

The Game “What Do We Know?”

GOAL

Students play a board game to review concepts related to electrical energy in the brain and body.



Set-up per gaming team (average 4 teams):

- Instruction sheet
- Drum or rhythm instrument
- Set (=16) of question / activity cards on frequency.
- Set of question/activity cards on energy in the brain.
- Set of question / activity cards on sleep graphing.
- Set of question / activity cards on the brain and body.
- Set of 10 wave cards to be used in conjunction with the question / activity cards on frequency
- Sleep graph
- 4-6 glass s”tones” as game pieces
- 1 die
- Answer sheets for each category with each game.



PROCEDURE

This evaluation lesson does not follow the 5 E format within lesson.

STEP ONE: Review instructions aloud:

While playing the game, students will pick up game cards that ask them to either do activities or answer questions. If the students do the activities or the answer questions correctly, they will keep the card until the end of the game. If they do not do the activity or answer the questions correctly, they should return the card to the bottom of its pile.

There are answer sheets provided with the game. The answer sheets should only be used to check the answers given by the players, not to answer the questions.

The winner of the game is the player with the most cards at the end of the game. The game ends when all players have moved their pieces around the board and return to the start / finish square..



PROCEDURE

STEP TWO: Student teams read instructions included in the game:

1. Enjoy yourself!
2. Start with your game piece on the start/finish space.
3. Players roll the die to see who goes first. The player rolling the lowest number will go first, followed by the player rolling the next lowest number, and so on.
4. Roll the die to know how many spaces to move forward.
5. When you land on a space with instructions, follow the instructions.
6. When you land on a colored space with the titles: "Frequency," "Brain waves," "Sleep Graph" or "The Heart, Brain, Body, Sleep Connection," pick-up a corresponding card (with the same color and graphic as the space) from the top of the deck, read the card so all players at your game can hear and answer the question or follow the instructions on the card.
7. If you answer the question or follow the instructions on the card correctly, keep the card until the end of the game.
8. If you do not answer the question or follow the instructions correctly, return the card to the bottom of the pile.
9. In the case of a dispute over the answer to a question, use the answer sheets included with the game. Do not look at the answer sheet before you try to answer the questions.
10. The player with the most "question/ activity" cards at the end of the game wins. The wave cards are not counted as "question/ activity" cards. In the case of a tie, everyone goes home a winner!
11. The game ends when all players have moved their pieces around the board once passing or landing on the start/finish space.
12. When you pass or land on the start/finish space, after moving your game piece once around the board, remove your game piece, count your cards and wait for the other players to finish.

STEP THREE: Review the purpose of the Question/Activity cards.

The **pink** "frequency" cards ask players to play beats on a drum corresponding to a wave pattern on the card; draw a wave pattern on a white "wave card" corresponding to the hertz designated on the card, or differentiate between qualitative and quantitative descriptors.

The **blue** "brain waves" cards ask players to play rhythms on the drums corresponding to the frequency of the brain waves during different states of consciousness. High frequency brain waves are represented by fast beats and low frequency by slow beats.

The green "sleep graph" cards ask players questions requiring them to interpret data on the sleep graph provided with each game.

The **yellow** "heart brain body sleep connection" cards ask players questions about the activity of different body parts during the different stages of sleep. Many of the cards ask the players to pretend to be different creatures in specific sleep stages while other players observe their actions. Other cards ask players to "play a sleep cycle" on the drum.

Brain Energy Test

Name _____

Date _____

Teacher _____

Circle the correct term:

1. "The drum beat is fast" is a (qualitative quantitative) description of the drum beat.
2. "The drum beat is 8 beats per second" is a (qualitative quantitative) description of the drum beat.

Read the sentence and answer the questions using one or two words:

“Cheryl has five shiny, red apples in her hands.”

3. What are the qualitative words describing Cheryl's apples.
4. What are the quantitative words describing Cheryl's apples.

Answer the following using complete sentences.

5. What type of energy in the brain do brain waves measure?
6. Are brain waves the same, regardless of what a person is doing? Explain.

Complete the following definitions using a vocabulary term:

REM sleep Frequency Slow Wave Sleep Hertz Electrical

7. The number of times something happens in a specific time period:
8. The unit of measurement for electrical waves per second:

Let's do the Math!

9. 14 beats are counted over 10 seconds

Frequency = 14 beats divided by 10 seconds or _____ beats per second

10. 20 beats over 10 seconds is _____ beats per second.

Draw that Wave Pattern!

Draw a wave pattern that best represents the electrical activity of your brain in the following situations:

11. You are asleep and dreaming.

12. You are awake and zoned out in front of the television.

13. You are awake and concentrating on a game.

Read about the sleep lab experiment. Then, study the sleep graph provided and answer questions 14 - 16.

