TRACKING TITANS

Their Footprints Say it All!

05

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Their Footprints Say it All!

We can use teeth and bones to figure out what a dinosaur looked like.

But what about how they **acted**?

Fossilized **FOOTPRINTS** and **TRACKWAYS** are like a snapshot of what the creature was doing at that exact moment.

The problem is ... it's really rare to find fossils of a dinosaur ***with*** its fossilized tracks.

So, we have to compare tracks and use a little bit of math to figure out what dinosaurs were doing.

CAUGHT IN THE ACT!

TRACK TALK

Even though we can't know for sure **exactly** what dinosaur made a track, we can tell the difference between footprints from major groups of dinosaurs.

To avoid confusion, palaeontologists give footprints their **own** names.

A FOOTPRINT! A.K.A. ...
"GRALLATOR" OR
"AMBLYDACTYLUS" OR
"BRONTOPODUS"

ACTIVITY 05.1

YOU BE THE SCIENTIST

STEP 1

Take a look at the cast of the ***Grallator* (specimen 14)** footprint.

Was this footprint made by a big dinosaur or a small one?

Answer = A small one

How many toes did this dinosaur have?

Answer =Three

Do the tips of its toes look rounded or pointy?

Answer =They're pointy

WHAT CAN THAT TELL US?

Toe claws can tell us a lot! Let's look a little closer at them.

STEP 2

Compare the two toe claw casts in the kit **(specimen 15** and **specimen 16)**.
Put on your ***palaeontologist*** hat and think about these questions.

Which claw belonged to a carnivorous (meat-eating) dinosaur? How can you tell?

THINK ABOUT THIS:

What would a carnivore be eating?
Would its prey be trying to escape?
How would the carnivore stop it from escaping?

Answer = The pointy one **(specimen 15)** is from a carnivore.

What kind of dinosaur does the other claw belong to?

Answer = The claw with the rounded toe **(specimen 16)** is from a herbivore.

Which toe claw is most like the toes in the *Grallator* footprint? Why?

Answer = **specimen 15** is pointy like the *Grallator* footprint.

NICE WORK!

We might not know the species that made the *Grallator* footprint, but now we know it was a carnivore.

TAKE IT A STEP FURTHER!

STEP 3

Look at **Card J**. Compare the ***Grallator*** footprint to what palaeontologists already know about dinosaur feet.

What type of dinosaur do you think made the ***Grallator*** footprint?

Answer = A theropod

DINO MATH

Let's Try it Again

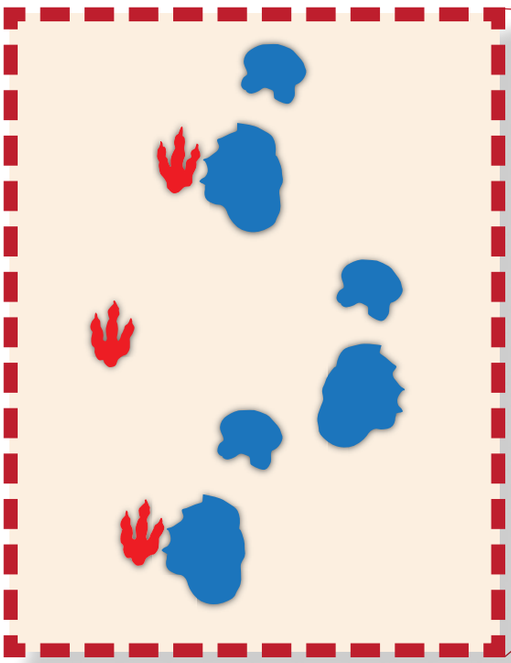
…using a picture of some **real, life-sized** dinosaur footprints from Texas. Look at the **trackway** on the floor.
And, get your **Track-maker Worksheet** ready.

