Using your knowledge of the brain and nervous system, answer the questions that follow each of the cases.

**Case 1**

It was very dark as Carol walked home from the library. She was thinking about tomorrow’s test when she heard heavy breathing and then felt a strong hand on her shoulder. She turned and stared into the terrifying eyes of a huge man holding a chain saw. Without thinking, she swung her book bag with all her might, hit the enormous man in his stomach, knocked the breath out of him, and saw him double over. Carol ran home faster than she had ever run before. Her roommate couldn’t believe that 5 foot 1, 98 pound Carol had the strength to knock out the man’s breath and speed on home. When Carol first got home, her heart was pounding, her breathing was rapid, her nerves were on edge, she was sweating, and her mouth was dry. It was not until several hours later that Carol had calmed down enough to go to sleep.

1. **Sympathetic** Which part of Carol’s nervous system gave her the “get up and go” and the strength to knock out the man’s breath and run home faster than the wind?

2. **Parasympathetic** Which part of Carol’s nervous system helped calm down her body?

3. What other things does your answer to question one do? *Increase heart rate, prevent digestion, dilate pupils*

4. What other things does your answer to question two do? *Rest, digest, slow heart/breathing etc*

**Case 2**

It was Saturday night and Mark had too much to drink. He was standing on the second floor balcony, loudly boasting that he was going to do a swan dive into the swimming pool. Everybody told him not to dive because he was too drunk and the pool was too shallow. Mark wouldn’t listen because he wanted to show off to the new coed. Shouting, “Look at me,” he jumped into the pool. He struck his head on the bottom and broke his neck. Although he survived the accident, Mark cannot move any parts of this body or feel any sensations from his shoulders down. However, all his other sensory and motor functions from the shoulders up are completely normal.

1. Why doesn’t Mark have any sensations below his shoulders? *Damaged his spinal cord*

2. Why can’t Mark move any of his muscles below his shoulders? *Paralysis from Spinal Cord damage*

**Case 3**

It was Friday the 13th and Janice was being especially careful as she walked down a busy downtown street. While she was stepping out on the street to avoid a construction ladder, leaping over a large crack in the pavement and shielding her eyes from a big black stray cat, a city bus hit her. The paramedics arrived to find Janice unconscious and not breathing. They immediately gave her CPR and tried mouth-to-mouth resuscitation but Janice did not start breathing. Just as the big black cat walked slowly by, the paramedic said, “I best her _____ was damaged and that’s why she stopped breathing.”

1. **Medulla** Which part of Janice’s brain regulated breathing and was damaged?

2. **Hindbrain** Where is the above part of the brain located?

3. **Heartbeat, Blood Pressure** What are the other functions of this part (beside breathing)?
Case 4

John is the kind of person who must have at least eight hours of sleep every night. If he doesn’t get his eight hours he is cranky, irritable, and a pain in the neck. However, during the last month something unusual has happened to John. He has gone from his usual eight hours a night to only three hours a night. Although now he has more time for work and play, he became worried about sleeping only three hours. When all his friends asked him, “What’s wrong with you?” John thought it might be some hidden psychological problem so he went to a therapist, but that didn’t help. Next, John went to his family doctor who prescribed sleeping pills but that didn’t help either. Finally, John went to a neurologist who did a brain scan. The neurologist told John that he had brain tumor. The tumor is affecting the part of his brain call the ________, which is involved in the regulation of sleep.

1. _______ Pons ________ Which part of John’s brain is being affected by the tumor and interfering with his sleep?

2. _______ hindbrain ________ Where is this brain part located?

Case 5

Here’s a real horror story. There is a tiny bug that lives under beds and comes out at night when a person is sound asleep. The bug crawls into the person’s ear and keeps going until it reaches the brain. Very quietly so as not to wake the person, the bug begins to eat away its favorite part of the person’s brain. The next morning, as the person gets up, he or she walks to the bathroom in a very clumsy way. The person has no trouble holding the toothbrush but has great difficulty making smooth, circular brushing strokes. At lunch time, the person has no trouble holding a quarter but has great trouble making the fine movements needed to put the quarter into the vending machine slot. Throughout the day, the person has no trouble starting movements but has difficulty making smooth movements and walks as if drunk.

