

Probability & Statistics Summer Packet

Student Name: _____ Due Date: 9/10/2019

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This packet is the **FIRST TEST GRADE** of Marking Period 1

Student Responsibilities

I will be able to improve my math performance by:

- Completing the summer math packet
- Reviewing math skills throughout the summer

Student Signature

Current Grade

Date Received

Parent Responsibilities

Parents will be able to ensure student success in math by:

- Supporting the math goal of ACHS
- Monitoring student completion of the summer packet

Parent Signature

Date Received

Date Reviewed

Topic: Summation Notation

<http://www.mathsisfun.com/algebra/sigma-notation.html>

Example 1: $\sum_{k=1}^5 3k$

Solution

$$3(1) + 3(2) + 3(3) + 3(4) + 3(5) =$$

$$3 + 6 + 9 + 12 + 15 = \mathbf{45}$$

Example 2: $\sum_{k=1}^4 k^2$

Solution

$$1^2 + 2^2 + 3^2 + 4^2 = 1 + 4 + 9 + 16 = \mathbf{30}$$

Directions: Evaluate each expression. Show work.

A. $\sum_{k=1}^{11} (2k - 7)$

Answer: _____

B. $\sum_{k=1}^9 (8k^2 - 3k)$

Answer: _____

Topic: Permutations

<https://www.mathsisfun.com/combinatorics/combinations-permutations.html>

$$\text{Permutation Formula (notation): } {}_n P_r = \frac{n!}{(n-r)!}$$

Example 1: Evaluate ${}_3 P_7$

Solution

$$\frac{7!}{(7-3)!} = \frac{7!}{4!} = \frac{7(6)(5)(4)(3)(2)(1)}{4(3)(2)(1)} =$$

$$7(6)(5) = \mathbf{210}$$

Example 2: How many different ways can first, second, and third place be awarded to 10 people?

Solution

$n = 10$ people

$r = 3$ (1st, 2nd, 3rd place)

$$\frac{10!}{(10-3)!} = \frac{10!}{7!} = \frac{10(9)(8)(7)(6)(5)(4)(3)(2)(1)}{7(6)(5)(4)(3)(2)(1)} =$$

$$10(9)(8) = \mathbf{720} \quad 10 \times 9 \times 8 = 720$$

Directions: Evaluate the following expressions. Show work.

A. ${}_{12} P_3$

Answer: _____

B. ${}_8 P_5$

Answer: _____

C. In how many ways can a president, a treasurer and a secretary be chosen from among 7 candidates?

Answer: _____

D. How many ways can 1st, 2nd, 3rd, and 4th place be awarded to 10 runners?

Answer: _____

Topic: Combinations

<https://www.mathsisfun.com/combinatorics/combinations-permutations.html>

Combination Formula (notation): ${}_n C_r = \frac{n!}{(n-r)!r!}$

Example 1: Evaluate ${}_3 C_7$

Solution

$$\frac{7!}{(7-3)!3!} = \frac{7!}{4!3!} = \frac{7(6)(5)(4!)}{4!(3)(2)(1)}$$

$$\frac{7(6)(5)}{3(2)(1)} = \frac{210}{6} = \mathbf{35}$$

Example 2: Five cousins at a family reunion decide that three of them will go to pick up a pizza. How many ways can they choose three people to go?

Solution

$$n = 5$$

$$r = 3$$

$$\frac{5!}{(5-3)!3!} = \frac{5!}{2!3!} = \frac{5(4)(3!)}{2(1)(3!)} = \frac{5(4)}{2(1)} = \frac{20}{2} = \mathbf{10}$$

Directions: Evaluate the following expressions. Show work.

A. ${}_{12} C_3$

Answer: _____

B. ${}_8 C_5$

Answer: _____

C. In how many ways can three books be selected from among seven books?

Answer: _____

D. Problem: From a group of 40 people, a jury of 12 people is selected. In how many different ways can a jury of 12 people be selected?

