

# FLIGHT PATH SORTING GAME ACTIVITY- HOW BIG? HOW FAST? HOW HIGH? HOW FAR?



## NOTES

### **AGE GROUP:**

Family, Multigenerational,  
Pre-K, Early Elementary,  
Upper Elementary, Tweens  
(9-12), Teens, Adults

### **TYPE OF PROGRAM:**

Facilitated hands-on  
experience; Passive  
program

### **ACTIVITY TIME:**

10-20 minutes

Informal educators can facilitate this sorting game activity in large or small groups in a passive or active setting, with patrons from Pre-K to adult. This simple and engaging activity introduces younger patrons to concepts such as height, weight, wingspan, and speed through birds and allows older patrons to explore these concepts further.



## WHAT'S THE POINT?

- Sorting activities encourage participants to compare and contrast bird characteristics (size, speed, flight altitude, and migration distance), helping them understand the remarkable diversity of bird adaptations.
- These games provide an engaging way to explore scientific concepts like flight mechanics, body weight ratios, and specialized adaptations while developing critical thinking and classification skills.
- By discussing their sorting decisions, participants practice evidence-based reasoning and collaborative problem-solving while deepening their appreciation for how different bird species have evolved unique traits for survival.

## MATERIALS AND SET-UP:

- Each set of cards works best with groups of 1-9 people.
- Four sets—**How Big? How Fast? How High? and How Far?**—of 9 cards, which can be found on pages 4–23 of this activity guide. Print at standard size (**do not enlarge or shrink**) on cardstock and/or laminate.
- Print a copy of the Bird Bios (pages 4-7) for each deck to have on hand if participants want to learn more about each bird featured in the game.
- Space to spread cards out (i.e. **table or a low-foot-traffic floor space**)

## INSTRUCTIONS:

Arrange groups of 1-9 patrons. Hand each group a deck of cards and ask them to arrange them by:

Slowest to Fastest Flight Speed (blue cards)



Lowest to Highest Flight Altitude (orange cards)



Lightest to Heaviest Weight or Shortest to Longest Wingspan (pink cards)



Shortest to Farthest Migration Distance (green cards)



Alternatively, for a passive program, leave a set of laminated cards out with brief instructions and a clearly labeled answer key (**face down or in a separate envelope**).

## EXTENSIONS:

- Instead of following the simple instructions described here, ask participants to line up in a different order (e.g., beak size or quietest-to-loudest). Or, ask them to come up with their own order. Also, suggest sorting the cards into groups, rather than a linear order (e.g., migratory and non-migratory or carnivorous, herbivorous, and omnivorous). Research the answers together as a group. This is a great introduction to categorization and taxonomy for younger participants, and a great icebreaker/conversation starter for older participants.
- Pair this activity with other Sorting Games on the STEM Activity Clearinghouse, including **How Far? How Hot? How Deep? How Fast?** and (non-bird) **How Big?**—just search “sorting games” on [clearinghouse.starnetlibraries.org](http://clearinghouse.starnetlibraries.org). The corresponding activity guides provide in-depth instruction on facilitating this style of activity and key concepts that it can help unlock.
- This activity can easily be distributed as a “Take and Make.” Print the cards on cardstock and/or laminate them, shuffle their order, put the “answer key” card at the front of the stack, and secure them with a rubber band or paperclip.
- Don’t have a color printer? Instead, encourage older tween and/or teen patrons to sketch cards for younger patrons to sort.

## CONCEPTS AND IDEAS

- The peregrine falcon and golden eagle achieve such tremendous speeds while steeply diving to catch prey. The hummingbird also achieves its relative high speeds diving in a courtship display. The rest of the birds on the list achieved their top speeds during horizontal flight. Horizontally, the peregrine falcon tops out around 69 miles per hour, while the golden eagle can reach 120 mph during a fast glide, and the ruby throated hummingbird has a normal flight speed of around 30 mph.
- What do you notice about the heaviest birds? What makes them different than the rest of the birds on the list? (They don’t fly!)
- Do you think that the birds with small and large wingspans live in the same habitat?
- Extinct, large, flightless birds like the moa and elephant bird weighed more than 500 pounds. The moa and elephant bird were likely hunted to extinction by humans.

## HOW FAST? BIRD BIOS

### **PEREGRINE FALCON**

- Peregrine falcons are famous for their dramatic dives — they hunt by flying high in the sky and then tucking their wings and feet before plummeting downwards towards their prey.

