King Edward VI Camp Hill School for Girls

Maths Department Newsletter

1st February 2021

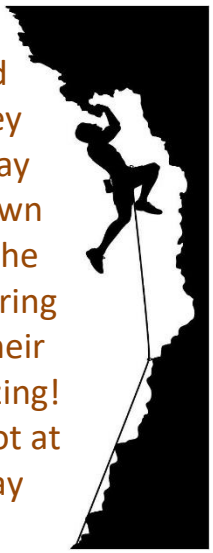
8 + 1 = 9 and 9 × 9 = 81

News

The theme for this week's newsletter is mountains. You may have seen in the news recently that a group of climbers from Nepal have become the first to climb to the top of K2 during winter. As you may know, K2 is the second highest mountain on earth, having a height of 8611 m. Mount Everest is the highest, at 8849 m. But, did you know that although Mount Everest is the highest mountain, it's not the tallest mountain? This is because there are three ways to measure the height of a mountain: from sea level to peak, from base to peak, or from the centre of the earth to its peak. The word 'highest' usually refers to height from sea level, whereas 'tallest' refers to the height from its base.[1] Like many things in maths, it's all about what you choose to call zero. Zero can mean many things. Sometimes it's fairly arbitrary, like when we measure temperature. Clearly zero degrees Celsius does not mean that an object has no heat! Zero can also sometimes be misleading. For example, lots of people think that on a number line, zero is in the middle, between the positive and negative numbers, but it's not. The number line is infinite, so it has no middle![2]

Classic Puzzle

There is a famous logic puzzle to do with a mountain climber. It goes like this:



A mountain climber climbs all day up a mountain path and arrives at the top where they camp overnight. The next day they begin their descent down the same path back down the mountain. At one point during the descent, they look at their watch and say, "This is amazing! I was at this exact same spot at exactly the same time of day yesterday on my way up."

The question is this:

What is the probability that, at some point during their descent, the climber will be at exactly the same spot at exactly the same time of day as they were the previous day on the way up the mountain?

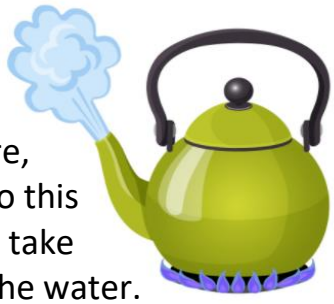
Joke

1. I don't know what word they use for the distance from the centre of the Earth. Maybe that's something for the Geography newsletter! Mauna Kea, in Hawaii, is the tallest mountain on Earth. Measured from its base below sea level to its peak, it is more than a quarter of a mile taller than Mount Everest!
2. Over the years, I have found that many students find this revelation shocking!

The Flag of Nepal

Did you know that Nepal is the only country to have a flag that isn't a rectangle? Instead, it is made out of two red triangles which represent the Himalayan mountains. This gets a mention by Sheldon in his podcast Fun With Flags.[3]

Did You Know?



If you were climbing a mountain and you wanted to know how high up you were, one way you could do this is to boil a kettle and take the temperature of the water. At sea level, water boils at 100 degrees Celsius, but for every 500 feet above sea level that you go, the boiling point of water decreases by approximately 0.5 °C. This is called a linear relationship, as you could plot this on a straight line graph.

Did You Know?

The highest mountain in the solar system is Olympus Mons on the planet Mars. It is more than three times as high as Mount Everest. I wonder who will be the first person to climb it?

Think about it...

If the temperature today up a mountain is 0 degrees Celsius, and tomorrow it is twice as cold, is it still 0 degrees Celsius?

Smaller or Lower?

What would you say if somebody asked you whether the number -5 was smaller than the number 2? You may say yes, and you may be right, but you may not be. It all depends on what you mean by smaller. -5 is definitely 'less than' 2, or 'lower than' 2, in that it's further down the number line than 2, but some people would argue that it's not a smaller number because 'smallness' is related to the size of the number and has nothing to do with whether the number is positive or negative. Therefore, the numbers -2 and 2 are the same size, and -5 and 5 are both the same size too and they are both bigger than -2 and 2. This does make a certain amount of sense because often, in practical applications, a negative value just means something like 'in the opposite direction'. So, for example, if you are calculating the size of a force and the solution to your equation tells you that it's -5 Newtons[4], this just means that it's a force of 5 Newtons that just happens to be in the opposite direction to the one you have decided to call positive. Nobody (I don't think) would want to argue that a solution of -10 meant you had a force that was smaller than, say, 2 Newtons. What do you think?

Anyway, I hope you are getting on well with working from home. See if you can solve the mountain puzzle before you google the answer! Bye for now!

3. Here's the video: https://www.youtube.com/watch?v=Xl12Sp1KiEk
4. Forces are measured in Newtons, named after Isaac Newton. 1 Newton of force is the force needed to accelerate 1 kilogram at a rate of 1 metre per second per second.