Fleas Among Us

Texas Cooperative Extension
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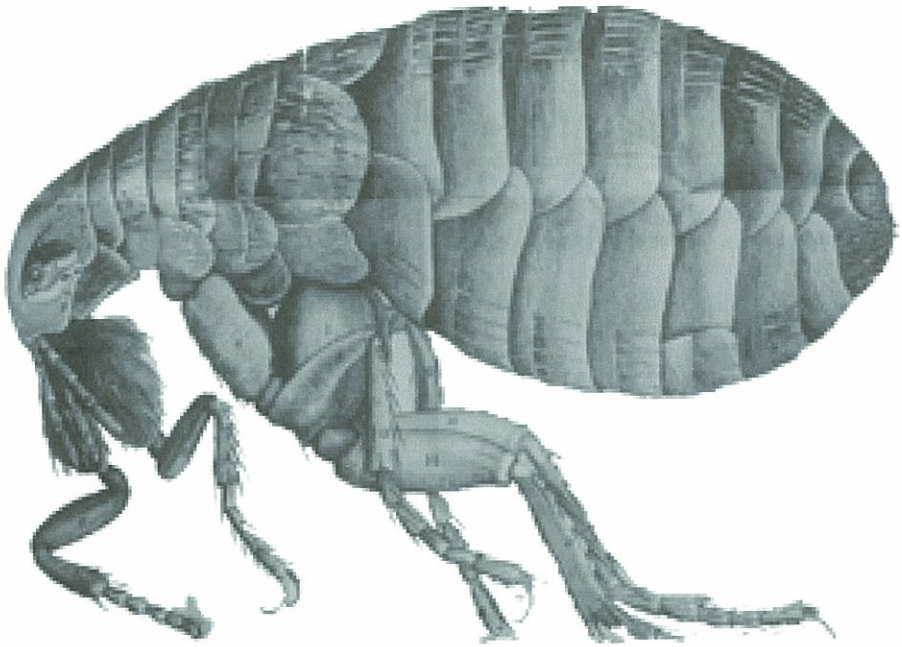
Preface

FLEAS are a very diverse group that can be found all over the world, with more than 2,000 different species of fleas found worldwide. They live on a wide variety of hosts and they can develop large populations in a short period of time. Around 94% of fleas will be found on mammals and about 5% will be found on birds. The most commonly found flea is the cat flea (*Ctenocephalides felis*).

Fleas are considered external parasites, since it is dependent on its host for a blood meal. Fleas can infest such areas as homes, barns and bird cages. Both males and female fleas bite and suck blood. The bite often leaves an itchy, red spot. Secondary infections can be caused by scratching the flea bite, especially in children.

Fleas are considered a health concern, since they are able to spread many diseases to humans. Fleas, such as *Ctenocephalides felis* and *Xenopsylla cheopis*, transmit murine typhus and plague to humans and companion animals. Murine typhus is common in South Texas and it has been a reportable disease in Texas for 40 years. The plague bacterium has been found in the western two-thirds of Texas in populations of squirrels, prairie dogs, rats, and mice, according to the Texas Department of State Health Services. These animals act as reservoirs for this bacterium. They allow the bacterium to be transmitted to humans and companion animals, if they are bitten by an infected flea.

In this booklet are a series of exercises to assist with educating your students about fleas and various methods that can be used to decrease flea populations.



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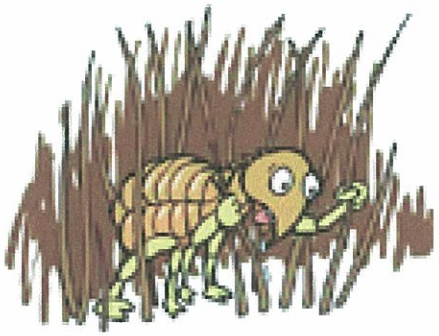
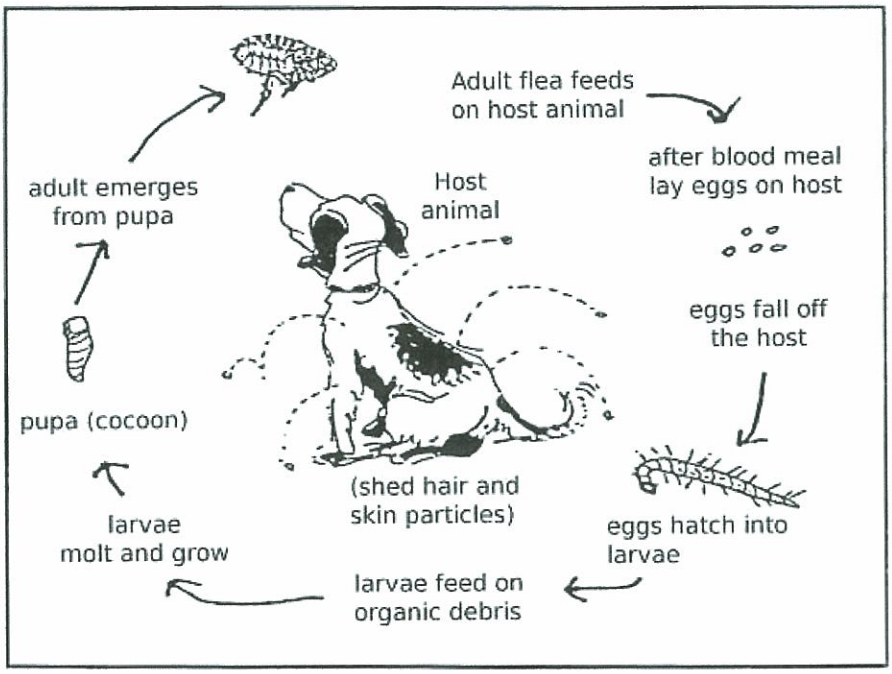


