At the amusement park they sell 8 different kinds of t-shirts.

How many ways can you pick at least 6 different shirts to buy?

at least 6 means six or more.... 6 or 7 or 8

$$_8C_6 + {}_8C_7 + {}_8C_8$$

$$= 28 + 8 + 1 = \boxed{37}$$

Pascal's Triangle

```
                    1
                  1   1
                1   2   1
              1   3   3   1
            1   4   6   4   1
          1   5  10  10   5   1
        1   6  15  20  15   6   1
      1   7  21  35  35  21   7   1
    1   8  28  56  70  56  28   8   1
```

Rows and Diagonals

```
              1
            1   1
          1   2   1
        1   3   3   1
  1   4   6   4   1  → Row
      1   5  10  10   5   1
    1   6  15  20  15   6   1
  1   7  21  35  35  21   7   1
```

Diagonal

Pascal's Triangle
Rows and Diagonals

Diagonal 0 Diagonal 1 Diagonal 2 Diagonal 3 Diagonal 4

Row 0: 1
Row 1: 1   1
Row 2: 1   2   1
Row 3: 1   3   3   1
Row 4: 1   4   6   4   1
1   5   10   10   5   1
1   6   15   20   15   6   1
1   7   21   35   35   21   7   1
1   8   28   56   70   56   28   8   1
1   9   36   84   126   126   84   36   9   1
1   10   45   120   210   252   210   120   45   10   1

Panel 1

Use a calculator to find each.

$$_5C_2 = 10$$

$$_4C_3 = 4$$

$$_6C_4 = 15$$

$$_8C_5 = 56$$

Panel 2

Pascal's Triangle

$_5C_2 = 10$
$_4C_3 = 4$
$_6C_4 = 15$
$_8C_5 = 56$

Row 0   1
Row 1   1   1
Row 2   1   2   1
Row 3   1   3   3   1
Row 4   1   4   6   4   1
1   5   10   10   5   1
1   6   15   20   15   6   1
1   7   21   35   35   21   7   1
1   8   28   56   70   56   28   8   1

Diagonal 0
Diagonal 1
Diagonal 2
Diagonal 3
Diagonal 4
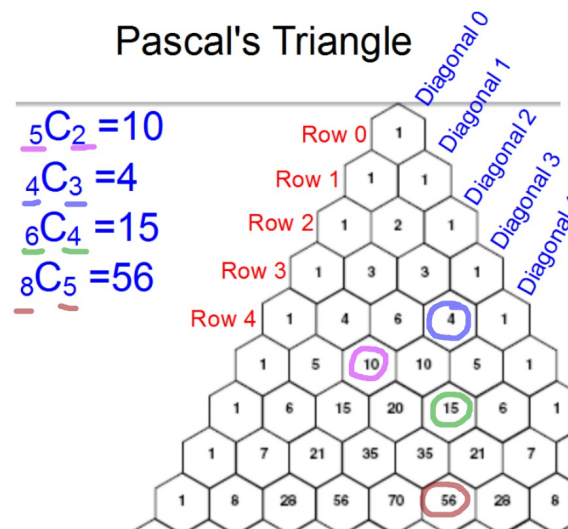
$_nC_r$

Row   Diagonal

Combinations can be found using Pascal's Triangle.

Panel 3

Section 1-6: Probability

2 kinds of probability

Experimental Probability

Using the results of an experiment to predict future outcomes.

$$= \frac{\text{\# times an event occurs}}{\text{Total \# of trials}}$$

Theoretical Probability

Using knowledge of a situation to predict future outcomes.

$$= \frac{\text{\# of favorable outcomes}}{\text{Total possible outcomes}}$$

Sample space

Panel 4

Sample Space:

The set of all possible outcomes

In a probability question the Sample Space will be the denominator of the answer.

Panel 1 (top left)

Is this Experimental or Theoretical Probability?   Theoretical, you are not actually going to spin this.

You will spin this spinner once. Find each probability as a fraction.

1. P(Factor of 12) = $\frac{5}{8}$

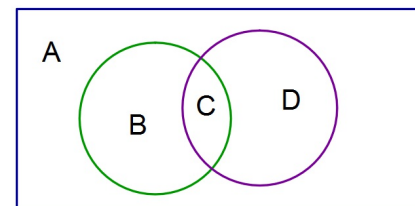2. P(multiple of 3) = $\frac{2}{8}$

3. P(Prime #) = $\frac{4}{8}$

4. P(Red or Blue) = $\frac{6}{8}$

5. P(Blue and Mult of 4) = $\frac{2}{8}$

6. P(Prime # or Blue) = $\frac{7}{8}$

Panel 2 (top right)

Venn Diagram   Shows the relationship between several groups.

Panel 3 (bottom left)

Is this Experimental or Theoretical Probability?   Experimental. You had to conduct a survey and record the results in order to create this Venn Diagram.

The Venn Diagram below shows after school activities that students belong to.
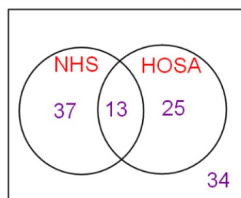
You will select a student at random, find each probability as a fraction.

Total = 37 + 13 + 25 + 34 = 109

1. P(NHS but not HOSA) = $\frac{37}{109}$

2. P(Neither HOSA nor NHS) = $\frac{34}{109}$

3. P(HOSA and NHS) = $\frac{13}{109}$

4. P(not NHS) = $\frac{59}{109}$

Panel 4 (bottom right)

Is this Experimental or Theoretical Probability?   Experimental. You had to conduct a survey and record the results in order to create this table.

A survey of people's favorite fruit was conducted. The results are shown below.

	Apple	Pear	Orange	Banana	Total
Male	73	64	80	51	268
Female	68	75	83	56	282
Total	141	139	163	107	550

1. P(Apple) = $\frac{141}{550}$

2. P(Banana or Orange) = $\frac{270}{550}$ ← 163 + 107

3. P(Female and Pear)

   = $\frac{75}{550}$ 75 people are both female and like pears.

4. P(Male or Apple)

   = $\frac{336}{550}$ → 336 = 268 males plus 68 females who like apples

   or

   336 = 268 males + 141 who like apples - 73 you just counted twice.

5. If 75 more people are surveyed approximately how many of them will say that Banana is their favorite?

   $\frac{107}{550} = \frac{x}{75}$ $x \approx 15$