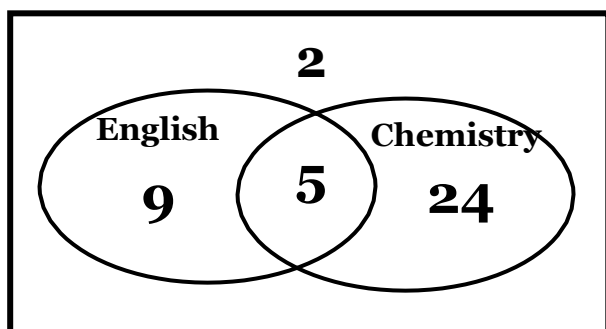
Answer: _____

Topic: Venn Diagrams (2 pages)

<http://www.regentsprep.org/regents/math/algebra/AP2/LVenn.htm>

Example 1: Out of forty students, 14 are taking English Composition and 29 are taking Chemistry. If five students are in both classes, how many students are in neither class?

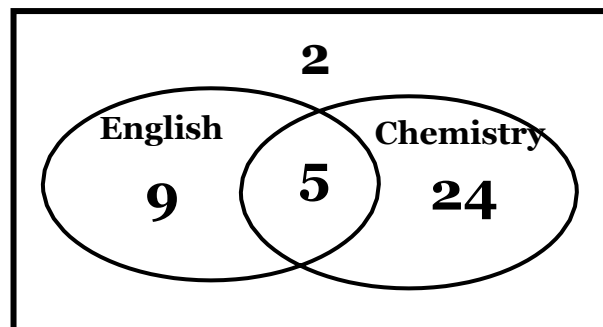
Solution



Two students are taking neither class.

Example 2: Out of forty students, 14 are taking English Composition and 29 are taking Chemistry. If five students are in both classes, how are in either class?

Solution



There are 38 students in at least one of the classes.

Directions: Create a Venn diagram to display the information then solve.

- A. In a class of 87 students, 40 take Chorus, 53 take Band, and 16 take both Chorus and Band. How many students in the class are not enrolled in either Chorus or Band?
- B. In a school of 800 students, 185 students are taking Spanish, 160 students are on sports teams, and 72 students participate in both activities. How many students don't participate in either activity?
- C. A veterinarian surveys 46 of his patrons. He discovers that 17 have hamsters, 21 have guinea pigs, and 19 have birds. Eight have hamsters and guinea pigs, and 5 people have a guinea pig and a bird. Seven have hamsters and a bird, and of these, 3 people have a guinea pig. How many patrons have none of these pets?

Topic: Standard Deviation (2 pages)

<http://www.mathsisfun.com/data/standard-deviation.html>

$$\text{Standard Deviation Formula: } \sqrt{\frac{\sum(x - m)^2}{N}}$$

Example: What is the population standard deviation for the numbers: 75, 83, 96, 100, 121 and 125?

Solution

1. Find the mean:

$$\text{Mean} = (75 + 83 + 96 + 100 + 121 + 125) \div 6 = 600 \div 6 = \mathbf{100}$$

2. Find the variance:

To calculate the variance, subtract each number by the mean, square the results, add the results, then average the final result.

$$(75 - 100)^2 + (83 - 100)^2 + (96 - 100)^2 + (100 - 100)^2 + (121 - 100)^2 + (125 - 100)^2 = (-25)^2 + (-17)^2 + (-4)^2 + (0)^2 + (21)^2 + (25)^2 = 625 + 289 + 16 + 0 + 441 + 625 = 1,996$$

$$\text{Variance} = 1,996 \div 6 \approx 332.66\dots$$

3. Find the standard deviation:

To calculate the standard deviation, take the square root of the variance.

$$\text{Standard deviation} = \sqrt{332.66\dots} \approx \mathbf{18.2} \text{ rounded to 1 decimal place}$$

Directions: Calculate the standard deviation for each problem. Show work.

A. Ten friends scored the following marks in their end-of-year math exam: 23%, 37%, 45%, 49%, 56%, 63%, 63%, 70%, 72% and 82%.