Lesson 1: The Fascinating Flea

Fleas are wingless insects found in the **Order Siphonaptera**. The flea's **exoskeleton** is hard, shiny and covered with hairs and spines. Fleas are dorsal-ventrally flattened to allow movement on their furry hosts. Fleas have short antennae located in grooves on the head and do not have compound eyes. They have strong hindlegs that allow them to jump away from danger or onto a host. It is estimated that a flea can jump over 7 inches high and 13 inches long.

Fleas live an many warm-blooded animals, such as dogs, cats, squirrels, rats and mice. They have sucking mouthparts in order to suck blood from their host. The most commonly found flea is the cat flea (*Ctenocephalides felis*). Contrary to its name, the cat flea may feed on cats, dogs, and accidentally on humans.

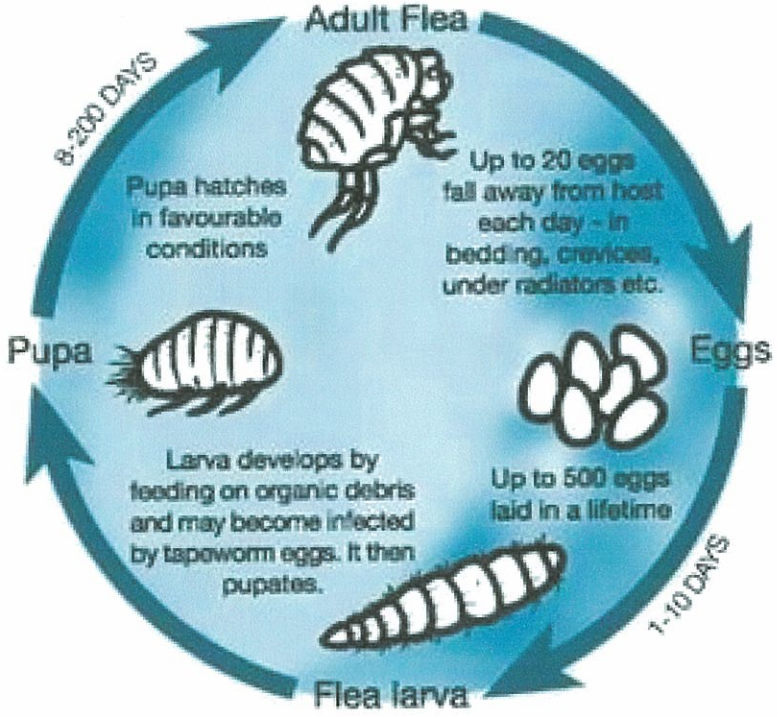
The flea develops through four life stages: eggs, larvae, pupae, and adults. Female fleas lay around 40-50 oval eggs a day on its host. Once the eggs are laid on the host, they fall off onto the ground below. This means that eggs may fall into bedding, carpet, backyards or wherever the animal roams. The eggs are tiny and white in color, but they are visible to humans. The eggs hatch into larvae. The flea larvae are also visible but they are translucent white, with dark colored internal organs. The larvae do not have eyes or legs. Since the flea larvae develop on the ground, there is an endless amount of food for development. The larvae mainly eat dried blood and skin flakes. The larvae must live in indoors or in shaded areas outdoors, since they are usually killed when temperatures reach above 95° F. Flea larvae would die if they developed in open areas under the summer sun, since temperatures tend to reach over 100° F in the summer. The larvae molt two times before pupating in silk cocoons. The silk cocoons are sticky in order to attract dirt and other debris that is used as **camouflage**. When fleas are developing indoors, the pupal stage is usually found under the carpet. The carpet serves to protect and provide shelter for the developing flea. The adult flea will remain in the silk cocoon until it senses vibrations and carbon dioxide from a potential host. Once a host is located, the adult flea will emerge from the silk cocoon and jump onto its host. Adult fleas tend to emerge faster in higher temperatures, but they can remain in the cocoon for 12 months. The complete lifecycle from egg to adult usually takes 3 weeks.



Questions:

1. What order is the flea found?
2. What type of mouthparts does a flea have?
3. How many stages are in a flea's lifecycle?
4. How is a flea able to jump?
5. How many days does it take a flea to complete its lifecycle, from egg to adult?

