NATIONAL HORSE RACING MUSEUM

The surprising science of horseracing

STEM LEARNING

Charity No. 283656

NATIONAL HORSE RACING MUSEUM

Introduction

The ideas in this resource were generated by Robert Cooper who is a science consultant for STEM Learning, having taught in primary schools for many years. In collaboration with The National Horseracing Museum, we wanted to tailor a course on Working Scientifically that would utilise all of the wonderful facilities and resources that the museum has to offer, and combine them with activities to illustrate the five types of investigation that the science curriculum requires all year groups to cover in Working Scientifically.

A big thank you goes to our group of primary teachers who came along for the day to help us trial and develop the ideas and resources in this pack of science activities. Have fun at a gallop in the museum!

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Classification

Introductory classroom activity

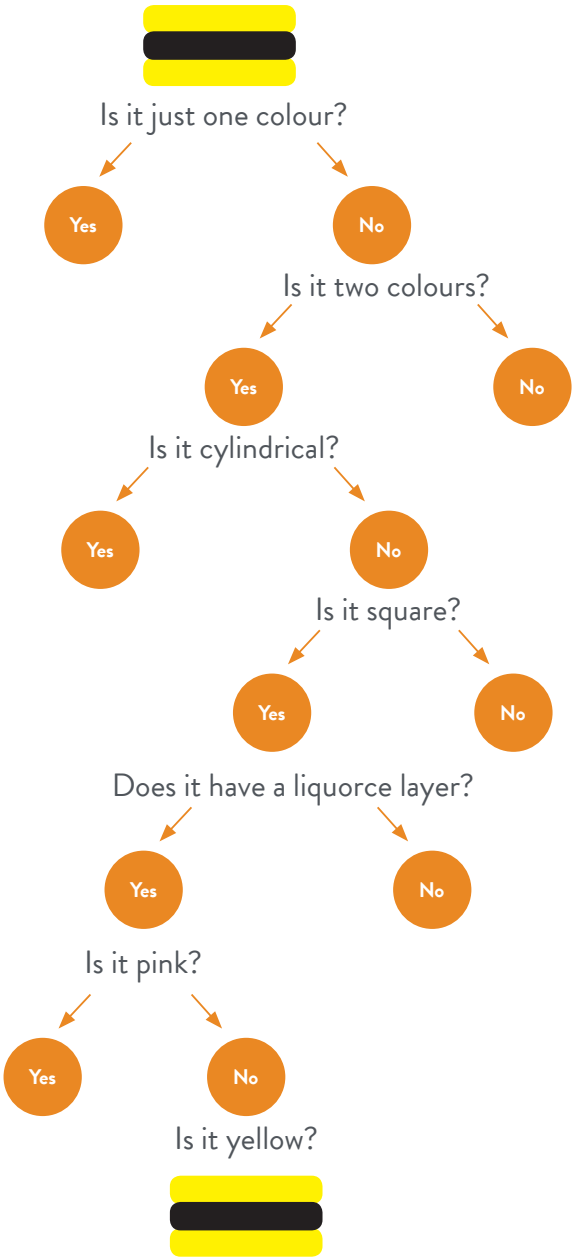
This activity will help children make a simple branching tree diagram using Yes/No questions to classify objects which can then be applied to classifying ungulates including horses.

Give groups of children a bag of Liquorice Allsorts, a large sheet of paper, post-it notes and a marker pen. Tell them that we are making a key to identify the different varieties of Allsorts. They need to sort out the Allsorts using only 'yes' or 'no' questions such as "Is it round?" or "Is it cylindrical?"

Write each question on a post it note and stick it on the paper. Put the relevant Allsorts next to the questions as you sort. You could start at the top of the paper and place each new question on a new row. Gradually there should be fewer and fewer until the bottom row will have only one Allsort for each question.

Children can test their classification by hiding one Allsort and getting a partner to use the branching diagram questions in order to find which one has been hidden.

