



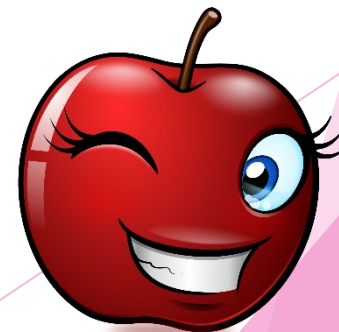
# CONTENT ENHANCEMENT

## The Concept Comparison Routine

# Reviewing Concepts

A category or class into which events, ideas, or subjects can be grouped. All members of the same concept class must possess all of a set of critical characteristics.

What is a Concept?



# Concepts

- ▶ A concept is a category or group of members that share the same characteristics
  - ▶ Fraction
  - ▶ Sport
  - ▶ Mammal
  - ▶ Democracy

Can I think of 3 examples of \_\_\_\_\_?  
If not, it probably isn't a concept.

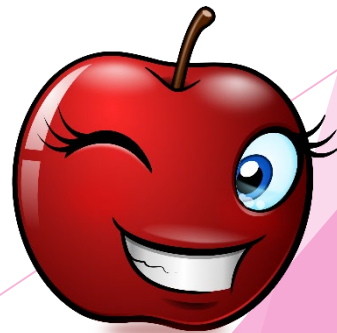
# Concepts

- ▶ In social studies, concepts include **government**, **revolution**, and **electoral process**.
- ▶ In science, concepts include **igneous rocks**, **vertebrates**, and **evolution**.
- ▶ In English, concepts include a **sentence**, **sonnet**, and **simile**.
- ▶ In mathematics, concepts include **triangle**, **algorithm**, and **multiplication**

# Choosing Concepts

- ▶ Abstract, making them difficult for students to understand
- ▶ Foundational from your standards and course
- ▶ High leverage, critical for students to understand a large chunk of the content

How do you pick a concept?



# Reflection

- ▶ Think about 2 or 3 related concepts that your student confuse with one another....
- ▶ Write 'em down
- ▶ Think about why students get them confused and make some notes to yourself...
- ▶ Save this for later.... 😊



# The Concept Comparison Routine

# Understanding the Challenge of Diversity

- ▶ Introduction of difficult but important concepts requires creating **connections to background knowledge**.
- ▶ Increased student diversity results in **varying levels** and types of background knowledge.
- ▶ Students need new ways of thinking about critical concepts and **relationships** between concepts.
- ▶ Teachers can take advantage of student diversity by comparing concepts from **different perspectives**.



# Responding to the Challenge

The Concept Comparison Routine helps students to:

- ▶ Focus on key concepts
- ▶ Focus attention on **similarities** and **differences** between known concepts
- ▶ Understand the usefulness of **higher-order categories** in understanding and learning
- ▶ Develop ways to **explain and summarize** similarities and differences between concepts

# Responding to the Challenge

The Concept Comparison Routine helps students to:

- ▶ Remember **a way (strategy)** to compare and contrast known concepts
- ▶ Interact with the teacher and other students **to explore and understand** relationships between concepts.
- ▶ Record information for **later studying and use**.

# Supporting Research

- ▶ The Concept Comparison Routine was studied in secondary content-area classes (**grades 7-11**) characterized by diversity.
- ▶ In each study, teachers learned the Concept Comparison Routine easily, and **student learning gains were observed by both teachers and researchers.**
- ▶ Students with learning disabilities and low-achieving students **gained an average of 15 to 24** percentage points on tests or tasks that required students to demonstrate understanding of concept comparisons. Teachers continued using the routine after the studies were completed.

# Supporting Research

These results were achieved when teachers:

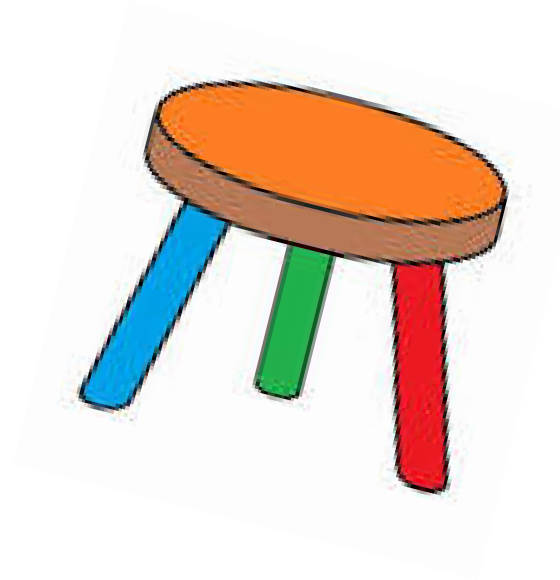
- ▶ received 2-3 hours of instruction in the routine,
- ▶ had opportunities to discuss the routine with colleagues,
- ▶ spent the necessary time to plan and use the routine for more inclusive teaching,
- ▶ taught students how to participate in and use the routine, and
- ▶ used the routine regularly over time.

