Algebra 2/Trig
Unit 7 Study Guide

Name: Key
Unit 7 Exam – Thursday 1/09/14

Vocabulary: Fundamental counting principle, permutations, combinations, factorial, independent event, dependent event, mutually exclusive, compound probability, Venn Diagram, odds in favor, odds against, term, arithmetic sequence, arithmetic series, geometric sequence, geometric series

Skill
1 – Determine the number of outcomes using the FCP, Permutations or Combinations.
2 – Calculate basic and compound probability.
3 – Determine the odds of a situation.
4 – Write a formula to represent a given arithmetic or geometric sequence.
5 – Determine the sum of an arithmetic or geometric series.
6 – Determine the sum of a series using summation notation.

Skill 1 - Determine the number of outcomes using the FCP, Permutations or Combinations.

1) The letters *A*, *B*, *C*, and *D*, are used to form four letter passwords for entering a computer file. How many passwords are possible if letters can be repeated any number of times?

4 · 4 · 4 · 4

256

2) How many ways can the first five letters of the alphabet be arranged if each is used only once?

$_5P_5$ or 5 · 4 · 3 · 2 · 1

120

3) A restaurant serves 5 main dishes, 3 salads and 4 desserts. How many different meals could be ordered if each has a main dish, salad and dessert?

5 * 3 * 4

60

4) How many different ways can 4 different books be arranged on the shelf?

$_4P_4$ or 4 3 2 1

24

5) How many 5-digit even numbers can be formed using the digits 4, 6, 7, 2, 8 if the digits can be repeated any number of times?

5 5 5 5 4

2,500

6) How many 4-digit positive even integers are there?

9 10 10 5

4500

7) How many license plate numbers consisting of three letters followed by three numbers are possible when repetition is allowed?

26 26 26 10 10 10

17576000

8) How many combinations are possible using the information in problem 15 if no repetition is allowed?

26 25 24 10 9 8

11,232,000

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Skill 1, Continued - Determine the number of outcomes using the FCP, Permutations or Combinations.

9) How many ways can the letters in MONDAY be arranged?

$_6P_6$ *no repeats in MONDAY

720

10) How many ways can the letters in CENTRAL BUCKS be arranged?

$\frac{12!}{2!}$ = 239,500,800

11) How many ways can the letters in NITTANY LIONS be arranged?

$\frac{12!}{3!2!2!}$ = 19,958,400

12) How many ways can 8 members of a family be seated side-by-side in a movie theater?

8 7 6 5 4 3 2 1

40,320

13) How many ways can 8 member of a family be seated side-by-side in a movie theater if the father is seated on the aisle?

1 7 6 5 4 3 2 1

5040

14) How many ways can 3 different books be placed on a shelf if chosen from a selection of 7 books?

$_7P_3$ 210

15) How many 5-digit numbers can be made using the digits from 19,323?

$\frac{5!}{2!}$ = 60

16) Eight playing cards are to be arranged in a row, no two cards are exactly alike, how many different arrangements of 8 cards are possible?

$_8P_8$ 40,320

17) There are 15 different books. How many groups of 6 books can be selected?

$_{15}C_6$ = 5005

18) From a group of 10 men and 12 women how many committees of 5 men and 6 women can be formed?

$_{10}C_5 * {}_{12}C_6$

232,848

19) From a standard deck of 52 cards how many ways can 5 cards be dealt?

$_{52}P_5$ = 311,875,200

20) How many tennis teams of 6 players can be formed from 14 players without regard to positio

$_{14}C_6$ = 3003

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Skill 2 - Calculate basic and compound probability. Express your answer as a fraction in simplest form.

1) A card is drawn from a standard deck of 52 cards. Find the probability of selecting a Jack or a Ten. * no overlap

$\frac{8}{52} = \boxed{\frac{2}{13}}$

2) A card is drawn from a standard deck of 52 cards. Find the probability of selecting a Queen or a Spade. overlap!

$\frac{4}{52} + \frac{13}{52} - \frac{1}{52} = \boxed{\frac{4}{13}}$

3) A card is drawn from a standard deck of 52 cards. Find the probability of selecting Black or a Face Card. * overlap

$\frac{26}{52} + \frac{12}{52} - \frac{6}{52}$

$\boxed{\frac{8}{13}}$

4) Each time a card is drawn from a standard deck of cards, it is not replaced. Find the probability of selecting an Ace then a 6.