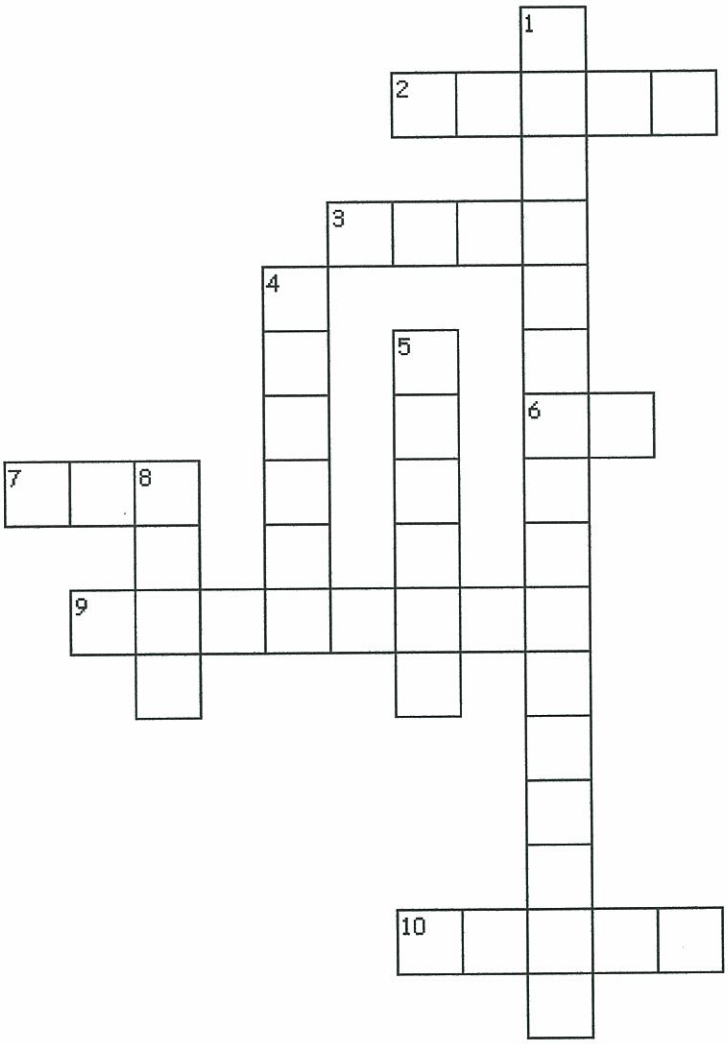
Remember The Lifecycle of The Flea



Enhancement Activity:

Directions: Fill in the answer to the questions according to the corresponding number.

Fascinating Fleas



Across

2. What color are flea eggs?
3. How many lifestages do fleas have?
6. Do fleas have compound eyes?
7. Are fleas wingless?
9. What allows fleas to jump?
10. What type of area do flea larvae not like to develop?

Down

1. What type of mouthparts do fleas have?
4. What animals do fleas feed on?
5. Where are flea pupae commonly found indoors?
8. What do flea larva feed on?

Word Bank

White	Carpet	Yes
Furred	No	Hindlegs
Skin	Sunny	Piercing-Sucking
Four		

Lesson 2: How Do Fleas Feed?

Adult fleas are the only life stage that lives on furred animals and feeds on blood. The adult flea can live between 4 to 25 days. Female fleas, like mosquitoes, require a blood meal in order to produce eggs. The female flea can lay eggs within 24 to 48 hours after her first blood meal. Both male and female fleas bite and suck blood for nutrition. Adult female fleas require a blood meal to produce **fertile** eggs. A female flea can produce between 400 to 800 eggs in about five months. Their eggs are laid on the furred animals, but then fall off, since they are not glued onto the animal's hairs. This means the flea eggs can fall off onto many different areas such as into bedding, carpet, the yard or wherever the animal spends time.

When fleas bite humans, they can cause swollen, red bumps on the skin. They are able to bite any part of the human body, but they most commonly bit our legs. Some people react more than others to flea bites. Ice or calamine lotion can be applied to the bite, in order to stop the itching. A doctor should be seen, if severe allergic reaction occurs.

Adult fleas can live months without a blood meal. However after the adult flea takes its first blood meal, changes occur within their bodies. These changes force the adult flea to find another blood meal within a few weeks or it will die.

Exercise: Feeding the fleas

Directions: Match the number to the corresponding letter at the bottom to fill in the missing words in the sentence.

1. Fleas feed on _____ _____ _____ _____ _____.
   2 12 15 15 4

2. Both _____ _____ _____ _____ _____ and _____ _____ _____ _____ _____ _____ _____
   13 1 12 5 19 6 5 13 1 12 5
   _____ feed on blood.
   19

3. _____ _____ _____ _____ _____ fleas are the only lifestage to feed on blood.
   1 4 21 12 20

4. Fleas have to feed on a furred _____ _____ _____ _____ _____ _____ in order to survive.
   1 14 9 13 1 12

5. Flea _____ _____ _____ _____ _____ feed on skin and dried blood.
   12 1 18 22 1

6. Flea _____ _____ _____ _____ _____ do not feed.
   16 21 16 1 5

7. Female fleas require a _____ _____ _____ _____ _____ meal, like mosquitoes to produce fertile eggs.
   2 12 15 15 4

8. Fleas _____ _____ _____ _____ _____ _____live without a blood _____ _____ _____ _____.
   3 1 14 14 15 20 13 5 1 12

9. Fleas complete their lifecycle faster in _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____.
   23 1 18 13 23 5 1 20 8 5 18

10. When _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ is sensed in the air, fleas will emerge from pupal cases.
    3 1 18 2 15 14 4 9 15 24 9 4 5

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**

Enhancement Activities: Feeding Frenzy Word Find

Directions for Word Search: Find the words in the word box within the block of letters.

