

Remove *yet to come* on 5<sup>th</sup> November lesson when this one is published.

18<sup>th</sup> September

Memory Verse

**Bless the LORD, O my soul,** and forget not all his benefits:

Who forgiveth all thine iniquities;

Who healeth all thy diseases;

Who redeemeth thy life from destruction;

Who crowneth thee with lovingkindness and tender mercies;

Psalms 103: 2-4

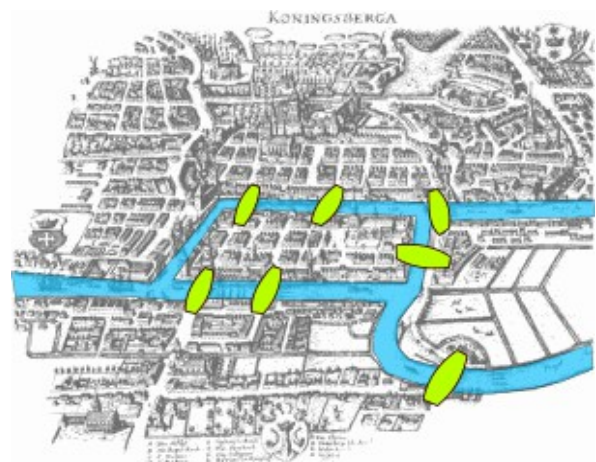
I have set out the verse above in a way that brings out a pattern that might help you memorize it. More about today's memory verse in lesson for 20<sup>th</sup> September.

Some puzzles in today's lesson. Some have solutions but the last one is still waiting for an answer!

A tricky problem to solve<sup>1</sup>

If you did the lesson about blacksmith Georg Israel and his friends last month<sup>2</sup> you might remember that they eventually found sanctuary in Königsberg the capital of Prussia, now called Kaliningrad and part of Russia. Today's lesson is about someone who lived in Königsberg later on.

You can see a map of old Königsberg on the right. The Pregolya River flowing through the town is highlighted in blue and the bridges across the river in green. You can see that the river divides Königsberg into four districts. The residents of the city used to amuse themselves by trying to take a walk through their city visiting each of the four districts of the town and crossing each of the bridges *only once*. No matter how hard they tried to find a route, the problem always baffled them. To cross *all* the bridges, one always had to cross at least one of the bridges twice – or leave one out.



It is not difficult to discover that this is the case by trial and error. You can chalk out the puzzle map on the ground and try walking round it to check if there is a way to solve it. Or if that is not possible draw it out on paper and trace routes with a pencil. More difficult, though, is to work out *why* this is so.

Leonhard Euler (1707-1783) was a Swiss mathematician, and a Bible believing Christian. He went to be with his Lord and master on 18<sup>th</sup> September 1783. He had just had lunch with his family and was discussing the newly discovered planet Uranus with a fellow mathematician and astronomer when he suddenly collapsed. Thus ended the earthly life of one of the greatest and most prolific

1 Image: By Bogdan Giușcă - Public domain (PD), based on the image, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=11292>

2 See the lesson for 24<sup>th</sup> August.

mathematicians of all time. It was he who had worked out the reason why such a route through Königsberg was impossible. In the process he opened the door to several branches of mathematics.

Euler lived during the so called “Enlightenment” in Europe, a period when philosophers were rejecting religion in general and the Bible in particular. In the Prussian capital his employer was Frederick the Great; at whose court the ideas of the philosopher Voltaire<sup>3</sup> held sway. Despite this uncongenial environment Euler stood firm for the inspiration and truth of the Bible. Voltaire taught that the existence of evil in the world proves that God cannot be all powerful. No, said Euler, God is omnipotent and he governs the universe. The universe is, he said:

... infinitely more worthy of the almighty Creator, who formed it. The government of this universe will, likewise, ever inspire us with the most sublime idea of the sovereign wisdom and goodness of God.

Euler wrote a whole book, *Defence of the Divine Revelation against the Objections of the Freethinkers*, about the divine inspiration of the Bible at a time when, just as today, the very idea that the Bible is the Word of God, was laughed at by people who considered themselves intelligent.

Euler spent much of his working life in the service of Frederick the Great of Prussia, and it was during that time that he was given the “The Seven Bridges of Königsberg” question (about which more below) to solve. However his views about the Bible as the inspired Word of God began to make life difficult for him.

If you did the lesson for May 7<sup>th</sup> you might remember that the composer Bach visited Frederick the Great's court in 1747 and it is possible that he met Euler. If so, the two men would have got on well. Not only were they both great geniuses but both were opposed to Enlightenment ideas that surrounded them because of their Christian faith. Euler himself wrote a book about musical theory and both he and Bach were members of a learned society called the *Corresponding Society of the Musical Sciences* to which Euler had contributed a paper.

As we saw in May, Bach, by his music alone, had left Frederick the Great and Voltaire sneering politely at his old fashioned “party trick” of improvisation. But Euler was able openly to oppose the ideas of Voltaire and the other Enlightenment philosophers, defending the God of the Bible in writing.