1. _______ cerebellum ________ Which part of the person’s brain did the tiny bug eat away?

2. _______ hindbrain ________ Where is this brain part located?

Case 6

At eight o’clock on a Saturday night in Las Vegas, Bruno was waiting in the big hall and heard the crowd cheer when his name was announced. He walked down the aisle, climbed into the ring, and raised his gloved hands to greet the crown. For about two hours of his time, Bruno was going to be paid five million dollars. Bruno had earned a reputation as being fast and strong and was likely to be the next heavy-weight boxing champion. In the first two rounds, his punches matched his reputation. In the middle of the third round, Bruno caught an unexpected vicious punch that snapped his head back. Before he knew what hit him, Bruno was lying on the mat, unconscious. Bruno never regained consciousness and remained in a coma. Now, many months later, Bruno’s chances of coming out of the coma are very small because one part of his brain was damaged by the knockout punch.

1. _______ Reticular Formation ________ What part of Bruno’s brain did the knockout punch damage?

2. _______ awareness/consciousness ________ What is the function of this brain part?

3. _______ Hindbrain ________ Where is it located?
Case 7
Bruno, who is in a coma, is kept alive by a life support system that includes a respirator to control his breathing and another machine to supply food and fluids. Bruno’s brain wave pattern is flat, which means that he is brain dead or that his forebrain is not functioning. The doctor tells Bruno’s mother that Bruno is in a vegetative coma from which he is most unlikely to ever come out. Being in a vegetative coma means that Bruno can make no response that we associate with being human—speaking, thinking, responding to questions. On the advice of the doctors, Bruno’s mother decides that it would be best if the respirator were disconnected and Bruno be allowed to die without pain. The doctors disconnected Bruno’s respirator and the room was very quiet for several minutes. Then, Bruno gasped for air and began to breathe on his own. The doctors explain that in a few cases such as Bruno’s, when the respirator is turned off, a small part of the brain can keep a person alive but the rest of the brain is dead.

1. medulla Which part of Bruno’s brain is keeping him alive?

Case 8
Although Michelle is usually smiley and happy, some very weird things have happened to her this week that cause her to be a little concerned. On Monday, she was sitting in her art class watching a video when she suddenly could not see and discovered that she was completely blind. On Tuesday, she was practicing the violin when she realized that she couldn’t hear anything and was totally deaf. On Wednesday, now blind and deaf, she was in the cafeteria eating a pizza when she realized that she could not taste anything and had lost all sense of taste. By Thursday Michelle was getting a little concerned about how her life was going and what could happen next. She pinched herself to make sure that she was all right discovered that she couldn’t feel a thing. In just four days, she had lost her ability to see, hear, taste and feel. She remembered having some really bad weeks but nothing like this one.

1. thalamus What part of Michelle’s brain was being destroyed by a tumor?
2. sensory relay station What is the function of this brain part?

Case 9
Harry was always one to accept a dare and this dare seemed like fun. All he has to do was put on a pair of roller skates and skate backward 100 feet. Harry had not been on skates since he was ten but was confident he could remember. He put on the skates, stood up, and took the first tentative steps. He was moving forward OK but now came the hard part—turning 180 degrees and skating backward. He tried to twist his body and turn his feet but everything got tangled up and he fell over backwards with his head hitting the concrete with a loud thud. When Harry slowly sat up, he rubbed his head and wondered why he was seeing stars.

1. Visual cortex/Occipital Lobe Why did Harry see stars when his head hit the concrete? What part of the brain was damaged (give specific part and lobe)?
2. Blind What would happen to Harry if the fall destroyed his entire lobe?

Case 10
Susie was a very healthy, happy baby except that she was born deaf. She has no other sensory or motor problems. When Susie was 18 years old, a neurosurgeon discussed her having a new but experimental brain operation. During this operation, tiny holes would be drilled into her skull, and then very tiny wires would be implanted into certain parts of her brain. The neurosurgeon explained that these tiny wires would be connected to a stimulator. When the stimulator was turned on, an electrical current flowed through the wires and stimulated the brain cells or neurons at the ends of the wires. Susie agreed to have the surgery, which was successful. After a two-week recovery period, the wires were connected to a stimulator. The stimulator was turned on, and what happened next brought tears to Susie’s eyes. For the first time in her life, she hear sounds.

