HORSE POWER

EDUCATOR GUIDE

ACTIVITY: Know Your Horse – Equine Anatomy

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FROM THE FILM:

In the film we are introduced to a variety of horses and the amazing abilities of different breeds including their strength, speed, intuition, and courage. This activity will further expand on what we learn in the film Horse Power.

ACTIVITY OVERVIEW

Students will learn about the key features in a horse's anatomy that makes them unique in their ability to be intuitive, fast, and agile. They will learn about the horse's emotional intelligence, large lungs and heart, how their hooves carry them at great speeds, and how their nostrils allow them to consume greater quantities of oxygen that fuels their momentum. Then they will apply this knowledge by labelling the key characteristics of the horse's anatomy.

MATERIALS LIST

- Printed copies of Horse Power anatomy pages (one per student)
- Pencils, pencil crayons
- Access to YouTube and a projector

EDUCATOR PREP

Print out copies of Horse Power anatomy pages (one per student) and gather pencils and pencil crayons for each table.

Photo by Photo Advocacy

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01 Begin by discussing the key features of a horse's body that contribute to their immense speed. Then discuss the capabilities of the horse's emotional intelligence. Start by asking the class what they think are the key features that contribute to the horse's speed and intelligence (optional: write a list on the board). Then explain the details to the class.

ABOUT THE KEY FEATURES

Nostrils:
One reason why horses are so fast is due to their nostrils and respiratory system. Horses are obligate nose breathers, meaning they cannot breathe through their mouths, allowing them to separate their breathing and food consumption and simultaneously graze and smell for predators. This design facilitates rapid, unobstructed airflow when the head and neck are extended during a gallop and helps them consume oxygen more efficiently, leading to immense power and speed.

Heart:
The horse's heart is 13 times larger than a human heart, and also plays an important role in their speed and endurance since it helps pumps large volumes of oxygen filled blood into their organs and muscles through their blood vessels and maintain high aerobic function over long distances.

Lungs:
Horses have extremely large lungs that can hold the same amount of air as 14 milk jugs! These large lungs contribute to their speed by helping them breathe more, thereby bringing in lots of oxygen which goes into the blood and is then pumped through the heart, fueling all of their muscles, and is then breathed out in the form of carbon dioxide. At rest, horses take about 10–12 breaths per minute, but after running fast, they can take up to 70 breaths a minute!

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CONT'D KEY FEATURES

Hooves:
In mammals there are three main types of locomotion, or walking around. We walk on our whole foot, which is extremely stable but not very fast. In contrast, cats and dogs walk on all of their toes which is pretty stable but allows for quicker movement than us. Horses walk on the edge of their toes, or tippy toes, that are surrounded by a nail-like structure which we call the hooves. Because of this, horses are able to move extremely fast and efficiently but they are not as stable making the risk for injury higher. Horse hooves are very much like giant, tough fingernails, and are made of the same protein, keratin.

Emotional Awareness & Recognition:
Research from the University of Sussex revealed that horses can recognize human emotions through facial expressions, vocalizations, and posture, and even retain emotional memories of specific individuals. Horses also distinguish emotional cues in other horses and show parallels with humans in how emotional awareness relates to social behaviour and stress responses!

Equine Therapy:
Studies show that the bond formed in equine-assisted interventions (EAIs) goes beyond physical interaction, relying heavily on emotional transfer between humans and horses. This mutual influence creates a shared emotional experience that supports healing, particularly for individuals with mental health challenges like trauma, autism, and substance use disorders. While horses are not therapists, they act as facilitators of emotional attunement and co-regulation, and while the success of equine therapy is not certainly known yet, it could be due to physical contact and the release of bonding hormones such as oxytocin. Some scientists suggest that these deep connections are rooted in horses' natural social behavior, which relies on non-verbal cues and strong emotional ties, similar to human family dynamics. Though more research is needed to fully understand and standardize EAIs, current evidence suggests that horses possess emotional intelligence and can positively impact human well-being, provided their own welfare is also respected.

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02 Next, watch the following videos:

Why Are Horses So fast?

Occupational therapy students learn about the healing power of horses– Temple University College of Public Health

03 Pass out copies of the Horse Power anatomy pages and have students label and color in their page with the help of the word bank provided.

