

1. Find the 19th odd integer.
2. Without adding all the terms up by hand, compute the sum  $2 + 4 + 6 + 8 + \dots + 300$ .
3. Give an example where inductive reasoning doesn't work.
4. How many *nonempty* subsets does the set  $B = \{\emptyset, a, 12\}$  have ?
5. How many 1:1 correspondences are there from  $\{1, 2, 3\}$  to  $\{a, b, c\}$ . Make up a tree diagram showing them.
6. Think of a number. Multiply it by 2. Add 2. Divide by 2. Subtract 1. Explain the trick and why it works.
7. Draw a Venn diagram showing two nonempty sets  $A$  and  $B$  for which  $A \cup B = A$ .
8. Suppose  $A = \{1, 2, 9\}$  and  $B = \{a, 2\}$ . Find  $A \times B$ .
9. Suppose  $f(x) = 3x + 1$  and the domain is  $\{-3, 2, 5\}$ . Describe  $f(x)$  using two sets with directed arrows and as a collection of ordered pairs.
10. Use a truth table to determine when if ever the formula  $p \rightarrow \neg q$  is true ?
13. Write the contrapositive of the statement "if I am hungry then I will eat".
14. Find the cardinality of the set  $\{x \mid x = i - j, \text{ where } i, j \in \{1, 2, 3\}\}$
15. Using flats, longs and units explain how to compute  $625_7 - 46_7$  in base 7.
16. Suppose  $f(x) = 2x - 3$  and  $g(x) = x^2$ . Draw a black box diagram for the composite function  $g \circ f(x)$  and compute its value when  $x = 5$ .
17. Use a Venn diagram to determine if the following is valid:  
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18. Use a numberline model to describe  $6 - 2$ .
19. Use both a partition model and repeated subtractions to describe  $14 \div 5$
20. Express the decimal number 43 in base 5 and in binary.
21. Explain how to add  $243_8 + 756_8$  working only in base 8.
22. Explain why division by zero isn't allowed, using an appropriate model.
23. Explain why the commutative law of multiplication holds using areas of rectangles.
24. What do you call the property that says  $5 \cdot (2 + 4) = (5 \cdot 2) + (5 \cdot 4)$  and how would you explain it using a model ?
25. Explain why we study arithmetic in other bases in this class.
26. Consider the relation "is at least as tall as" on the set of people in the room. Is it reflexive, symmetric and/or transitive ?
27. Review all the homework, all the quizzes, and your notes from class.