

1. Explain why a ratio of integers must have a repeating or terminating decimal and then express  $\frac{17}{19}$  as a repeating or terminating decimal.
2. Draw a pentagon and a hexagon. Define the terms “concave”, “isosceles”, and “polygon”.
3. Give an example where inductive reasoning doesn't work.
4. Think of a number. Multiply it by 2. Add 2. Divide by 2. Subtract 1. Explain.
5. Explain how a numberline model with a car handles  $5 - 3$  and  $7 - (-2)$ .
6. Explain why the commutative law of multiplication holds using areas of rectangles.
7. A student says that  $39 + 51 = 40 + 50$  and concludes that  $39 \cdot 51 = 40 \cdot 50$ . How will you handle that ?
8. Use a Venn diagram to determine if the following is valid:
  - . College classes are always a lot of fun.
  - Math 201 is a college class.
  - Therefore, Math 201 is always a lot of fun.
9. Explain why we study the arithmetic of other bases in this class. Then show how to add  $273_8 + 765_8$  working only in base 8.
10. Use patterns to show how to compute  $9 + (-2)$ .
11. Explain why multiplication by 5 can be done by dividing by 2 and then moving the decimal place.
12. For what values of the digit  $a$  is the integer  $92145341679532a$  divisible by 3.
13. What is a prime number. Show how to use the Sieve of Eratosthenes to find all primes less than 100. Suppose you just wanted to test whether or not 397 is prime by looking for factors. At what point should you stop looking for factors ? Why are primes and factorings and related concepts important to the average person (without them knowing usually) ?
14. Describe what you get if you take a rectangular piece of paper and glue two opposite sides together with a twist. What is that object called. Describe some interesting and perhaps surprising properties it has.
15. Suppose you are transported back in time and find yourself in a prisoner of war camp. Explain how you would use similar triangles to estimate how far you would have to dig an escape tunnel.
16. Use the Euclidean algorithm to find the g.c.d. of 8532 and 3876.
17. Xavier Roundhead wears a size 8 hat. Assuming that corresponds to his head's diameter, find the circumference of his head.
18. A sale item is priced at \$120 and is described as 25% off. What do you think the original price was and why ? If the store's description is incorrect, what should they have said ?
19. Without using decimals, find a model that can be used to compare  $\frac{1}{5}$  and  $\frac{1}{7}$  ? What about  $\frac{2}{5}$  and  $\frac{3}{8}$  ?
20. Find the l.c.m. of 12 and 32. Show it using lists of multiples.
21. Working modulo 12, compute  $7 + 9 + 4 + 7 + 11$  and  $8 \cdot 3$ . What common object can be used to understand these problems ? Historically, ancient people ended up using base 12 for time (and 60 which is five 12's). It is believed that counting with a certain part of the hand led to this. Explain.
22. Explain some methods that can be used for quick arithmetic, such as for computing a tip, or multiplying by 4 or estimating a sum of numbers.
23. Why can't you divide by zero ?
24. Give a model that explains why  $\frac{1}{3}$  equals  $\frac{2}{6}$ .
25. Review all the homework, all the quizzes, the previous review sheets, the previous exams, and your notes from class. Then review everything else.