



# CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

<b>Name(s)</b>  <b>James Glenny</b>	<b>Project Number</b>  <b>J1212</b>
<b>Project Title</b>  <b>The Vitruvian Kid: A Study of Mathematical Relationships in the Human Body</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives</b> During the Renaissance, Leonardo da Vinci studied "de Architectura," by Vitruvius, seeking out ways to perfect his art, at which time he created one of his most famous drawings, The Vitruvian Man. Da Vinci, as an artist and even scientist worked to perfect human bodies in his work and used what is known as The Golden Ratio or The Divine Proportion. I studied these ratios and wondered, Could there be perfect human body ratios for kids? I used da Vinci's research largely to set an expected adult outcome. With consent of parents, I gathered kids ages 7-17 of both genders and recorded body measurements such as the circumference of the neck, wrist, head and waist. I also recorded the length of the arm span, height of the person, and a few other parts. Setting da Vinci's adult human body ratios as the expectation, I hypothesized that the majority of kids' body ratios would meet the expectations of the adult Golden Ratio. I was correct as I discovered that children's bodies ages, 7-17 do meet many of the ratios of an adult body and therefore grow proportionally with time. Males most closely matched the Golden Ratio that da Vinci obsessed over, as expected, since the historic research is male based. I did make some new discoveries that younger children, ages 7-12, have a few unique body ratios of their own, not liken to adult ratios, and were consistent to one another within their age group. This experiment has implications for art, health and explaining unconscious beauty. "The Vitruvian Man" was drawn over 500 years ago. The human diet and physical activity levels have changed dramatically, yet body ratios remain nearly the same. Taking simple measurements of children is a simple health diagnostic tool and could aide in medication management if understood further. Interestingly, 500 years later we still have an unconscious attraction to certain body types and symmetry. Understanding ratios of children can also be used for economic gain in marketing products. Lastly, art benefits from understanding children's ratios. During da Vinci's time, many pictures of children looked more like miniature adults instead of children.</p> <p><b>Methods</b> Materials I used included a measuring tape, a seamstress measuring tape, a pencil, a recording sheet and children volunteers, ages 7-17 with parent consent.</p> <p><b>Results</b> Every gender and age (7-17) had a arm span:height ratio approximately 1:1. Children had neck circumference: waist circumference , wrist circumference: head circumference, and wrist circumference: waist circumference ratios, with a 25% variance compared to standard expectations. Lastly, females, 13-17 had the largest difference in ratios to the standard v males 13-17.</p>	
<b>Summary Statement</b>  The Vitruvian Kid is a mathematical study of human body ratios in children for health, art and economic benefit.	
<b>Help Received</b>  I designed the experiment myself and completed the measurements of my subjects on my own. I had help from my dad in setting up formulas under Excel for calculating my results.	