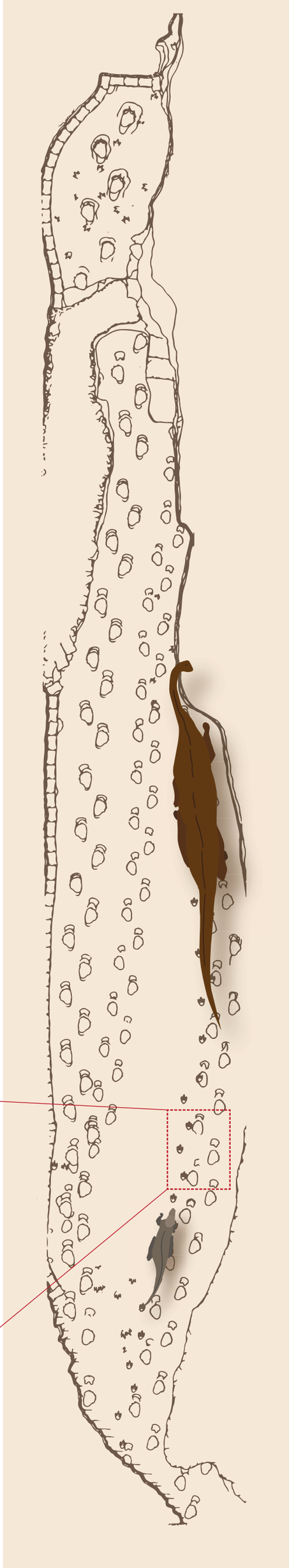
WHAT DO YOU NOTICE?

How many dinosaurs were walking here? There were **two** track-makers in this trackway! One was travelling on the left **(red footprints)**, the other on the right **(blue footprints)**.

WHO WERE THEY?

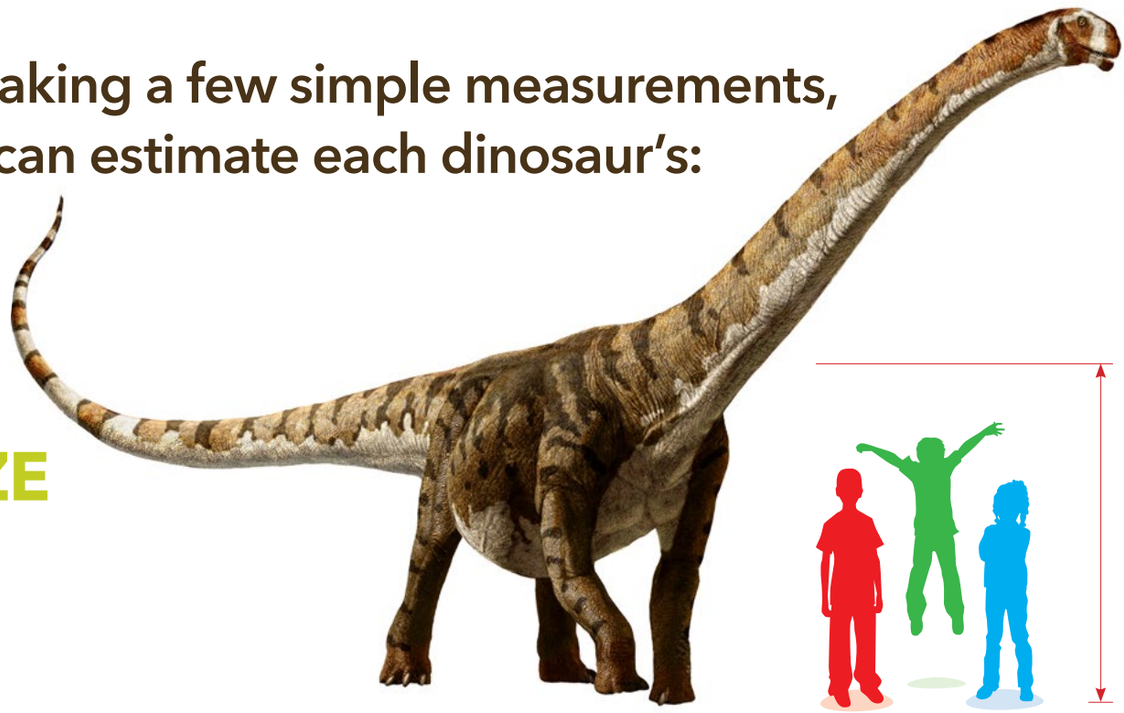
Use **Card J** to figure out what kind of dinosaur made each footprint. Write it down on your **Track-maker Worksheet.**





