

Through the Nose

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Every day, our senses tell us about the world. We taste, touch, smell, hear, and see things, and what we experience helps us learn. As we store more and more information in our memory, we are able to decide how to act in different situations based on the knowledge we have gained through our senses. For example, if you've ever touched a hot stove, your sense of touch quickly told you that *OUCH!* the stove is too hot. We learn that the high heat can hurt us, and we know the next time we walk into the kitchen not to touch the stove when it's on!

Animals learn the same way we do: by using their senses. A dog's eyes and ears and nose work the same way that ours do, by detecting sights, sounds, and scents. Dogs' noses, however, are super-powered compared to ours. Let's get gross for a minute, and think about the inside of our noses. Membranes, thin, film-like layers that line the inside of the nasal cavity, help us smell because they are packed with tiny scent-tracking hotspots called olfactory receptors. Humans have about 5 million of these receptors, while dogs have 220 million. If you were to lay a dog's nasal membranes out flat, they would be able to cover its body!

So what does this mean? It means that dogs can smell a lot more things a lot more strongly than we can. Their powerful sense of smell can pick up scents that we don't even know exist, and a large portion of a dog's brain is dedicated to interpreting what those scents mean. Dogs constantly sniff:

the air, the ground, food, furniture, other dogs, and humans, and it's all because they are trying to make sense of the world around them.

What do dogs do with all of the information they collect with their noses? The scents that dogs pick up help them understand their surroundings. Dogs store what they learn, making memories that guide their future actions. When trained to discern tiny differences in scents, dogs can do remarkable things. For instance, dogs can learn to sniff out drugs and explosives (have you ever seen a dog with a security guard at a big office building or an airport?). They can also, with training, pick out the one stick thrown for them from a heap of many, based on the scent of their owner. With that kind of olfactory ("olfactory" means that something is related to the nose and scent) talent, it's no wonder dogs are often used in searches for missing hikers or people lost in avalanches!

Also, dogs recognize one another by scent; a mother dog knows which puppies are hers by how they smell, for example. Plus, dogs can determine pretty quickly what another dog is like, and whether or not they're going to get along, by detecting specific scents on other animals that indicate age, gender, and even mood.

Dogs know humans by scent, too! You don't notice it, but you have a unique scent, and your dog – and other people's dogs – can tell the difference between you and someone else in large part because of your specific smell. Pets come to associate the scent of their owners with home and safety, as human and dog become more familiar with one another. Some scientists even think that dogs can tell how their owners are feeling based on smell, and one study in England tested the ability of dogs to detect cancer in human patients.

A simple way to think about how dogs can do these incredible things is to look at the process like a chain. A dog sniffs, breathing in a lot of different scents, which are then interpreted by its brain as information about the environment. The dog learns about its surroundings that way, and with training – repeated exposure to a certain scent in order to make it easily recognizable – stores what it has learned in its memory, and is able, in the future, to act on what it knows. That's how dogs help rescue teams find

missing people and help policemen locate dangerous substances in searches, and that's how your dog knows it's you when you come home after school.

Name: _____ Date: _____

1. What animal's sense of smell is discussed in the passage?

- A a cat's sense of smell
- B a dog's sense of smell
- C a chicken's sense of smell
- D a pig's sense of smell

2. What does this passage describe?

- A the different parts of a dog's brain and the role each part plays in interpreting smells
- B the experience of two people who get lost while hiking and the dog that helps find them
- C how dogs are used by doctors around the world to detect cancer in human patients
- D dogs' sense of smell and what dogs do with the information collected by their noses

3. A dog's sense of smell is much more powerful than a human's sense of smell.

What evidence from the passage supports this statement?

- A A dog has 220 million scent-tracking hotspots in its nose, while a human has about 5 million.
- B A dog's eyes, ears, and nose work the same way that a human's eyes, ears, and nose work.
- C Touching a hot stove teaches people not to do so again because the stove's high heat can hurt them.
- D Every person has a specific scent that is different from the scents of other people.

4. What is one reason that dogs are able to help find drugs, explosives, and dangerous substances?

- A Some dogs are able to recognize people and other dogs by scent.
- B Some drugs, explosives, and dangerous substances have a smell.
- C Drugs, explosives, and dangerous substances are often carried by missing hikers.
- D Dogs are able to tell how their owners are feeling based on smell.

5. What is this passage mainly about?

- A why it is important for security guards at big office buildings and airports to have dogs with them
- B what olfactory receptors are, how they work, and the ways they can be used by people to learn about their surroundings
- C the amount of time it takes dogs to associate the scent of their owners with home and safety
- D the information dogs pick up through smells and what they can do with that information

6. Read the following sentence: "A dog's eyes and ears and nose work the same way that ours do, by detecting sights, sounds, and **scents**."

What does the word **scents** mean?

- A problems
- B dreams
- C feelings
- D smells

7. Choose the answer that best completes the sentence below.

Dogs learn about their surroundings by using their senses, _____ the sense of smell.

- A after
- B although
- C especially
- D before

8. According to the passage, how can a dog tell the difference between you and someone else?

9. Describe the process a dog goes through to store information about its surroundings in its memory.

10. Suppose that a dog owner went for a walk in the woods behind his house and then disappeared. Would his dog be able to help find him? Explain why or why not, using evidence from the passage.

Teacher Guide & Answers

Passage Reading Level: Lexile 1180

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8. According to the passage, how can a dog tell the difference between you and someone else?

Suggested answer: A dog can tell the difference between you and someone else because every person has a unique, specific smell.

9. Describe the process a dog goes through to store information about its surroundings in its memory.

Suggested answer: Students should relate or summarize the process detailed in the last paragraph of the passage. A dog breathes in a lot of different scents. Then the dog's brain interprets the scents as information about the environment where the dog is. When the dog smells a certain scent enough times, that piece of information about its environment gets stored in its memory.

10. Suppose that a dog owner went for a walk in the woods behind his house and then disappeared. Would his dog be able to help find him? Explain why or why not, using evidence from the passage.

Suggested answer: Multiple answers are acceptable, provided they are supported by information from the passage. Students may argue that the dog would be able to help find the owner because a dog can recognize the specific scent of its owner. Students may also point out that dogs are able to learn about their surroundings through their sense of smell, which might enable the dog to lead a rescue team through the woods on a search.