04 Finish with a class discussion about the key features that contribute to a horse's speed and the impact of their emotional intelligence.

QUESTION:

How do the nostrils make breathing for the horse easier? And how does that increase the horse's speed?

A horse can only breathe through their nostrils, separating their breathing and food consumption which allows for a more efficient respiratory system, and therefore more oxygen being pumped into through their body to assist with metabolism and aerobic function.

QUESTION:

How much bigger is the horse's heart from ours? And what does this big organ pump into the muscles?

The horse's heart is 13 times bigger than ours and it pumps oxygen and nutrients into the muscles.

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QUESTION:

How do the lungs help fuel the horse to run super fast in comparison to us humans?

The large lungs bring in a lot more oxygen to the body compared to us, which as a result is pumped through the heart and can fuel the muscles with a greater capacity.

QUESTION:

How do horses walk on their hooves that makes them faster? Do they walk on their whole foot like us?

Horses walk on the edge of their hooves or their tippy toes which makes them more agile in comparison to humans who walk on their whole foot, which prioritizes stability rather than speed.

QUESTION:

How are horses emotionally intelligent?

Recent research shows that horses can mirror and read our emotions in addition to being able to react and change their behavior depending on our emotions.

QUESTION:

How do horse herds potentially impact the horse's emotional intelligence?

Within the herd the horses have to communicate and read each others body language and social cues so it is likely that that is where those skills originate from.

QUESTION:

Which feature surprised you the most and why?

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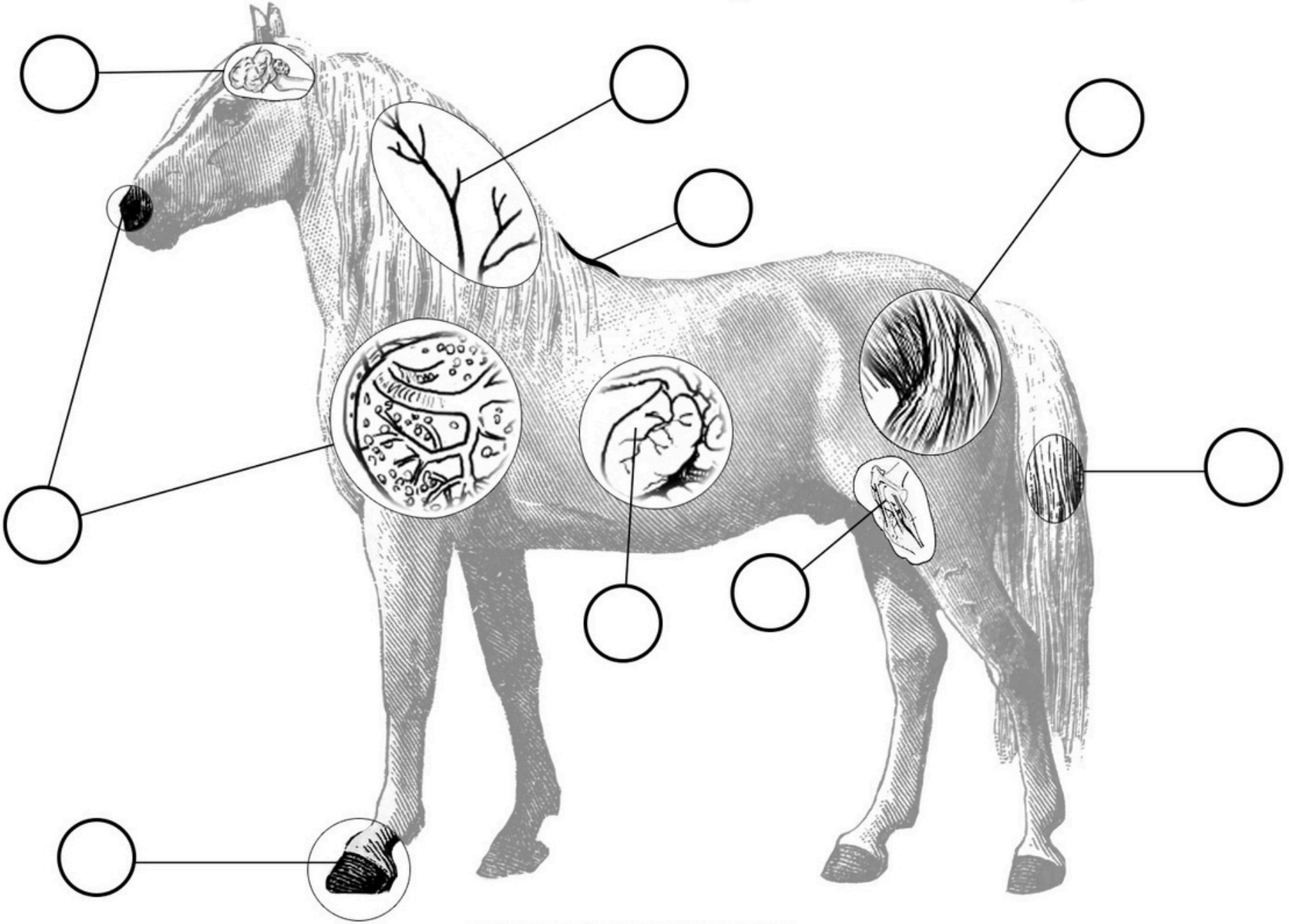