# Components of the Concept Comparison Routine

The Comparison Table  
Teaching Device

The **COMPARING**  
Linking Steps

The  
**CUE-DO-REVIEW**  
Instructional Sequence



# Concept Comparison v Unit Organizer

- ▶ Boxes 1-6
- ▶ Let's see what you can predict
  - ▶ What will this routine be about?
  - ▶ How is it similar to other Content Enhancement Routines?
- ▶ Boxes 7 & 8

# Comparison Table

2 Overall Concept

1 Concept

1 Concept

3 Characteristics

3 Characteristics

4 Like Characteristics

6 Unlike Characteristics

6 Unlike Characteristics

8 Summary

C  
O  
M  
P  
A  
R  
I  
N  
G

- Communicate Targeted Concepts
- Obtain the Overall Concepts
- Make lists of Known Characteristics
- Pin down Like Characteristics
- Assemble Like Categories
- Record Unlike Characteristics
- Identify Unlike Categories
- Nail Down a Summary
- Go Beyond the Basics

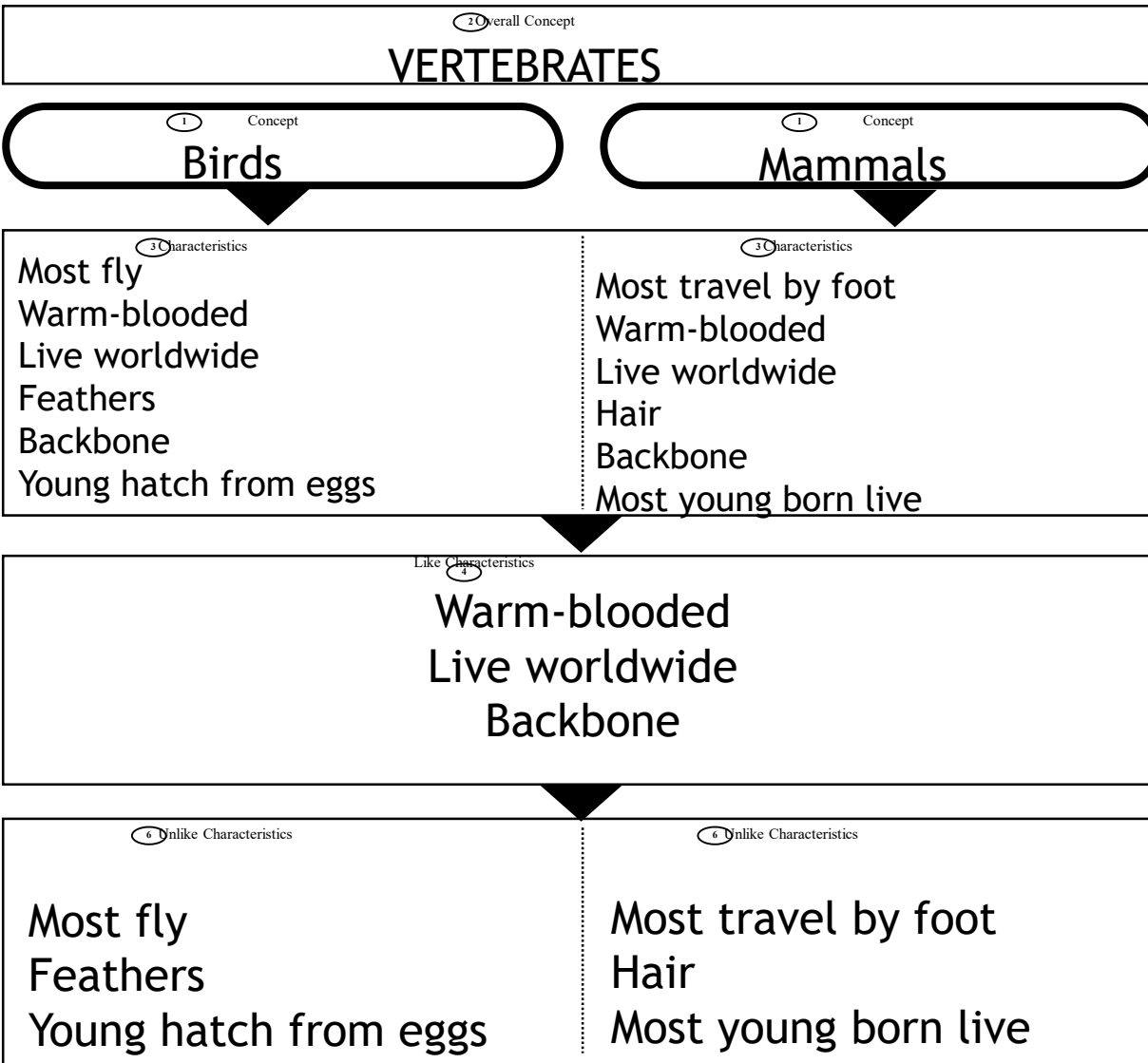
9 Extensions

5 Like Categories

7 Unlike Categories

What  
do  
you  
see?

# Comparison Table



## COMPARING

Communicate Targeted Concepts  
Obtain the Overall Concepts  
Make lists of Known Characteristics  
Pin down Like Characteristics  
Assemble Like Categories  
Record Unlike Characteristics  
Identify Unlike Categories  
Nail Down a Summary  
Go Beyond the Basics

**9 Extensions**

Explore how many heart chambers birds and mammals have, and enter the information on the table

**5 Like Categories**

How body temperature is regulated.  
Where they live.  
How their bodies are supported.

