

# Lesson 5: Understanding Pain

Pain is something that is difficult to quantify and treat in some cases. What is extremely painful to one person may be less so to another. Did you know that people who suffer with depression or anxiety, pain can become particularly intense and hard to treat? People suffering from depression, for example, tend to experience more severe and long-lasting pain than other people.



## Learning Objectives

Students will learn:

- the function of pain
- how pain affects the body



## Learning Outcomes

By the end of the lesson, students will be able to:

- Explain some of the signs of pain in animals
- explain the pain gate theory
- Draw an illustration of the pain gate theory



## Resources Required

### Resource 1:

Powerpoint

### Resource 2:

Teacher's notes

### Resource 3:

Worksheet on pain, coloured pencils, paper



## Key Words

pain, human reflex arc, pain gate theory, palpate,

## NC Links

Aims and objectives of Science: understand how society makes decisions about scientific issues and how the sciences contribute to the success of the economy and society

Subject content: 8.

Biology. Knowledge and Understanding:

11. Biology specifications must ensure that there is an appropriate balance between plant biology, animal biology and microbiology and include an appreciation of the relevance of sustainability to all aspects of scientific developments.

12. Living organisms, including plants, animals and microorganisms, interact with each other and with the non-living world. The living world can be studied at population, organism, cell and molecular levels. There are fundamental similarities as well as differences between plants, animals and microorganisms.

Consider ethical issues in the treatment of humans, other organisms and the environment

Working scientifically - informing students of the role of science in understanding the causes of and solutions to some of the challenges facing society.

Development of scientific thinking: appreciating the power and limitations of science and considering ethical issues which may arise

Activity	Description	Timing
Introduction	Based on slide one, discuss with the children their knowledge of pain. What kind of pain have they experienced, How did it make them feel. Can they tell when members of their family are in pain? How about if their dog or cat are in pain?	10 min
Pain Gate theory	Teach about pain gate theory - slides 3 - 8. Slide 4 depicts the human reflex arc. For more information see notes	15 min
The vocabulary of pain	Worksheet - Give students ten minutes to come up with four more examples for each column. How pain may feel, it's strength and the effect on the person  This could be completed verbally as a class, or use the attached worksheet to record answers.  The following slide on the Powerpoint gives you a number of suggestions	15 min
Observe, Observe, Observe	We can't ask an animal if they are in pain the same way we can a human. However, they will give us lots of signs they are in pain.  Use slides 12-14 to discuss this and what they may see in an animal in pain.	10 min
Plenaries	Write 5 top tips to spot pain in your cat or dog.  With the information you have learnt in this lesson on pain, discuss with a partner if the use of animals in laboratory testing is ethical and should it continue? Alternatively, you may want to convert this into a debate or a homework assignment	10 min

### Key questions:

What is pain?

How could One Medicine benefit humans and animals in the relief of pain?

What have you learnt about pain and it's function in this lesson?

# Plenary/ Assessment of Learning



## Assessing Progress

Write 5 top tips to spot pain in your cat or dog.

## Extension activities

Create an information poster on pain in animals and how to identify it



## Teacher's Notes / Observations

# Teacher's Notes

## Additional Information:

Looks at the term pain, what it is and how it can affect humans and animals behaviour

Slide 1: Pain: Information for the section- Did you know?

Many animals hide their pain and as such the way to recognise pain in an animal, before they limp or you see other injuries/damage is through their behaviour.

With humans we KNOW they are in pain, because they tell us, sometimes repeatedly that they are!

They can describe the pain and tell the doctor where it is. A vet has to use their eyes, palpation and the information from the animal's guardian to work out what may be wrong with them.

Slide 2: The symptom of pain is an essential fact of life and helps guide us to immobilize an injured part of the body, seek help, and direct care. Pain is one of the most common symptoms aiding physicians in diagnosis and treatment.