Frederick the Great, his royal employer, certainly did not agree with him and he also did not like to see his favourite philosopher, Voltaire, so strongly contradicted by someone with an obviously great intellect. He rather unkindly began to call Euler “my Cyclops”<sup>4</sup>– for reasons which will be obvious if you look at Euler's portrait closely. As with Bach (a musician not a philosopher), Frederick was able excuse his disregard for the mathematician Euler's views in the realm of philosophy by branding them as being in an area outside Euler's field of competence.

As it happened, however, Euler, even with his impaired physical vision, was more clear-sighted than Voltaire and in the end the loss was Frederick's. Euler decided to seek work elsewhere and found a more congenial post in Russia. Here he worked on under the patronage of a ruler eager for the advancement of science in her domains and here he continued to make fundamental discoveries in mathematics.

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3 See the lesson for 30<sup>th</sup> May.

4 Mythical one-eyed monster.

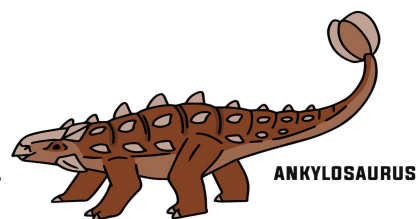
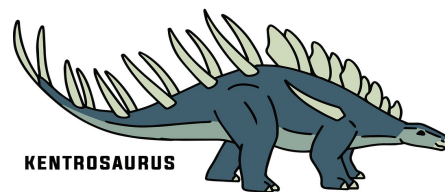
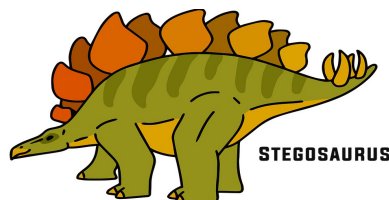
And the bridges of Königsberg? Euler used mathematics to arrive at his conclusion. I have highlighted the mathematical terms that he used instead of “bridge” and so on in the explanation that follows. These terms help to make the problem more general rather than being just about bridges and landmasses. It will help if you draw out the problem using dots instead of land masses and lines between the dots instead of bridges.

It is the number of bridges (edges, lines) that converge on each land mass (vertex, dot) that is the key to the problem. Some vertices have an even number of edges converging on them: these are called vertices of even degree. Some have an odd number (called vertices of odd degree). To be able to take the Königsberg walk the number of vertices of odd degree must be 0 or 2.

What Euler worked out was a rule that would apply to any set of land masses and bridges not just those of Königsberg. It had many other applications as well.<sup>5</sup>

### A dinosaur puzzle solved<sup>6</sup>

We have come across dinosaurs in these lessons many times.<sup>7</sup> The remains of these fascinating extinct creatures, some huge and some small are found all over the world. Of particular interest when looking at fossil dinosaurs is the question of how they died. For some time it had been noticed that when fossilised armoured dinosaurs were found they were often upside down. How strange! Why was that? Canadian Palaeobiologist Jordan Mallon decided to investigate. He looked at all the available armoured dinosaur fossils available to him in Canada and found that 70% had been found upside down. He published solution to the puzzle on 18<sup>th</sup> September 2017. Dr Mallon and his colleagues investigated using a computer model and came to an interesting conclusion: these dinosaurs had been in water when they died. Their bodies had swollen as they decomposed and floated in the water. Top heavy with their armoured backs; they flipped over before being fossilised. This ties in perfectly with what we know from the Bible. These magnificent creatures perished in a world wide flood.



For more about dinosaur fossil poses and what they mean see the lesson coming up on 5<sup>th</sup> November.

### An unsolved puzzle from ancient Rome



On 18<sup>th</sup> September AD96 the Roman Emperor Domitian<sup>8</sup> met his end. Like a large number of other Roman emperors he was assassinated. Here is how the Roman historian Suetonius (c.69-c.122AD) describes his downfall. At the start of the story, Domitian is concerned about a prophecy of when and how he will die:

As the time when he anticipated danger drew near, becoming still more anxious every day, he lined the walls of the colonnades in which he used to walk with phengite stone, to be able to see in its brilliant surface the

5 If you would like to delve into the explanation: <https://www.mathsisfun.com/activity/seven-bridges-konigsberg.html> is good.

6 Information from <https://www.youtube.com/watch?v=w19jCJeCvtU> and other sources.

7 See the lessons for February 20<sup>th</sup>, April 23<sup>rd</sup> and August 21<sup>st</sup> for instance.

8 Image: By Rasiel Suarez - Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?>



reflection of all that went on behind his back. And he did not give a hearing to any prisoners except in private and alone, even holding their chains in his hands....

Finally he put to death his own cousin Flavius Clemens, suddenly and on a very slight suspicion, almost before the end of his **consulship**; and yet Flavius was a man of most contemptible laziness and Domitian had besides openly named his sons, who were then very young, as his successors, changing their former names and calling the one Vespasian and the other Domitian. And it was by this deed in particular that he hastened his own destruction.

