UNIVERSITY OF WATERLOO

Faculty of Mathematics
Waterloo, Ontario N2L, 3G1

Centre for Education in
Mathematics and Computing

Grade 6 Math Circles

Wednesday, February 17, 2021

The Golden Ratio - Problem Set

1. What is the simplest form of the ratio 169:221?

2. Express the following ratios as fractions in simplest form.

   (a) 3:4
   (b) 44:20
   (c) 10:9
   (d) 16:18
   (e) 60:105
   (f) 36:24

3. Sparky Tech's new phone charger gives 8 hours of power for every hour and a half of charging. What is the ratio of hours of charging to hours of power? (Hint: Recall that the quantities in ratios are represented using whole numbers)

4. A parking lot has four cars to every van.

   (a) Represent the number of cars to the number of vans as a ratio and as a fraction.
   (b) If there are 160 cars, how many vehicles are there in total? Find the ratio of vans to total vehicles in the parking lot.
   (c) What fraction of the vehicles in part b are cars? How does this fraction differ from the fraction you got in part a?

5. In a vending machine, the ratio of chocolate bars to packets of gum is 2:5 and the ratio of packets of gum to energy drinks is 4:1. What is the ratio of chocolate bars to energy drinks?

6. Geckos are colourful lizards with four legs and five toes on each of their feet. In one cage of geckos, you can only see their legs. You count 72 legs. How many toes do the geckos have in total?

7. Jay's hockey team won a trophy and as a treat, her coach brought nine boxes of TimBits.

(a) If there are three chocolate TimBits in every box of twenty TimBits, how many chocolate TimBits are there in total?

(b) What is the ratio of chocolate TimBits to total TimBits in every box? What is the ratio of total chocolate TimBits to total TimBits in all nine boxes? Simplify, if possible.

(c) What do you notice about your answer to part (b)?

(d) Anastasia is on the team too and only likes honey curlers. She goes through all the boxes and eats only the honey curler TimBits. If she eats 18 TimBits in total, how many honey curlers were in each box?

(e) Using your observation from part (c), state the ratio of total honey curlers to total TimBits in all nine boxes, in simplest form

8. A television channel plays advertisements for 1 minute at 5-minute intervals. How many minutes of advertisement are there during a 1-hour show?

9. Coco's Grocery Store sells bags of chocolate chips for \$1.10. If each bag is 550 grams, what is the unit rate of grams of chocolate chips per cent?

10. Find out the measurements of Leonardo da Vinci's most famous painting, the Mona Lisa. Is the Mona Lisa in the Golden Ratio?

11. The base of a triangle is 10 cm. If the ratio of the base to the height of the triangle satisfies the Golden Ratio, what is the height of the triangle?

12. Start with a stick that is 50 cm long. How would you break the stick into two parts such that the ratio between the two portions is the same as the ratio between the whole stick and the larger segment i.e. the pieces are in golden ratio?

13. Sam creates a sequence that uses the same rule as the Fibonacci Sequence except the first two terms in his sequence are $3, 4$. Find the next 5 terms of the sequence.

14. Use the first three terms of the Fibonacci Sequence to create a new sequence where the next number in the sequence is found by adding the previous three numbers. For example, $0 + 1 + 1 = 2$ so the fourth number in this sequence is 2. Calculate the next 5 terms of this sequence.