The average person normally dreams about 5 times during the night. However, some scientists tried an experiment in the sleep lab one weekend. One Saturday night, a person who usually dreams about five times a night was woken up every time they started to dream. On Sunday night they were allowed to sleep all the way through the night uninterrupted. Sunday night their sleep pattern was not normal. Your sleep graph shows the Sunday night sleep pattern of a person who is recovering from being woken up.

The sleep subject measured on this graph went to bed sometime before 9:00. Study this graph and write down the differences you notice between this sleep pattern and a normal sleep pattern.

14. How many dreams did this person have on Sunday night? _____

15. Record all of the times that this person had a dream on Sunday night.

Name _____

16. What did you notice about the recovery sleep on Sunday night as compared with normal sleep?

Circle the correct letter (a, b or c).

The 2 stages of sleep we've studied are Slow Wave Sleep and Rapid Eye Movement (REM) sleep. We dream mostly during REM sleep.

18. During REM sleep there are:

- a.) High frequency brain waves.
- b.) Low frequency brain waves.
- c.) No brain waves.

19. When there are high frequency brain waves there is:

- a.) Rapid eye movement.
- b.) Some eye movement.
- c.) No eye movement.

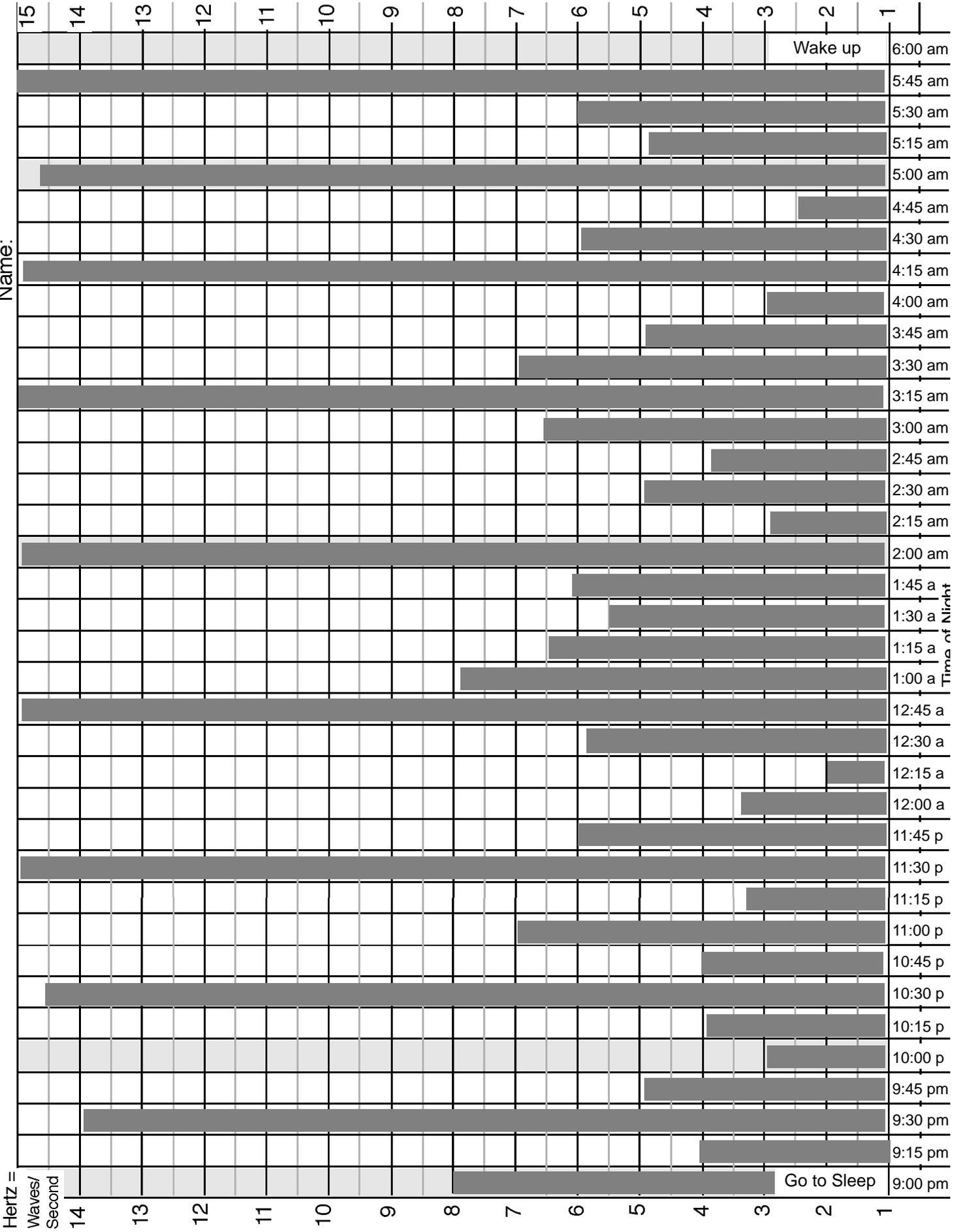
20. When there are high frequency brain waves there is:

- a.) A lot of skeletal muscle activity.
- b.) Some skeletal muscle activity.
- c.) No skeletal muscle activity.

extra credit:

What have you learned about the patterns of energy in the brain? Think about what happens in your brain when you're asleep as well as when you are awake. Use complete sentences. Continue on back.

