Mathematics: STATISTICS & PROBABILITY

Cirrus

Measures of Central Tendency

mean: $\bar{x} = \dfrac{x_1 + x_2 + \dots x_n}{n}$

median: the middle number

mode: the most common number

Measures of Spread

standard deviation: $\sigma = \sqrt{\dfrac{\Sigma(x_i - \mu)^2}{N}}$

range: $R = largest\ value - smallest\ value$

interquartile range: $IQR = Q_3 - Q_1$

Binomial Probability

$P = {}_nC_r(p^r)(q^{n-r})$

n = trials r = successes

p = probability of success

q = probability of failure

Transforming Data

Adding c to each term

▶ the mean increases by c

▶ the standard deviation is unchanged

Multiplying each term by c

▶ both the mean and standard deviation will be multiplied by c

Permutations & Combinations

$P(n,r) = {}_nP_r = \dfrac{n!}{(n-r)!}$ $C(n,r) = {}_nC_r = \binom{n}{r} = \dfrac{n!}{(n-r)!r!}$

▶ order matters   ▶ order doesn't matter

Probability of Multiple Events

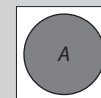|	
Intersection	$P(A \cap B) = P(A) \times P(B)$
Union	$P(A \cup B) = P(A) + P(B) - P(A \cap B)$
Conditional	$P(B|A) = P(A \cap B)/P(A)$

Probability of a Single Event

P (an event) $= \dfrac{number\ of\ favorable\ outcomes}{total\ number\ of\ possible\ outcomes}$
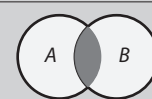
Set Theory
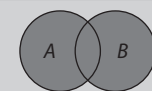
A

▶ all items in A

A'

▶ all items *not* in A

$A \cap B$

▶ items in A *and* B

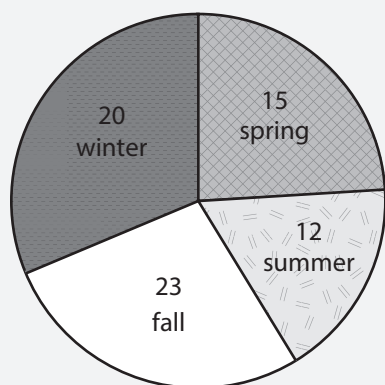$A \cup B$

▶ items in A *or* B

Graphs and Charts

Pie chart

▶ shows parts of a whole

15 spring
12 summer
23 fall
20 winter
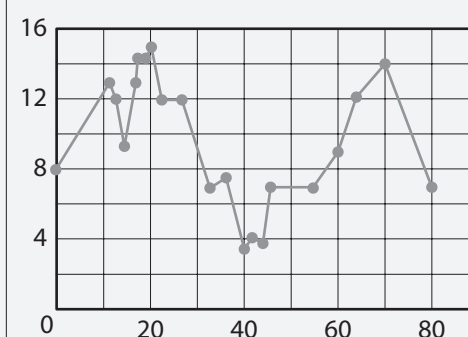
Scatter plot

▶ shows relationships between two continuous variables
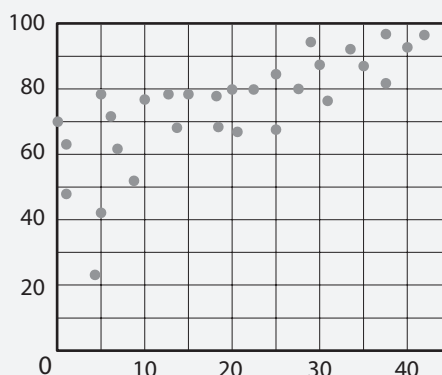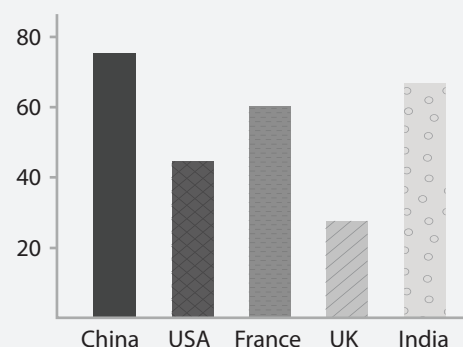

Line graph

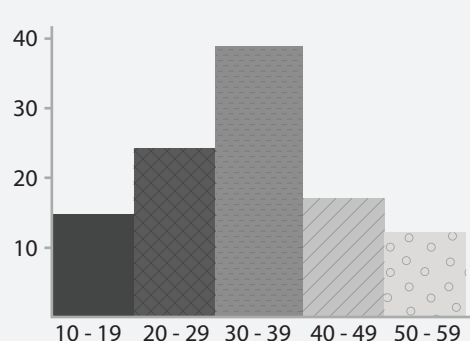▶ shows relationships between two variables and emphasizes change

Bar graph

▶ shows relationship between a continous variable and data in categories

China   USA   France   UK   India

Histogram

▶ shows frequency of data in category or ranges

10 - 19   20 - 29   30 - 39   40 - 49   50 - 59

Stem and leaf plot

▶ shows the general distribution and shape of a data set

Stem	Leaf
0	5
1	6, 7
2	8, 3, 6
3	4, 5, 9, 5, 5, 8, 5
4	7, 7, 7, 8

5|12 = 512