Feeding Frenzy

O M E O A M S C X A I A Y U T X H W D Z M Y B C S
Q U D V A F T S L N Y X D N N K R V V Y Y S I F X
D G R L N K E J S J B L L U Y D Y A I W K C T X E
T A E Q X H P E C R T F H J L E P F N E U S E G O
L C M Z K O C K R G N B E V A T K Z W S A F I X A
L W T Z X T A X T E X R Q H N E H B B E N B I S D
N I H C S M E F V A R U F Z A O U O H S M H W X N
O J F Q V L M M X R O Z L G R N O T U O H F N B C
J R D E U U G D S N Y T B Y J N Q V C M Q Q M C U
F Y Q V S K N K C J T N I T M B A H G W Q S T A J
F S R D M T I R V V P O J P E A M B R E J Y V N P
O U B W I H A K Q Y X M U L U Z G Q W A H E J I E
B G H M J Z J G S Q P G Z H P W Q B D Z I Z T M H
F G J H S R O M E Y C Q O B X X V K Z Q B R E A B
B C D B V N T K T M U S S Y A I S O C K S S D L Z
S B O U K Q A P U P D I H U N J O W K V S C O S U
M R Z M V S A M B E Q L H H A I F N F P P I O H E
T J E L A M E F U N N W Q C U E T S J X L L L T I
U W E D O K O G K H C T B B J O Y R G X B N B B S
D V Q R M V E Y K D F B K D G A R G F T P V E T C
C E L E R P G X D I X K K L A F E W R R I O T L J
U K P U B A N U B L L Y Z T K M E W L T W U Y P I
P N F Z B T B J J M D Q H R P F C Z R A L T L X O
L M W V I Y C I K C V Z L Q Q M J R A A C V B V D
K M F Y D A T H X U O S W B J T V J C S R T H I K

ADULT
BITE
EGG
HUMANS
LARVA
MALE
PUPA
TINY

ANIMALS
BLOOD
FEMALE
INSECTS
LIFESTAGE
PETS
SOCKS

Lesson 3: My Pet Has Fleas…How Did That Happen?

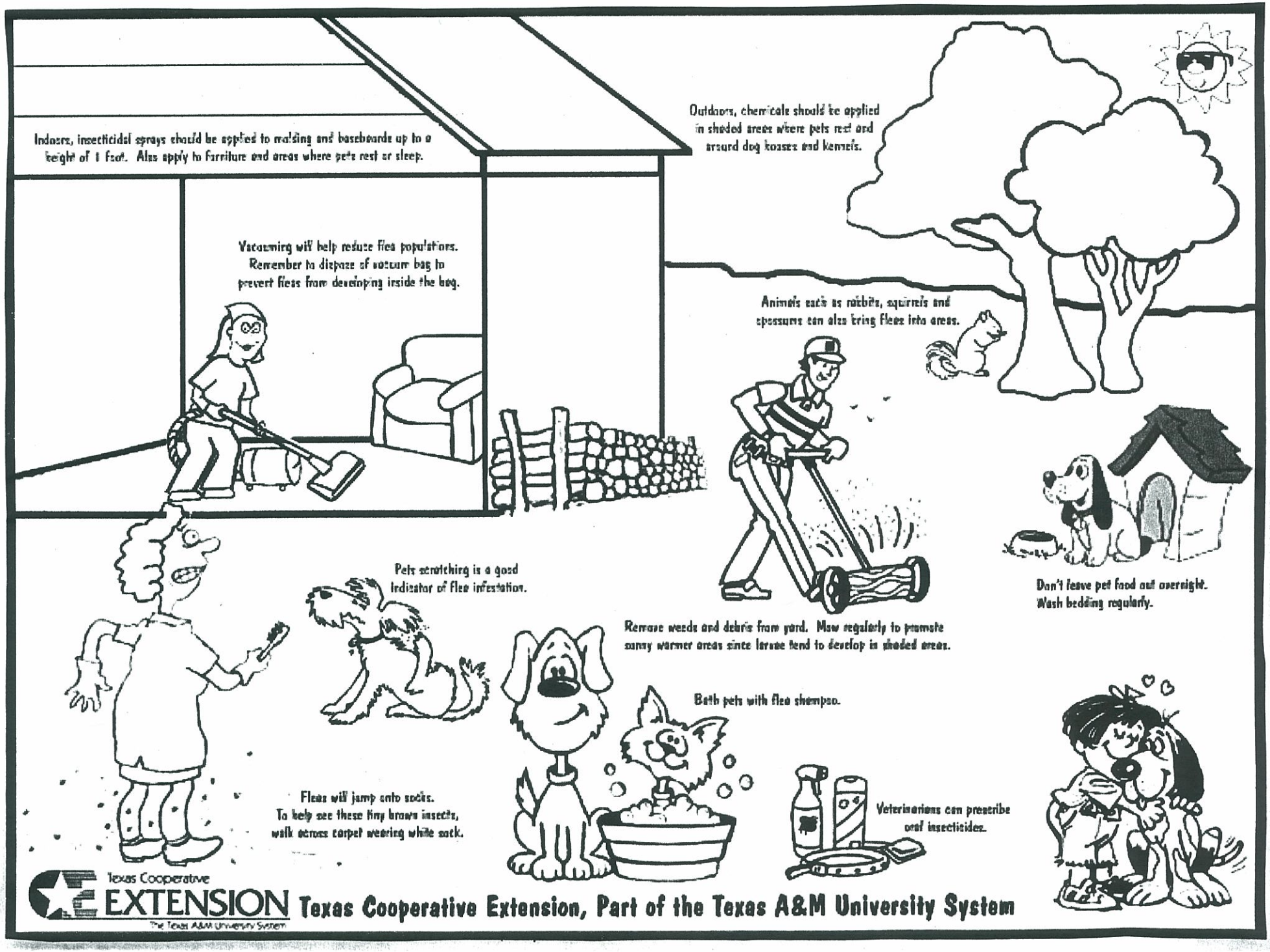
How do I know if I have fleas in my house?