Horse Anatomy: Word Bank Fact Sheet

A **Lungs & Nostrils (Respiratory System) -** The respiratory system includes the lungs and the path that air takes to get to the lungs. Horse lungs are massive! Human lungs can hold 1.5x more air than an empty milk jug, but a horse's lungs can hold 14 milk jugs worth of air!

Horses are obligate nasal breathers – they can't breathe through their mouths. This is because the pathway between the mouth and the lungs is blocked off so that food doesn't accidentally get brought into the lungs.

B **Heart & Blood Vessels (Circulatory System) -** Horses have really big hearts! A horse's heart is 13 times bigger than an adult man's heart. Horses are incredible athletes and they need to have a very strong heart so that they can get oxygen and nutrients to their muscles while they are running.

C **Brain - The equine brain** is a complex organ responsible for processing sensory information, controlling movement, and managing emotions. Unlike humans, whose brains are heavily developed for logical reasoning and problem-solving, **horses rely on instinct and sensory perception.** Their brains are wired for survival, constantly assessing threats and reacting quickly to potential dangers.

D **Hooves -** A horse's hoof is equivalent to a human fingernail and is made up of a protein called keratin. Underneath the hoof wall made of keratin, there are fingerlike projections of tissue called laminae that hold the hoof wall to the bone underneath. Since horses are so heavy, their hooves are designed to decrease the impact of the force when their foot hits the ground.

E **Stomach (Digestive System) -** Just like dogs and cats, food moves through the digestive system of a horse in the same manner. However, horses like other herbivores eat only plants, so they have developed special adaptions to their digestive system to help get the most out of their food sources. Plants are made up of molecules that animals are unable to digest on their own. Herbivores, like horses, have come up with a strategy to fix this! Horses are hindgut fermentors, which means they take advantage of bacteria housed in the colon and cecum that can digest these plant substances. These bacteria digest the horses food for them, resulting in horses now being able to absorb these digested nutrients. Horses are basically farming bacteria inside their guts to help them digest their food!

Horse Anatomy: Word Bank Fact Sheet

F **Muscular System -** Horses have evolved to be exceptional athletes. Equine limbs display extreme adaptions for a running lifestyle. Their limbs are long and have most of their muscles at the top of their legs to help increase the length of their stride. Several muscles in their legs, especially those more distal (away from their core), have also been reduced or replaced with bands of tendons or ligaments.

G **Withers -** The prominent "bony" ridge near the base of the mane where the neck meets the back. A horse's height is measured at its withers.

H **Tail -** The horse's tail helps improve their balance. The tail also helps with temperature regulation and to swish away biting insects. The position and movement of the tail is also used for communication purposes.

I **Stifle -** The stifle is a joint, similar to a person's knee joint, at the front of the thigh in the flank area. It is the point where the horse's hind leg meets the body. It is the largest joint in the horse's body and stabilizes the leg when the horse is moving.