

4.E: Tree Diagrams and the Multiplication Axiom (Optional Exercises)

Do the following problems using a tree diagram or the multiplication axiom.

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| 1. A man has 3 shirts, and 2 pairs of pants. Use a tree diagram to determine the number of possible outfits. | 2. In a city election, there are 2 candidates for mayor, and 3 for supervisor. Use a tree diagram to find the number of ways to fill the two offices. |
| 3. There are 4 roads from Town A to Town B, 2 roads from Town B to Town C. Use a tree diagram to find the number of ways one can travel from Town A to Town C. | 4. Brown Home Construction offers a selection of 3 floor plans, 2 roof types, and 2 exterior wall types. Use a tree diagram to determine the number of possible homes available. |
| 5. For lunch, a small restaurant offers 2 types of soups, three kinds of sandwiches, and two types of soft drinks. Use a tree diagram to determine the number of possible meals consisting of a soup, sandwich, and a soft drink. | 6. A California license plate consists of a number from 1 to 5, then three letters followed by three digits. How many such plates are possible? |

Do the following problems using the Multiplication Axiom

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| 7. A license plate consists of three letters followed by three digits. How many license plates are possible if no letter may be repeated? | 8. How many different 4-letter radio station call letters can be made if the first letter must be K or W and no letters can be repeated? |
| 9. How many seven-digit telephone numbers are possible if the first two digits cannot be ones or zeros? | 10. How many 3-letter word sequences can be formed using the letters {a, b, c, d} if no letter is to be repeated? |

Use a tree diagram for questions 11 and 12:

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| 11. A family has two children, use a tree diagram to determine all four possibilities of outcomes by gender. | 12. A coin is tossed three times and the sequence of heads and tails is recorded. Use a tree diagram to list all the possible outcomes. |
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Do the following problems using the Multiplication Axiom

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| 13. In how many ways can a 4-question true-false test be answered? | 14. In how many ways can three people be arranged to stand in a straight line? |
| 15. A combination lock is opened by first turning to the left, then to the right, and then to the left again. If there are 30 digits on the dial, how many possible combinations are there? | 16. How many different answers are possible for a multiple-choice test with 10 questions and five possible answers for each question? |
| 17. In the past, a college required students to use a 4 digit PIN (Personal Identification Number) as their password for its registration system. How many different PINs are possible if each must have 4 digits with no restrictions on selection or arrangement of the digits used? | 18. The college decided that a more secure password system is needed. New passwords must have 3 numerical digits followed by 6 letters. There are no restrictions on the selection of the numerical digits. However, the letters I and O are not permitted. How many different passwords are possible? |

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