Unit 9 Review

9.1/9.3 Combinations, permutations and probability

$$_nC_r = \frac{n!}{r!(n-r)!}$$

Committee

$$_nP_r = \frac{n!}{(n-r)!}$$

Presidency

$$\text{Probability} = \frac{\#\,of\ desired\ outcomes}{\#\,of\ possible\ outcomes}$$

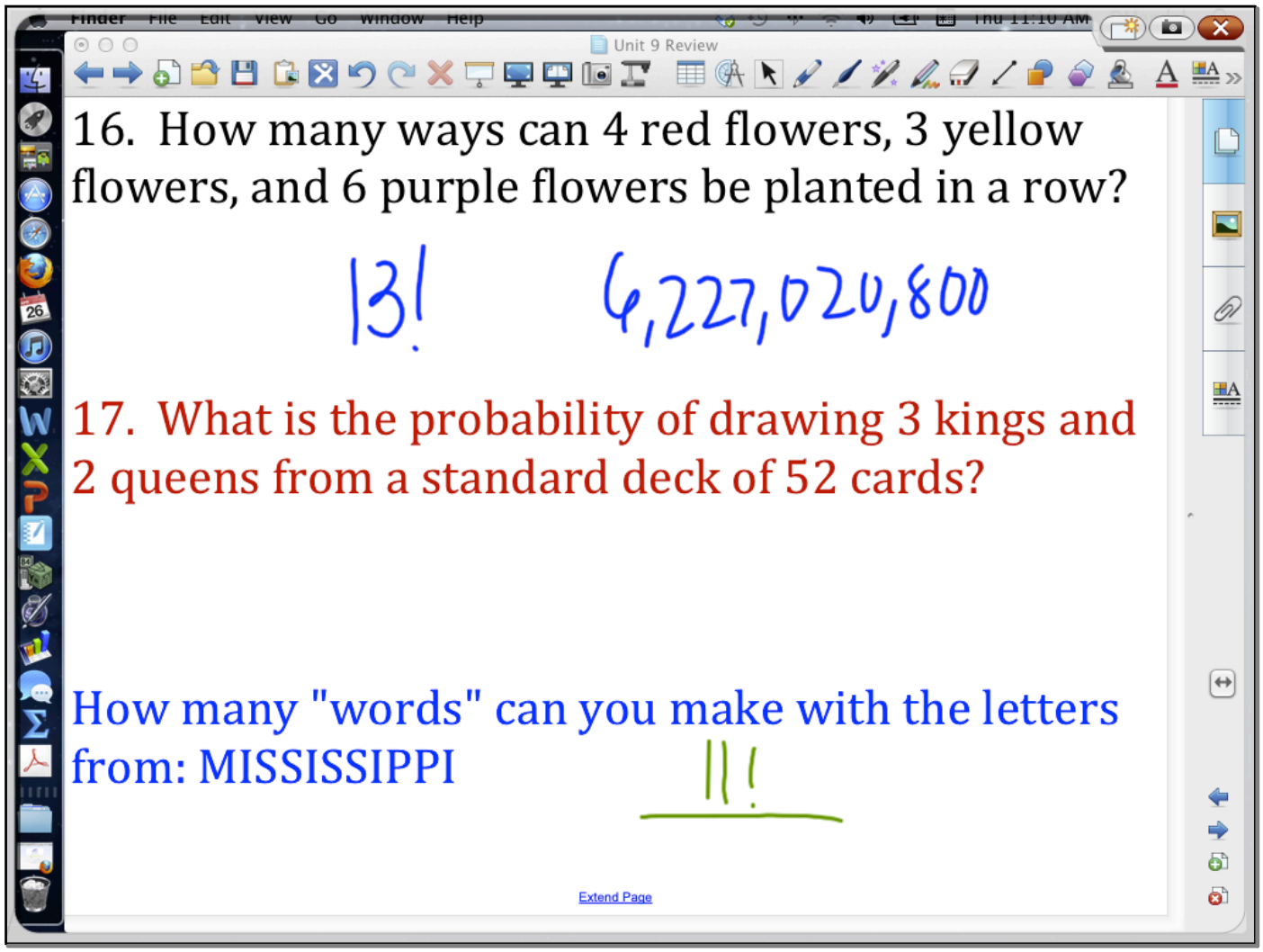
16. How many ways can 4 red flowers, 3 yellow flowers, and 6 purple flowers be planted in a row?