**7 Unlike Categories**

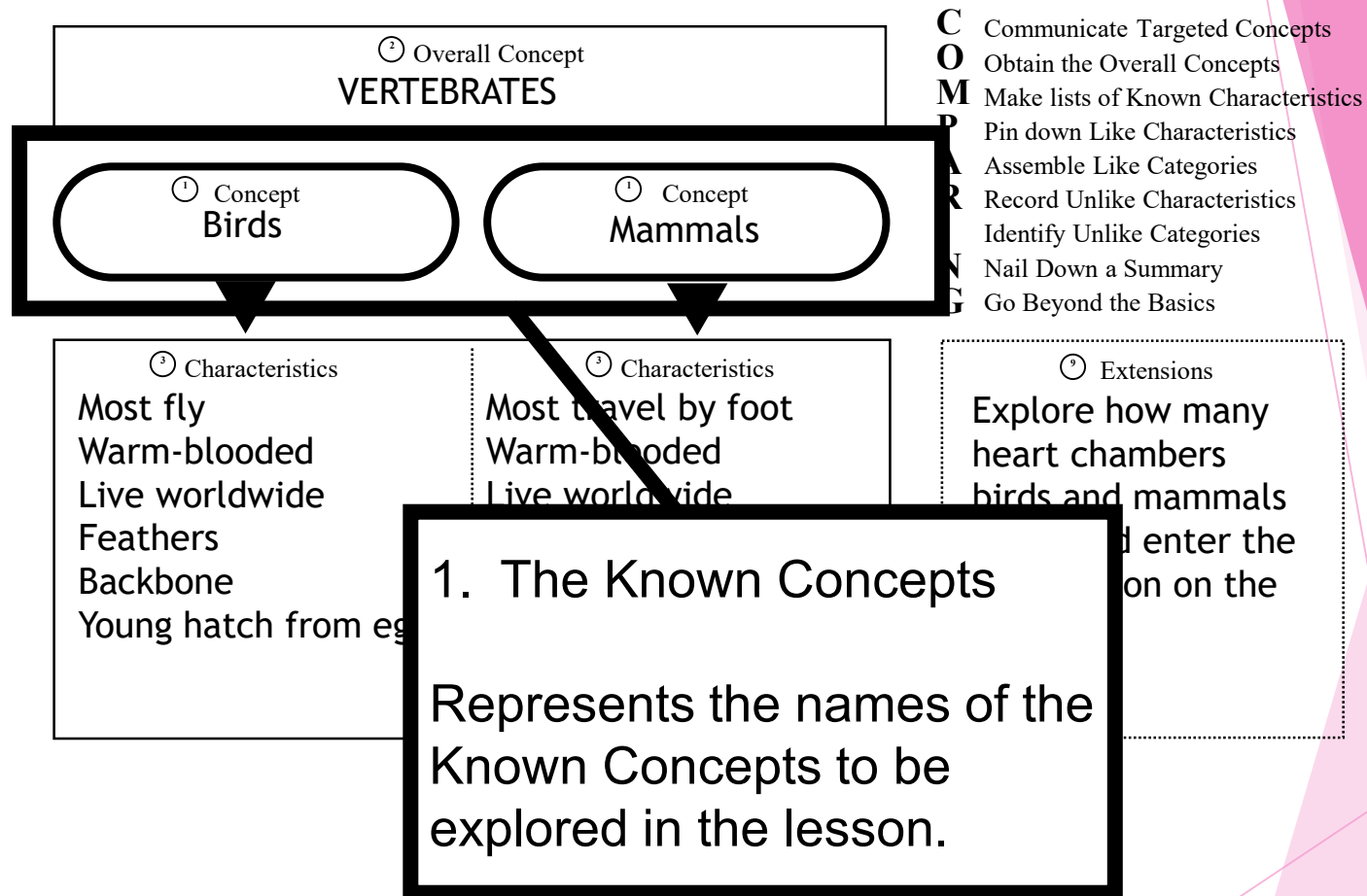
How they travel.  
What covers their bodies.  
How young are born.

**8 Summary**

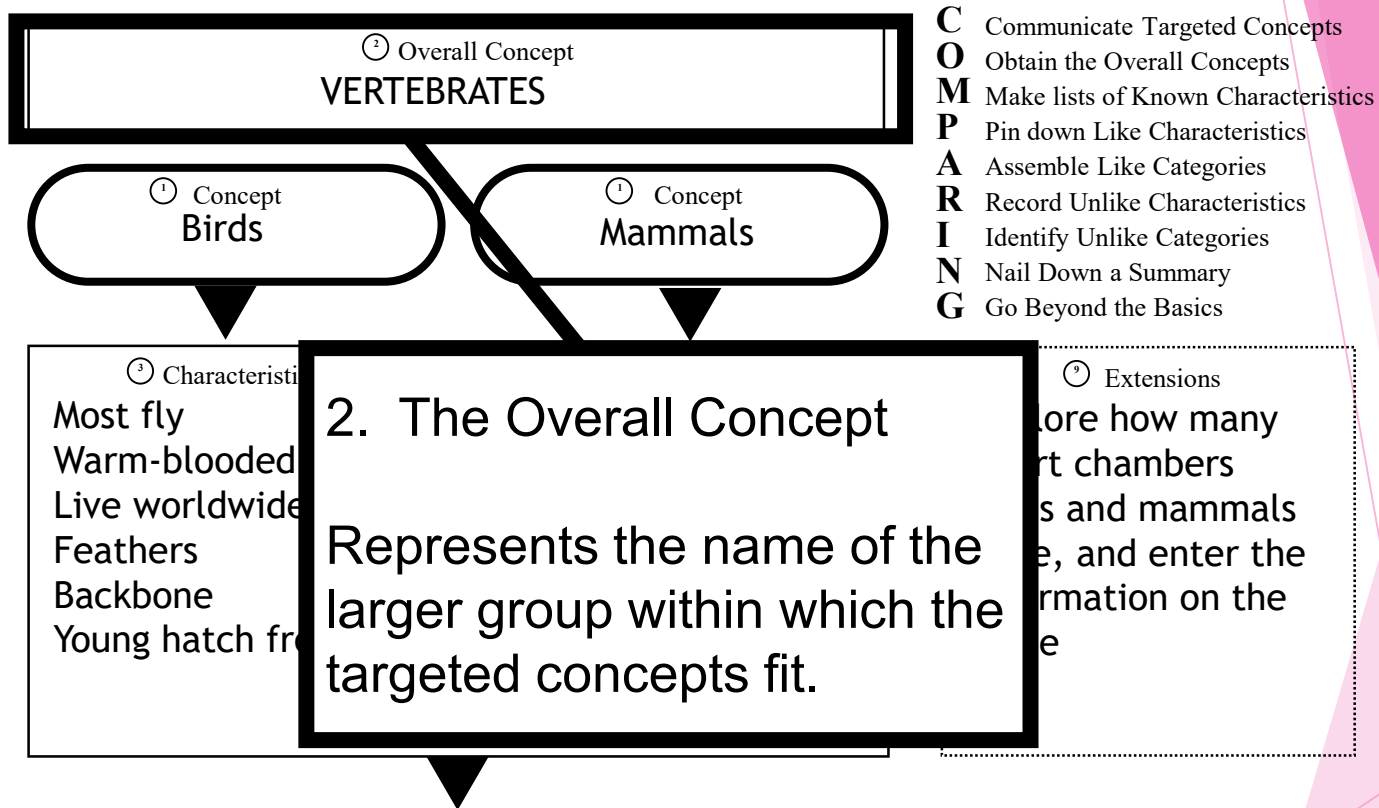
Birds and mammals are two vertebrates that are alike with regard to how their body temperature is regulated, where they live and how their bodies are supported. They are different in terms of what covers their bodies and how they travel from one place to another. They are also different in terms of how their young are born.



