PURDUE EXTENSION
FNR-470-W
EXPERT REVIEWED

The Nature of Teaching

Coloration Exploration

Lesson Plan

This activity will teach students how animals use coloration to stay alive within their environments.

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Lesson Plan Overview

Estimated Time

60 minutes

Vocabulary

- Coloration
- Aposematic coloration
- Cryptic coloration
- Sexual dimorphism

Lesson Objective

Students will be able to identify and give examples of different coloration strategies and indicate how they affect an animal's behavior and survival.

Targeted Grade-Level Indiana Standards

Math

2.1.8; 2.1.9; 2.1.12
3.1.2; 3.1.10; 3.1.13;
4.2.3; 4.3.2; 4.6.2; 4.6.3
5.1.1; 5.1.4; 5.1.5; 5.2.1; 5.2.2; 5.2.5

Science

2.2.5; 2.4.1; 2.4.4
3.1.2; 3.1.3; 3.2.1; 3.2.5; 3.4.1; 3.4.2; 3.4.3
4.2.4; 4.5.4
5.4.4; 5.4.5; 5.4.7; 5.5.1; 5.5.10

Required Materials

- Camo Frogs Picture and Key
- Bright Frogs Picture and Key
- Frog Tally A and B Worksheets
- Animal Line Drawings
- Animal Coloration Photo Examples
- Forest Ecosystem Poster
- Vocabulary Worksheet and Key
- Thick paper for animal printouts
- Crayons/markers

Reference Materials

See teacher's notes.

Authors

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Procedure

1. Show **Camo Frogs** picture on the overhead or projector. Have the students quietly count how many frogs they can find in 30 seconds and record that number on the Frog Tally worksheet (worksheet A for pie charting or worksheet B for bar graphing).
2. Show the **Bright Frogs** picture and have the students quietly count how many frogs they can find in 30 seconds. Record that number on the Frog Tally worksheet chosen in step 1.
3. Show the **Camo Frogs Key** and then the **Bright Frogs Key**. Point out the locations of frogs to the students. There are 10 frogs in each picture. Using either **Frog Tally worksheet A or B**, help the students calculate the percentage of frogs they found in each picture. Illustrate this using the pie chart and/or bar graph provided. Have students answer Question 1.
4. Ask students: why do they think coloration is important for animals? How does the coloration of Frogs from sheet A compare to sheet B? How could both be helpful for the different frogs' survival?
5. Discuss reasons for observed differences in number of frogs between the two pictures (some frogs are using cryptic coloration and some are using aposematic coloring).
6. Explain that animals use a variety of coloration strategies to stay alive. Define and then show examples of aposematic coloration, cryptic coloration, and sexual/gender dimorphism.
    - *Aposematic coloration:* skunk, coral snake
    - *Cryptic coloration:* Fowler's toad, arctic hare
    - *Sexual/gender dimorphism:* cardinal, mallard
7. Give each student one of the bird or frog coloring sheets (the teacher will need to hand out representatives of all sheets provided). Each coloring sheet has a description of cryptic, aposematic, male or female. Students should color their animal according to the description on the sheet. For example:
    a. Female birds and cryptic frogs will need to blend into their surroundings. Students should color them earth tones like green, brown, and/or black.
    b. Male birds have showy colors that attract a female. Students should use bright colors for these.
    c. Aposematic frogs issue a warning sign. Students should color these frogs with bright colors and bold patterns.
8. After the students have colored their animal sheet, they will then act out the animal's defense strategy. To accomplish this, have a student act as a predator (bobcat, hawk, wolf, snake, etc.) and another students will respond in the following ways: aposematic and male animals will stand up and hold their ground; cryptic and female animals will freeze in place and/or hide. Students that do not exhibit the proper behavior will be captured by the predator until.
9. As a conclusion, have the students review each coloration strategy and fill out the **Vocabulary Worksheet**.

Teacher's Notes

Animal coloration, which can include both the coloration and patterns of color on an animal's body, may affect the behavior (active during the day vs. nighttime) and survival of many species in the animal kingdom. The coloration of an animal can help it blend into its environment (crypsis) or make it stand out (aposematic). In this lesson plan we compare and contrast a few different coloration strategies: aposematic vs. cryptic and of males vs. females.

