GET KIDS INTO SURVEY®

Q&A MINING

Q1: Piggle Wiggle and the Bengal cat are racing towards some mine surveyors. What are the surveyors doing?

A: The earth beneath our feet is not solid. In fact, it's full of holes, like a big block of Swiss cheese! These holes, called caves, can be tiny, medium-sized, or massive, but from the surface we can't tell their size... or where they are! That's why we use specialist equipment to safely measure how big the caves are and how far they extend, way before we start sending heavy diggers across them, or try to drill tunnels through!

Q2: What are the surveyors using to measure the big cavity?

A: Some underground spaces, or cavities, are natural - like caves. Others are man-made, such as train tunnels and storage spaces. When these cavities need to be measured, the quickest, easiest and safest way to do so is not to send a person down, but to use specialist equipment instead. These surveyors are using a 'CALS' - a Cavity Auto-scanning Laser System - to scan and measure the inside of the cave. I bet they'll be glad they didn't have to go into the cavity when they find out what's down there!

Q3: Where is Bernard the brown bear, and who do you think he has seen?

A: Bernard is enjoying the view from the top of the Orica blasting truck - hopefully the man with the Health & Safety clipboard below won't spot him up there! Blasting uses carefully controlled explosions to allow miners access to rocks and minerals buried in the earth. Bernard is busy waving across the mine, to a surveyor who is measuring the distances between the benches. Now, these aren't the kind of benches you'd sit on at the park! They are actually a series of large steps or ledges, like a staircase, cut into the earth so that miners can work deeper without going below the surface.

By measuring the distances across this 'open-cast' (or 'open-pit') mine, the surveyor can calculate the mine's volume and height, as well as its precise location on a map. This helps the mining company to make sure that its miners don't accidentally take things out of the ground which were lying outside of their mining area.

Q4: Harry the wombat likes dark, wet areas. What has he found down there?

A: Harry seems to have made a friend! And it's not surprising - both he and his new pal, the 'Zeb Revo', are perfectly designed for working underground. Mounted to the top of a robotic vehicle, the Zeb Revo is made by a company called GeoSLAM Technology, and it is able to measure the inside of underground cavities like this cave tunnel automatically. Usually, this kind of device is hand-held, but attaching it to a robot means that it can be sent into really small spaces while the surveyor stays above ground, controlling the robot remotely. This also means that the robot-riding Zeb Revo can check out cave tunnels and monitor them to see if they could be dangerous to miners who need to do their work underground.

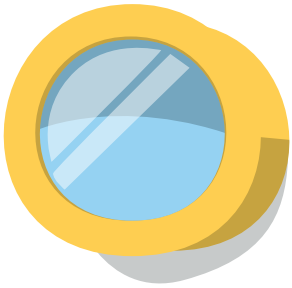
Q5: Can you spot Sven the Viking? He's controlling something with his computer. What do you think it is, and what's it for?

A: Sven is using his computer to control the robot to which the Zeb Revo has been attached - like a real life driving video game! The robot is rolling along in an underground cave, right beneath Sven's feet. Can you see the caterpillar treads on the robot? These help it traverse the rocky, loose, uneven surfaces of the cavity. It also helps that Sven is an experienced driver - although from the look on the dragon's face, it seems like he might just have trundled over its tail!

Q6: Can you find Captain Alice? What's she showing the mine surveyor?