Fleas reproduce at a rapid rate so if one flea is encountered, there are probably many in the area. One way to detect flea infestations is to walk around your house in white socks. To determine if fleas are present in your home, walk across a carpeted floor while wearing white socks help see these tiny brown insects. The dark-colored fleas will stand out from the white background of the sock as the fleas jump onto the socks. If fleas are present in the house, **integrated pest management** (IPM) approach to controlling these insects can be taken in to decrease the flea population.

Also a pet scratching is a good indicator of flea infestation. Tiny specks of dried blood may also be found on pet bedding, which is another sign of flea infestation.
Flea eggs may also be seen, especially if the eggs are found on a dark colored background. A flea egg is commonly mistaken for a grain of sand. However the flea eggs are filled with liquid. This makes flea eggs easily distinguished from grains of sand, when they are crushed between fingers. Remember that finding an adult flea means there are also eggs and larvae within the area. Therefore killing only the adult flea does not guarantee eliminating the entire flea population. If you have fleas inside take all pets to the veterinarian for medication that will help kill any fleas that jump on them.

How do fleas enter homes?

The perfect environment for fleas is in areas that are well protected from rain, sun and have a temperature range between 70-90° F. These areas are usually under porches, decks, car ports, at the edges of woods, and in places where your pets lay down outdoors. Fleas can enter the home in many ways, even if companion animals are never or rarely outside. Fleas have the ability to jump from surrounding areas and land on humans or companion animals. A person does not have to own a pet to have fleas in and around their house. Other animals such as rabbits, squirrels, opossums can bring the fleas into areas. This can allow fleas to begin an infestation in and around structures.


Indoors, insecticidal sprays should be applied to molding and baseboards up to a height of 1 foot. Also apply to furniture and areas where pets rest or sleep.
Outdoors, chemicals should be applied in shaded areas where pets rest and around dog houses and kennels.
Vacuuming will help reduce flea populations. Remember to dispose of vacuum bag to prevent fleas from developing inside the bag.
Animals such as rabbits, squirrels and opossums can also bring fleas into areas.
Don't leave pet food out overnight. Wash bedding regularly.
Pets scratching is a good indicator of flea infestation.
Remove weeds and debris from yard. Mow regularly to promote sunny warmer areas since larvae tend to develop in shaded areas.
Bath pets with flea shampoo.
Fleas will jump onto socks. To help see these tiny brown insects, walk across carpet wearing white sock.
Veterinarians can prescribe oral insecticides.
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Activity: "I SPY POSSIBLE FLEA HABITATS"

Areas of Possible Infestations	Ways to Eliminate Fleas
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

Lesson 4: What Makes a Flea Dangerous?

Why are fleas so dangerous?

Fleas are irritating to all animals, since they will feed on any warm-blooded animal. After a flea bites, the skin becomes irritated and inflamed. In addition, flea bites will cause itching. Sometimes their bites will cause some people and pets to suffer from flea allergy **dermatitis.** This dermatitis can cause intense itching, hair loss, and lead to **secondary infection**. Also biting fleas can cause **anemia** in young, older or ill pets, which causes pale gums, weakness, and **lethargy**.