Aposematic Coloration vs. Cryptic Coloration

An animal utilizing **aposematic coloration**, or warning coloration, is alerting other animals that it is potentially dangerous. These brightly colored and boldly patterned animals stand out in their environment and advertise that they may be poisonous, venomous, or taste bad. Animals that have aposematic coloration often move slowly and are active during the daylight hours. A few examples of animals with aposematic coloration are skunks, poison arrow frogs, bees, coral snakes, red-spotted newts and monarch butterflies.

An animal utilizing **cryptic coloration** blends into its surroundings. A cryptically colored animal may have coloration that breaks up its outline or that matches items in its habitat such as rocks, leaves and tree bark. Animals that display this coloration strategy will attempt to hide during the daylight hours and become active at night. Cryptic coloration usually involves a blotchy pattern of browns, tans, greens, or any color from their environment. Some animals are capable of changing their coloration seasonally to match their surroundings, like the snowshoe hare, that changes its white winter coloration to brown in the summer. Examples of cryptically colored animals are bobcats, deer, horned lizards, green frogs and walking stick insects.

In summary, both aposematic and cryptic coloration help increase an animal's survival, but they work in different ways. An animal with aposematic coloration is going to display its bright colors and patterns to a predator, relying on the predator's knowledge that this animal will be dangerous to eat. A cryptic animal will try to hide and blend into its surroundings, relying on its coloration to make it invisible to the predator.

Sexual/Gender Dimorphic Coloration

Sexual or **gender dimorphism** (sexual dimorphism is the scientific term; however, depending on age group and maturity, gender may be substituted) is the difference between males and females within a species of animal, and, in this case, the differences in coloration. This phenomenon is most noticeable in birds but can occur in other types of animals. Typically, the male is brightly colored to signal he is the best mate for females or to attract the attention of a predator when a male flees the nest. Females, on the other hand, are generally duller in coloration because they must tend to the nest after eggs are laid. If a female is brightly colored while sitting on a nest, a predator could easily find her and then potentially eat her or the young. Examples of animals that display sexually dimorphic coloration are northern cardinals (the males are bright red, whereas females are gray/tan color), mallards (males have a green head, whereas females are brown), and ring-necked pheasants (males are brightly colored with green and red, whereas females are brown).

Frog Tally A Worksheet

How many frogs can you find in each picture in 30 seconds?

Camo Frogs Picture

I found:_____of_____frogs.

OR

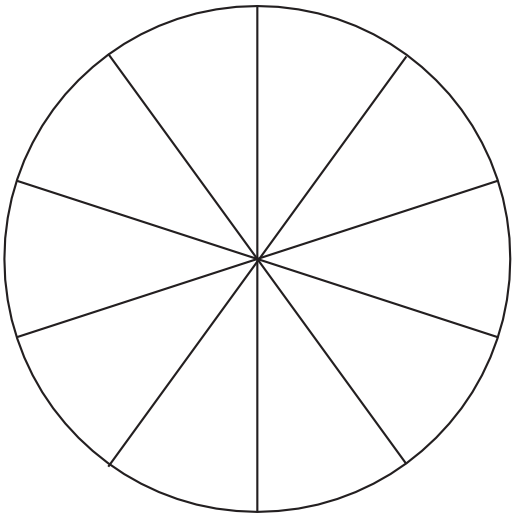
I found:_____% of the frogs.

Bright Frogs Picture

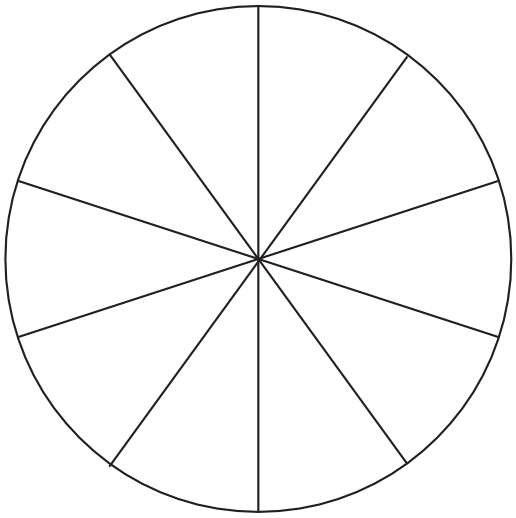
I found:_____of_____frogs.

OR

I found:_____% of the frogs.



Pie Charts



Question 1 - Did you find more frogs in the first or second picture? Why?

