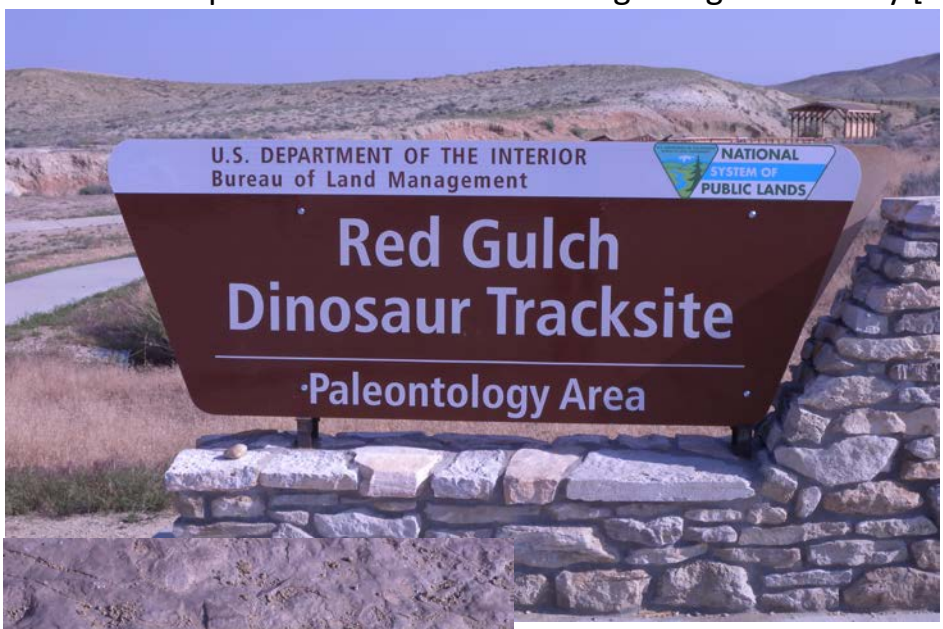
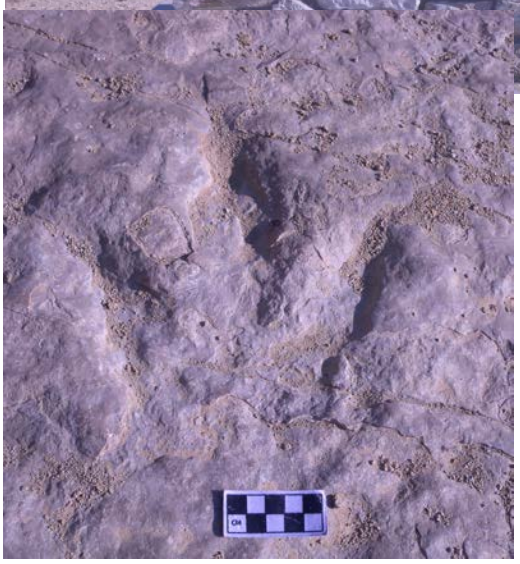
EARTH SCIENCES WITH PLYMOUTH UNIVERSITY

The Red Gulch Dinosaur Tracksite: Walk like a Dinosaur

The Red Gulch Dinosaur Tracksite is an assemblage of fossil dinosaur footprints on public land near Shell, in Big Horn County, Wyoming, USA. Hundreds of three-toed footprints from small to medium sized meat-eating dinosaurs are preserved in sediments deposited in a tidal flat setting along the seaway [1]. The site is managed by the Bureau of Land Management as part of the Red Gulch/Alkali National Back Country Byway and is open to the public [2]. The fossilized tracks are believed to be Middle Jurassic (160-180 million years) in age and formed on the shore of the Sundance Sea [2]. All the tracks so far identified were formed by two-legged (bipedal) dinosaurs. Most of the tracks appear to have been made by meat-eating theropod dinosaurs [2].





[1] https://www.geowyo.com/red-gulch-dinosaur-tracksite--sundance-seaway.html
[2] https://www.blm.gov/visit/red-gulch-dinosaur-tracksite

This teaching resource allows students to create their own dinosaur trackways; learn differences between a pace and a stride and measure pace and stride.

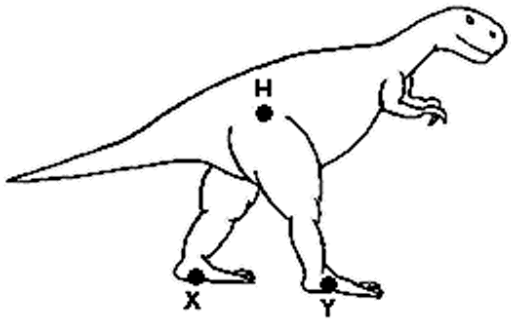
ACTIVITY: Create a dinosaur runway (trackway) to measure pace and strides.

