Unit05 PDF

Lesson Five TEXT A Angels on a Pin Alexander Calandra Pre-class Work I Read the text once for the main idea. Do not refer to the notes, dictionaries and the glossary yet. Some time ago, I received a call from Jim, a colleague of mine, who teaches physics. He asked me if I would do him a favor and be the referee on the grading of an examination question. I said sure, but I did not quite understand why he should need my help. He told me that he was about to give a student a zero for his answer to a physics question, but the student protested that it wasnt fair. He insisted that he deserved a perfect score if the system were not set up against the student. Finally, they agreed to take the matter to an impartial instructor. And I was 0selected. I went to my colleagues office and read the examination question. It said: "Show how it is possible to determine the height of a tall building with the aid of a barometer." The student had answered: "Take the barometer to the top of the building, tie a long rope to it, lower the barometer to the street, and then bring it up and measure the length of the rope. The length of the rope will be the height of the building." I laughed and pointed out to my colleague that we must admit the student really had a pretty strong case for full credit since he had indeed answered the question completely and correctly. On the other hand, I could also see the dilemma because if full credit were given to him it could mean a high grade for the student in his physics course. A high grade

is supposed to prove competence in the course, but the answer he gave did not show his knowledge on the subject. "So, what would you do if you were me?" Jim asked. I suggested that the student have another try at answering the question. I was not surprised that my colleague agreed, but I was surprised that the student did, too. I told the student that I would give him six minutes to answer the question. But I warned him that this time his answer should show some knowledge of physics. He sat down and picked up his pen. He appeared to be thinking hard. At the end of five minutes, however, I noticed that he had not put down a single word. I asked him if he wished to give up, but he said no. He had not written anything down because he had too many possible answers to this problem. He was just trying to decide which would be the best one. I excused myself for interrupting him and asked him to go on. In the next minute, he dashed off his answer, which read: "Take the barometer to the top of the building and lean over the edge of the roof. Drop the barometer and time its fall with a stopwatch. Then, using the formula $S = 1/2\ at2$, calculate the height of the building." At this point, I asked my colleague if he would give up. He nodded yes, and I gave the student almost full credit. When I left my colleagues office, I recalled that the student had said that he had other answers to the problem. I was curious, so I asked him what they were. "Oh, yes," said the student. "There are many ways of getting the height of a tall building with the aid of a barometer. For example, you could take the barometer out in a sunny day and measure the height of the barometer, the length of its shadow, and the length of the shadow of the building, and by the

use of a simple proportion, determine the height of the building. The beauty of this method is that you dont have to 0drop the barometer and break it." "Fine," I said. "Any more?" "Yes," said the student. "There is a very basic measurement method that people will like, because it is so simple and direct. In this method, you take the barometer and walk up the stairs. As you climb the stairs, you mark off the length of the barometer along the wall. You then count the number of marks, and this will give you the height of the building in barometer units. The only trouble with this method is that it doesnt require much knowledge of physics." "Of course, if you prefer a more sophisticated method, a method that will really show some knowledge of physics, you can tie the barometer to the end of a rope, swing it as a pendulum and determine the value of g at the street level and at the top of the building. From the difference between the two values of g the height of the building can, in principle, be worked out." Finally, he concluded that while there are many ways of solving the problem, "Probably the best and the most practical in a real-life situation is to take the barometer to the basement and knock on the superintendents door. When the superintendent answers, you speak to him as follows: Mr. Superintendent, I have here a fine barometer. If you will tell me the height of this building, I will gladly give you this barometer!" At this point, I asked the student if he really didnt know the expected answer to this question. He smiled and admitted that he did, but said he was fed up with standard answers to standard questions. He couldnt understand why there should be so much emphasis on fixed rules rather than creative thinking. So he could

not resist the temptation to play a little joke with the educational system, which had been thrown into such a panic by the successful launching of the Russian Sputnik. At that moment I suddenly remembered the question: How many angels can dance on the head of a pin? We teachers are always blaming the students for giving wrong answers. Perhaps we should ask ourselves whether we are always asking the right questions. 100Test