Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_

**The Brain Throughout Life Timeline Worksheet**

**Instructions**: Read the following articles on *BrainFacts.org* and fill in the blanks in the text below.

* Chapter 6: The Developing Brain
* Chapter 7: Infant, Child & Adolescent Brain
* Chapter 8: Adult & Aging Brain

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| **Age Range** | **Brain Facts** |
| Embryo | During the very early stages of embryonic development, three layers of nerve cells emerge — the ectoderm, outer-most layer, mesoderm, middle layer, and endoderm, inner-most layer.  The proliferative process permits rapid growth during early development of the brain, with billions of cells being produced in a matter of weeks.  About three or four weeks after conception, new neurons journey from the inner surface of the embryonic brain, where they formed, to their long-term locations in the brain. This process is called migration. |
| Baby | During critical periods of development, inputs from sensory, motor, and even emotional aspects of life experiences affect how the brain develops and adapts to the given environment. |
| Childhood | During early childhood, the brain begins to reduce the number of synapses through synaptic pruning. This process is shaped by toddlers’ experiences as they grow and allows weaker connections to diminish while stronger synapses that are activated more often will grow and stabilize.    By the time a child is 5 years old, the brain has reached about 90 percent of its adult size. |
| Adolescence (up to the age  of 20) | During this time, more synaptic pruning occurs, with stronger connections beating out weaker ones in a process called competitive elimination.  The late maturation of the frontal lobe might explain characteristics of a “typical teenager,” such as a short attention span, blurting out whatever comes to mind, and forgetting to do homework.  Frequent drug use during adolescence is associated with damage to brain regions important for cognitive functions such as memory, attention, and executive functioning. |
| After 20 | Neuroscience research indicates that human brains continue to develop until we are about 30 years old.  Closer to 30, the frontal and parietal neocortices become more myelinated, which helps with working memory and higher cognitive functions.  Around age 40, the white matter in the human brain has reached its peak volume. |
| Elderly | A healthy brain experiences cognitive, structural, neuronal, and chemical changes as it ages.  With increasing age, the dendrites shrink, their branches become less complex, and they lose dendritic spines, the tiny protuberances that receive chemical signals.  Cortical thinning is especially pronounced in the frontal lobes and parts of the temporal lobes.  Declarative memory, autobiographical memory of life events and learned knowledge, declines with age, but nondeclarative memory, procedural memory, remains largely intact.  Several studies have reported that less dopamine is synthesized in the aged brain, and there are fewer receptors to bind the neurotransmitter. |