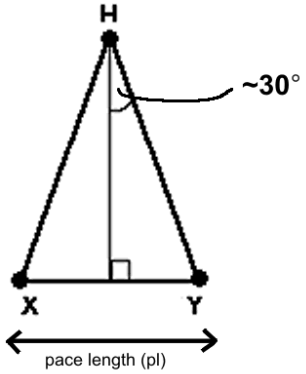
Materials required:
Scissors; Sponge Dinosaur Feet templates; long sheet of card; Washable Paint in tray

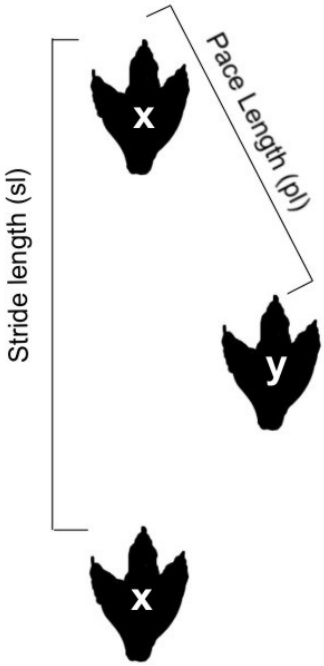
Procedure:

1. Create dinosaur feet from sponges using a template.
2. Attach dinosaur feet to boots.
3. Place paint in tray
4. Step in tray with paint
5. Carefully walk or slither on your trackway (long sheet of card) with your dinosaur feet
6. Let your trackway dry
7. Use a ruler to figure out the height and speed of your dinosaur using pace and strides in centimeters.
8. Use the Dinosaur Trackway charts below to find your matching animal and dinosaur from your pace and stride

Dinosaur palaeobiology: height and speed







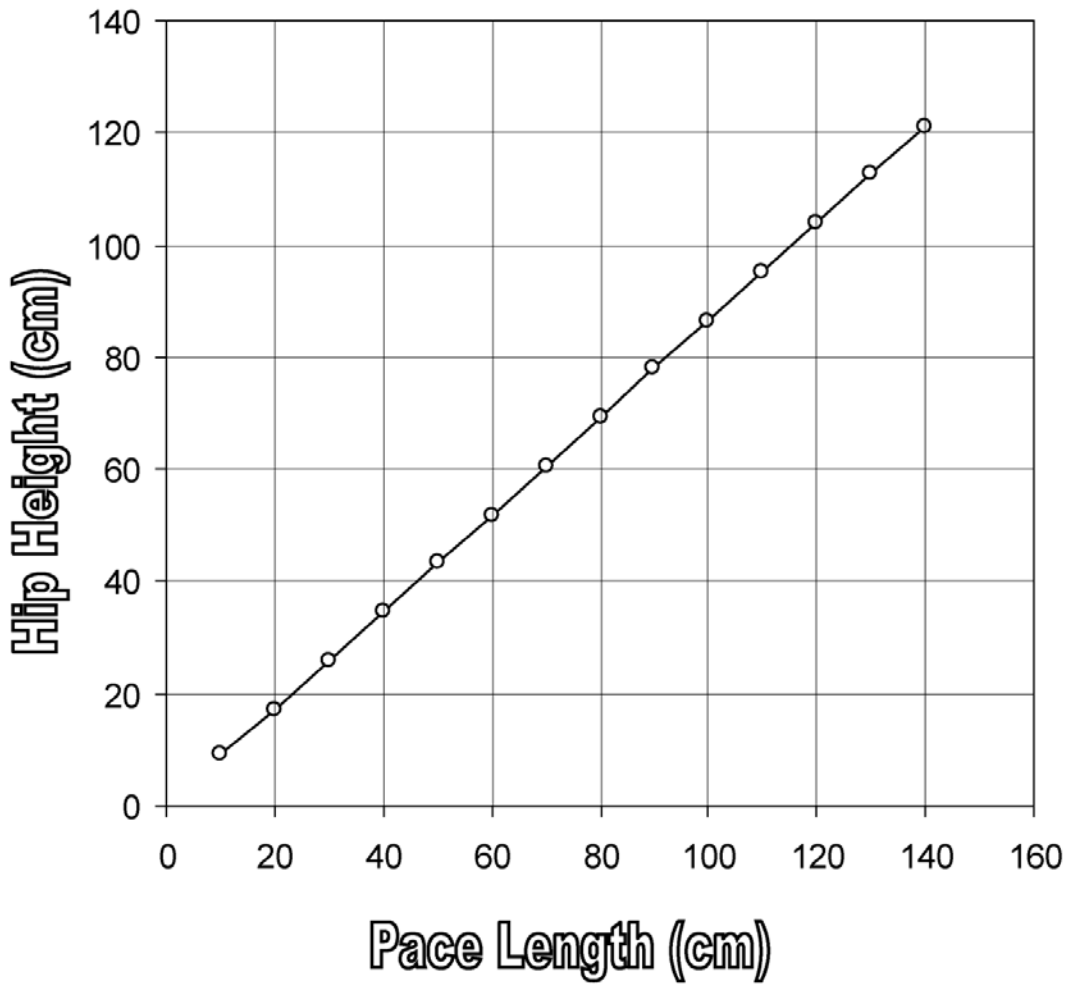
Hip Height (h) calculations : The Method