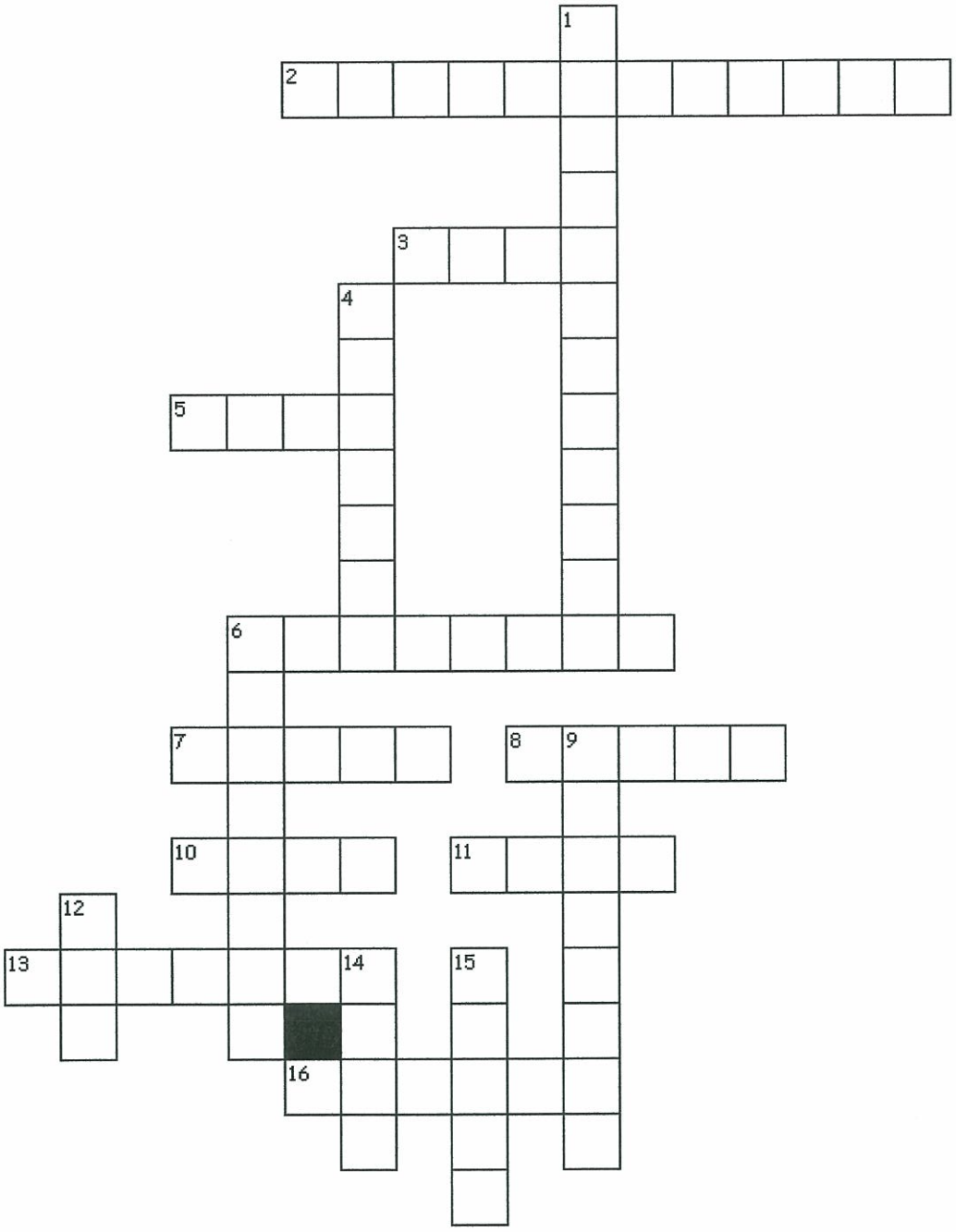
Many fleas are carriers for **parasites** and disease. Fleas can transmit **tapeworms** to pets, which can produce a shaggy coat, mild diarrhea, weight loss, and sometimes seizures. Tapeworm eggs are normally ingested by flea larva as they feed on the ground. Once the larva has ingested the tapeworm egg, the tapeworm continues to develop inside the flea larva. Once the adult flea emerges from the cocoon, the adult will have the tapeworm parasite. If this infected flea lands on your pet, your pet can eat the flea while grooming. If the pet eats the infected flea, your pet will now have the tapeworm parasite.

Fleas can also transmit diseases such as **plague** and **murine typhus**. Fleas found most commonly on rodents have the ability to transmit plague to cats and to humans. Plague causes fever, swollen lymph nodes, and sometimes death. There are two types of plague, **pneumonic plague** and **bubonic plague**. Fleas or an infected animal can spread bubonic plague. Symptoms of bubonic plague include fever, headache, and painful, swollen **lymph nodes**. Pneumonic plague causes pneumonia. Although plague can be fatal to both humans and animals, it is treatable with antibiotics if diagnosed early. Also a plague vaccine is available for special groups at very high risk. Murine typhus is a common disease in south Texas. Often the disease is mild and unnoticed; however, it can be severe and sometimes deadly. Infected rat fleas **excrete** the bacteria, while sucking blood from the host. This causes **contamination** of the bite site and other fresh wound sites. Symptoms of murine typhus include headache, backaches, high fever (around 105°F), and a rash. Antibiotics can also be prescribed to cure murine typhus.

Early **diagnosis** and treatment give humans the best chance of recovery from these and other flea transmitted diseases. By keeping fleas away from your pet, your pet will remain healthy.

Exercise: Crossword

Fighting Off Fleas!!!



Across

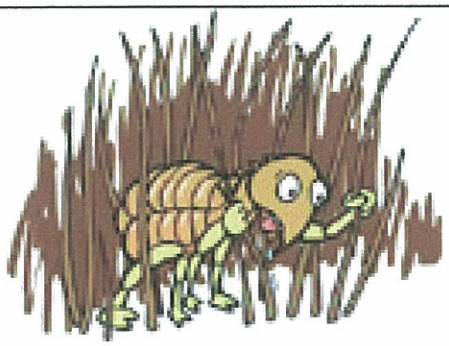
2. Type of doctor pets are taken to
3. Fleas have this many wings
5. The number of stages in a flea lifecycle
6. The use of insecticides is what type of control
7. Both male and female fleas feed on _____.
8. Fleas prefer to breed in this area
10. Flea larva develops into _____.
11. Flea eggs sometimes look like grains of
13. Fleas can live on birds and _____.
16. Fleas have this type of mouthpart

Down

1. Fleas are found in this Order
4. Female fleas need blood to produce what type of eggs
6. These methods for controlling fleas result in changing the environment
9. The body part that allows the flea to jump
12. The most common type of flea
14. Flea larvae feed on dried blood and _____.
15. The color of socks used to detect a flea infestation

Word Bank:

Zero	Blood	Veterinarian
Sand	Fertile	Mammals
Six	Chemical	White
Cultural	Cat	Pupa
Hindlegs	Shady	Skin
Itch	Four	Biting
Fertile	Disease	Siphonaptera



Lesson 5: How Can We Decrease Flea Populations?

