Probability & Data Analysis

Unit 8

Find the Measures of Central Tendency

- **Mean**: Average
- **Median**: Middle
  - (when arranged least to greatest)
- **Mode**: Most Frequent
- **Range**: Maximum – Minimum

Test Scores:

$$\frac{90+91}{2} = Median$$

- 75, 80, 85, 88, 89, 90, 91, 92, 95, 95, 98, 99

- Mean: $\frac{1077}{12} = 89.75$
- Median $= 90.5$
- Mode: 95
- Range: $99 - 75 = 24$

Find the measures of Central Tendency

Joey Chestnut Hot Dogs at Coney Island

- 2005: **32**
- 2006: **52**
- 2007: **66***
- 2008: **59***
- 2009: **68***
- 2010: **54***
- 2011: **62***
- 2012: **68***
- 2013: **69***
- 2014: **61***
- 2015: **60**
- 2016: **70***
- 2017: **72***
- 2018: **74***

Mean: 61.9286
Median: 64
Mode: 68
Range: 42

Batting Averages of the 2018 Phillies Starters

- Alfaro - .**262**
- Santana - .**229**
- Hernandez - .**253**
- Kingery - .**226**
- Franco - .**270**
- Hoskins - .**246**
- Herrera - .**255**
- Williams - .**256**

Mean: $\frac{1.997}{8}$ = .250

.226
.229
.246
.253
.255 → Median: .254
.256
.262
.270

Mode: none
Range: .044

2009: Competition reduced from 12 to 10 mins.
*: won competition

$$\frac{135 + 120 + 155 + 185 + x}{5} = 162$$

$$135 + 120 + 155 + 185 + x = 810$$

$$595 + x = 810$$

Find the Missing Data

- The following athletes lifted the following weights in the bench press: 135, 120, 155, and 185. If the average weight lifted is 162, what was the fifth athlete's bench press weight? **215 lb.**

$$\frac{66 + 68 + 70 + 71 + 72 + 73 + 75 + x}{8} = 70.875$$

$$495 + x = 567$$

$$\boxed{x = 72}$$

- The scores for a few golfers at the Master's Tournament were: 66, 68, 70, 71, 72, 73, and 75. If the average score was a 70.875, what was the score of the last golfer?

Two-Way Tables

	Math	Science	English	Social Studies	TOTAL
Freshmen	(35)	33	50	48	166
Sophomores	(42)	40	45	45	172
Juniors	(51)	48	30	42	171
Seniors	(65)	(60)	(38)	(30)	(193)
TOTAL	193	181	163	165	702

- What percent of student body were seniors or math favorite?

$$\frac{193 + 193 - 65}{702} = \frac{321}{702} = 45.73\%$$

- What percent of the student body were freshmen who picked math? $\frac{35}{702}$

$$= 4.99\%$$

- What percent of sophomores picked science? $\frac{40}{172} = 23.26\%$

- What percent of juniors picked social studies? $\frac{42}{171} = 24.56\%$

- What percent of upper classmen selected English? $\frac{68}{364} = 18.68\%$

- What percent of the seniors picked English or social studies? $\frac{68}{193} = 35.23\%$

- What percent of the student body picked math? $\frac{193}{702} = 27.49\%$

Two-Way Tables

	Liberal	Moderate	Conservative	TOTAL
Female	35	36	6	77
Male	50	44	21	115
TOTAL	85	80	27	192

- What percent of people are male given that they are conservative?

  $21/27 = 77.78\%$

- What percent of females are liberal?

  $35/77 = 45.45\%$

- If we know someone is moderate, what is the chance (%) they are male?

  $44/80 = 55\%$

- What percent of people that are conservative are female?

  $6/27 = 22.22\%$

- What percent of people are male and liberal?

  $\dfrac{50}{192} = 26.04\%$

- What percent of people are female and conservative?

  $\dfrac{6}{192} = 3.13\%$

Box-and-Whisker Plots
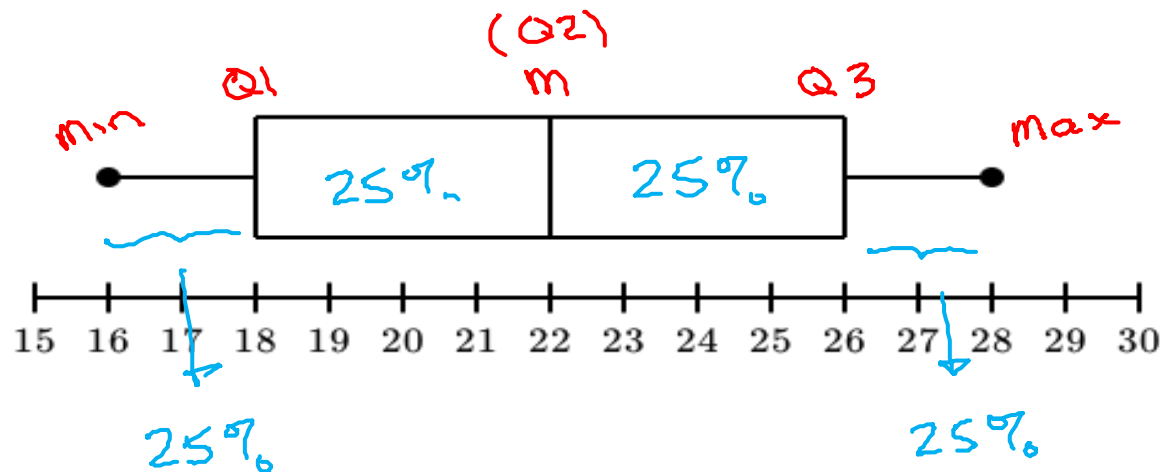
- Identify the:
  - Min: 16   Max: 28
  - Q1: 18   Median: 22
  - Q3: 26   IQR: 26 − 18 = 8