# Comparison Table



# Comparison Table



# Overall and Targeted Concepts

“Fish and mammals (concepts being compared) are two kinds of vertebrates (overall concept).”

“Comedy and tragedy (concepts being compared) are two forms of drama (overall concept).”

# Practice

## Concepts

- ▶ Metals & Nonmetals
- ▶ Ink Jet & Laser
- ▶ Bar graphs & Line graphs
- ▶ Cooperation & competition
- ▶ Plot & Theme
- ▶ Kingdoms & Phyla
- ▶ Igneous & Sedimentary

## Overall Concept

- ▶ Elements
- ▶ Printers
- ▶ Data displays
- ▶ Ways to do work
- ▶ Elements of Literature
- ▶ Taxonomy
- ▶ Types of Rock

# COMPARISON TABLE

⌚ OVERALL CONCEPT

⌚ CONCEPT

⌚ CONCEPT

⌚ CHARACTERISTICS

⌚ CHARACTERISTICS

⌚ EXTENSIONS

⌚ LIKE CHARACTERISTICS

⌚ LIKE CATEGORIES

⌚ UNLIKE CHARACTERISTICS

⌚ UNLIKE CATEGORIES

⌚ SUMMARY

Step 1: Communicate  
targeted concepts

Step 2: Obtain  
Overall Concept

Step 3: Make lists of  
known characteristics

Step 4: Pin down  
Like Characteristics

Step 5: Assemble  
Like Categories

Step 6: Record  
Unlike Characteristics

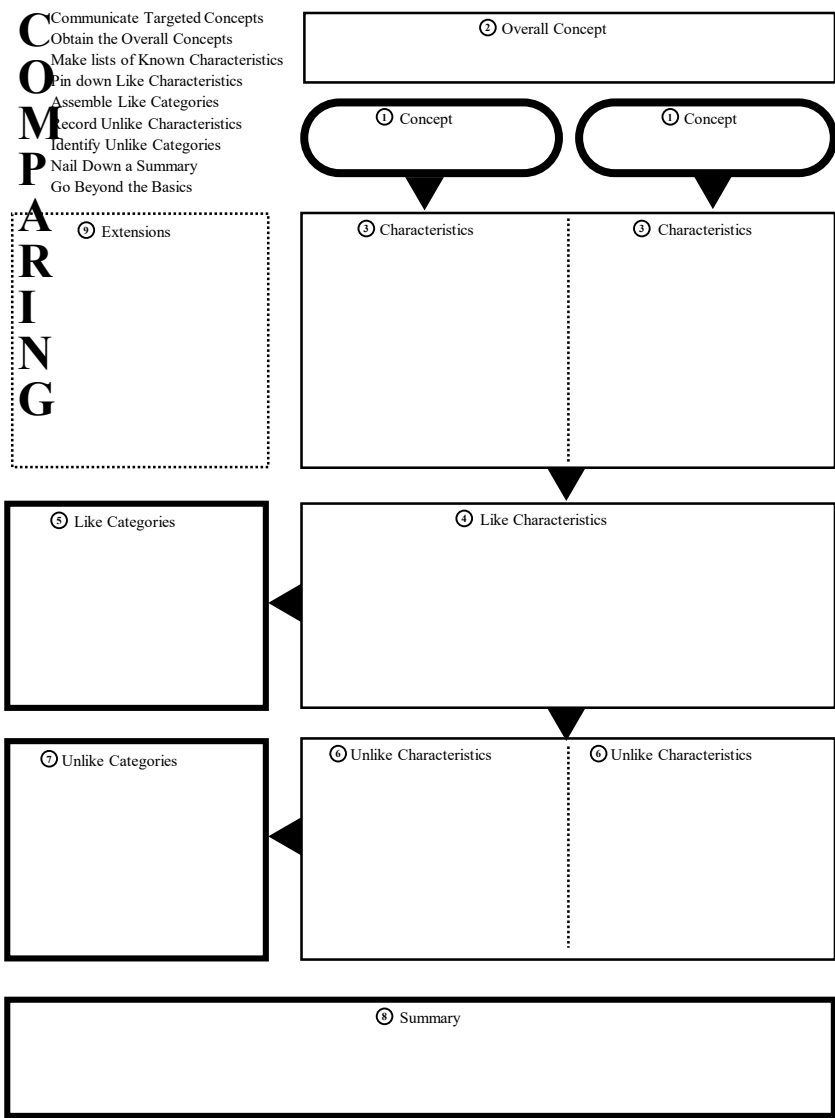
Step 7: Identify  
Unlike Categories

Step 8: Nail down  
a summary

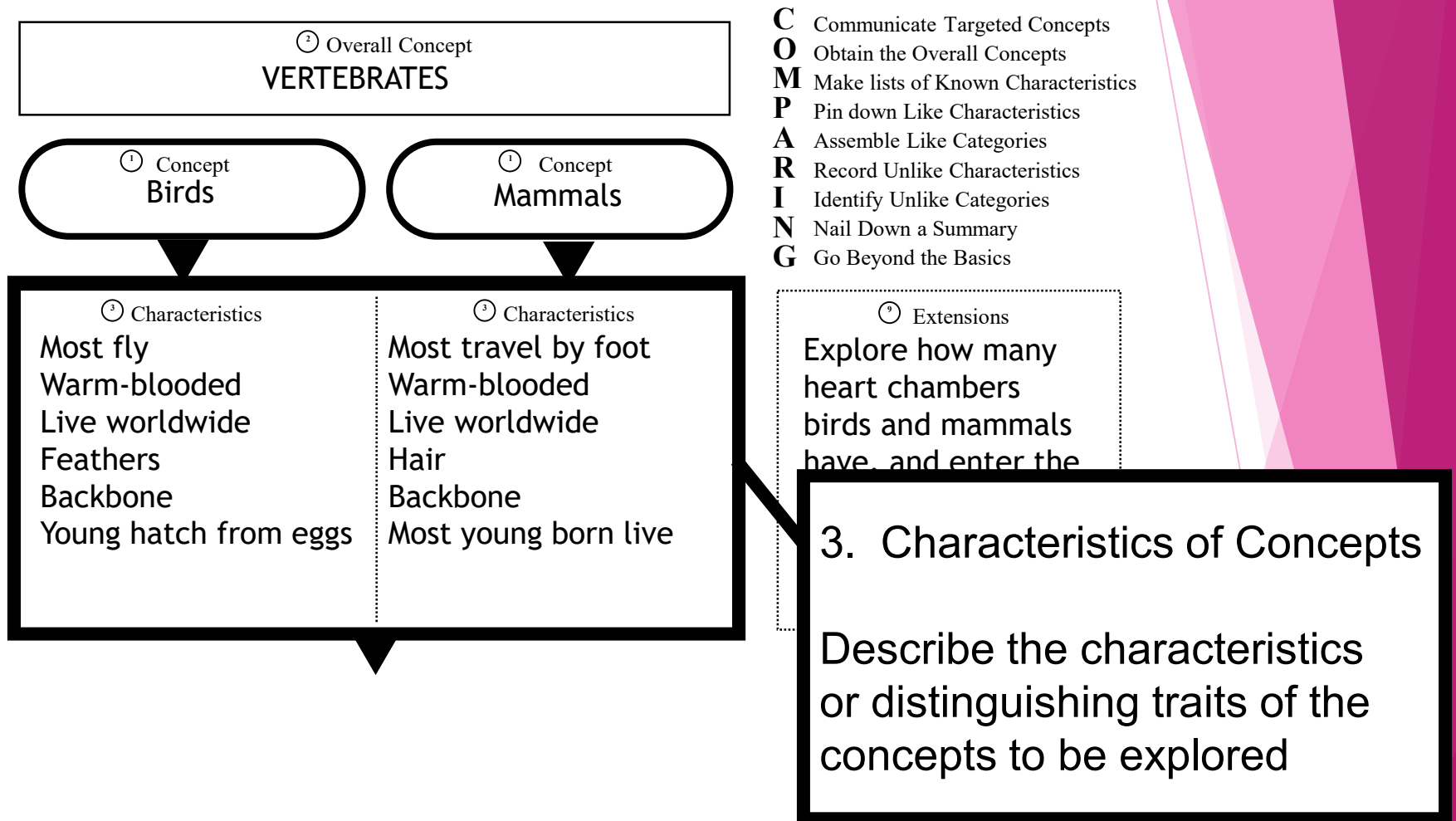
Step 9: Go beyond  
the basics

Adapted from The Concept Comparison Routine. Copyrights for the template are held by the authors of The Concept Comparison Routine.

