AIM: How do we make tree diagrams and lists to show sample space?

Example:
For your birthday you can have a chocolate cake, vanilla cake or lemon cake. You can have chocolate or vanilla frosting.

List all the different cake with frosting possibilities:

\[ \{ (c,c), (l,v), (l,c), \\ c,v), (v,c), (v,v) \} \]

1. How many different cake/frosting possibilities are there? 6

2. What's the probability that you will pick a chocolate cake with vanilla frosting? \[ P(c,v) = \frac{1}{6} \]

Helpful Hints:
1. Think of each "stage" as an activity that is being done.
2. Put a heading for each "activity."
3. Pretend you are doing the activity, and think about the possible outcomes you can get. Write these below each heading.
4. Don't forget to list the sample space...the end results!

The tree diagram is an important way of organizing and visualizing outcomes.
The tree diagram is a particularly useful device when the experiment can be thought of as occurring in stages.

Now, Let's make a tree diagram for the "cake" problem!

What's the probability that you will pick a cake with chocolate frosting? \[ P(\text{choc frosting}) = \frac{3}{6} \]

How many possible cakes can be made? 6
Travel  Aimee wants to pack enough items to create 6 different outfits. She packs 1 jacket, 3 shirts, and 2 pairs of jeans. Can Aimee create 6 different outfits from her clothing items?

1. Complete the table below.

<table>
<thead>
<tr>
<th>Outfit</th>
<th>Clothing Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>jacket, shirt 1, jeans 1</td>
</tr>
<tr>
<td>2</td>
<td>jacket, shirt 1, jeans 2</td>
</tr>
<tr>
<td>3</td>
<td>jacket, shirt 2, jeans 1</td>
</tr>
<tr>
<td>4</td>
<td>jacket, shirt 2</td>
</tr>
<tr>
<td>5</td>
<td>jacket, shirt 3</td>
</tr>
<tr>
<td>6</td>
<td>jacket</td>
</tr>
</tbody>
</table>

2. The table is an example of an organized list. What is another way to show the different outfits that Aimee can create?

3. The three students chosen to represent Mr. Balderick’s class in a school assembly are shown. All three of them need to sit in a row on the stage.

   Use a tree diagram to find the sample space for the different ways they can sit in a row.

   A) How many different possible sitting arrangements are there? 6

   B) What's the probability that Adrienne will sit next to Greg?

   \[ \text{P(C next to A)} = \frac{4}{6} \]
4. A car can be purchased in blue, silver, red, or purple. It also comes as a convertible or hardtop. Use a tree diagram to find the sample space for the different styles in which the car can be purchased.

A) How many different possible car models are there?

B) What's the probability that Mr. Desantis will purchase a blue car?
5. A coin is tossed twice and a die is rolled once. Construct a tree diagram for this situation.

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  Die  coin 1  coin 2
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*How many different outcomes are there? _____*

*What's the probability that you get an even number and two heads? _____*

6. Mike has a red, green, blue, and brown shirt and either jeans or khaki pants. Construct a tree diagram that shows all the possibilities of making an outfit that has one pair of pants and one shirt.

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  shirt
  r    g    bl   br
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*How many outcomes will have a blue or green shirt with jeans? _____*

*What's the probability of picking an outfit that is a pair of jeans with either a blue or green shirt?*

*Answer: __________*