NOW LET'S GET TO KNOW THOSE DINOSAURS A LITTLE BETTER! ...

By taking a few simple measurements, we can estimate each dinosaur's:



SIZE

GAIT

(whether it was walking, trotting, or running)

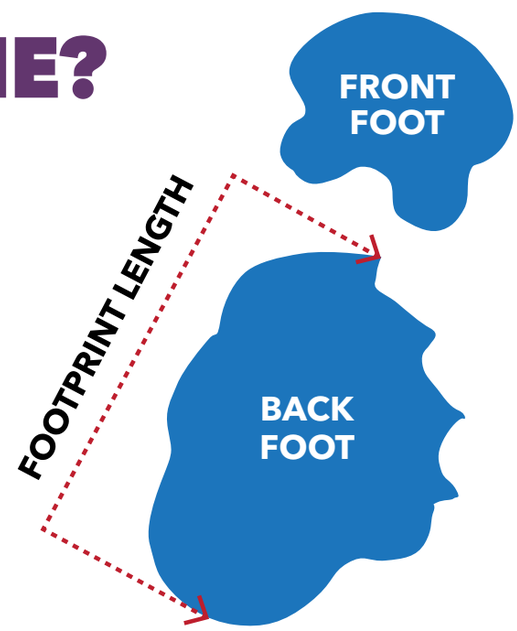
SPEED

ACTIVITY 05.2
YOU BE THE SCIENTIST

STEP 1

Measure the **length** of one of the **footprints** on the trackway – from the tip of the toe to the back of the heel (the longest dimension).

BUT WHICH ONE?



First you have to figure out if these dinosaurs walked on **two** legs (bipedal) or **four** (quadrupedal).

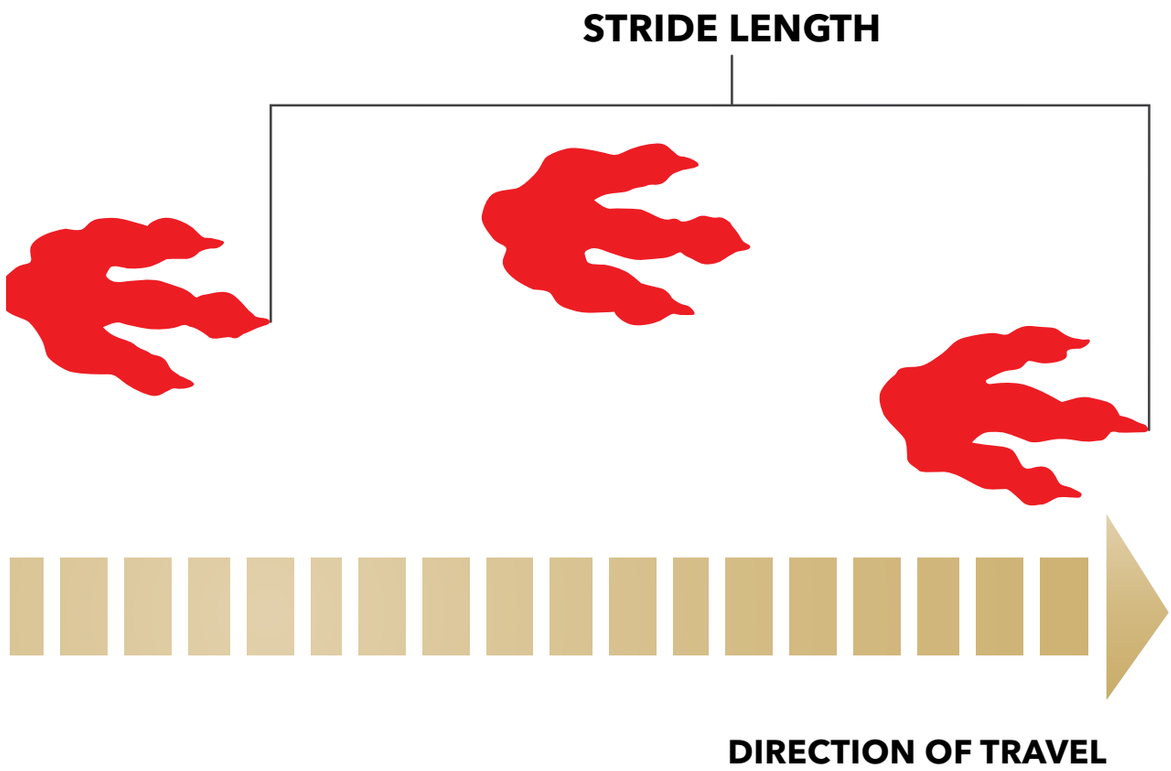
Then use your worksheet.