# Comparison Table



# Comparison Table



② Overall Concept  
**VERTEBRATES**

① Concept  
**Birds**

① Concept  
**Mammals**

③ Characteristics  
Most fly  
Warm-blooded  
Live worldwide  
Feathers  
Backbone  
Young hatch from eggs

③ Characteristics  
Most travel by  
Warm-blooded  
Live worldwide  
Hair  
Backbone  
Most young born live

#### 4. Like Characteristics

Those qualities or attributes that the targeted concepts have in common.

④ Like Characteristics  
Warm-blooded  
Live worldwide  
Backbone

⑤ Like Categories  
How body temperature is regulated.  
Where they live.  
How their bodies are supported.

- C** Communicate Targeted Concepts
- O** Obtain the Overall Concepts
- M** Make lists of Known Characteristics
- P** Pin down Like Characteristics
- A** Assemble Like Categories
- R** Record Unlike Characteristics



## 6. Unlike Characteristics

Characteristics of the targeted concepts that are related yet not shared

### ④ Like Characteristics

Warm-blooded  
Live worldwide  
Backbone

### ⑥ Unlike Characteristics

Most fly  
Feathers  
Young hatch from eggs

### ⑥ Unlike Characteristics

Most travel by foot  
Hair  
Most young born live

### ⑦ Unlike Categories

How they travel.  
What covers their bodies.  
How young are born.