### **GOLDEN EAGLE**

- Golden eagles are powerful raptors known for their death-defying courtship displays. During their “sky-dances” they will perform up to 20 steep dives in quick succession.

### **RED-BREASTED MERGANSER**

- Red-breasted mergansers need a running start to take off from the surface of the water, but once they get going, rapid wingbeats can carry these birds hundreds of miles on their annual migrations.

### **COMMON SWIFT**

- Common swifts are aerial acrobats that spend their life on the wing — eating, drinking, and even sleeping while aloft. One bird fitted with a tracking device went ten months without landing!

### **RUBY-THROATED HUMMINGBIRD**

- Ruby-throated hummingbirds spend their days zipping from flower to flower looking for nectar, flapping their wings an astonishing 53 times every second.

### **PILEATED WOODPECKER**

- Pileated woodpeckers are large, non-migratory forest birds that defend their territories year-round. They forage for insects by drilling rectangular holes in old trees.

### **MAGNIFICENT FRIGATEBIRD**

- Magnificent frigatebirds are seabirds with long, narrow wings perfect for catching air currents as they soar over the surface of the ocean.

### **WILD TURKEY**

- Contrary to what many people might think, wild turkeys are capable of flight. They will take off for short distances when threatened, and fly into trees to roost at night.

### **GREAT BLUE HERON**

- Great blue herons are stately birds that hunt by standing stock-still in the water and striking prey with their spear-like bill. When it's time to fly between hunting grounds, their large bodies make an impressive silhouette.



## HOW HIGH? BIRD BIOS

### **RÜPPELL'S VULTURE**

- Rüppell's vultures are scavengers that scan for carcasses as they soar above the savanna. To achieve the ultimate bird's-eye-view, they have a special modified protein that enables them to get enough oxygen even at high altitudes.

### **BALD EAGLE**

- To conserve energy when they migrate, bald eagles will fly up where the wind is faster and steadier.

### **COMMON CRANE**

- The migration path of common cranes can take them over the Himalayas — the world's highest mountain range — where they soar over peaks to avoid predators in the lower mountain passes.

### **BAR-HEADED GOOSE**

- In 1953, a mountaineer spotted a bar-headed goose flying over the peak of Mount Everest — a feat that scientists at the time thought was physiologically impossible due to low air pressure and lack of oxygen.

### **CHICKEN**

- A startled chicken is capable of a short burst of flight, but this domestic bird's heavy body limits its mobility in the air.

### **ANDEAN CONDOR**

- Andean condors live in the Andes Mountains of South America, where they use their 10-foot wingspan to glide on thermals for hours on end, scanning the valleys far below for their next meal.

### **MALLARD**

- Mallards are North America's most familiar waterfowl, known for the males' signature green heads and their affinity for suburban lakes and ponds. In the spring and fall, they migrate in groups, often in a "V" formation to save energy.

### **WHITE STORK**

- White storks travel thousands of miles on their migration between Europe and Africa each year, using long, broad wings to ride air thermals and conserve energy.

### **EMPEROR PENGUIN**

- Emperor penguins have evolved wings that are flat and stiff like flippers, which propel them deep into the ocean as they search for fish.

## HOW BIG? BIRD BIOS

### **COMMON OSTRICH**

- Common ostriches are flightless birds that live on the African savanna and rely more on their powerful legs than their wings. At their top speeds, they are the fastest bipedal animal on land.

### **EMU**

- Emus are found only in Australia, where they graze on plants in forests and scrublands. Their powerful legs allow them to jump up to 7 feet in the air.

### **EMPEROR PENGUIN**

- Emperor penguins are found only in Antarctica, and they have special adaptations — like two layers of feathers and a hefty fat reserve — to survive their freezing environment.

### **SNOWY/WANDERING ALBATROSS**

- Wandering albatrosses are shaped like airplanes, with long, narrow wings adapted to gliding rather than flapping. These restless seafarers can go for years without touching down on land, resting on the ocean or on the wing as they travel tens of thousands of miles.

### **CALIFORNIA CONDOR**

- If you visit the Grand Canyon, you might be lucky enough to see the impressive silhouette of a California condor lazily circling as it searches for carrion below.

### **AMERICAN FLAMINGO**

- These long-legged, cotton candy-colored birds stand as tall as an average twelve-year-old and form flocks in the thousands.