Name:



Name _____

Date _____

Teacher _____

Circle the correct term:

1. "The drum beat is fast" is a (**qualitative** quantitative) description of the drum beat.

2. "The drum beat is 8 beats per second" is a (qualitative **quantitative**) description of the drum beat.

Read the sentence and answer the questions using one or two words:

“Cheryl has five shiny, red apples in her hands.”

3. What are the qualitative words describing Cheryl's apples.

shiny, red

4. What are the quantitative words describing Cheryl's apples.

five

Answer the following using complete sentences.

5. What type of energy in the brain do brain waves measure?

Brain waves measure electrical energy

6. Are brain waves the same, regardless of what a person is doing? Explain.

No, brain waves vary in frequency depending on how active a person's brain is at the time. For example, when a person is “zoned out”, their brain waves are slower than if they are taking a test. If they are dreaming, their brain waves are usually very fast compared to when they are not dreaming.

Complete the following definitions using a vocabulary term:

REM sleep

Frequency

Slow Wave Sleep

Hertz

Electrical

7. The number of times something happens in a specific time period:

Frequency

8. The unit of measurement for electrical waves per second:

Hertz

Let's do the Math!

9. 14 beats are counted over 10 seconds

Frequency = 14 beats divided by 10 seconds or 1.4 beats per second

10. 20 beats over 10 seconds is 2 beats per second.

Draw that Wave Pattern!

Draw wave patterns that best represent the electrical activity of your brain.

11. You are asleep and dreaming.

(lots of waves close together)

12. You are awake and zoned out in front of the television.

(a few waves, spread apart)

13. You are awake and concentrating on a game.

(lots of waves close together)

Read about the sleep lab experiment. Then, study the sleep graph provided and answer questions 14 - 16.

The average person normally dreams about 5 times during the night. However, some scientists tried an experiment in the sleep lab one weekend. One Saturday night, a person who usually dreams about five times a night was woken up every time they started to dream. On Sunday night they were allowed to sleep all the way through the night uninterrupted. Sunday night their sleep pattern was not normal. Your sleep graph shows the Sunday night sleep pattern of a person who is recovering from being woken up.

The sleep subject measured on this graph went to bed sometime before 9:00. Study this graph and write down the differences you notice between this sleep pattern and a normal sleep pattern.

14. How many dreams did this person have on Sunday night? 9

15. Record all of the times that this person had a dream on Sunday night.

9:30, 10:30, 11:15, 12:45, 2:00, 3:15, 4:15, 5:00, 5:45

16. What did you notice about the recovery sleep on Sunday night as compared with normal sleep?

The person had a lot more dreams, more often when they were recovering from being woken up the night before. The usual time between dreams is 90 minutes. These dreams were not more than 75 minutes apart, and seem to average about an hour between dreams. They do not seem to be longer than the average dream in this case. The dreams became more frequent towards the end of the night.

Circle the correct letter (a, b or c).

The 2 stages of sleep we've studied are Slow Wave Sleep and Rapid Eye Movement (REM) sleep. We dream mostly during REM sleep.

18. During REM sleep there are:

- a.) High frequency brain waves.
- b.) Low frequency brain waves.
- c.) No brain waves.

19. When there are high frequency brain waves there is:

- a.) Rapid eye movement.
- b.) Some eye movement.
- c.) No eye movement.

20. When there are high frequency brain waves there is:

- a.) A lot of skeletal muscle activity.
- b.) Some skeletal muscle activity.
- c.) No skeletal muscle activity.

extra credit:

What have you learned about the patterns of energy in the brain? Think about what happens in your brain when you're asleep as well as when you are awake. Use examples from your life. Use complete sentences. Continue on back.

Students should write about fast versus slow brain waves and apply to their lives. (e.g.: My waves are fast when I play soccer. My brain has higher levels of electrical energy when I am dreaming. When I am not dreaming, the electrical energy in my brain is lower and there is more activity in my body. I roll over and move around in my sleep.) N.B. It is not proven that nightmares produce faster brainwaves than other dreams.



The Game