COULD YOU FALL THROUGH THE EARTH?

BY BILAL ALI DATE JANUARY 2017

Image from pixabay

The Earth's surface has many volcanoes and cracks where tectonic plates meet. What would happen (**theoretically**!) if a person fell through a crack in the surface of the Earth? If there was a hole the whole way through, could you fall through the Earth and end up on the other side?

In short, no. But scientists have been thinking about this question and have come up with an explanation.

One of the immediate problems is that Earth is made up of a lot of solid or **molten** rock, which is at a temperature hot enough to melt iron. This means it would not be possible to actually build a drill or machine that would be able to withstand these temperatures in order to drill a hole in the first place. But let's put this issue to one side and imagine that a hole just opened up naturally…

Falling through a hole in the Earth would be extremely hot and uncomfortable with all that molten rock, but scientists have also suggested that it would not be possible at all because of the forces involved.

When you started falling, you would accelerate due to gravity (remember that gravity attracts objects towards the centre of other objects, so you would be pulled towards the centre of the Earth). As you fell, you would build up more air resistance (combined with the friction from the walls of your tunnel) so your acceleration would decrease.

You would still be accelerating as you passed the centre of the Earth, but after that is where things get interesting. You would still be moving towards the other side of the Earth but once you are past the centre of the Earth (now technically moving 'upwards'!), gravity would start to act the other way, acting again towards the centre. Your speed wouldn't be enough to overcome the pull of gravity, so you would be pulled back towards the centre, again with the momentum that had built up being enough to take you past the centre. This process would repeat itself, causing you to **oscillate** until you eventually came to a stop at the very centre of the Earth.

Other scientists decided that if it was purely a theoretical question, then they could also make other **assumptions**. If the hole or tunnel was completely airless, there could be no air resistance, and completely smooth or lubricated to reduce the effects of friction. This would mean that your acceleration would be much greater and you might build up enough momentum to make it all the way through to the other side before gravity pulled you back in. Using this theory, combined with the diameter of the Earth, these scientists calculated that it could take just 19 minutes to get to the other side of the Earth. This would make international travel very quick indeed, but remember that this is just theoretical!

Physicists enjoy these sorts of **quandaries** or 'thought experiments', even though there is unlikely to be any actual experiment that comes of it.

Answer the following questions in full sentences:

1. What is this news story about?

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2. What assumptions did the scientists have to make in order for you to be able to get through the Earth?

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3. State and define any forces mentioned in this article.

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4. Explain how this article could be useful.

5. Write down the meanings of any words **in bold** in the article.