An example of a diagram.



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Adaption-ungulates

By the end of this activity children will be able to classify ungulates and identify three ways that Ungulate Mammals are adapted to their environment.

An ungulate is a hooved animal. Some have an odd number of toes and some are even-toed. A modern horse is an odd-toed ungulate as they have just one toe on each foot.

Classroom activity

Set small groups of children the task of researching one domesticated and one wild ungulate by searching for information online – there are a few suggestions below:

Domesticated	**Wild**
Pigs	Bison
Sheep	Hippopotamus
Cows	Deer
Goats	Zebra
Donkeys	Giraffe
Horses	Elephants

Ask them to find out what each animal eats, how they eat and where they live. Looking at their wild ungulate, ask them to find three ways that this animal is suited to its environment.

(Hint: giraffes are a good place to start with this as their long necks enable them to eat food that shorter animals can't access http://www.whatdogiraffeseat.info/)

List all of the ungulates they have looked at and challenge your class to sort them into different groups in any way they can. You could find photographs online to make a set of cards for them to sort to help with this activity.

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Activity at the National Heritage Centre for Horseracing & Sporting Art

Hooves

Have horses' hooves always been the same?

Visit the evolution display in The Maktoum Gallery of the Thoroughbred to collect evidence to support your answer. Before you look, write down here whether you think horses' hooves have always been the same.

I think that horses' hooves have always looked the same.	I think that horses' hooves have changed from a long time ago.

Use this page to write down the evidence that you find.

Visit the horses in the Rothschild Yard and ask the people there if you can have a look at the horses' hooves. See if you can find out more about the shoes that they wear. Why do horses need to wear shoes? Do they always wear the same sort?

See if you can find information to help you label this picture

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Activity at the National Heritage Centre for Horseracing & Sporting Art

Visit the horses in the Heritage Centre to find out what they eat. Do they always eat the same diet? See if you can find the answers to these questions. You may need to ask the people in the yard about some of these questions:

How much do the horses eat in a day?	
What and how much do they eat when they are racing?	
What and how much do they eat when they are resting?	
Why do you think this is different?	
How much water does a racehorse drink on a race day? on a rest day? Why is this different?	
How do horses eat their food? Do they grind it, rip it up with their teeth or chew like humans?	
Whilst looking round the Heritage Centre Find a picture of a horse's tooth and draw it here. How do you think the shape of the tooth helps a horse to eat?	

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Horse and human heart rates

Heritage Centre activity

By the end of this activity children will be able to explain what happens to their pulse rate before and after riding the "horse" and to reflect on why it changes.

In small groups visit the simulator in the King's Yard.
Before the children ride on the simulator get them to pair up and measure each other's pulse rate. To do this get children to find the pulse in the wrist at the base of the thumb and count how many beats there are in one minute. You can buy small, electronic pulse meters if that would be easier for your pupils.

Ask children to predict what will happen to their pulse rate when riding on the simulator. Get the children to take turns riding the simulator and, as soon as they finish, get their partner to measure their pulse rate again. Use the table on page 8 to record this.

When everyone has had a go, compare the difference between the pulse rates before they rode and afterwards. Who had the lowest and whose pulse rate increased the most? Were the readings reliable or were some doubtful? Back at school, challenge pupils to find the best way to show these results on a chart.

While they are waiting for their turn on the simulator, ask children to look at the information about how a jockey's riding position has changed over the years. Why do they think this has happened?

Now go to the comparative anatomy display in the The Maktoum Gallery of the Thoroughbred and watch the film about the horse. What happens to a horse when it gallops? Can you count how many breaths the horse is taking? What do children think happens to a horse's pulse rate when it races?

Find the models of the horse's heart and brain and the human heart and brain and encourage children to compare the weight and size. You could tell the children to sketch them and compare what is the same and what is different. Ask them to consider why they are different. What does the horse's heart help it to do?