Answer: _____

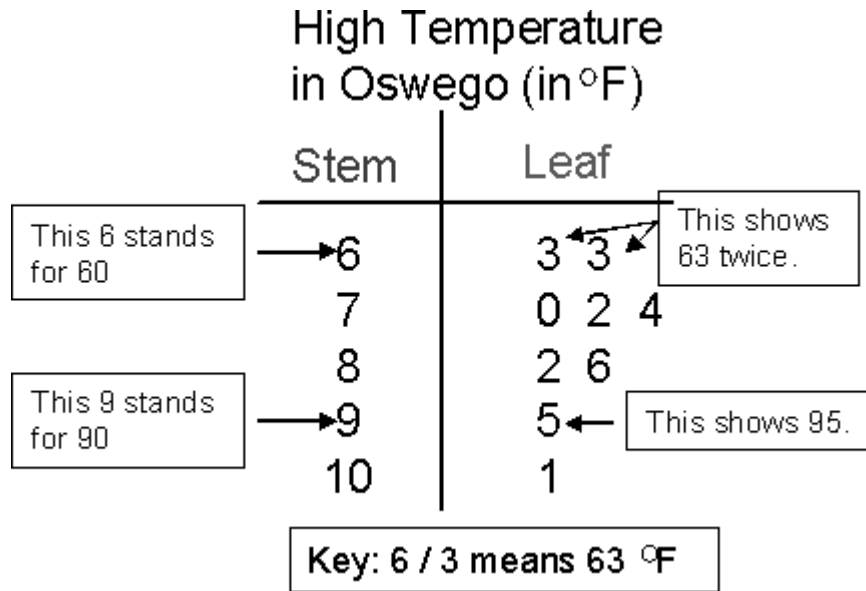
B. A booklet has 12 pages with the following numbers of words: 271, 354, 296, 301, 333, 326, 285, 298, 327, 316, 287 and 314.

Answer: _____

Topic: Stem and Leaf Plots

<https://www.mathsisfun.com/data/stem-leaf-plots.html>

Example: Create a Stem and Leaf plot for the following temperatures (in degrees). 63, 63, 70, 72, 74, 82, 86, 95, 101



Directions: Create a stem and leaf plot, with a key, for each set of data.

A. Data: 12, 13, 20, 21, 25, 25, 28, 34, 36, 39, 53, 54, 54, 54, 56, 62, 65, 66, 66, 67, 68, 80, 83, 85, 98

B. Data: 45, 10, 79, 33, 15, 30, 26, 49, 53, 11, 28, 54, 42, 77, 33, 11, 36, 84, 58, 27, 47, 21, 43, 31, 19, 37, 45, 23, 71, 33

To access the project click [here](#)

Topics: Frequency Tables and Histograms

<http://openhighschoolcourses.org/mod/book/view.php?id=206&chapterid=353>

Example: The following numbers were rolled on a die: 1, 2, 3, 1, 2, 6, 2, 5, 1, 2, 6, 3, 2
Create a frequency table for the data.

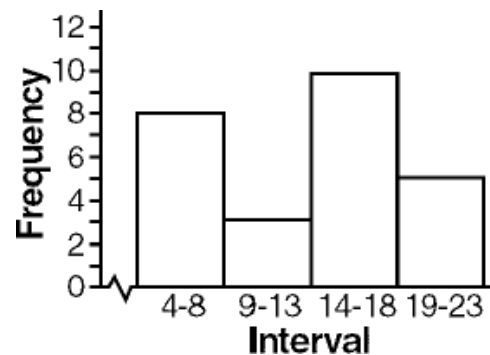
Solution

Number Rolled	Tally	Frequency
1		3
2		5
3		2
5		1
6		2

Example: Create a histogram of the frequency table.

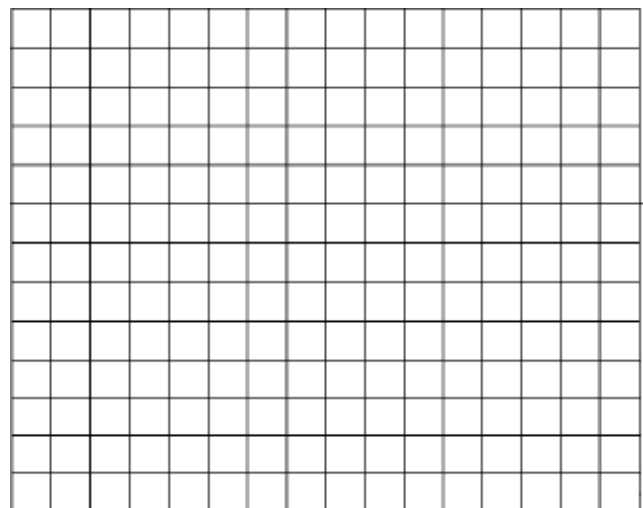
Interval	Frequency
4-8	8
9-13	3
14-18	10
19-23	5

Solution



A. The scores on a mathematics test were 70, 55, 61, 80, 85, 72, 65, 40, 74, 68, and 84.
Complete the accompanying table, and use the table to construct a frequency histogram for these scores.

