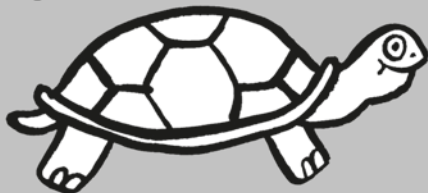


WHICH OF
THESE ANIMALS
CAN BREATHE
THROUGH THEIR
BOTTOM?

A A TURTLE



B A FROG



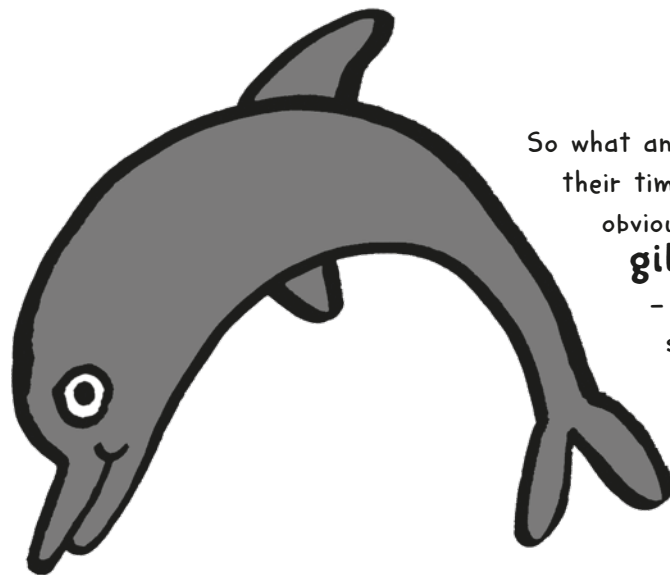
C A DOLPHIN



D A PUFFER FISH

All living creatures need **oxygen** to survive, but you'd have to be rather desperate to get it by breathing through **your bottom**, right? I mean, in an ideal world it's not exactly where I'd like to exhale from. Mine, not yours. Well, I wouldn't really like to breathe through your bottom either. No offence.

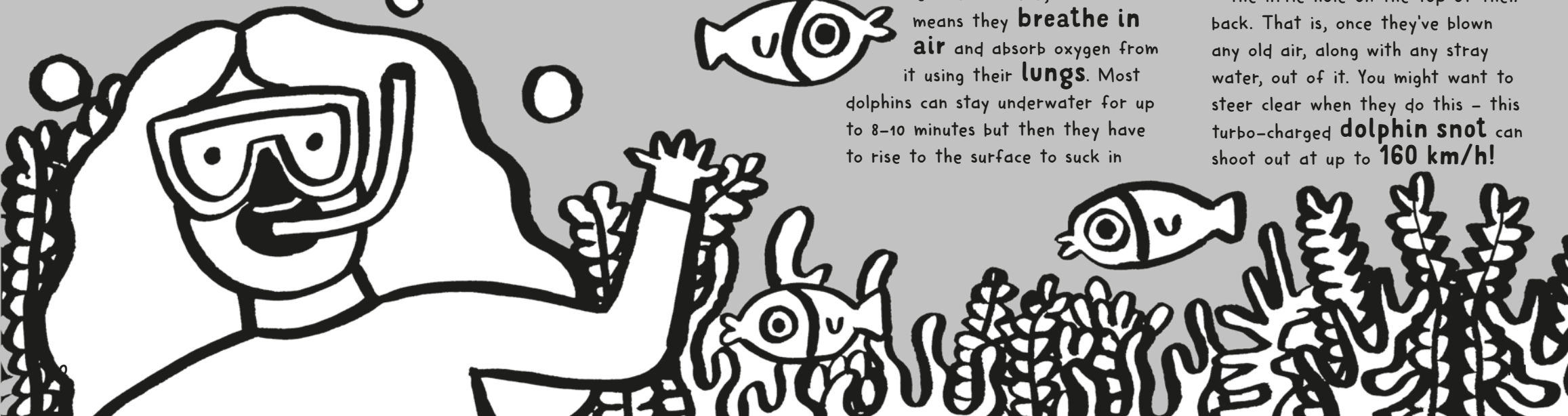
But however, there are some brave creatures that use **bottom-breathing** on a regular basis, despite the fact that they have a **perfectly good mouth** – and a set of **lungs**. So why not use **them** then, like any sensible person (I mean animal) would? Well, it's pretty **hard** to breathe with your mouth and lungs if you're stuck **underwater** for long periods of time.



So what animals spend a lot of their time underwater? Fish, obviously. But fish use their **gills** to obtain oxygen – special little flaps of skin that **absorb oxygen directly from water** as it flows across them.

How about **dolphins**? Dolphins are **mammals**, which means they **breathe in air** and absorb oxygen from it using their **lungs**. Most dolphins can stay underwater for up to 8–10 minutes but then they have to rise to the surface to suck in

fresh air through their **blowhole** – the little hole on the top of their back. That is, once they've blown any old air, along with any stray water, out of it. You might want to steer clear when they do this – this turbo-charged **dolphin snot** can shoot out at up to **160 km/h!**





What about **whales** then?

