PSC-320 Final, Name _____

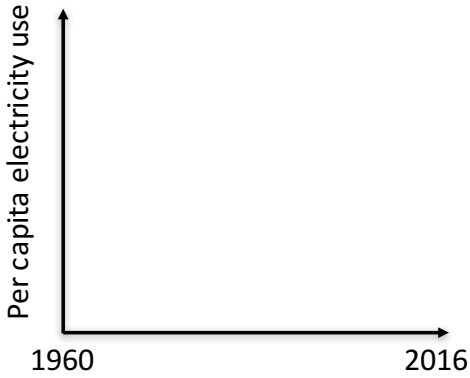
1. The portion of *Global Electricity* supplied by *solar and wind combined* is closest to:
2% 10% 25% 50% 75%

2. We presently estimate that we've already used about what % of remaining *accessible global* oil reserves?
1% 5% 20% 50% 75% 85% 95% 99%

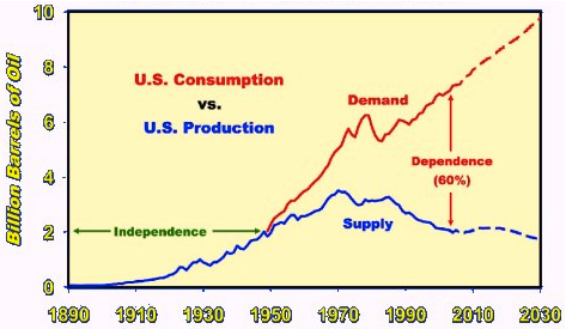
3. The USA average *per person* CO_2 emission is closest to:
50 mg, 10 kg, 1 Ton, 15 Tons, 25 kiloTon, 85 kiloTon, 1 MegaTon, 10 MegaTon, 30 MegaTon, 3 GigaTon,

4. The power output of an average coal, NG, or nuclear facility is closest to:
Watt, milliWatt, kilowatt, MegaWatt, GigaWatt, 100 GigaWatt, TeraWatt, 17 TeraWatt

1) On the axis at right:
   a) Please make two lines on this graph: one of US electricity use per person, and another line for Californians.
   b) Please explain why these two lines are different. What happened? How did it happen?
   c) What does this difference say about possible energy/economic development?



2) Please look at the graph at right, likely made around 2006.
   a) Please extend the graph to 2016.
   b) Please extend the graph again to 2018.
   c) Please describe the cause behind the 2 trends that you just updated



3) You have a 100 W incandescent light bulb that you leave on constantly, 24/7. ***Clearly show your work***

a) How much electrical energy do you use in a month (720 hours)?
b) About how much does this cost you in electricity per month?
c) About how much CO_2 does this put in the atmosphere per month if you live in California?
d) You can buy a $1.00 LED light bulb that gives off the same amount of light as the 100 W incandescent light bulbs, consuming only 10 W. Estimate the financial pay back time – how long will it take you to make back your initial investment?

4) In the above question, let's say that instead of buying an LED, you keep the 100 W bulb and instead install an extra solar panel on your grid-connected roof-top solar system to offset the 100 W. ***For credit: clearly show your work***

a) About what wattage solar panel is necessary to offset your electricity use?
b) What is the size of this solar panel in square meters?
c) About how much will this solar panel cost to buy?
d) What else would you have to pay for to have your grid-connected PV? And about what would be the total cost?
e) Estimate the payback time for this investment.

5) Solar Energy: Consider CSP or STE (Concentrated Solar Power or Solar Thermal Electric), PV (Photovoltaic,) and Passive Solar. Please distinguish these four *briefly* and state at least one advantage for each.

a) CSP, STE

Particular Advantage

b) PV

Particular Advantage

c) Passive Solar

Particular Advantage

6) California: Some people are telling California's leadership to become a global leader in renewable energy and sustainability, while others say that the **economy** is more important. What advice do you have? Can we have both? If so, how? If not, which is more important and why?

7) a) What's "permaculture" (or wholistic design) in the context of studying it in an energy class.

b) explain an advantage of wholistic design.

c) explain a disadvantage… I mean if it's so good, why doesn't everyone do it?

8) Describe each: Ozone Hole | Climate Change

a) What "pollutants" cause each of these two "problems"?

b) Describe the mechanism that causes each of these two problems. I recommend drawings.

c) What is the *biological* effect of each of the problems?

d) What are the solutions to each of these two problems?

e) To what degree has society "solved" each of these two problems?

f) How has the global youth engaged with each of these two problems?

g) …and what do you see as *your* role? "*nothing*" is an acceptable answer if you support it.

9) Why are temperatures in the arctic regions rising at about 4 times the rate of temperatures in warm areas?