

ANSWER SHEET FOR SOLAR PANEL EXTRA CREDIT, ASSIGNED 12/06/2000

Here's the deal on the extra credit assignment which is based on the news articles on the "solar wings" for the space station alpha. These articles were distributed in class on Wed. 12/6/00. You can earn up to two (2) points of extra credit by answering the questions below. You will have to read the questions carefully, and the articles carefully, to answer questions.

GIVEN INFORMATION:

Each panel is 38 feet wide by 115 feet long, and there are two panels. They cost \$600 million dollars total. Together, they produce 65 kW of electrical power WHEN THEY ARE IN SUNLIGHT! They are in sunlight only 50% of the time; the other 50% is spent in the earth's shadow, in the dark (NO power produced). One acre = 43,560 square feet. One year has 365.25 days in it. Electricity on earth costs about \$0.10 per kWhr
The energy of sunlight is 1000 W per square meter. Of course, solar panels are not 100% efficient.

QUESTIONS:

NOTE: your answers MUST appear on an answer sheet, which will be available on my website late Thursday:

UHAVAX.HARTFORD.EDU/~BANZ Or, the answer sheet can be picked up in person at my office. NO answers will be accepted unless they are on this answer sheet. **All work**, clearly presently and neatly shown, **must be attached to the answer sheet** in order for credit to be awarded.

NAME: _____

Write Answers in Boxes Below:

QUESTION 1: What is the total area of the new solar panels, in square feet?

QUESTION 2: What is the total area of the new solar panels, in acres?

QUESTION 3: Is the answer to question 2 in agreement with the information in the news articles? Explain your answer.

QUESTION 4: What is the total area of the new solar panels, in square meters?

QUESTION 5: How much electrical power is currently generated (WITHOUT the new panels) on Space Station Alpha?

QUESTION 6: How much sunlight power falls on the solar panels when they are in light?

QUESTION 7: What is efficiency of the solar panels, based on your answer to question 6?

QUESTION 8: In one year, what is the value of the electrical power produced by the solar panels, based on the cost of power on earth?

QUESTION 9: How many years would it take to pay back the cost of the solar panels?

QUESTION 10: If the average home in the USA uses 2 kW of power, how big a solar panel would be needed to supply this? Use the same efficiency you found in question 7 for the earth-bound panels. Assume that, on the average, a home is in sunlight about 6 hours per day (this accounts for rain, clouds, and atmospheric affects). Express your answer as the length of the side of a square which contains all the needed solar panels, in feet.