$13!$ $\quad 6{,}227{,}020{,}800$

17. What is the probability of drawing 3 kings and 2 queens from a standard deck of 52 cards?

How many "words" can you make with the letters from: MISSISSIPPI

$$\frac{11!}{4!4!2!}$$


Unit 9 Review
16. How many ways can 4 red flowers, 3 yellow flowers, and 6 purple flowers be planted in a row?
13!
6,227,020,800
17. What is the probability of drawing 3 kings and 2 queens from a standard deck of 52 cards?
How many "words" can you make with the letters from: MISSISSIPPI
11!
Extend Page

9.2 The Binomial Theorem

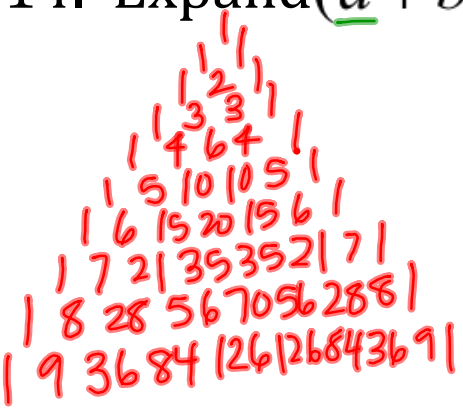
$$\binom{n}{r} = \frac{n!}{r!(n-r)!}$$

$$(a+b)^n \longrightarrow \binom{n}{r} a^{n-r} b^r$$

$= {}_nC_R$

can use calculator :)

14. Expand $(a+b)^9$ using a method of your choice.



$\binom{9}{0}a^9+\binom{9}{1}a^8b+\binom{9}{2}a^7b^2+\binom{9}{3}a^6b^3+\binom{9}{4}a^5b^4$
$\binom{9}{5}a^4b^5+\binom{9}{6}a^3b^6+\binom{9}{7}a^2b^7+\binom{9}{8}ab^8+\binom{9}{9}b^9$

$a^9+9a^8b+36a^7b^2+84a^6b^3+126a^5b^4+126a^4b^5$
$+84a^3b^6+36a^2b^7+9ab^8+b^9$

15. Find the x^8 term in the expansion of $(x-2)^{12}$

$\binom{12}{8}x^8(-2)^4 = {}_{12}C_8 = 495(-2)^4x^8$

$= \boxed{7920x^8}$

Expand $(x-2y)^4$ using the binomial theorem

9.4 Sequences

Arithmatic

$$a_n = a_1 + d(n-1)$$

n^{th} term of arithmatic

Geometric

$$a_n = a_1 \cdot r^{n-1}$$

n^{th} term

Explicit vs. Recursive

2, 4, 8, 16, 32,…

$$b_1 = -1 \text{ and } b_{k+1} = b_k + 10 \quad \text{for} \quad k \geq 1$$

Find an explicit formula for the sequence, find the 10th term

-6, -2, 2, 6, 10, ...

$d = 4$

$a_n = -6 + 4(n-1)$

$a_n = -6 + 4n - 4$

$\boxed{a_n = 4n - 10}$

$a_{10} = 4(10) - 10$

$\boxed{a_{10} = 30}$

Find an explicit formula for the sequence, find the 10th term

2, 6, 18, 54, ...