### **NORTHERN CARDINAL**

- Northern cardinals are some of the most conspicuous backyard birds in the Eastern United States thanks to males' bright red plumage and their habit of sticking around all year. This makes them a perennial favorite — seven states claim northern cardinals as their state bird.

### **CAROLINA CHICKADEE**

- Carolina chickadees have heads that are proportionally large for their tiny bodies, giving them a cute, round appearance. They are frequent visitors to bird feeders across their range.

### **BEE HUMMINGBIRD**

- Bee hummingbirds might be mistaken for their namesake insect as they flits from flower to flower on their home island of Cuba.

## HOW FAR? BIRD BIOS

### **SPIX'S MACAW**

- Spix's macaws are one of the world's most endangered birds, declared extinct in the wild in 2000. In 2022, after years of captive breeding efforts, 20 Spix's macaws were reintroduced to their native home in Brazil, but most individuals alive today remain in captivity.

### **SHOEBILL STORK**

- Shoebills are prehistoric-looking birds with large, powerful bills that they use to hunt fish, snakes, lizards, and even baby crocodiles in the swamps of eastern Africa.

### **TAWN FROGMOUTH**

- Tawny frogmouths would like you to think that they're tree branches — these birds use mottled brown feathers to perfectly blend with their surroundings.

### **SECRETARY BIRD**

- Secretary birds have the longest legs of any predatory bird, which they use to stomp snakes to death. They hunt on foot, but can still cover an impressive distance — up to 20 miles! — in their daily search for food.
- *[NOTE: In the current answer guide for this bird, it says that they "tend to have territory around 500 square km", but the San Diego Zoo website says 50 square km.]*

### **COMMON RAVEN**

- Common ravens are highly intelligent birds found throughout the northern hemisphere. Remarkably adaptable, they can survive in a number of habitats year-round.

### **GALAPAGOS PENGUIN**

- These little penguins are found only in the Galapagos and are the only penguin species in the world that lives north of the equator.

### **GREAT SNIPE**

- These stocky marshbirds are surprisingly adept fliers, able to reach speeds of 60 miles per hour on the wing. They put this ability to good use on their annual migrations.

### **ADÉLIE PENGUIN**

- Adélie penguins are the smallest penguin species native to Antarctica. In winter, when eternal night descends upon the continent, they follow the edge of the ice out to sea as it grows north towards the sun.

### **ARCTIC TERN**

- Arctic terns could just as well be called "Antarctic terns" — each year, they make the journey from pole to pole.

# PEREGRINE FALCON



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## HOW FAST?

# GOLDEN EAGLE



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## HOW FAST?



# RED-BREASTED MERGANSER



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## HOW FAST?

# COMMON SWIFT



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## HOW FAST?



# RUBY-THROATED HUMMINGBIRD



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## HOW FAST?

# PILEATED WOODPECKER



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## HOW FAST?

# MAGNIFICENT FRIGATEBIRD



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## HOW FAST?

# WILD TURKEY



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## HOW FAST?





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## HOW FAST?

### FASTEST TO SLOWEST

1. Peregrine Falcon: 242 miles per hour.
2. Golden Eagle: 200 mph.
3. Magnificent Frigatebird: 95 mph
4. Red-breasted Merganser: 81 mph.
5. Common Swift: 69.3 mph.
6. Ruby-Throated Hummingbird: 60 mph.
7. Wild Turkey: 50 mph.
8. Great Blue Heron: 30 mph.
9. Pileated Woodpecker: 21 mph.

## HOW FAST? ANSWERS



Image Credit: A Rüppell's Vulture (*Gyps rueppellii*) at Nairobi National Park, Kenya, just taking flight with wings outspread. Wikimedia Commons. Shared Under Creative Commons 2.0. Photographer: Jorge Lascar.

**HOW HIGH?**



Image Credit: Wikimedia Commons, Photographer Lewis Hulbert, Shared under Creative Commons Attribution 4.0

**HOW HIGH?**



# COMMON CRANE



Image Credit: Cranes searching for wheat grains.  
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**HOW HIGH?**

# BAR-HEADED GOOSE



Image Credit: Bar-headed Goose.  
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**HOW HIGH?**



**CHICKEN**



Image Credit: Paul Korecky, Shared under Creative Commons 2.0

**HOW HIGH?**

**ANDEAN CONDOR**



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**HOW HIGH?**





**MALLARD**

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**HOW HIGH?**



**WHITE  
STORK**

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**HOW HIGH?**

# EMPEROR PENGUIN



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## HOW HIGH?