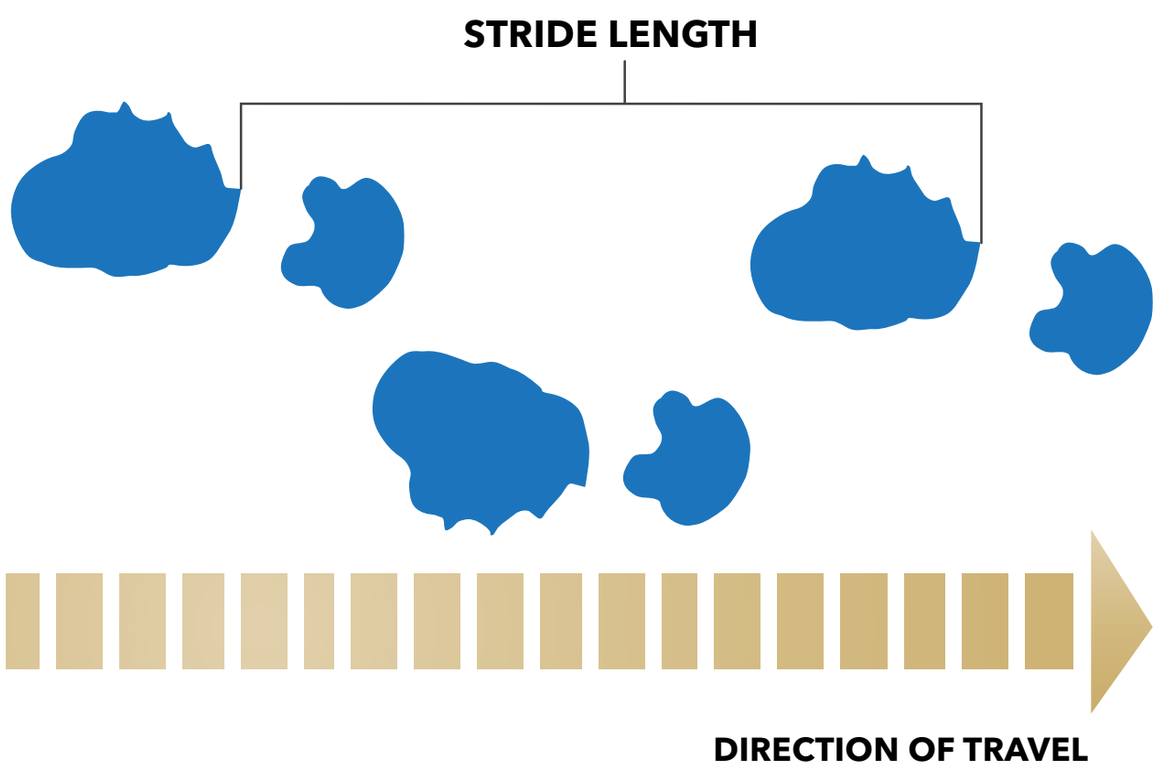
Look at the left track-maker **(red footprints)**.
Do you see a big print and a little print together?
What about the right track-maker **(blue footprints)**?
Are there big prints and little prints together?