$r = 3$

$\boxed{a_n = 2 \cdot (3)^{n-1}}$

$a_{10} = 2 \cdot 3^{10-1}$

9.4 Series

$$\sum_{k=1}^{n} a_k$$

Sum of a finite arithmatic sequence

$$* \quad S_n = \frac{n}{2}(a + a_n)$$

Sum of finite geometric sequence

$$* \quad S_n = \frac{a(1-r^n)}{1-r}$$

Sum of infinite geometric sequence

$|r| < 1$ Converges

$$S_n = \frac{a_1}{1-r}$$

$|r| \geq 1$ diverges

$$\sum_{k=1}^{\infty}$$

$$\sum_{n=1}^{5} n^2 - 1$$

$(1^2-1)+(2^2-1)+(3^2-1)+(4^2-1)$
$+(5^2-1) = 50$

$$\sum_{k=0}^{4} \left(\frac{1}{2}\right)^k$$

$S_n = \frac{a_1(1-r^n)}{1-r} = \frac{1(1-\frac{1}{2}^5)}{1-\frac{1}{2}}$

$31/16$

$$\sum_{j=3}^{5} j - j^2$$

$$\sum_{n=0}^{5} (-1)^n n^3$$

$$\sum_{n=1}^{\infty} 4\left(\tfrac{2}{3}\right)^{n-1}$$

$|\frac{2}{3}| < 1$ converges

$S = \frac{a}{1-r} = \frac{4}{1-2/3} = 12$

$$\sum_{k=0}^{\infty} 2\left(\tfrac{1}{5}\right)^{k}$$

$$\sum_{n=0}^{\infty} 3\left(-\tfrac{1}{3}\right)^{n+1}$$

$$\sum_{k=1}^{n} 2k+3$$

$(2(1)+3)+(2(2)+3)+\cdots+(2(n)+3)$

$$4, \frac{-4}{3}, \frac{4}{9}, \frac{-4}{27}, \ldots\ldots, 4\left(\frac{-1}{3}\right)^{10}$$

9.7/9.8 Statistics

Stem and Leaf plots

Five number Summary

{min, Q_1, med, Q_3, max}

Standard Deviation

Calc. σx

Variance

σ^2

68-95-99.7 Rule

68% within $\pm 1\sigma$

95% within $\pm 2\sigma$

99.7% within $\pm 3\sigma$

hh

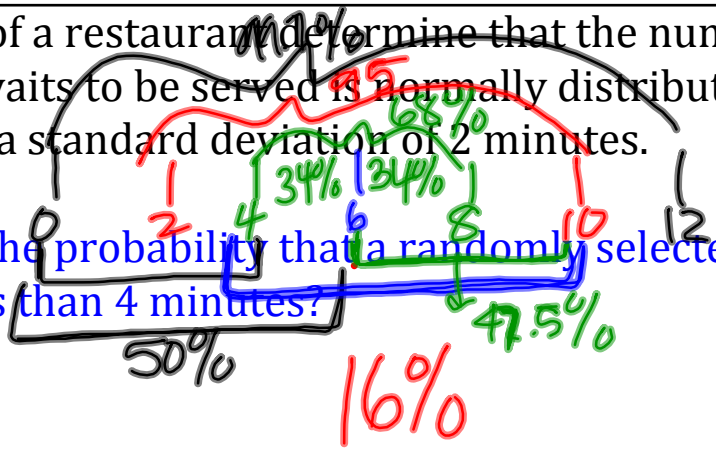
32.7

42.1

27.3

27	3
28	
29	
30	
31	
32	7

The owners of a restaurant determine that the number of minutes that a customer waits to be served is normally distributed with a mean of 6 minutes and a standard deviation of 2 minutes.



11. What is the probability that a randomly selected customer will be served in less than 4 minutes?

12. During a survey, 500 customers are served. How many would you expect to be served in less than 8 minutes?

84% .84(500) = 420

13. If 1000 customers are served, how many would you expect to wait between 4 minutes and 10 minutes?

34 + 47.5 = 81.5% 1000(.815) 815