

Warmup Practice

Grade 12 Applied

Week 5 Day 3

MrF

**Combinations
Investments
Annuities (loans)**

Warmup/Practice

4-1. Tommy has 7 marbles. In how many ways can he choose 5 of them?

4-2. A teacher is going to choose 4 students from his class of 18 students to organize a class trip. In how many ways can he do this if

a) there are no restrictions?

b) Meredith, a student in the class, must be one of the students chosen?

c) Alex, Trey and Yvonne, students in the class, must not be chosen?

4-3. How many 5-card hands will be dealt out from a deck of 52 cards if

a) there are exactly 3 face cards?

b) there is at least 3 face cards?

c) What is the probability you will be dealt a hand with 3 Face Cards

Warmup/Practice

2-5. Elizabeth wants to get the most money she can out of her investments. As a result, after investing \$1500 in a savings account for 4 years at an interest rate of 4.2%, compounded weekly, she moves her money to a GIC that she invests in for another 6 years. The GIC offers an interest rate of 5.5%, compounded monthly. How much money will she have at the end of the 10 years?

Just use
App

yy

3-1. Josh invests \$50 weekly for 6 years in his savings account that has a 2.8% interest rate, compounded weekly. How much money will he have after 6 years?

Annuity!
USE App

3-2. Rhonda needs to have \$2500 in three and a half years. What monthly investment will she have to make if her bank offers a 4.8% interest rate, compounded monthly?

Loan!
USE App!

4-1. Tommy has 7 marbles. In how many ways can he choose 5 of them?

Does this not scream: **COMBOS!!!???**

You are familiar with the words in the glossary?

The number of ways of selecting objects is a combination. (order is not important)

Example: how many ways can 3 players on a team be selected for a league all-star game? It doesn't matter what order you get selected in, just that you make the team. The answer is ${}_{10}C_3$ or 120 ways

$$\frac{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3}{5!}$$

← If order mattered

← ways to juggle the order of 5 things

$${}_{7}C_5 = {}_n C_r (7, 5)$$

${}_{n}C_r(7, 5)$

= 21

7 nCr 5

21



4-2. A teacher is going to choose 4 students from his class of 18 students to organize a class trip. In how many ways can he do this if

a) there are no restrictions?

b) Meredith, a student in the class, must be one of the students chosen?

c) Alex, Trey and Yvonne, students in the class, must not be chosen?

a) $18^C_4 \equiv {}_n C_r(18,4) = 3060$ different groups

b) 17^C_3 (already decided Meredith in group) = 680 different groups

c) Fun! Logic!

15^C_4

$$\begin{array}{r} 3060 \text{ no restrictions} \\ - 15 \text{ groups WITH Alex, Trey, Yvonne} \\ \hline (3045) \rightarrow \text{Groups WITHOUT Alex, Trey, Yvonne} \end{array}$$

"Choose" often means combo!

No order involved!

Just an un-ordered

group Combo!

4-3. How many 5-card hands will be dealt out from a deck of 52 cards if

a) there are exactly 3 face cards? $(171,600)$

b) there is at least 3 face cards?

c) What is the probability you will be dealt a hand with 3 Face Cards

a)

$$\frac{12C_3}{\uparrow \text{Combos of 3 Face}} \cdot \frac{40C_2}{\uparrow \text{Combos of Non Face}} = (171,600)$$

Diagram illustrating the calculation for 3 Face and 2 Non-Face cards in a 5-card hand:

- A large circle represents the 52 cards in the deck.
- The deck is divided into 12 Face cards and 40 Not Face cards.
- A smaller circle represents a 5-card hand, containing 3 Face cards (F) and 2 Non-Face cards (N).
- Arrows indicate that the 3 Face cards are chosen from the 12 Face cards, and the 2 Non-Face cards are chosen from the 40 Not Face cards.

b) At least means 3 or 4 or 5

$$3 \text{ Face} = 171,600; \quad 4 \text{ Face} = 12C_4 \cdot 40C_1 = 19,800$$

$$5 \text{ Face} = 12C_5 \cdot 40C_0 = 792$$

$$171,600 + 19,800 + 792 = (192,192 \text{ ways at least } 3 \text{ Face})$$

Prob (3 Face Cards)

$$= \frac{\text{\# ways to get 3 Face Cards}}{\text{Total number of Poker Hands}}$$

$$= \frac{171,600}{52^C_5} = \frac{171,600}{2,598,960}$$

\approx 6.60% Chance being
dealt 3 (only 3) face
Cards in a 5 Card
hand

2-5. Elizabeth wants to get the most money she can out of her investments. As a result, after investing \$1500 in a savings account for 4 years at an interest rate of 4.2%, compounded weekly, she moves her money to a GIC that she invests in for another 6 years. The GIC offers an interest rate of 5.5%, compounded monthly. How much money will she have at the end of the 10 years?

Two separate calculations

-1,500	PV
0	PMT
1,774.28	* FV
4.2	Rate
208 <i>→ 52 * 4</i>	Periods
Weekly	

-1,774.28	PV
0	PMT
2,466.11	* FV
5.5	Rate
72 <i>6 * 12 = 72 months</i>	Periods
Monthly	

She has \$2,466.11

3-1. Josh invests \$50 weekly for 6 years in his savings account that has a 2.8% interest rate, compounded weekly. How much money will he have after 6 years?

"Annuity"; regular payments.

use App

0	PV
-50	PMT
16,982.00	* FV
2.8	Rate
312 ← 6.52	Periods
Weekly	

OF COURSE

You Do

A Hand-drawn
"Screen-Shot"

Sounds about
right!

With zero interest
would have been
\$15,600

$$50 \cdot 312$$

3-2. Rhonda needs to have \$2500 in three and a half years. What monthly investment will she have to make if her bank offers a 4.8% interest rate, compounded monthly?

Annuity! Regular payment

0	PV
-54.78	* PMT
2,500	FV
4.8	Rate
42 \rightarrow 3.5 yr \cdot 12 month / 1 yr	Periods
Monthly	

← Screenshot



She needs to make 42 monthly payments of \$54.78