What are some ways to treatment for fleas?

If fleas exist, then an **Integrated Pest Management** plan should be initiated to decrease the flea population. Integrated Pest Management plans involve the use of multiple control tactics such as cultural and chemical controls to decrease existing flea populations. Cultural control can be defined as anything you do to prevent flea populations from growing. Chemical control involves the use of insecticides in order to decrease existing flea populations. The following paragraphs describe some of the cultural and chemical control options we can use to decrease flea populations.

If flea infestations exist inside, the following are some cultural control options for decreasing flea populations. Washing the pet's bedding regularly and vacuuming will help reduce the flea populations. However, remember to dispose of the vacuum bag, to prevent fleas from developing inside the bag. Shampooing carpets and rugs can also kill and remove flea eggs and larval stage.

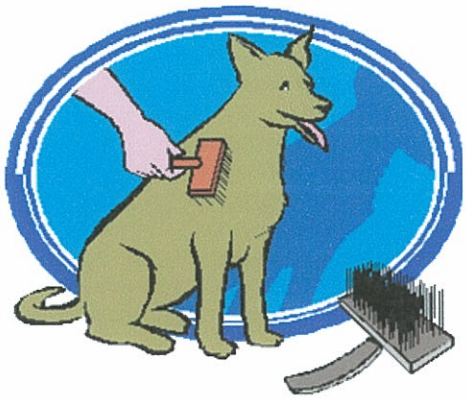
There are many methods of controlling adult fleas on pets. One way is bathing the pet with flea shampoo. Pets may be combed or shampooed frequently to remove adult fleas before they can irritate the pet or lay eggs. It is suggested that the shampoo lather remain on the animal for up to 15 minutes before rinsing the pet with water. Some pets may be allergic to the flea shampoo, so be cautious when using.

There are also other flea treatments that can be prescribed by a veterinarian. **Oral insecticides** are available. There are also **topical insecticides** that are applied to one spot between the pet's shoulder blades. They are non-toxic to mammals and kill almost all fleas on the pet within 24 hours of treatment. It is best to seek the advice of a veterinarian using any insecticide on an animal.

If flea infestations exist outside, there are many cultural control options that will decrease flea populations. One control option is to remove weeds and debris from the yard and mow the lawn regularly in order to promote sunny warmer areas. Also since flea larvae tend to develop in shaded areas, sometimes enough rain will cause flooding to lower outdoor flea populations. Also wild animals, such as opossums, skunks, rats, mice and squirrels should be discouraged from living in backyards by cleaning up debris and trash, keeping firewood off the ground, and not leaving pet food out at night. By reducing possible habitats for these wild animals, there will be a reduction in the amount of fleas introduced around your home.

In addition, outdoor and indoor chemicals can be applied. Outdoors, chemicals should be applied in the shaded areas where pets rest and around dog houses and kennels. Indoors, insecticidal sprays should be applied to molding and baseboards up to a height of 1 foot. Also apply insecticides to furniture and specific areas where pets rest or sleep. The infested area should be treated thoroughly in order to reduce the flea population. Treatments should be repeated in order to kill the newly hatched or emerged adult fleas. It is important to read and follow carefully the instructions on the container label.

To protect ourselves, repellants can be applied to repel adults. Repellants such as **DEET** can be applied to the skin and **permethrin** can be applied to clothing.



Exercise: Treating for Fleas

Treating for Fleas

Directions: Unscramble each of the clue words. Then take the letters that appear in ◯ boxes and unscramble them for the final message.

PETLNALER	◯ ☐ ◯ ◯ ☐ ◯ ◯ ◯ ◯ ◯
CUUVMA	☐ ◯ ◯ ◯ ◯ ☐
SAWINHG	☐ ☐ ☐ ☐ ◯ ◯ ◯
MOPAOSH	☐ ☐ ◯ ☐ ☐ ◯ ◯
ETP	☐ ◯ ◯
KUSKNS	☐ ☐ ◯ ◯ ☐ ☐
RETSE	◯ ◯ ☐ ☐ ☐
MOBC	◯ ◯ ☐ ◯
TEDE	◯ ◯ ◯ ◯
NIAETVREANIR	☐ ☐ ◯ ☐ ☐ ◯ ◯ ◯ ☐ ◯ ◯ ◯
SART	◯ ◯ ◯ ☐
HASDE	☐ ◯ ◯ ◯ ◯
TSCACTI	◯ ◯ ◯ ☐ ◯ ◯ ◯
EWDES	◯ ◯ ◯ ☐ ☐
CIEMACLSH	◯ ◯ ☐ ◯ ◯ ◯ ◯ ◯ ◯
PIM	◯ ◯ ◯