Slide 4: Human reflex arc. Pain is generated in the skin surface and detected by nociceptors that warn the nervous system, this pain information is received in the spinal cord, and then sent to the brain through ascending pathways where the pain information is received and processed in the somatosensory cortex. The somatosensory cortex communicates this information to the motor cortex, which sends electrical pulses through descending pathways to react to the noxious stimulation by contracting the muscles and move away from the source of pain.

# Teacher's Notes

## Additional Information:

Slide 6: Pain Gate theory.

To explain why thoughts and emotions influence pain perception, Ronald Melzack and Patrick Wall proposed that a gating mechanism exists within the dorsal horn of the spinal cord.

Small nerve fibres (pain receptors) and large nerve fibres ("normal" receptors) synapse on projection cells (P), which go up the spinothalamic tract to the brain and inhibitory interneurons (I) within the dorsal horn.

The interplay among these connections determines when painful stimuli go to the brain:

When no input comes in, the inhibitory neuron prevents the projection neuron from sending signals to the brain (gate is closed).

Normal somatosensory input happens when there is more large-fibre stimulation (or only large-fibre stimulation). Both the inhibitory neuron and the projection neuron are stimulated, but the inhibitory neuron prevents the projection neuron from sending signals to the brain (gate is closed).

Nociception (pain reception) happens when there is more small-fibre stimulation or only small-fibre stimulation. This inactivates the inhibitory neuron, and the projection neuron sends signals to the brain informing it of pain (gate is open).

Descending pathways from the brain close the gate by inhibiting the projector neurons and diminishing pain perception.

This theory doesn't tell us everything about pain perception, but it does explain some things. If you rub or shake your hand after you bang your finger, you stimulate normal somatosensory input to the projector neurons. This closes the gate and reduces the perception of pain. From [www.science.howstuffworks.com](http://www.science.howstuffworks.com) The control of this 'gate' depends upon the relative activity in large-diameter (A-beta) fibres and small-diameter (A-delta and C-) fibres. Large-diameter fibre activity closes the 'gate', while small-diameter fibre activity opens it. Descending pathways from the brain also close the gate.

Slide 10: Activity - Give students ten minutes to come up with four more examples of how pain may feel, it's strength and the effect on the person  
answer sheet is slide 11

Can we look at how a vet has to find a diagnosis of a health issue?

Slide 13. Give students some time to discuss in pairs what they may see if an animal in pain:  
After a discussion give them further information as below:

## Teacher's Notes

### Additional Information:

Pain in animals, what may be seen. Pain is very individual, so what we observe in one animal may be very different in another.

VOCALISATIONS. This can be barking, or whining, crying or a low long sigh when undertaking a certain activity

- DAILY HABITS: Withdraw from contact, may sleep in a different place, sleep more or less, drink more or less, not want to go out for a walk, eating more or less, not going up or down the stairs, getting on and off the settee.
- SELF MUTILATION: Licking parts of the body, scratching a certain area, biting and nibbling
- CHANGES IN ACTIVITY LEVELS: May not want to go out for walks the same, struggling after walks, restless, struggling to get up, may seek more affection than usual.
- FACIAL EXPRESSIONS: Flattened ears, panting when resting, vacant stare, wide eyes, whale eyes
- POSTURE AND MOVEMENT: Limping – intermittent or continual, stiffness in movement, hunched back, weight bearing not balanced, posture links with behaviour
- COAT CHANGES: Lost usual shine, standing up in different areas, facing the wrong way, losing fur, dandruff
- SELF PROTECTION: Protects certain areas from contact, may move away from contact, and may not want stroking any longer, doesn't want to be helped, picked up, hides
- REACTIVITY: Growl or bark at other dogs or people, snap or lunging on lead, especially if new behaviour

ANY change in behaviour, please have your animal checked over by your VET.

If we know what a painful condition in people is, we will know that it will be painful in animals. Assessing the types of pain could help with the correct medications being prescribed to people and animals to make sure they are pain free.



# Pain

Sharp describes how pain feels, while short term or chronic describe how long pain lasts.  
Add more examples to each column below.

Feeling	Strength	Effect
shooting	mild	annoying