Watch the video on the Secret Life of the Brain. Record your thoughts in the PMI chart below. Take one or two of your ideas from the interesting column and reword it into a critical thinking question.

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The Baby's Brain: Wider than the Sky

1. **If a baby is born three months early, what are some challenges it might face?**
   - A premature baby's brain cannot easily coordinate such basic functions as eating, sleeping, and breathing.
   - It has neither the ability to focus or sort the important from non-important stimuli of a full-term baby, nor the essential myelin coating that allows brain messages to speed along.
   - Preemies continue to be hyperactive throughout life, unless there is an intervention—like in Elizabeth Traphagen's case—to normalize brain function early on.

2. **How are brain cells different than other types of body cells in terms of development and reproduction?**
   - We are born with all of the brain cells we will ever have—they do not reproduce (i.e. skin cells reproduce & we shed approx. 90 lbs of skin cells in our lifetime).
   - Glial cells surround and provide a supportive framework for nerve cells as they migrate to the sections of the brain where they belong, forming a network of pathways that carry information.

3. **What are some ways in which the world influences the developing brain?**
   - Some believe that the harsh lights, loud noises, and bustle of a neonatal unit may contribute to overstimulation and learning difficulties that preemies may have later on.
   - Conversation between babies and others shapes the language areas of the brain.
   - The best way to stimulate an unborn baby is with your own voice, by talking, reading, and singing; some believe that over-stimulation during gestation can send development off on a wrong track.
   - Good nutrition is important for healthy brain development; eat a balanced diet containing adequate protein, complex carbohydrates, and 300 calories over your usual intake. Supplementing your diet with the B vitamin, folic acid, has been shown to reduce the risk of neural tube defects.
   - Alcohol during pregnancy - fetal alcohol syndrome – low birth weight, slow growth, brain and skull abnormalities, and learning and behavioural difficulties.
   - Stress hormones ultimately reach the fetus – can lead to babies being over-reactive, though pregnancy hormones can also buffer mother and child against the outside world.
The Child's Brain: Syllable From Sound

1. If you tried to learn a foreign language now, why would it take so much more work than when you learned to speak your native language as a very young child?
   - as a baby gets older, its brain becomes more efficient at responding to the language it regularly hears, filtering out subtle differences between other sounds
   - in their first year of life, researchers have found that babies are “citizens of the world” - they can distinguish between sounds in other languages that are indistinguishable to an adult who doesn't speak that language
   - by 11 mos, babies lose the ability to hear distinctions that do not occur in their native language
   - year-old babies listen to and understand speech with both the right and left hemispheres of the brain, but by 20 months the language functions have begun to shift to the left hemisphere in most children
   - it is experience with a language, not age, that drives this hemisphere specialization
   - although the brain is most plastic (adaptable) before this occurs, if necessary it can adapt even after it has matured

2. What difficulties do 8-year-old Katie Warrick and 14-year-old Michael Rehbein face after their brain surgeries? How do they deal with them?
   - children who have had their left hemispheres of their brains surgically removed (to stop severe seizures) can re-learn, slowly and with lots of practice, how to speak
   - the right hemisphere can take over for the missing left, but it is not as efficient in its work

3. Think back to when you learned a new skill, like riding a bicycle or playing a particular sport. Did practicing help? Did there eventually come a time when you suddenly felt like you “got it”? What do you think was going on in your brain at that time and during the attempts leading up to it?
   - i.e. Learning a new language as an adult – when I started to think in the language (rather than think in English and translate) I felt like I got it
   - similarly, when learning the 3rd language, my second language kept slipping out of my mouth when I would try to speak in the new language
   - learning how to play an instrument at an older age (still waiting for the “got it”)

The Teenage Brain: A World of Their Own

1. In this program, Steven E. Hyman says, “The brain is a work in progress, and adolescence is the last great time of enormous brain change and brain development.” Think about your experiences and feelings in recent months. Do you see any evidence that your brain is changing?
   - development of the brain's centres for reasoning and judgement make adolescence a time of great risk, both for the mental illness schizophrenia and for drug addiction

2. As you watched the program, how did Courtney Hale Cook's experiences with schizophrenia challenge your previous ideas or teach you something new?
   - Schizophrenia is the cruelest disease imaginable, Hyman says, because it strikes
during young adult life, when society's investment in a human being has reached its peak
– “it affects the highest human functions... our ability to think at high conceptual levels,” Nancy Andreasen of the U of Iowa

3. What did you learn about drug addiction from this program that challenged your previous ideas or taught you something new?
– addiction is a chronic disease, the result of observable changes in brain function
– addictive drugs cause changes in the brain
– repeated use of any mood-altering drug produces fundamental changes in brain chemistry
– these drugs mimic the brain's natural neurotransmitters
– all mood-altering drugs alter the way neurons receive, process and transmit information by altering the level of certain neurotransmitters in the synapse, the space between neurons
– they hijack the reward pathways, so that all the things that normally produce feelings of pleasure “go into hibernation”
– this pathway of neurons regulates our basic survival drives – for food, water and reproduction; repeatedly stimulating it by drug use can result in what amount to biochemical “reprogramming” of our survival priorities
– those who feel alcohol's effects the least are most likely to become addicted; for some it is as addictive as cocaine
– alcohol has a huge impact on brain waves
– the brain carries a permanent imprint of drug addictions; old associations stimulate renewed cravings, perhaps explaining why so many addicts relapse
– alcohol and inhalants are actually the most brain-damaging drugs of all as they literally destroy neurons

4. If addictive drugs change their brains, are teenage addicts still responsible for their addictions? What are some ways teenagers can resist taking these drugs if their brains have been altered?
– risk factors (characteristics of a young person's life that can make him/her more likely to go from simply experimenting to abusing drugs) include:
  – family history of substance abuse
  – lack of involvement from parents and friends who use
– but, the fact is that ANYONE who uses an addictive drug over a long enough period of time and in sufficient doses will trigger the addictive process in his or her brain