Let the children try to guess the parts of the horse on the interactive display in front of the horse skeleton. Encourage them to discuss what they have discovered about the differences and similarities between the horse's anatomy and a human body.

As a follow up activity back at school the children could try making a model in paper/newspaper of the horse foreleg and a human one, displaying them side by side and labelling the parts.

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Pulse rate table

Name	Pulse rate before riding simulator	Predicted pulse rate after riding the simulator	Actual pulse rate after riding the simulator	Difference

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Classroom Activity- horse breeds, adaptation and research

Introduction

By the end of this activity children will be able to name at least three British equine breeds and give one fact about how a specific breed has adapted to its environment or how humans have made use of its characteristics.

Show your class the picture of horses provided on page 11. Have a short whole class discussion about the key differences between the horse breeds. Which are the biggest and smallest? Which would they choose to pull a big, heavy cart? Which would be happy to live outside in bad weather? Which one would they choose for speed?

Give each child a horse playing card that's been prepared from the pictures provided. Children could work in pairs or small groups for this activity. Pupils are going to make a 'Top Trumps' card for their own horse by adding some key facts.

Some basic facts about each breed have been provided on page 10 but you could encourage children to do their own research online. There is some useful information here:
http://www.equine-world.co.uk/about_horses/horse_pony_breeds.asp

Ask them to find three interesting facts about their horses – identifying which facts demonstrate how the horse has adapted to its environment and how people have made use of its characteristics. Small groups could use their cards to have a game of 'Horse Breed Top Trumps'. Follow this up with a "speed dating" activity where each person shares the picture of their horse and then speed dates key facts about it.

As a whole class plenary, collect some of the cards up and pick one at random then challenge the class to play "20 questions" to guess which breed of horse you have chosen. Of all of the characteristics they have learned about which are the most important for a Thoroughbred racehorse?

Activity at the National Heritage Centre for Horseracing & Sporting Art

During a visit to the Museum challenge children to find evidence of as many qualities as possible that makes a Thoroughbred ideal for racing. They can research information in the galleries, ask staff and observe horses in the Rothschild Yard. Ask them to write, sketch, record or even take photographs where permitted, in order to record their evidence. When back at school, challenge them to design the best racehorse and to explain how their horse is adapted for racing.

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Factsheet – Horse breeds (A hand is 101.6 mm and is measured from the ground to the horse's withers or shoulder.)

Name	Height	Colour	Characteristics	Temperament	Strength
Exmoor Pony	11.2-12.3 hands	Brown, bay or dun	Thick neck, broad back, strong legs	Alert, intelligent and kind	Strong with good stamina
Welsh Cobb (Section D)	Over 13.2 hands	Any colour	Long neck, strong shoulders, muscular neck	Intelligent, kind, brave and willing	Hardy and strong
Highland	13-14.2 hands	Dun, grey, black brown or bay. Some have a stripe	Broad neat back, strong neck and body, short strong legs	Docile, intelligent and sensitive	Strong
Thoroughbred	14.2-17.2 hands	Any solid colour	Refined head, long neck, sloping shoulders, long legs	Spirited and bold	Has good stamina
Shire Horse	16.2- 18 hands	Black, bay brown or grey with white on legs and feet	Thick neck, muscular body	Docile and hard working	Very strong
Suffolk Punch	15.2 -16.2 hands	Shades of chestnut	Thick neck, muscular body, short legs	Docile, active and gentle	Strong
Welsh Pony(section A)	up to 12 hands	All	Strong necks, sturdy but not wide, slim legs	Intelligent and bold. Gentle	Strong enough to be ridden by a child
Hackney Horse	14.3-15.3 hands	Bay, dark brown, chestnut or black	Small head, long neck, compact body short legs	Alert, spirited and brave	Good stamina

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Exmoor Pony

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Welsh Cobb

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Highland

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Thoroughbred

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Shire Horse

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Suffolk Punch

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