### HIGHEST TO LOWEST:

1. Rüppell's Vulture fly at great heights to expand their field of vision. In 1973, a Rüppell's Vulture collided with an aircraft at a height of 37,000 feet.
2. Common Cranes have been recorded at heights of 33,000 in the Himalayas, avoiding eagles in the lower mountain passes.
3. Bar-headed Geese have also been recorded flying high – up to 29,000 feet – over the peaks of the Himalayas on their migratory path.
4. The largest bird of prey in the world, the Andean Condor, prefers to roost and breed between 10,000 and 16,000 feet above sea level and have been seen as high as 21,300 feet.
5. Mallards typically migrate between 400 and 2000 feet, but in 1963 a collision between a mallard and aircraft occurred in the sky at 21,000 feet above sea level.
6. Bald Eagles typically fly within 1500 feet of the ground but have been recorded as high as 19,000 feet during migration.
7. White Storks may reach 16,000 feet while migrating.
8. Chickens can fly 5-10 feet in the air, if startled.
9. Emperor Penguins cannot fly, but can dive to depths greater than 1800 feet!

## HOW HIGH? ANSWERS





**COMMON  
OSTRICH**

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**HOW BIG?**



**EMU**

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**HOW BIG?**



# EMPEROR PENGUIN



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## HOW BIG?

# SNOWY/ WANDERING ALBATROSS



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## HOW BIG?



# CALIFORNIA CONDOR



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**HOW BIG?**

# AMERICAN FLAMINGO



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**HOW BIG?**



# NORTHERN CARDINAL



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## HOW BIG?

# CAROLINA CHICKADEE



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## HOW BIG?

# BEE HUMMINGBIRD



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## HOW BIG?

### BY WEIGHT

1. Common Ostrich: Up to 345 pounds
2. Emu: Up to 121 pounds
3. Emperor Penguin: Up to 99 pounds
4. Snowy/Wandering Albatross: Up to 28 pounds
5. California Condor: Up to 22 pounds
6. American Flamingo: Up to 9 pounds
7. Northern Cardinal: 1.5-1.7 ounces, or ~1/9th of a pound
8. Carolina Chickadee: 0.3-0.4 ounces, or ~1/40th of a pound
9. Bee Hummingbird: Less than .09 ounces, or ~1/174th of a pound

### BY WINGSPAN

1. Snowy/Wandering Albatross: 10-12 feet
2. California Condor: 8.2-9.8 feet
3. Common Ostrich: 6-6.6 feet
4. American Flamingo: 4.6-6.4 feet
5. Emperor Penguin: 2.5-2.9 feet
6. Emu: 14-16 inches
7. Northern Cardinal: 9.8-12.2 inches
8. Carolina Chickadee: 5.9-7.9 inches
9. Bee Hummingbird: Approximately 1.28 inches

## HOW BIG? ANSWERS



## SPIX'S MACAW



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## HOW FAR?

## SHOEBILL STORK



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## HOW FAR?





## TAWNY FROGMOUTH

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**HOW FAR?**



## SECRETARY BIRD

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**HOW FAR?**





## COMMON RAVEN

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### HOW FAR?



## GALAPAGOS PENGUIN

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### HOW FAR?





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**HOW FAR?**



Image Credit: Photographer: ravas51. Wikimedia Commons.  
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**HOW FAR?**



# ARCTIC TERN



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## HOW FAR?

### BY SHORTEST TO FARTHEST DISTANCE:

1. Spix's Macaw: The Spix's Macaw is extinct in the wild, and only survives in captivity, meaning he can only fly a few feet!
2. Shoebill Stork: Most never leave their nesting grounds, with most having a foraging distance of less than 60 feet!
3. Tawny Frogmouth: Tend to live near human cities in Australia, and don't venture beyond their urban habitats
4. Galapagos Penguin: Rarely swim between the islands of the Galapagos, and live surrounding a single island their entire lives
5. Secretary Bird: Nomadic birds that tend to have territory around 500 square km
6. Common Raven: Tend to stay in one location, but can range over a few hundred miles to avoid seasonal patterns
7. Great Snipe: Travels from Scandanavia to Sub-Saharran Africa (over 4,000 miles) without landing, losing half its body weight!
8. Adélie Penguin: Migrates over 8,000 miles every year
9. Arctic Tern: Can travel up to 30,000 miles pole to pole

## HOW FAR? ANSWERS