_____

_____

_____

_____

Frog Tally B Worksheet

How many frogs can you find in each picture in 30 seconds?

Camo Frogs Picture

I found:_____of_____frogs.

OR

I found:_____% of the frogs.

Bright Frogs Picture

I found:_____of_____frogs.

OR

I found:_____% of the frogs.

Bar Graph

Picture 1 Picture 2

Question 1 - Did you find more frogs in the first or second picture? Why?

Vocabulary Worksheet

WORD BANK

Gender Dimorphism | Cryptic Coloration | Aposematic Coloration

1. _____ An animal using bright colors to warn predators to stay away.

2. _____ An animal that blends into the environment and hides.

3. _____ When males and females are colored differently.

Vocabulary Worksheet — KEY

WORD BANK

Gender Dimorphism | Cryptic Coloration | Aposematic Coloration

1. **Aposematic Coloration** — An animal using bright colors to warn predators to stay away.

2. **Cryptic Coloration** — An animal that blends into the environment and hides.

3. **Gender Dimorphism** — When males and females are colored differently.

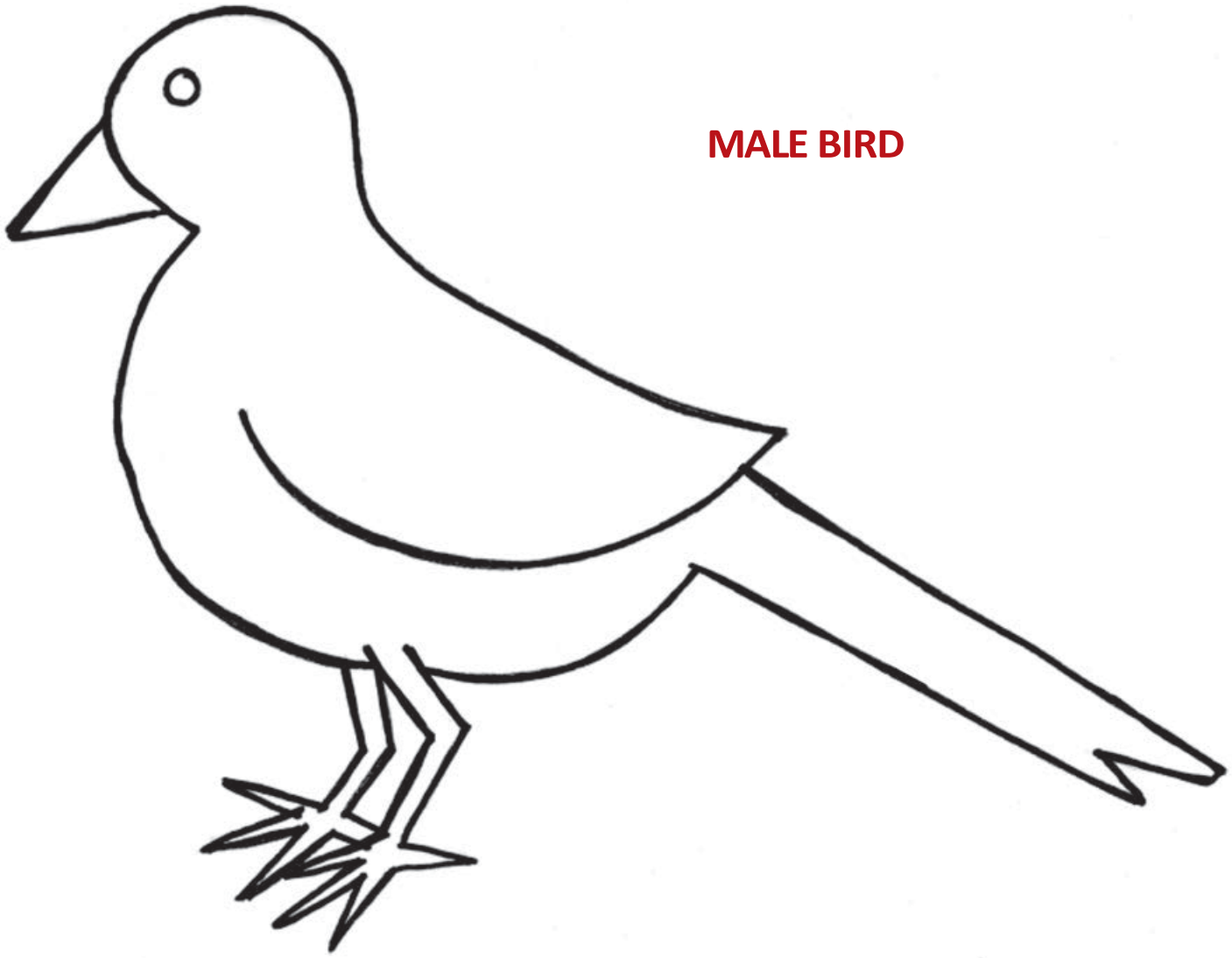
Camo Frogs Picture

Camo Frogs Picture — KEY

Bright Frogs Picture

Bright Frogs Picture — KEY

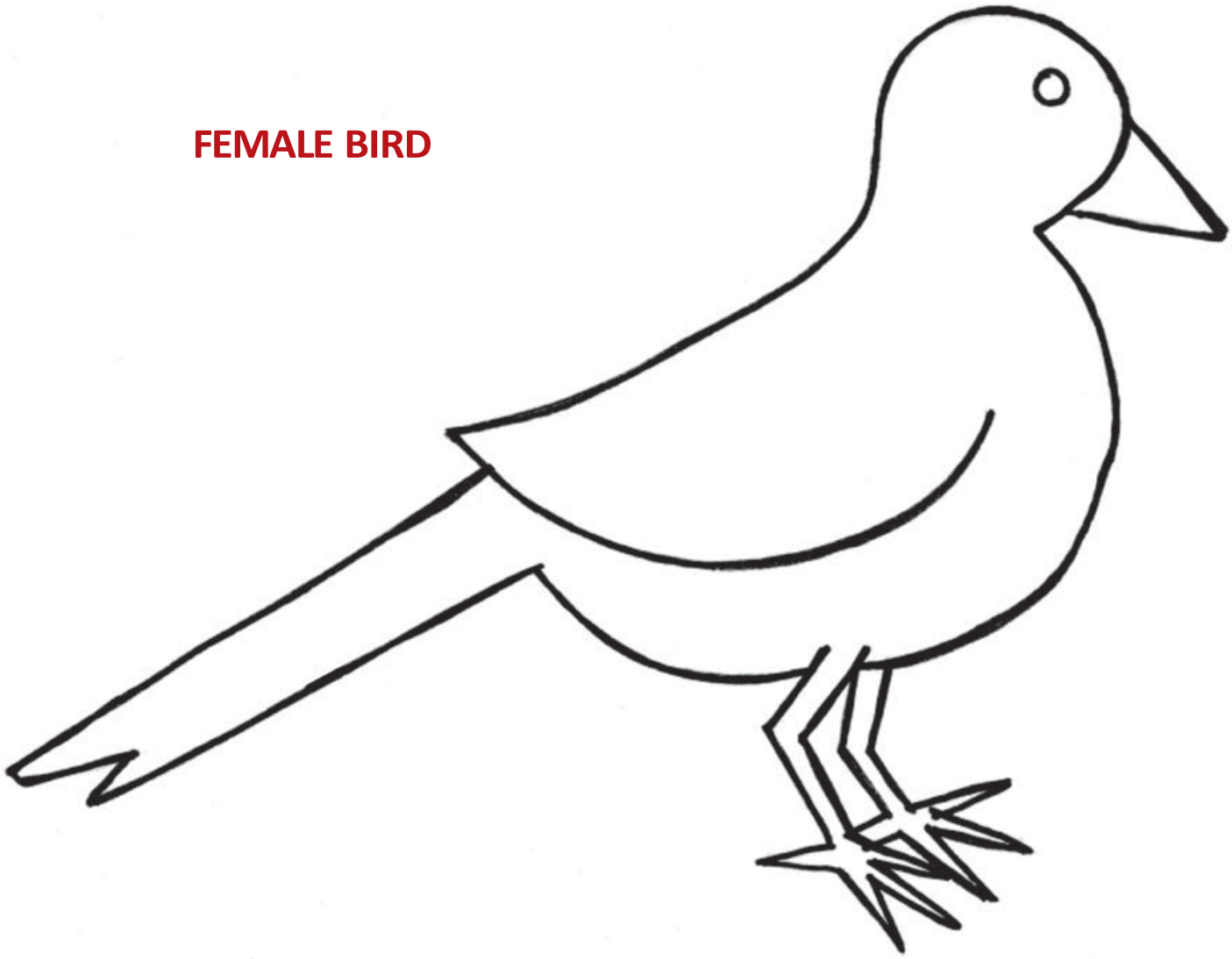
Animal Line Drawing



MALE BIRD

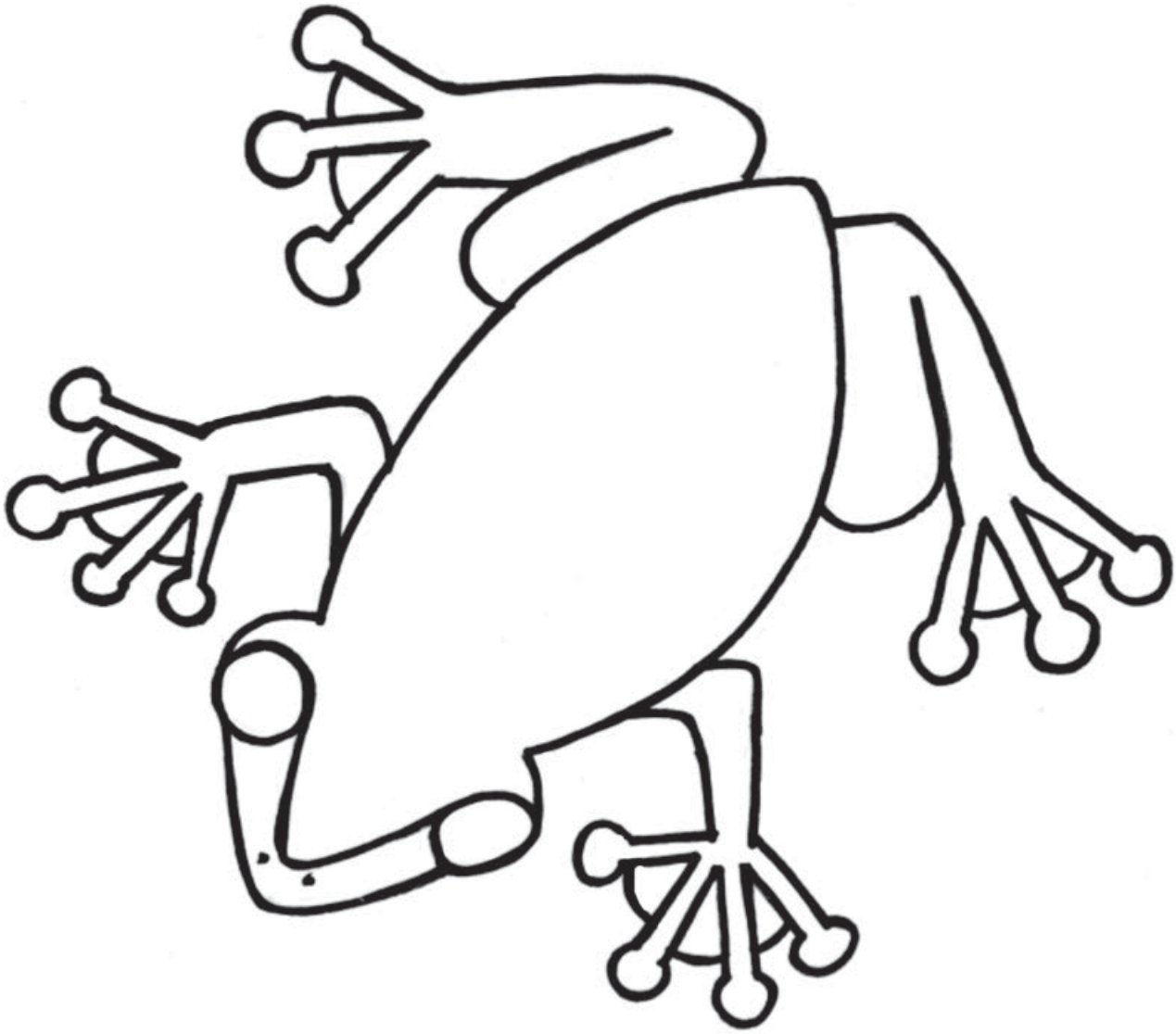
Animal Line Drawing

FEMALE BIRD



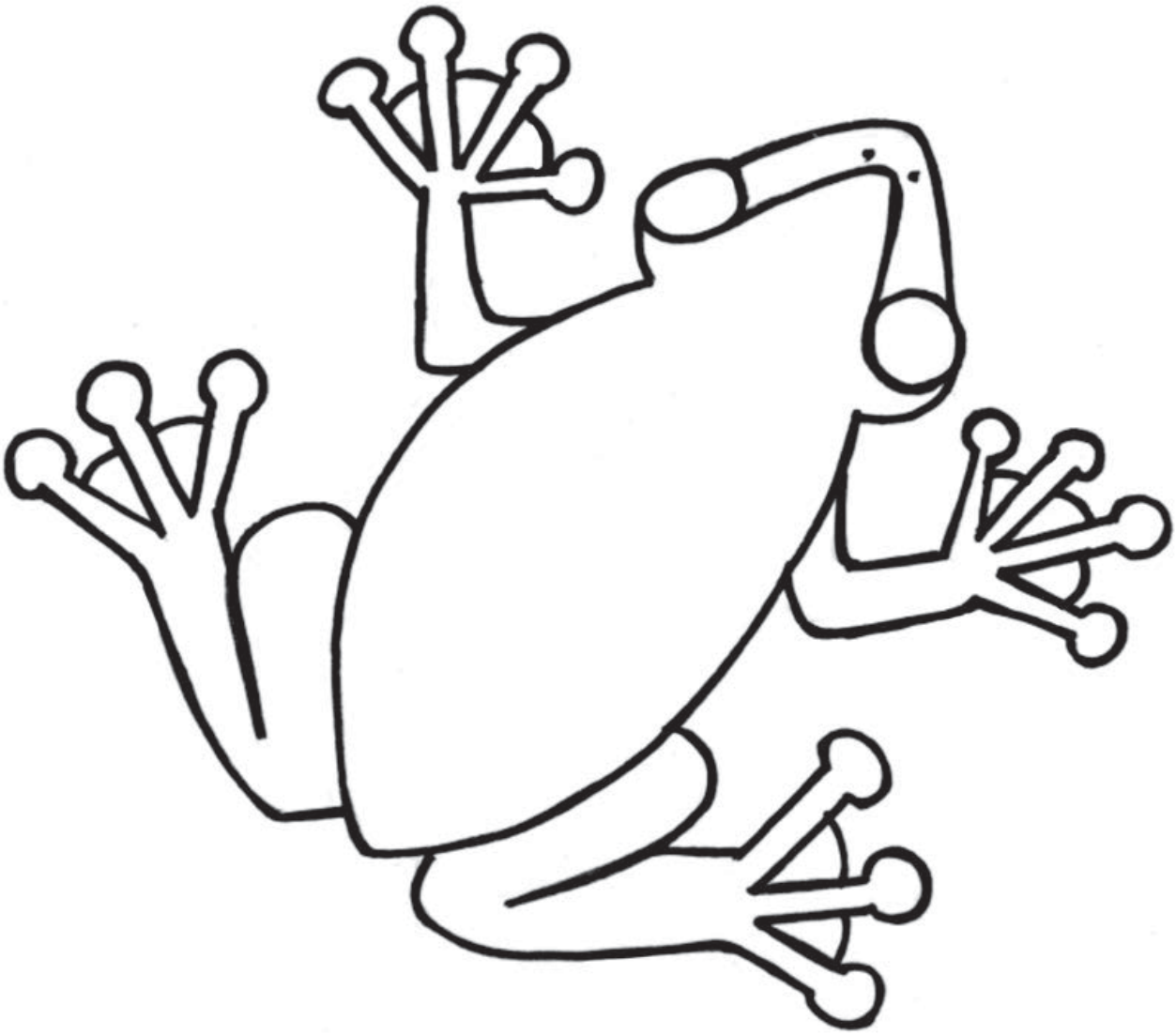
Animal Line Drawing

APOSEMATIC FROG



Animal Line Drawing

CRYPTIC FROG



Animal Coloration Photo

Aposematic Example

SKUNK

Animal Coloration Photo

Aposematic Example

CORAL SNAKE

Animal Coloration Photo

Cryptic Example

FOWLER'S TOAD

Animal Coloration Photo

Cryptic Example

ARTIC HARE

Animal Coloration Photo

Cryptic Example

FEMALE CARDINAL MALE CARDINAL

Animal Coloration Photo

Cryptic Example

FEMALE MALLARD MALE MALLARD