Quadrupeds (four-legged dinosaurs) usually have smaller front feet than back feet.

STEP 2

Measure the **stride length** – from any point on one footprint to the ***exact*** same point on the next footprint made by the ***same foot***. Let's measure from toe tip to toe tip.





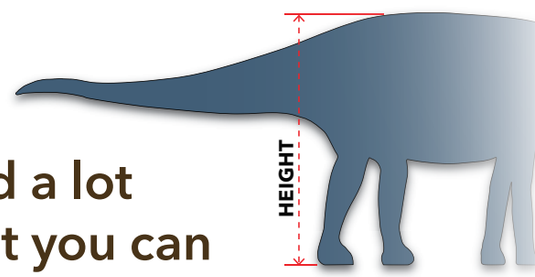
NOW IT'S TIME FOR THE MATH!

First, to figure out how tall these dinos were.

STEP 3

To calculate the **height of the dinosaur's hips,** use the footprint length of each dinosaur and multiply it by a certain number.

WHAT NUMBER?



Palaeontologists have compared a lot of dinosaurs and figured out that you can find the height of each type of dinosaur by using a different number for each one.

THEROPOD
(A LARGE ONE)

FOOTPRINT LENGTH X 4.9

SAUROPOD
(THEY'RE ALL BIG!)

FOOTPRINT LENGTH X 4.6

Look at your worksheet. ***What type of dinosaur is each track-maker? What number should you multiply for each one?***

NICE WORK!

Now that you know how high each dinosaur's hips were, you can imagine just how big the whole dinosaur was!

Now, let's figure out if they were walking, trotting, or running.

STEP 4

To calculate the **gait** of each dinosaur, you have to find what's called the **Relative Stride Length (RSL).**
Just divide each dinosaur's stride length by its hip height. That will give you the **RSL**.

if the **RSL** is...	
less than **2.0**	the dinosaur was **walking**
between **2.0** and **2.9**	the dinosaur was **trotting**
greater than **2.9**	the dinosaur was **running**