_ Y   _ _ _ _ _   _   _ _ _ B _ _ _ _ _ _ _   _ F   _ _ _ _ _ _ _ _

_ _ _   _ _ _ _ _ _ _ _   _ O _ _ _ O L   _ _ _ _ _ C _ ,   _ _

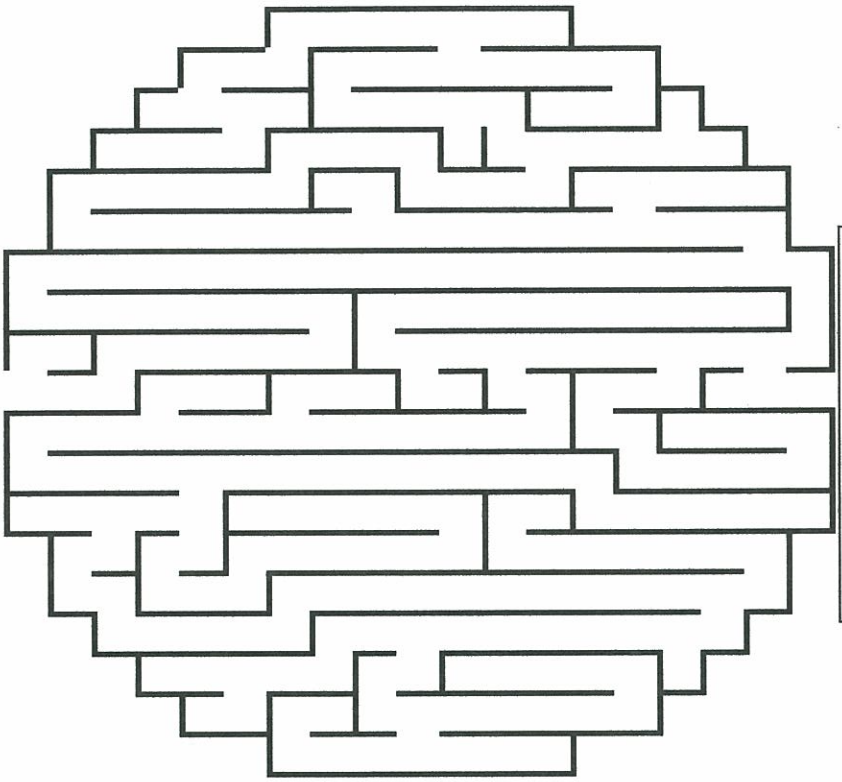
C _ N   _ _ _ U C _   _ _ _   F L _ _   _ O _ U L _ _ _ O N

Word Bank

IPM	Rats	DEET	Pet
Trees	Vacuum	Comb	Skunks
Washing	Weeds	Shade	Shampoo
Repellant	Chemicals	Veterinarian	Tactics

Enhancement Activity: Flea Maze

Help Mari Rid Her Pet of Fleas……



Fun Flea Facts:

The female flea can consume 15 times her own body weight in blood daily.

If one adult flea is seen, there might be more than 100 offspring or adults living in nearby furniture, cracks, carpeting or on a pet.

Some fleas can jump 150 times their own length. That compares to a human jumping 1,000 feet.

Fleas have been around for 100 million years, so they might have even bothered Tyrannosaurus Rex or Triceratops.

Vocabulary for Flea Lessons

Order Siphonaptera: Latin for *siphon* = a tube, *aptera* = wingless

Exoskeleton: an external supportive covering of an arthropod

Camouflage: something designed to deceive or hide

Fertile: capable of breeding or reproducing

Integrated pest management: Management of pest populations using systems of complimenting control strategies that maintain pest populations at levels that can be tolerated by humans in terms of their economy, health, and/or quality of life

Dermatitis: inflammation of the skin

Anemia: a condition in which the blood is lacking red blood cells, hemoglobin, or in total volume

Lethargy: a condition causing laziness or sluggishness

Secondary infection: an infection that occurs during or after treatment of another, already existing infection

Parasites: an organism living in, with, or on another organism

Tapeworms: a class of worms parasitic usually in the intestines of vertebrates

Murine typhus: a mild febrile disease that is marked by headache and rash, is caused by a rickettsia that is widespread in nature in rodents, and is transmitted to humans by a flea

Plague: a virulent contagious febrile disease that is caused by a bacterium that occurs in bubonic, pneumonic, and septicemic forms

Pneumonic plague: spread by breathing in a bacteria suspended from a person or animal with pneumonic plague; usually requires direct and close contact with the ill person or animal. Pneumonic plague may also occur if a person with bubonic or septicemic plague is not treated and the bacteria spreads to the lungs

Bubonic plague: plague caused by a bacteria and characterized especially by the formation of swelling of a lymph gland especially in the groin

Lymph nodes: glands that play an important part in a body's defense against infection, by producing lymph, which travels throughout the body in the lymph nodes and filters impurities from the body

Excrete: to separate and eliminate from the blood or tissues

Contamination: to infect by contact or association

Diagnosis: the act of identifying a disease from its signs and symptoms

Oral insecticides: insecticides ingested by mouth

Topical insecticides: insecticides applied directly to the skin

Permethrin: a synthetic pyrethrin used especially as an insecticide

DEET: a colorless oily liquid insect repellent