  Quartile 1 ←

  Inter-Quartile Range
  = Q3 − Q1

- What percent of the data is over 18? 75%

- What percent of the data is under 22? 50%

- What percent of the data is above 26? 25%

Box-and-Whisker Plots

6th Grade Math Test

1. What is the median?

   85

2. What is the IQR?

   93 − 78 = 15

3. What is the lowest score?

   68

4. What percent of the students scored above a 78%?

   75%
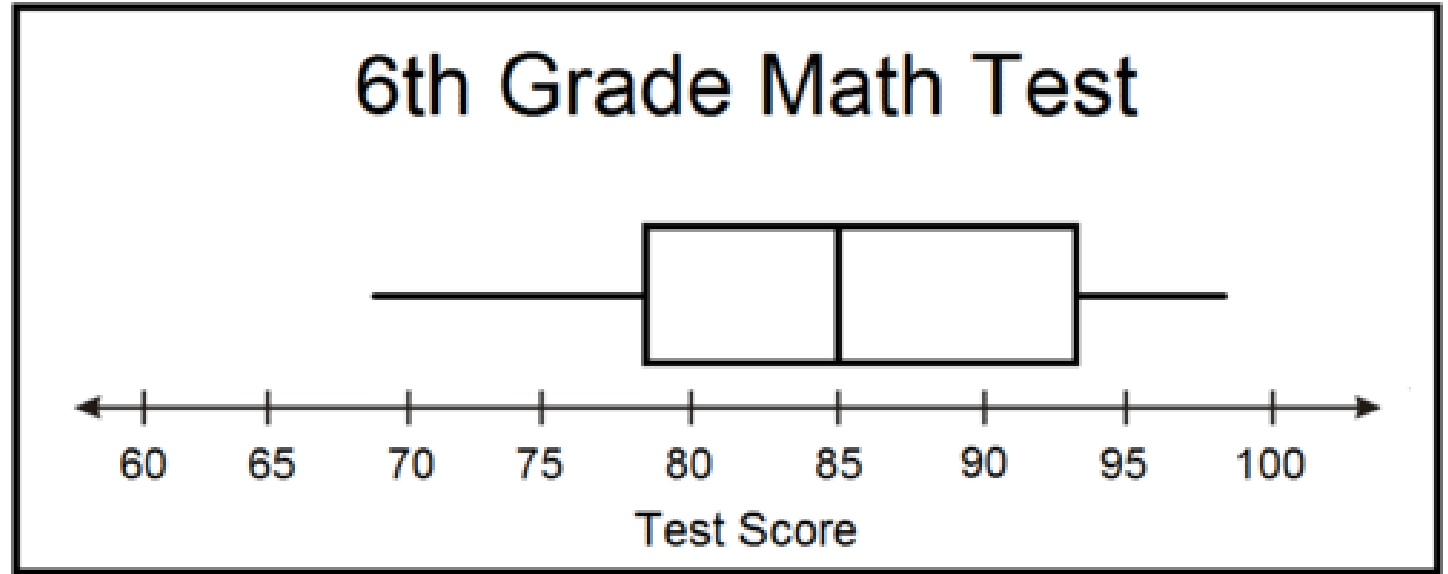
5. What percent of students scored below 85%?   50%

6. What percent of students scored between 78 and 93%?

   50%

Probability

TOTAL = 40

A bag of swim equipment has the following items: 4 green racing goggles, 10 red racing goggles, 5 clear practice goggles, 6 mirrored goggles, 7 Swedish goggles, and 8 scuba goggles.

- Find the following probabilities (as fractions)

Independent Events

With Replacement

Dependent Events

Without Replacement

1. P(green): $\frac{4}{40} = \frac{1}{10}$

6. P(green, then clear): $\frac{1}{10} \cdot \frac{1}{8} = \boxed{\frac{1}{80}}$

11. P(green, then clear): $\frac{1}{10} \cdot \frac{5}{39} = \boxed{\frac{1}{78}}$

2. P(clear): $\frac{5}{40} = \frac{1}{8}$

7. P(2 clear in a row): $\frac{1}{8} \cdot \frac{1}{8} = \boxed{\frac{1}{64}}$

12. P(2 clear in a row): $\frac{1}{8} \cdot \frac{4}{39} = \boxed{\frac{1}{78}}$

3. P(mirror): $\frac{6}{40} = \frac{3}{20}$

8. P(scuba, then mirror): $\frac{1}{5} \cdot \frac{3}{20} = \boxed{\frac{3}{100}}$

13. P(scuba, then mirror): $\frac{1}{5} \cdot \frac{6}{39} = \boxed{\frac{2}{65}}$

4. P(Swede): $\frac{7}{40}$

9. P(2 racing goggles): $\frac{14}{40} \cdot \frac{14}{40} = \boxed{\frac{49}{400}}$

14. P(2 racing goggles): $\frac{14}{40} \cdot \frac{13}{39} = \boxed{\frac{7}{60}}$

5. P(scuba): $\frac{8}{40} = \frac{1}{5}$

10. P(racing, then scuba): $\frac{14}{40} \cdot \frac{1}{5} = \boxed{\frac{7}{100}}$

15. P(racing, then scuba) $\frac{14}{40} \cdot \frac{8}{39} = \boxed{\frac{14}{195}}$

Linear Regression – Line of Best Fit

- Determine the linear equation that best fits the data
  - Use Graphing Calculator

Days	Height of Plant (cm)
1	8
2	12
4	15
7	23
12	38
15	45

Hours Watching TV	Grade on Test
5	60
4	66
3.5	70
3	80
1.5	92
0.5	91

$y = 2.65x + 5.41$

$y = -7.75x + 99.11$