a user understands a computer system.

3 linguistic view / cognitive view

   A _____ considers what a user needs to understand about a system in order to operate it.

   B _____ considers the interactions between a human and a system.

4 material component / CLG

   A A _____ considers both the graphics of the user interface and the system hardware.

   B _____ describes the user interface of all aspects of a system.

5 design view / user interface

   A The _____ describes the attributes of a system that are relevant to the user.

   B The _____ is a conceptual model that focuses on icons and screen layouts.

5 🎧 **Listen and read the textbook excerpt again. What are some different views that engineers use when considering user interfaces?**

Listening

6 🎧 **Listen to a conversation between two software engineers. Mark the following statements as true (T) or false (F).**

1 ___ The material component was already finished.

2 ___ The woman confuses the task level and the semantic level.

3 ___ The man will work on the semantic level.

7 🎧 **Listen again and complete the conversation.**

Engineer 1: We need to talk 1 _____ _____ on the library software.

Engineer 2: Okay. Well, the material component 2 _____ _____.

Engineer 1: When will it be done?

Engineer 2: Probably by the end of this week.

Engineer 1: That's good. What about 3 _____ _____ ?

Engineer 2: We didn't start that yet.

Engineer 1: Oh. I think we should get to work on that as soon as possible.

Engineer 2: I agree. Do you want to 4 _____ _____ _____ and then work on them separately?

Engineer 1: That's a good idea. I'll take the semantic level. You get 5 _____ _____ _____ _____ .

Engineer 2: What goes into the task level again?

Engineer 1: You define the tasks performed 6 _____ _____ and the tasks performed by the software.

Speaking

8 **With a partner, act out the roles below based on Task 7. Then, switch roles.**

USE LANGUAGE SUCH AS:

I think we should ... / Do you want to ...
I'll take ...

Student A: You are an engineer. Talk to Student B about:
- the status of the software components you are developing
- when certain components will be completed
- who will work on each component

Student B: You are an engineer. Talk to Student A about the software components you are developing.

Writing

9 **Use the textbook excerpt and conversation from Task 8 to complete a guide to components. Include: a list of software components, the levels within each**