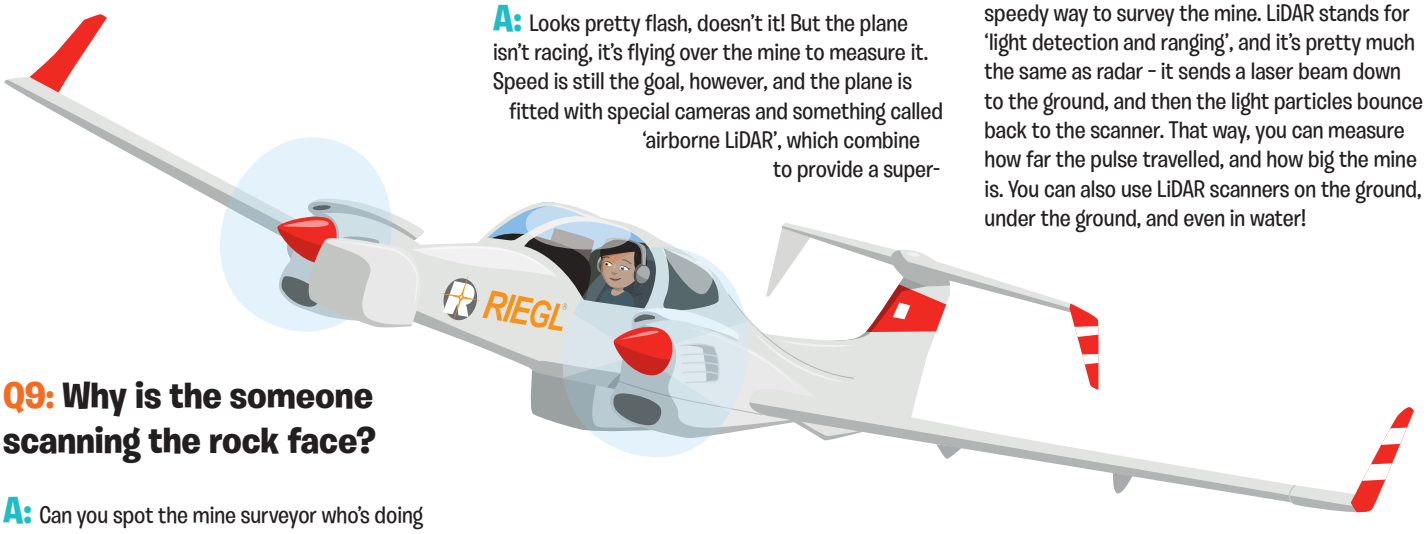
A: Captain Alice, with her tremendously fetching tricorn hat, is showing the mine surveyor a map of the mine that she has made. As a cartographer, Captain Alice is able to combine lots of different data to create a map which shows how big the mine is, and the exact location of everything inside it. It also shows who owns which bits of land, both inside and around the mine.

Q7: Can you count how many 'monitoring prisms' there are? What do you think they're for?



A: There are 9 prisms in this picture. Did you manage to find all of them? They're not that easy to see! They look like small, round mirrors, set into the walls of the mines. They act like targets, as well as reflective surfaces, bouncing back beams from survey equipment. The distance the beam has travelled is measured by the equipment, and then that number is halved in order to know how far the walls are from the point where the equipment was placed. By taking these measurements regularly, the mine walls can be monitored to see if any of the distances are changing. Sometimes mine walls can shift, and we need to know about that in case it means the mine is becoming unsafe. You can find out more here.

Q8: Open cast mines can be really huge, so using a plane can be the best way to map the site. How do you like this plane?



A: Looks pretty flash, doesn't it! But the plane isn't racing, it's flying over the mine to measure it. Speed is still the goal, however, and the plane is fitted with special cameras and something called 'airborne LiDAR', which combine to provide a super-speedy way to survey the mine. LiDAR stands for 'light detection and ranging', and it's pretty much the same as radar - it sends a laser beam down to the ground, and then the light particles bounce back to the scanner. That way, you can measure how far the pulse travelled, and how big the mine is. You can also use LiDAR scanners on the ground, under the ground, and even in water!

Q9: Why is the someone scanning the rock face?

A: Can you spot the mine surveyor who's doing this? He's just beside Robert (who is riding Buck, the brown horse). This particular mine surveyor is known as a 'blast engineer', pretty much the coolest job title in the world! He puts explosives down holes drilled into the rock face. However, he can't just go throwing in as much explosive as he pleases! If he uses too much, rocks will fly, which will be very dangerous. If he uses too little, he'll have to do it all again. So, this surveyor is relying on his blue and white laser scanner to measure the amount of rock between those holes and the face of the rock, in order to get his explosive quantities exactly right. Luckily for him, business is booming!

Q10: Can you find the engineers making stockpiles?

A: The two operators working the conveyor belt on the right are stockpiling rocks, although one of them is about to add her sandwich to the pile! In quarries, rocks that come out of the ground have to be sorted and put into stockpiles according to their size. The laser scanner on the conveyor is checking the sizes of the rocks to ensure they get delivered onto the right stockpile. In this quarry, there's one pile of small rocks, one pile of medium rocks, and one pile of big rocks, or boulders.