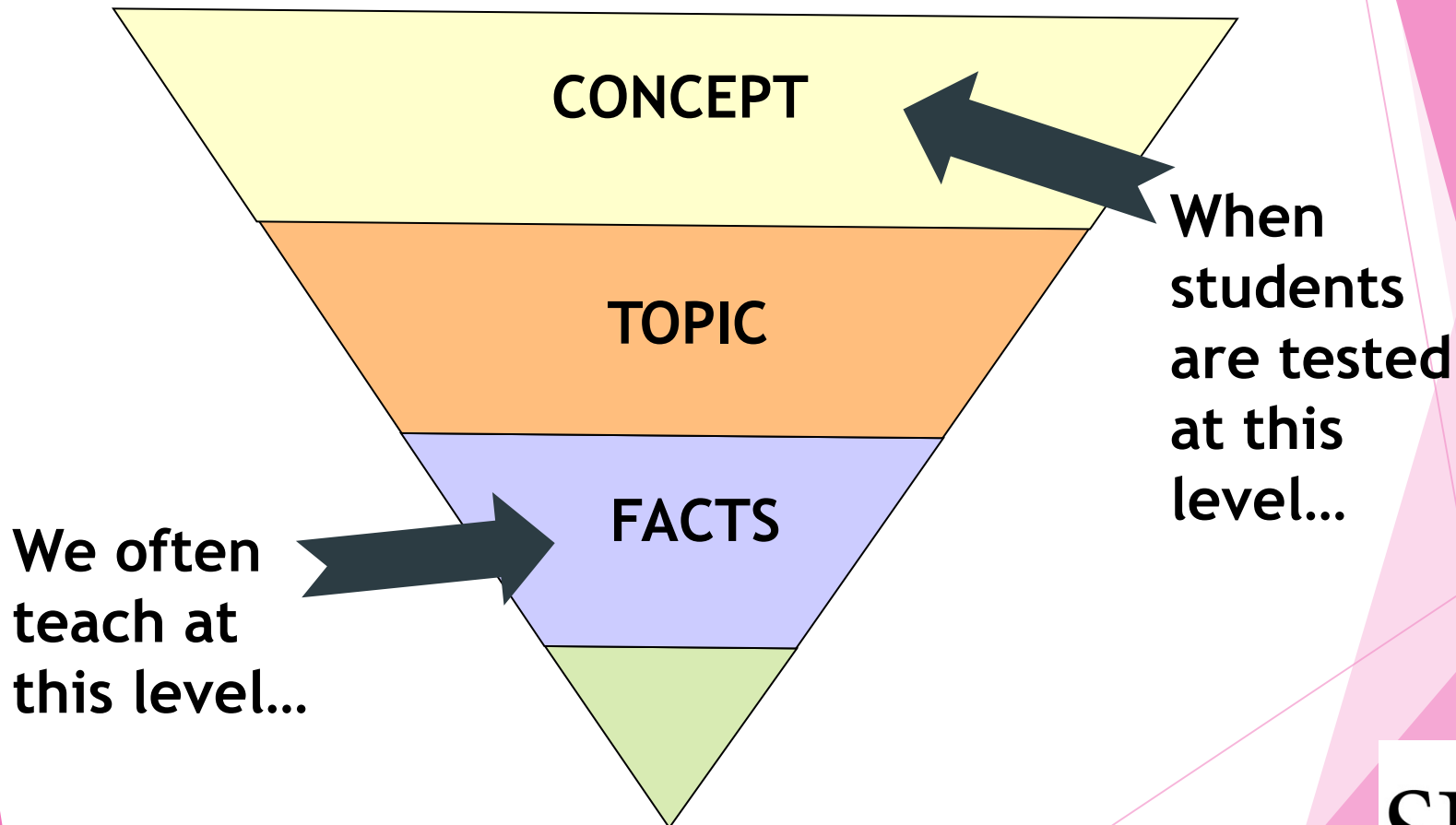
### ⑧ Summary

Birds and mammals are two vertebrates that are alike with regard to how their body temperature is regulated, where they live and how their bodies are supported. They are different in terms of what covers their bodies and how they travel from one place to another. They are also different in terms of how their young are born.

# TTYN & SO

- ▶ What do you know so far about the device?
- ▶ What are you wondering?

# Levels of Understanding & the Power of Generalization



② Overall Concept  
**VERTEBRATES**

① Concept  
**Birds**

① Concept  
**Mammals**

③ Characteristics  
Most fly  
Warm-blooded  
Live worldwide  
Feathers  
Backbone  
Young hatch from eggs

③ Characteristics  
Most travel by  
Warm-blooded  
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- C** Communicate Targeted Concepts
- O** Obtain the Overall Concepts
- M** Make lists of Known Characteristics
- P** Pin down Like Characteristics
- A** Assemble Like Categories
- R** Record Unlike Characteristics

② Overall Concept  
**VERTEBRATES**

① Concept

① Concept

**5. Like Categories**

③

Most fl  
Warm-  
Live w  
Feathe  
Backbo  
Young hatch from eggs

The larger groups or categories to which the Like Characteristics belong

Most young born live

④ Like Characteristics

Warm-blooded  
Live worldwide  
Backbone

**C** Communicate Targeted Concepts  
**O** Obtain the Overall Concepts  
**M** Make lists of Known Characteristics  
**P** Pin down Like Characteristics  
**A** Assemble Like Categories  
**R** Record Unlike Characteristics  
**I** Identify Unlike Categories  
**N** Nail Down a Summary  
**G** Go Beyond the Basics

⑨ Extensions

Explore how many heart chambers birds and mammals have, and enter the information on the table

⑤ Like Categories

How body temperature is regulated.  
Where they live.  
How their bodies are supported.