1. Temporal Lobe In which lobe of Susie’s brain were the tiny wires implanted?
Case 11

Patti’s goal is to be a terrific figure skater and compete in the next Winter Olympics. For the next four years Patti must practice 4-6 hours every day, watch her weight, eat right, and get as much sleep as she can. During one of her practice sessions she was doing a spectacular double whirl, spin, and leap when she caught an edge. She happened to fall down in the path of an oncoming speed skater, who was going to fast to avoid her. The speed skater’s skate passes over one side of Patti’s skull and damaged the right side of her brain. When Patti tried to get up and walk, she discovered that the right side of her body moved normally but her left leg and left arm were paralyzed. But when someone grabbed her left arm and leg to help her up, she realized that she has no problem feeling hands touching her left leg and left arm.

1. ______ Motor Cortex _________ First, which area (part) of Patti’s brain was damaged?
2. ______ Frontal Lobe _________ In which lobe is this area located?

Case 12

You’re from out of town, not knowing anyone at the college, you decide to live on campus. You’re assigned a roommate and are eager to meet him and get settled. When you enter your room, you find that Harry, your new roomy, has scattered his things all over the floor, bed, desks, and chairs. When you ask Harry to clean up the mess, he gets incredibly angry and yells, “Go to hell!” The next minute he is smiling and saying, “I’m sorry; I’ll clean it up.” You watch as Harry picks up his things and moves them around the room but can’t figure out how to organize his things. You’re really mad now and shout. “Get this stuff cleaned up NOW or you’re out of here!” To your surprise, Harry starts to cry and explains that he cannot seem to plan and organize or get things done right. He says that people don’t understand him and just holler at him. Just then, Harry’s father walks in and explains that when Harry was a youngster, part of his brain was damaged.

1. ______ Frontal Lobe _________ Which part of Harry’s brain has been damaged?
2. ______ Planning, organization and emotional control _________ Can you name two behaviors that the lobe is involved in?

Case 13

Sharon has never told anyone her most secret fear. She’s terrified that she is part crazy because of things that happen to her. Sometimes she has terrible sexual desires that she can just barely restrain. Sometimes she goes from restaurant to restaurant and eats 4-8 meals a day. Sometimes she goes to a water fountain and drinks water for 15 minutes straight. Sometimes she feels tremendous love for her boyfriend and then, without warning, hates his guts. Sometimes she is happy and then suddenly becomes angry. There is a tumor growing in Sharon’s brain that is causing all of these strange behaviors.

1. ______ Hypothalamus _________ Where is the tumor growing in Sharon’s brain?
2. ______ Hunger, thirst and Sex motivation and Body temperature _________ Name three behaviors regulated by the part?
3. ______ Limbic System _________ Name the evolutionary, very old brain system of which this brain part is part of?
Case 14

Sam was getting off an elevator when he dropped an important folder. As he reached down to pick it up, the evaluator doors closed and squeezed his head between them. Ever since the accident Sam has not been the same. For example, he goes to the same video store several times a week and always hands the clerk the same beat-up note with one word on it, Batman. The clerk always asks, “Have you ever seen Batman before?” Sam always shakes his head and replies, “No, it’s the first time. Is it any good?” The clerk always replies, “It’s really great. You’ll love it.” So far, Sam has rented Batman 74 times and can’t remember ever having seen it. Although Sam can’t remember ever seeing Batman, he has no sensory motor problems.

1. **hippocampus** Which part of Sam’s brain was damaged, causing this particular kind of memory problem?
2. **Process NEW memories** what is the function of this part of the brain?

Case 15

Just before the world-famous dancer Agnes DeMille was to perform on stage, she felt an incredible pain in her head and then lost consciousness. She woke up in an ambulance that was taking her to the emergency room. She looked around and was able to ask, “What’s happened to me?” The paramedic answered, “I think you’ve had a stroke. Just lie quietly until the neurologist has a chance to examine you.” Agnes did have a stroke, which permanently changed her behavior. She could never dance again because she could not feel where her right foot or right hand were and could not feel if someone touched them. However, she has no difficulty moving her right hand or food.