$\frac{4}{52} * \frac{4}{51} = \boxed{\frac{4}{663}}$

5) Each time a card is drawn from a standard deck of cards, it is not replaced. Find the probability of selecting two Aces in a row.

$\frac{4}{52} \cdot \frac{3}{51} = \boxed{\frac{1}{221}}$

6) Each time a card is drawn from a standard deck of cards, it is not replaced. Find the probability of selecting two Clubs in a row.

$\frac{13}{52} \cdot \frac{12}{51} = \boxed{\frac{1}{17}}$

7) A pair of dice are thrown. Find the probability of rolling doubles (the numbers matching).

$\frac{6}{36} = \boxed{\frac{1}{6}}$

8) A pair of dice are thrown. Find the probability of getting a sum of exactly 10.

$\frac{3}{36} = \boxed{\frac{1}{12}}$

Skill 3 - Determine the odds of a situation. Express your answer as a ratio in simplest form.

1) The odds of an event occurring are 1:3. Find the probability of that event.

$\frac{1}{4}$

2) The odds of an event occurring are 5:2. Find the probability of that event NOT occurring.

$\frac{2}{7}$

3) The probability of an event is 10/13. Find the odds of the event occurring.

$\frac{10}{3}$

4) Determine the odds of selecting a King from a standard deck of cards. 4/52 ← prob.

4:48

$\boxed{1:12}$

5) Determine the odds of selecting a black card from a standard deck of cards. 26/52 ← prob

26:26

$\boxed{1:1}$

6) Determine the odds of selecting either an 8 or a Heart from a standard deck of cards.

4+13-1 → 16/52 ← prob

16:36 $\boxed{4:9}$

Skill 4 - Write a formula to represent each arithmetic or geometric sequence. Then find a_{10}.

1) A 3, 7, 11, 15, ... +4

$a_1 = 3$ $d = 4$

$a_n = 3 + (n-1)4$

$\boxed{a_n = -1 + 4n}$

$a_{10} = -1 + 40$

$\boxed{a_{10} = 39}$

2) G 3, 9, 27, 81, ... *3

$a_1 = 3$

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

$a_{10} = 3 * 3^{10-1}$

$\boxed{a_{10} = 59049}$

* technically this is $\boxed{a_n = 3^n}$

3) A -6, -11, -16, -21, ... d = -5

$a_n = -6 + (n-1)(-5)$

$-6 + -5n + 5$

$\boxed{a_n = -1 - 5n}$

$a_{10} = -1 - 5(10)$

$a_{10} = -1 - 50$

$\boxed{a_{10} = -51}$

4) G 80, -40, 20, -10, 5, ... r = -2

$\boxed{a_n = 80 \cdot (-\frac{1}{2})^{n-1}}$

$a_{10} = 80 * (-\frac{1}{2})^{10-1}$

$a_{10} = 80 * (-\frac{1}{2})^{9}$

$\boxed{a_{10} = -.15625 \text{ or } \frac{-5}{32}}$

$a_{10} = -.15625$ or $-5/32$

Skill 5 - Determine the sum of the first 15 terms for each arithmetic or geometric series.

1) A +3 3 + 6 + 9 + 12 + ... n = 15

$S_{15} = 15\left(\frac{3 + 45}{2}\right)$

$a_{15} = 3 + (15-1)(3)$

$a_{15} = 45$

$\boxed{S_{15} = 360}$

2) A -2 19 + 17 + 15 + 13 + ...

$S_{15} = 15\left(\frac{19 + -9}{2}\right)$

$a_{15} = 19 + (15-1)(-2)$

$a_{15} = -9$

$\boxed{S_{15} = 75}$

3) G 2 + 4 + 8 + 16 + 32 + ... *2

$S_{15} = 2\left(\frac{1 - 2^{15}}{1 - 2}\right)$

$\boxed{S_{15} = 65534}$

4) 20 + 10 + 5 + 2.5 + 1.25 + ... $*\frac{1}{2}$

$S_{15} = 20\left(\frac{1 - (\frac{1}{2})^{15}}{1 - (\frac{1}{2})}\right)$

$\boxed{S_{15} = 39.999}$

Skill 6 - Determine the sum of a series using summation notation.

1) $\sum_{n=1}^{5} 4n - 5$ $\boxed{= 35}$

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

$-1 + 3 + 7 + 11 + 15$

2) $\sum_{n=1}^{4} n^2 + 3$ $\boxed{= 42}$

$(1)^2 + 3 + (2)^2 + 3 + (3)^2 + 3 + (4)^2 + 3$

$4 + 7 + 12 + 19$