## 6. Unlike Characteristics

Characteristics of the targeted concepts that are related yet not shared

### ④ Like Characteristics

Warm-blooded  
Live worldwide  
Backbone

### ⑥ Unlike Characteristics

Most fly  
Feathers  
Young hatch from eggs

### ⑥ Unlike Characteristics

Most travel by foot  
Hair  
Most young born live

### ⑦ Unlike Categories

How they travel.  
What covers their bodies.  
How young are born.

### ⑧ Summary

Birds and mammals are two vertebrates that are alike with regard to how their body temperature is regulated, where they live and how their bodies are supported. They are different in terms of what covers their bodies and how they travel from one place to another. They are also different in terms of how their young are born.

## 7. Unlike Categories

Larger groups or categories to which the Unlike Characteristics belong.

### ⑤ Like Categories

How body temperature is regulated.  
Where they live.  
How their bodies are supported.

### ⑥ Unlike Characteristics

Most fly  
Feathers  
Young hatch from eggs

### ⑥ Unlike Characteristics

Most travel by foot  
Hair  
Most young born live

### ⑦ Unlike Categories

How they travel.  
What covers their bodies.  
How young are born.

### ⑧ Summary

Birds and mammals are two vertebrates that are alike with regard to how their body temperature is regulated, where they live and how their bodies are supported. They are different in terms of what covers their bodies and how they travel from one place to another. They are also different in terms of how their young are born.

④ Like Characteristics

Warm-blooded  
Live worldwide  
Backbone

⑤ Like

How body temperature is regulated  
Where they live  
How their bodies are supported.

## 8. Summary

An understanding of the similarities and differences between concepts that can either:

- explain how the concepts are alike or different in terms of named categories,
- explain how the concepts are alike or different in terms of both characteristics and categories, or
- raise questions or list insights gained from the comparison.

⑥ Unlike Characteristics

Most fly  
Feathers  
Young hatch from eggs

⑥ Unlike Characteristics

Most travel by foot  
Hair  
Most young born live

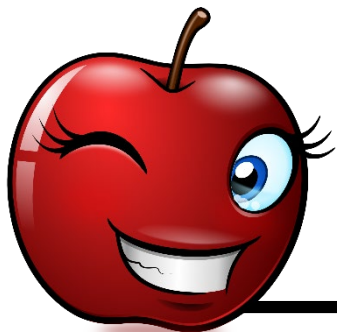
⑦ Unlike

How they move  
What covers their bodies.  
How young are born.

⑧ Summary

Birds and mammals are two vertebrates that are alike with regard to how their body temperature is regulated, where they live and how their bodies are supported. They are different in terms of what covers their bodies and how they travel from one place to another. They are also different in terms of how their young are born.





# Comparison Table

⌚ Overall Concept

**9. Extensions**

An assignment on key information related to the targeted concepts that prompts further exploration or study.

Young hatch from eggs. Most young born live

- C** Communicate Targeted Concepts
- O** Obtain the Overall Concepts
- M** Make lists of Known Characteristics
- P** Pin down Like Characteristics
- A** Assemble Like Categories
- R** Record Unlike Characteristics
- I** Identify Unlike Categories
- N** Nail Down a Summary
- G** Go Beyond the Basics

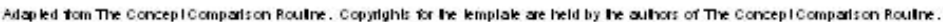
⌚ Extensions

Explore how many heart chambers birds and mammals have, and enter the information on the table

**Differentiation Opportunity!!!**

Can we compare more than 2 concepts?

**Step 1: Communicate targeted concepts** **Step 2: Obtain the Overall Concept**  of known characteristics



# MULTIPLE-CONCEPT COMPARISON TABLE, p. 2

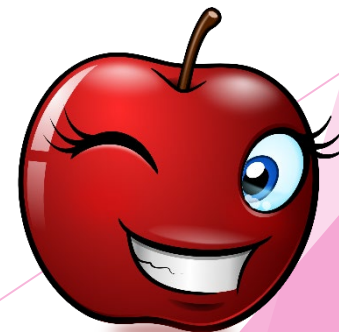
CONCEPT	CONCEPT	CONCEPT	CONCEPT	CONCEPT	
⊕ Like Characteristics	⊕ Like Characteristics	⊕ Like Characteristics	⊕ Like Characteristics	⊕ Like Characteristics	⊕ LIKE CATEGORIES
⊖ Unlike Characteristics	⊖ Unlike Characteristics	⊖ Unlike Characteristics	⊖ Unlike Characteristics	⊖ Unlike Characteristics	⊖ UNLIKE CATEGORIES
⊗ SUMMARY					⊗ EXTENSIONS  Steps 4-9 of the Concept Comparison Routine Step 4: Find down the Characteristics Step 5: Assemble Like Categories Step 6: Record Unlike Characteristics Step 7: Identify Unlike Categories Step 8: Nail down a summary Step 9: Go beyond the basics

# Creating a Comparison Table

## *Modeling drafting*

(Options for order in  
drafting device)

What do you have to  
do before teaching  
Concept Comparison?



# Comparison Table

② Overall Concept

## Strands of DNA

② Concept

Chromatin (p. 176)

② Concept

Chromosome (p. 176)

② Concept

Chromatid (p. 244)

③ Characteristics

- Made of DNA
- Carries genetic information
- 2 full sets of genetic material
- Spread out in the nucleus
- Looks like a plate of noodles
- Present during G1, S, G2

③ Characteristics

- Made of DNA
- Carries genetic information
- 2 full sets of genetic material
- Coiled up so you can see individual pieces
- Looks like "X"
- Present during M - Cell Division

③ Characteristics

- Made of DNA
- Carries genetic information
- 1 set of genetic material ( $\frac{1}{2}$  of chromosome)
- Coiled up,  $\frac{1}{2}$ 's pulled apart in anaphase
- Looks like a straw
- Present during M - cell division

③ Extensions

On the back of this paper, draw and label a picture of each structure of DNA.