Using the method illustrated above, succeeding footprints ('x' and 'y') are assumed to be the base of an isosceles triangle. 'H' represents hip height:

Hip height (H) = (pl x 0.5)/tan 30° (equation 1)

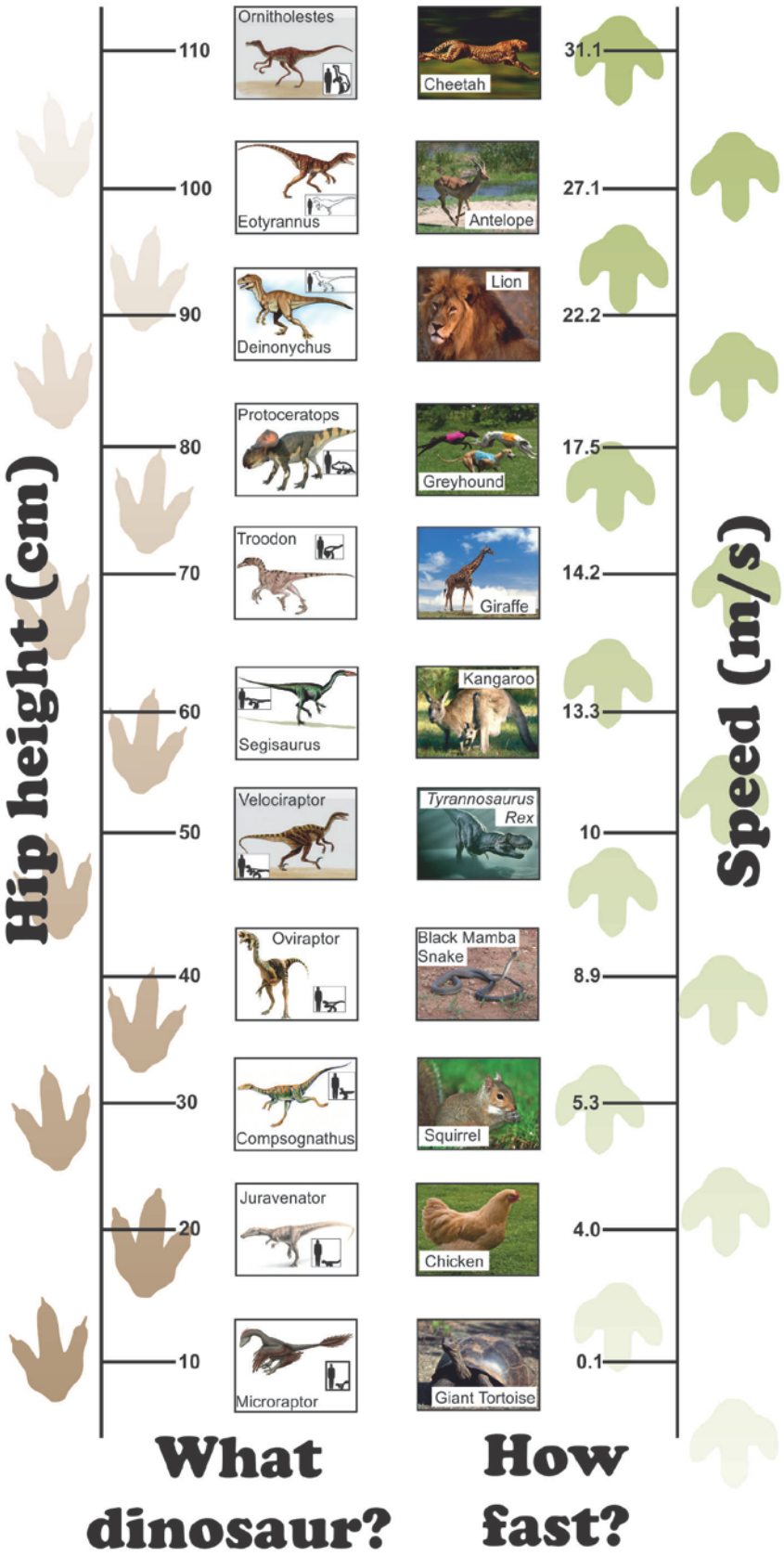
Hip heights have been calculated from a range of pace lengths using equation 1 (and plotted in the graph below).