Sperm whales can stay underwater for up to a whopping **90 minutes**, thanks to special electrically charged proteins that help their blood to carry **high levels of oxygen**, so they don't need to take in air as often. Pretty impressive when you consider that the longest that a human has held their breath for underwater is a measly **24 minutes**: a record set

in 2016 by a Spanish freediver. But even whales do still have to come up for air **eventually**. That's why **whale watching** is so exciting. You never know when old spermie is going to pop up to the surface ... but you know he'll have to at some point!

How about frogs? Frogs, like most amphibians, have lungs for breathing when they're on **land**, but also a special type of **skin** that they can use to absorb oxygen when they're underwater – kind of like one **giant gill**. No need for any bottom-breathing for them.

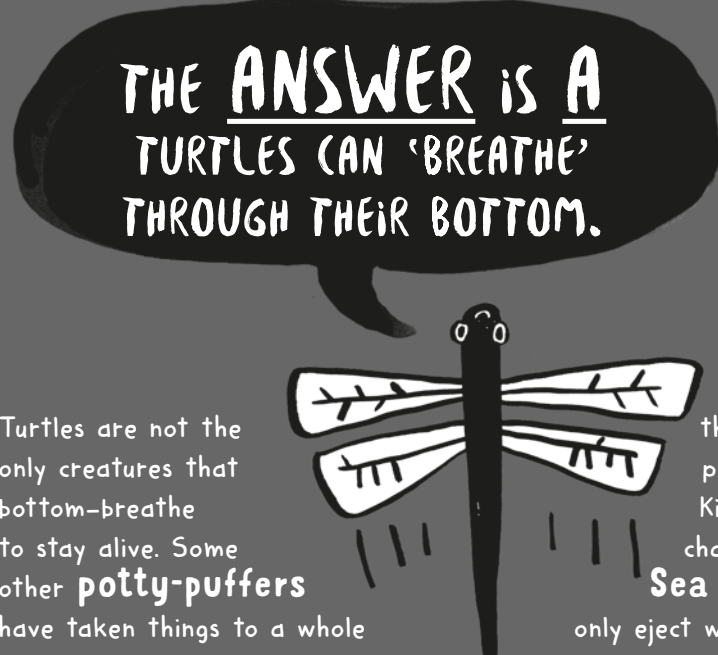
But what about if you're an animal that needs to spend a **long time** underwater and you don't have gills like a fish, a blowhole like a dolphin, or special skin like a frog? Sometimes your **bottom** is your only hope.

And that's exactly what certain types of **turtle** have to do. Like frogs, turtles have mouths and lungs, which they use for breathing when they're on land. However, the **Australian Fitzroy river turtle** and the **North American eastern painted turtle** spend up to **5 months** at a time hibernating in **ice-covered** water to avoid the freezing cold winters on land. Their skin is covered with **thick scales** and a **hard shell** – so they can't do **skin-breathing** like their froggy friends. So they've had to come up with an alternative way to get oxygen when snoozing underwater ... You guessed it! Their bottom.



EXCUSE ME!

OK, so this bottom-sucking technique isn't strictly-speaking 'breathing' (as it doesn't involve air entering their lungs), but it is a very **efficient** way for turtles to get oxygen when there's no air available. This means that they can **hibernate underwater** for long periods of time during the freezing winter, without having to come up for air.



THE ANSWER IS A
TURTLES CAN 'BREATHE'
THROUGH THEIR BOTTOM.

Now a turtle's bottom isn't exactly a bottom like you and I have. Turtles have a sort of **multi-purpose hole** at their rear end called a **cloaca**, through which they urinate, excrete waste, and lay eggs. But it turns out that when they're underwater they can also use it to **absorb oxygen**. The cloaca has 2 sacs next to it called **bursae**, which can easily **expand** and are lined with **blood vessels**.

The turtle **sucks water in** through its cloaca and into its bursae, where life-giving oxygen can be **absorbed** from the water straight into the turtle's blood vessels. This is similar to how a fish absorbs oxygen across its gills. Then the turtle **shoots** the water back out of its bottom (sorry, cloaca) . . . and starts again. Turtles can do this up to **60 times a minute**, and it takes very little energy to do so.

Turtles are not the only creatures that bottom-breathe to stay alive. Some other **potty-puffers** have taken things to a whole new level, finding extraordinary additional uses for their rear-end water-shooting skills. In times of emergency, **baby dragonflies** shoot water out of their cloaca to propel themselves forwards so

they can escape from predators like **ducks**. Kind of like a turbo-charged water fart.

Sea cucumbers not only eject water out of their rear ends but also **expel** some of their **insides** with it. The resulting tangly mess of **sticky tubes** can trap a predator that is trying to sneak up on Mr Cucumber from behind.