Date: $\qquad$

MEASURES OF CENTRAL TENDENCY
MEAN, MEDIAN \& MODE
Scenario:
Two car salesmen are competing for a mid-year bonus. The owner of the dealership wants to assess the better competitor. Who is the better candidate? Explain.

| Monthly Sales |  |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Matt | 16 | 28 | 32 | 28 | 26 | 31 |
| Jordan | 34 | 30 | 26 | 26 | 27 | 26 |



Rearrange the values in ascending order


Measures of Central Tendency: Mean - Median - Mode


There are 3 ways to find the common trend (or central tendency) for a set of data.

1. MEAN the average. It's the sum of the values in a list divided by the number of values in the list. "USE WHEN THE DATA IS FAIRLY CLOSE TOGETHER"
Example 1
Jesara is buying a home that will require a mortgage. The bank wants to know her monthly salary. She works on commission, so she must calculate her average salary. Given her income for the first 6 months of the year, what is her average salary?

Jan--\$3675, Feb--\$4250, Mar--\$3225, Apr--\$2985, May--\$3650, Jun--\$4600.

$$
\begin{aligned}
\operatorname{Mean}(\mu) & =(3675+4250+3225+2985+3650+4600) \div 6 \\
& =22385 \div 6 \\
& =\$ 3730.83
\end{aligned}
$$

$\therefore$ She will tell the bank her average salary is $\$ 3730.83 /$ month
2. MEDIAN the middle value when data is ordered from least to greatest.
"USEFUL when there is on OUTLIER"
*To find the median:
a) If there is an odd number of data points: take the middle one
E.g. if there are 7 numbers in the list, the median is the $4^{\text {th }}$ $1,2,3,4,5,6,7$
b) If there is an even number of data points: the median is the average of the two middle flumbers (add and $\div$ by 2 )

Example 2
Find the median mark for each list of student grades.
a) $6 \%, 6 / 4,7 /, 89,7 \%, 5 /, 93$
b) $56,84,63,61,62,98$

First, list the numbers in ascending order $\qquad$ (smallest to biggest)
a) $54,62,64,72,76,89,93$

Median $=4^{\text {th }}$ entry

$$
=72
$$

$$
\begin{aligned}
& \text { b) } 56,62,63,67,84,98 \\
& \text { Median }=(63+67) \div 2 \\
&=65
\end{aligned}
$$

3. MODE the value that occurs most often (doesn't have to be numerivel) There can be no modes as well os mere then one mode.
Good when the value of the data is the most important info. Shows consistency and is the only choice with categorical type data

Find the modes) for each list of numbers.
a) $5,7,9,8,6,3,4,10$
b) (25) (30) $32,(30,25,29,20$
no mode = each \# is unique
Two modes: 25 and 30
c) $63,57,66,83,79,72,79,69,60,63,79,85,80$
one mode: 79
Example 4
The modes of the following set of data are 7 and 9 . What must be the value of $y$ ?

$$
6,9,3,4,8,0,7,2,9, y
$$

Since 7 and 9 are both modes, they must occur an equal number of times.
$\rightarrow 9$ occurs twice
$\rightarrow 7$ occurs one
$\therefore y$ must be 7 .

## MEAN, MEDIAN \& MODE SUMMARY

## How do you choose which measure of central tendency to use?

Mean: Use when the data is fairly close together
Median: Useful when there is an outlier (extreme value that is far away from other values which would skew the data.

Mode: Good when the $\qquad$ of the data is the most important information. Shows consistency $\qquad$ and is the only choice with $\qquad$ type data.

## ACTIVITY

Identify whether each statement below describes the mean, median, or mode. Answers are not unique (i.e., a statement could describe more than one measure of central tendency)

| Description | Mean, Median or Mode? |
| :--- | :---: |
| Usually the least representative of a set of data | Mode |
| Most popular | Mean |
| May have more than one answer | Mode |
| Useful when comparing sets of data | Mean, Median |
| Not as popular as mean | Median, Mode |
| Extreme values (outliers) do not affect as strongly | Median |
| Used for categorical type data | Mode |
| Only one answer Median |  |
| Data must be listed in ascending order (if done manually) | Median |
| Difficult to interpret or compare if there is more than one answer | Mode |
| Not as popular as median | Mode |
| Affected by extreme values (outliers) | Mean |
| Not affected at all by extreme values (outliers) | Mode |
| Useless if no values repeat | Mode |

# MEASURES OF CENTRAL TENDENCY - PRACTICE <br> MEAN, MEDIAN \& MODE 

1) Find the mean, median and mode for each set of data.
a) $64,69,72,54,89,92$
b) $6,0,8,2,9,5,6,7,7,8$
2) The masses, in kilograms, of group of Jessy Bragg's weight loss group are shown. $81,79,83,76,89,75,67,83,65,74,78$
a) Find the mean, median and mode.
b) Is the median greater than or less than the mean?
c) Is the mode greater than or less than the mean?
3) The hourly rates of employees of a supermarket are given.
$\$ 9.25, \$ 8.50, \$ 22.50, \$ 7.85, \$ 8.85, \$ 12.65, \$ 10.85, \$ 11.50$
a) Find the mean, median and mode.
b) Which of your answers best represents the data? Why?
c) Which of your answers would most misrepresent the data? Why?
4) State and explain which measure of central tendency should be used in the following scenarios:
a) The age of people in this classroom, not including your teacher.
b) The most popular search engine used by students in this class.
c) The amount money students in this classroom earned last summer.
d) The age of people in this classroom including your teacher.

## BONUS QUESTION

6) You earned the following marks (all equally weighted) on your first five tests: $28,36,38,41$, and 44 . What mark would you have to get on the next test in order to bring your test mean average up to $80 \%$ ?

Solutions

1. a) mean $=65.8 ;$ median $=66.5 ;$ mode $=54 \quad$ b) mean $=5.8 ;$ median $=6 ;$ mode $=7$
c) mean $=3.8 ;$ median $=2.6 ;$ modes $=2.1$ and $5.7 \quad$ d) mean $=95 / 12 ;$ median $=5 / 6 ;$ mode $=n / a$
2. a) mean $=77.3 ;$ median $=78 ;$ mode $=83$ b) greater than c) greater than
3. a) mean $=\$ 11.49$; median $=\$ 10.05$; mode $=n / a \quad$ b) median; wide range of wages $\quad$ c) mean; data is not close together
4. a) mean b) mode c) median d) median
5. a) $106 \%$ or 53 out of 50 .