Read off the hip height using the pace length



Pace Length =	Hip Height =

Walk like a Dinosaur



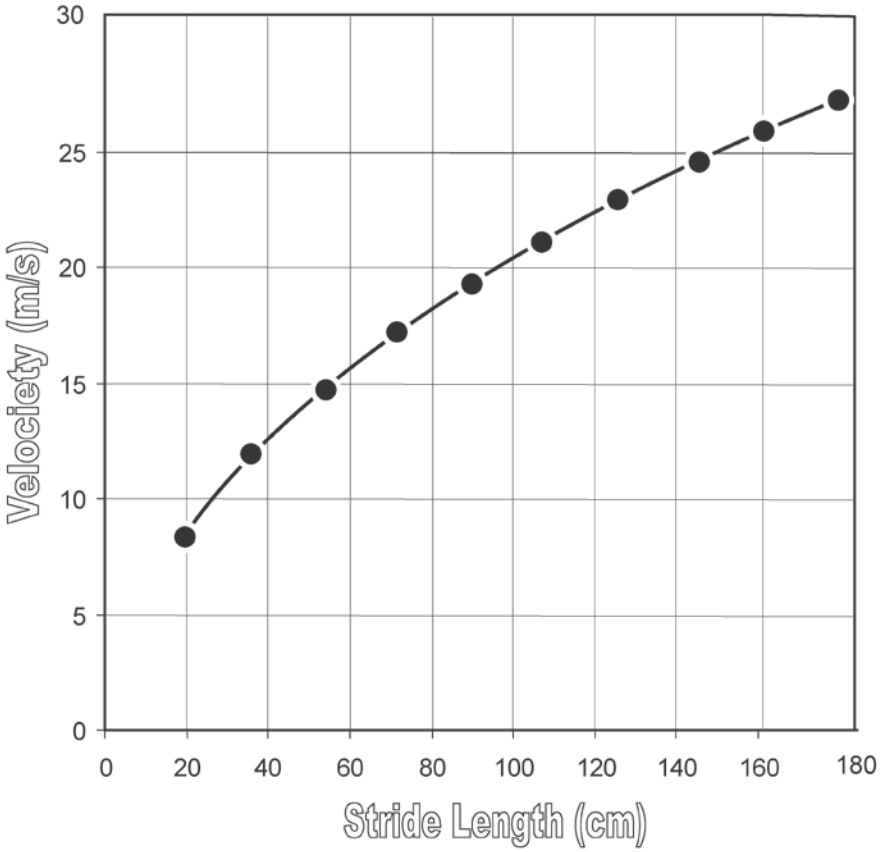
Dinosaur Speeds

Estimating speeds of dinosaurs from trackways involves more detailed calculations – but can be calculated by measuring stride length.

For running dinosaurs: V = [gh(SL/1.8H)2.56]0.5

where V = velocity; g= the acceleration of free fall; sl = stride length; H = hip height.

Velocity (metres per second) has been calculated from a range of stride lengths using these equations (and plotted below, and adjusted for the Dinosaur Runway). Read off the velocity using the stride length



Stride Length =	Velocity (Running) =

You can compare the speed of your dinosaur footprints with the table of animals below:

Maximum Running speeds	**MpH**	**m/s**
Three-toed sloth	0.2	0.1
Giant tortoise	0.2	0.1
Spider	1.2	0.5
House mouse	8.0	3.6
Chicken	9.0	4.0
Pig	11.0	4.9
Squirrel	12.0	5.3
Black mamba snake	20.0	8.9
Tyrannosaurus	22.5 – 33.8	10-15
Elephant	25.0	11.1
Human Athlete (i.e. Usain Bolt)	27.7	12.2
Cat (domestic)	30.0	13.3
Kangaroo	30.0	13.3
Grizzly bear	30.0	13.3
Giraffe	32.0	14.2
Reindeer	32.0	14.2
Rabbit (domestic)	35.0	15.6
Greyhound	39.4	17.5
Hyena	40.0	17.8
Ostrich	40.0	17.8
Zebra	40.0	17.8
Lion	50.0	22.2
Gazelle	50.0	22.2
Wildebeest	50.0	22.2
Antelope	61.0	27.1
Cheetah	70.0	31.1
Peregrine falcon	200.0	88.9

Refrences

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THULBORN, R.A., WADE, M. 1984 Dinosaur trackways in the Winton Formation (mid-Cretaceous) of Queensland. Memoirs Queensland Museum, 21:413–517.