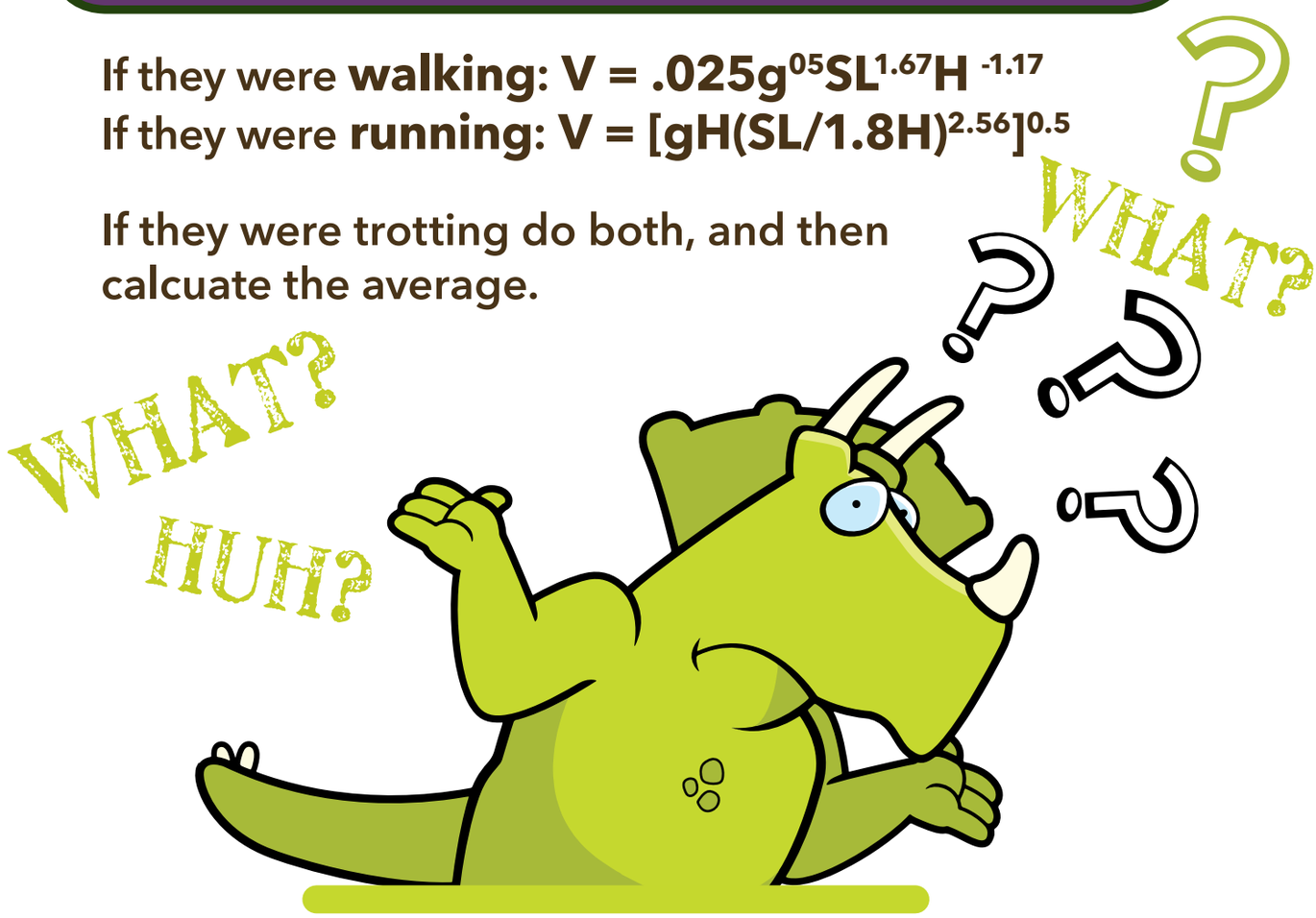
OK, so you know how it was moving… now let's find out just *how fast* it was going!

STEP 5

Calculate the **speed** of each dinosaur. It's easy!
Just use these formulas:

If they were **walking:** $V = .025g^{05}SL^{1.67}H^{-1.17}$
If they were **running:** $V = [gH(SL/1.8H)^{2.56}]^{0.5}$

If they were trotting do both, and then calcuate the average.



OK... so that's ***really*** complicated!

But luckily we've included special calculators that will help you find the speed of each dinosaur, using the numbers you've already come up with!

HERE'S HOW:

Use the **Speed Calculators** in your kit to figure out how fast each dinosaur was going. Line up the arrows so they point to the stride and height you came up with.

- Round your numbers to the nearest whole number on the calculator
- Turn over the calculator
- If your numbers were right, the speed will be revealed!

WHAT DOES IT ALL MEAN?

You have a lot of numbers… now you have to do some detective work to put the pieces together.

Think about the information you have and you can figure out what these dinosaurs might have actually been doing when they made these tracks!

What kinds of dinosaurs are they?

Were they going the same speed?

What do you think happened here?

Any other ideas?

We'll never know for sure! But we can figure out what we think happened using information about the dinosaurs' behaviours.

Maybe the track-maker on the left was stalking the one on the right (neither was running, so it wasn't a chase).

Maybe the two dinosaurs were walking calmly beside each other.

Maybe the two dinosaurs crossed the same area at totally different times!

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