Compare (in words or a picture) chromosomes and chromatin to shoes.

④ Like Characteristics

- Made of DNA
- Carries genetic information

⑤ Like Categories

- Make up (material it is made of) made of
- purpose

⑥ Unlike Characteristics

- 2 full sets of genetic material
- Spread out in the nucleus
- Looks like a plate of noodles
- Present during G1, S, G2

- 2 full sets of genetic information
- Coiled up so you can see individual pieces
- Looks like "X"
- Present during M - Cell Division

- 1 set of genetic info ( $\frac{1}{2}$  of a chromosome)
- $\frac{1}{2}$ 's of chromosome pulled apart in anaphase
- Looks like a straw
- Present during M - cell division

⑦ Unlike Categories

- Amount of genetic material
- Amount of space taken up
- What it looks like
- What phases it is found in

⑧ Summary

Chromatin, chromosomes and chromatids are all strands of DNA that are alike in their makeup and purpose but differ in the amount of space they take up, the amount of genetic material they have, what they look like and what phases they are found in.

# Creating a Comparison Table

## *Guided Practice* *with* Plants and Fungi

# Create Your Own

- ▶ Create a draft of a Concept Comparison Table
- ▶ Reminder...these concepts should be essential for students to know.

# The Comparing Linking Steps

Is it ever okay to let students complete one on their own?

Guide the teacher to:

- ▶ present the Comparison Table effectively;
- ▶ involve students in constructing and using the Comparison Table;
- ▶ investigate the relationship between concepts; and
- ▶ focus student attention on learning.

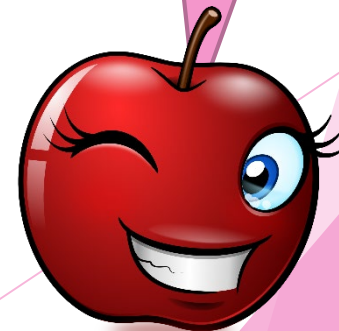


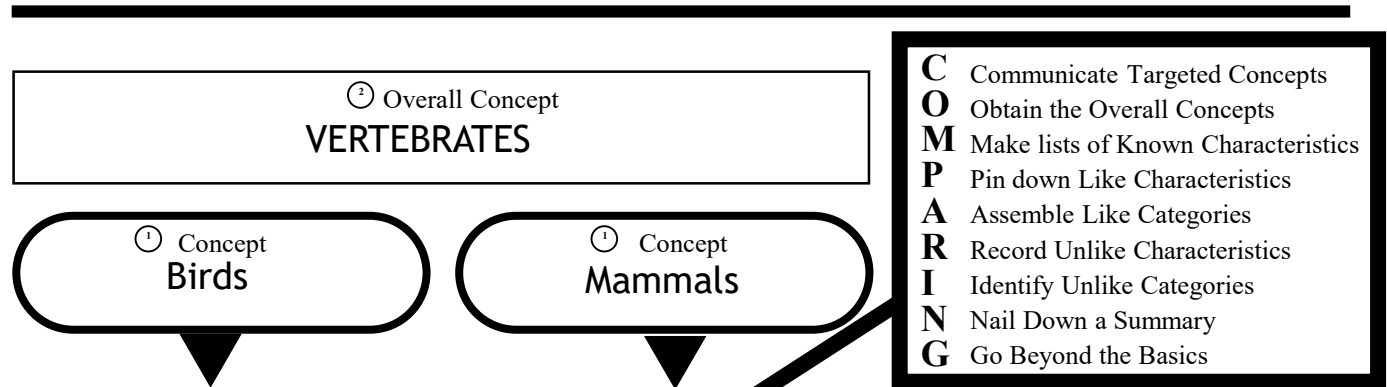


# The COMPARING Linking Steps

- ▶ Communicate Targeted Concepts.
- ▶ Obtain the Overall Concept.
- ▶ Make Lists of Known Characteristics.
- ▶ Pin Down Like Characteristics.
- ▶ Assemble Like Categories.
- ▶ Record Unlike Characteristics.
- ▶ Identify Unlike Categories.
- ▶ Nail Down a Summary.
- ▶ Go Beyond the Basics.

Why do we have  
linking steps?





## The Linking Steps

These steps guide the teacher during the in-class, interactive presentation of the Comparison Table.

The teacher prepared a draft of the Comparison Table in advance of the lesson, but the final version is co-constructed with the students during class.

These steps are cued by the acronym **COMPARING**.

④ Explore how many heart chambers birds and mammals have, and enter the information on the table

⑤ Like Categories  
How body temperature is regulated.  
Where they live.  
How their bodies are supported.

# The CUE-DO-REVIEW Instructional Sequence

What is the  
instructional  
sequence?

- ▶ **CUE** - The teacher introduces the *Concept Comparison Routine* and explains expectations for student participation.
- ▶ **DO** - The teacher and class collaboratively construct the device using the *COMPARING* Linking Steps.
- ▶ **REVIEW** - Information presented in the *Comparison Table* is reviewed and confirmed, and the process of exploring and answering a question is reviewed.



# Checking for student Mastery During a Review

How to check understanding

- ▶ Ask about the content including concepts characteristics, how they are alike and not alike, and the categories.
- ▶ Ask about the process of comparing concepts including the linking steps and how you can use this in other classes



# Wrap-up:

- ▶ Burning Questions?
- ▶ Aha's! (Once around)
- ▶ SIM EDU
  - ▶ Upload Draft
  - ▶ Knowledge Check
  - ▶ Workshop Eval
- ▶ *Support is ALWAYS available!*