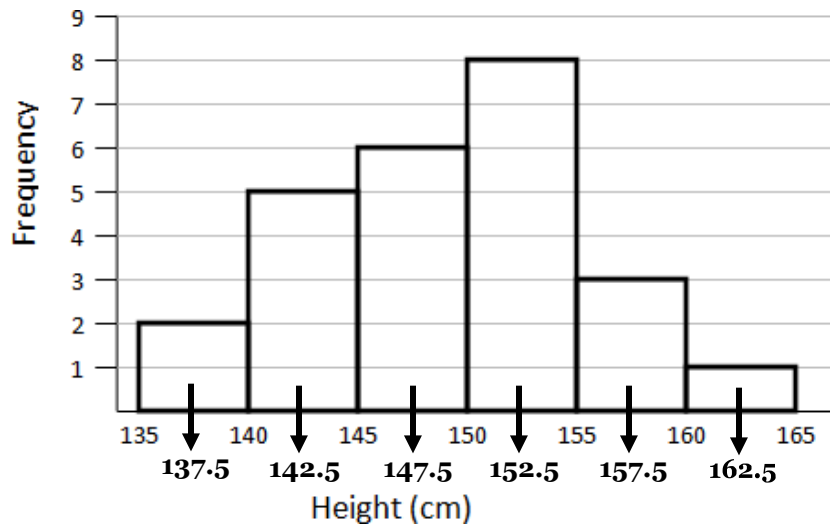
Score	Tally	Frequency
40-49		
50-59		
60-69		
70-79		
80-89		



Topics: Mean, Median, and Mode of Histograms

<http://passyworldofmathematics.com/mean-median-mode-for-grouped-data/>

Example: Find the mean, median, and mode of the histogram.



Solution

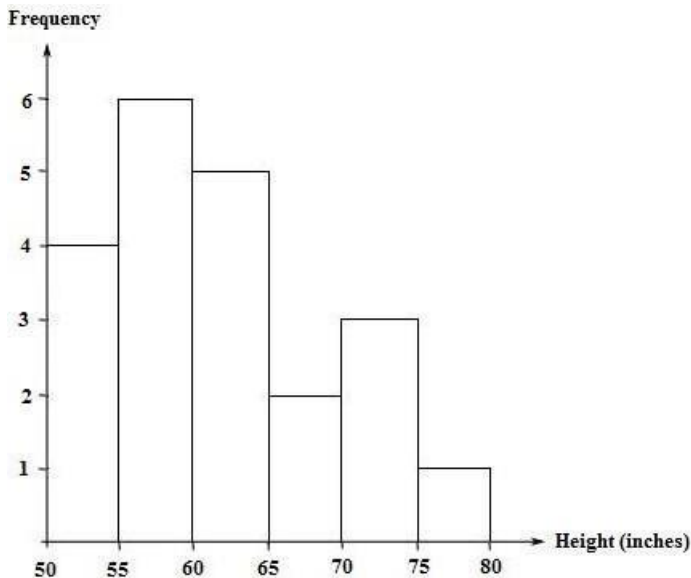
Mean: Find the midpoint of the heights of each bar.

$$\text{Mean} = \frac{2(137.5) + 5(142.5) + 6(147.5) + 8(152.5) + 3(157.5) + 1(162.5)}{2+5+6+8+3+1} = \frac{3727.5}{25} = \mathbf{149.1}$$

Median: Find the middle. There are 25 entries. The 13th entry will be the median. This is at **147.5 (or between 145 – 150)**

Mode: Find the most. There are 8 entries for **152.5 (or between 150 – 155)**

Directions: Find the mean, median, and mode of the histogram. Show work.



Mean = _____

Median = _____

Mode = _____