1. **Somatosensory Cortex** Can you name the area in Agnes’ brain that the stroke damaged?
2. **Parietal** In which lobe is the area located?
3. **Left** On which side did the damage occur?

Case 16

Each time Dave talked, people laughed and said that he had one of the best comedy routines that they had ever heard. Dave would begin with what seemed like a normal sentence but after a few words he would start talking about an entirely different topic, and after a few more words he would get off on another area. The result was that Dave never seemed to finish a sentence or make any sense but he talked in a very fluent manner. For example, Dave might sound like this: “Like, it’s all sunny, cause books cost a lot, and there’s no reason for a car, and don’t buy shoes, and I like hamburgers on sale except in bad times.” The reason Dave talked like this is because he had a certain part of his brain damaged.

1. **Wernickes Area** Which area of Dave’s brain was damaged and cause him to speak in a fluent way but make no sense?
2. **Temporal** In which lobe is this area located?
**Case 17**

From the time that she was a little girl, Marci had epileptic seizures. However, when she was young, the seizures occurred infrequently because drugs controlled them. As she grew older, the seizures became worse and the drugs no longer worked. By the time she was 21, she was having five to six major seizures a day. During a major seizure, Marci would fall to the floor, become unconscious, and her arms and legs would move in violent spastic motions. Many times her limbs were sprained and bruised. After the seizures, she would have no memory of what happened, and she usually felt very drowsy. Because the seizures were so frequent and so bad and drugs did not work, she chose to have a radical brain surgery called a split-brain operation. After the split-brain operation, Marci’s seizures were greatly reduced.

1. **Corpus Collosum** What part of Marci’s brain did the neurosurgeon cut to produce a split-brain?
2. **Connect 2 hemispheres** What is the function of the part that was cut?
3. **Left** Which hemisphere of the brain has superior language skills?
4. **Left** Which hemisphere of the brain has superior mathematical skills?
5. **Right** Which hemisphere of the brain is better at recognizing faces?

**Case 18**

Marci, whose speech area is in her left hemisphere, appears and behaves relatively normal after her split-brain procedure. She can carry on a normal conversation, read a book, dress herself, drive a car, and do hundreds of other things. In fact, if you meet Marci, you would have a very difficult time telling that she had a split-brain operation. However, when she is given specific tests, it becomes very clear that her left and right hemispheres are not communicating. For example, suppose we show a photo of a dog to only her right hemisphere, and we ask Marci, “What did you see?”

1. **Have her point to what she saw** How can Marci identify what her right hemisphere saw?

**Case 19**

Marci, who you know has a split brain, is asked to do another task. She is blindfolded and told to reach into a big with her right hand and select any one of the four objects in the bag. The bag contains a pencil, ball, triangle, and a small box. Marci reaches into the bag with her right hand, and after feeling the four objects, grabs the ball. Without looking at the object, Marci is asked to remember the object she holds in her right hand. Then she is told to withdraw her hand and leave the object in the bag. Now Marci’s blindfold is removed.

1. **She can say what the object was** How can Marci, who has taken her right hand out of the bag, identify the object?

**Case 20**

You and your grandmother, who is 83 years old, were talking about how you’re doing in school. Suddenly she stopped talking and said something strange was going on in her head. When the doctor examined your grandmother, he explained that she had had a stroke. A stroke means that one of the arteries in her brain became blocked. As a result, part of her brain was damaged by lack of blood and oxygen. The stroke affected granny’s ability to speak. The good news is that she will be able to understand most of what is spoken to her. The bad news is that she will not be able to speak in a fluent fashion. Instead, her speech pattern will be very broken. Before the stroke, granny could say, “I need to go to the grocery store and buy several cans of chicken soup and see if the lettuce is fresh.” After the stroke, granny can only say, “Go to store, buy soup, see lettuce.”

1. **Broca’s Area** Which part of granny’s brain was damaged and cause her to speak in a broken, halting manner but did not interfere with her understanding of what was said?
2. **Frontal** In which lobe of the brain is this part located?