For eight successive months so many strokes of lightning occurred and were reported, that at last he cried: "Well, let him now strike whom he will." The temple of Jupiter on the **Capitol** was struck and that of the Flavian family, as well as the Palace and the emperor's own bedroom. The inscription too on the base of a triumphal statue of his was torn off in a violent tempest and fell upon a neighbouring tomb....

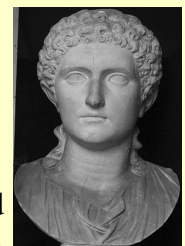
**Fortune of Praeneste**<sup>9</sup> had throughout his whole reign, when he commended the new year to her protection, given him a favourable omen and always in the same words. Now at last she returned a most direful one, not without the mention of bloodshed....



The day before he was killed he gave orders to have some apples which were offered him kept until the following day, and added: "If only I am spared to eat them"; then turning to his companions, he declared that on the following day the moon would be stained with blood in Aquarius, and that a deed would be done of which men would talk all over the world. At about midnight he was so terrified that he leaped from his bed.

The next morning he conducted the trial of a soothsayer sent from Germany, who when consulted about the lightning strokes had foretold a change of rulers, and condemned him to death.... Then he asked the time, and by pre-arrangement the sixth hour was announced to him, instead of the fifth, which he feared. Filled with joy at this, and believing all danger now past, he was hastening to the bath, when his chamberlain Parthenius changed his purpose by announcing that someone had called about a matter of great moment and would not be put off. Then he dismissed all his attendants and went to his bedroom, where he was slain.

Concerning the nature of the plot and the manner of his death, this is about all that became known. As the conspirators were deliberating when and how to attack him, whether at the bath or at dinner, Stephanus, Domitilla's<sup>10</sup> steward, at the time under accusation for **embezzlement**, offered his aid and counsel. To avoid suspicion, he wrapped up his left arm in woollen bandages for some days, pretending that he had injured it, and concealed in them a dagger. Then pretending to betray a conspiracy and for that reason being given an audience, he stabbed the emperor in the groin as he was



reading a paper which the assassin handed him, and stood in a state of amazement. As the wounded prince attempted to resist, he was slain with seven wounds by Clodianus, a **subaltern**, Maximus, a freedman of Parthenius, Satur, **decurion** of the chamberlains, and a gladiator from the imperial school.

A boy who was engaged in his usual duty of attending to the **Lares**<sup>11</sup> in the bedroom, and so was a witness of the murder, gave this additional information. He was bidden by Domitian, immediately after he was dealt the first blow, to hand him the dagger hidden under his pillow and to call

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9 Image: Camelia.boban - Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=18356473>

10 Wife of Domitian. Image: By DK-National Aggregation Service - [https://www.omnia.ie/index.php?navigation\\_function=2&navigation\\_item=%2F2020903%2FKAS289&repid=1](https://www.omnia.ie/index.php?navigation_function=2&navigation_item=%2F2020903%2FKAS289&repid=1), CC0, <https://commons.wikimedia.org/w/index.php?curid=110726603>

11 Image: CC BY-SA 2.5, <https://commons.wikimedia.org/w/index.php?curid=74772144>

the servants; but he found nothing at the head of the bed save the hilt, and besides all the doors were closed. Meanwhile the emperor grappled with Stephanus and bore him to the ground, where they struggled for a long time, Domitian trying now to wrest the dagger from his assailant's hands....

The people received the news of his death with indifference, but the soldiers were greatly grieved and at once attempted to call him the **Deified** Domitian; while they were prepared also to avenge him, had they not lacked leaders. This, however, they did accomplish a little later by most insistently demanding the execution of his murderers. The senators on the contrary were so overjoyed, that they raced to fill the House, where they did not refrain from assailing the dead emperor with the most insulting and stinging kind of outcries. They even had ladders brought and his shields and images torn down before their eyes and dashed upon the ground; finally they passed a decree that his inscriptions should everywhere be erased, and all record of him obliterated....

If you read popular church history books you will often find Domitian described as the most terrible persecutor of Christians of all the Roman Emperors.<sup>12</sup> No doubt he was hated by the Roman Senate as he promoted members of the *Equites* on merit passing over the Senators who were a superior rank in society. "How delightful it was, to smash to pieces those arrogant faces, to raise our swords against them, to cut them ferociously with our axes, as if blood and pain would follow our blows." wrote Pliny gleefully describing what was known as the *Damnatio memoriae* in which the senators smashed all reminders of Domitian's greatness as we read above. But it is hard to discover now whether or not Domitian's reputation as a relentless persecutor of *Christians* is justified. Some modern historians cite the fact that contemporary secular historical sources which mention Nero's earlier persecution of Christians do *not* mention Domitian's. This is very strange if Domitian was really a fierce persecutor. Nevertheless, from Eusebius (c.265-339) onwards, who cited earlier writers whose works are now lost, Domitian *is* portrayed as a persecutor of great cruelty who was responsible for the banishment of the Apostle John to the Isle of Patmos. If he was not a particularly fierce persecutor why did this reputation grow up? Will the puzzle ever be solved?

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12 A good example is <https://www.windowintothebible.com/the-emperor-domitian>.