

***Practice and
Warmup***

Week 4 Day 4

***Probability
&
Personal Finance***

Warmup/Practice

Dependent Probability. Rick has 12 individual socks in his drawer. Six white and six black. He reaches into his drawer in the dark and randomly pulls out two socks.

- a. Determine the probability he pulls out two white socks
- b. Determine the probability he pulls out a matching pair

There are 10 teams in your daughters ringette league. If every team plays every other team:

- a. how many games will your daughter play?
- b. how many games will be on the schedule for all the teams?

Examine the word 'SCHOOL'

- a. how many different (distinguishable) arrangements of the letters can be made?
- b. if the first letter in the arrangement above has to be an 'L', how many arrangements can be made?

Warmup/Practice

Amanda invests \$10,000 in Dylan's new software company! Dylan promises an annual return (APR) of 8% on her investment, compounded monthly, and will pay Amanda back after 9 years. Determine how much (the future value) Amanda will receive in 9 years. [use the formula manually, and also use an App]

Debbie just cashed - in her shares in Sandra's 'Photos R Us' photography company. Debbie had loaned Sandra some money to set up a studio five years ago. Sandra promised the shares would make 10% compounded quarterly. Debbie gets a cheque for \$20,000 when she cashes in her shares. Determine the Principal (PV) amount of money that Debbie had invested those 5 years ago . [Just use an App. You *may* want to try using the formula and some algebra too]

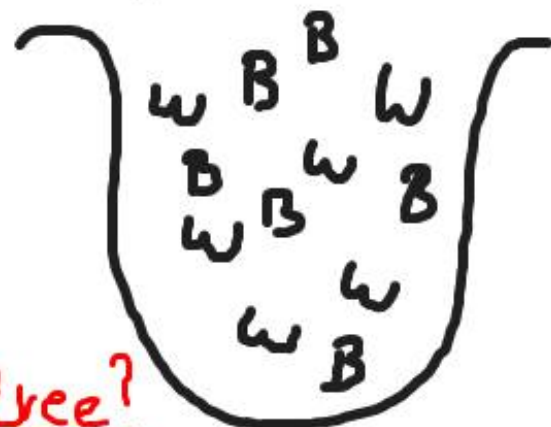
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- Determine the probability he pulls out two white socks
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Warmup/Practice

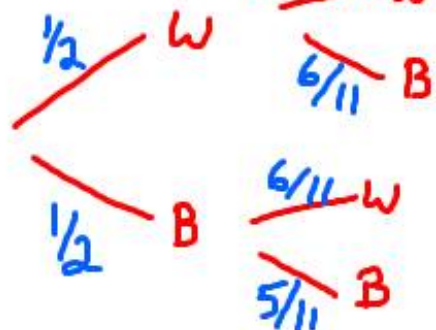
Pulling out a "pair" → combos
 Probability = $\frac{\text{fav combo}}{\text{all combos}}$ Initial thoughts
 Dependent Prob! Pulling out socks, no replace

$$\begin{aligned} a) \text{ Prob}(w_1, w_2) &= \text{Prob}(w_1) \cdot P(w_2 | w_1) \\ &= \frac{6}{12} \cdot \frac{5}{11} = \frac{5}{22} \end{aligned}$$



or maybe you like the graphic tree?

start events



$$P(w, w) = \frac{1}{2} \cdot \frac{5}{11} = \frac{5}{22} \approx 22.73\%$$

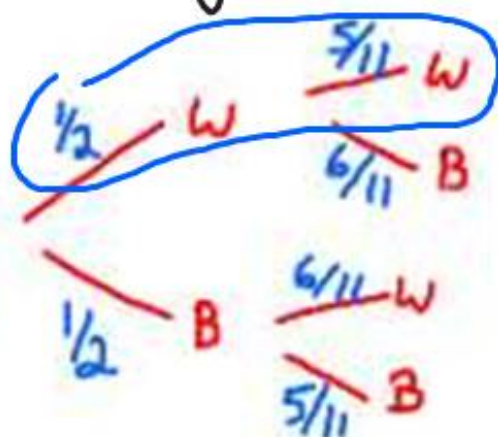
Dependent Probability. Rick has 12 individual socks in his drawer. Six white and six black. He reaches into his drawer in the dark and randomly pulls out two socks.

- Determine the probability he pulls out two white socks
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Warmup/Practice

b) Prob(matching Pair)

start events



$$P(W, W) = \frac{1}{2} \cdot \frac{5}{11} = \frac{5}{22}$$

OR = add!

$$\frac{5}{22} + \frac{5}{22} = \frac{10}{22} = \frac{5}{11}$$

$$22.73\% + 22.73\% = 45.46\%$$

$$P(B, B) = \frac{1}{2} \cdot \frac{5}{11} = \frac{5}{22}$$

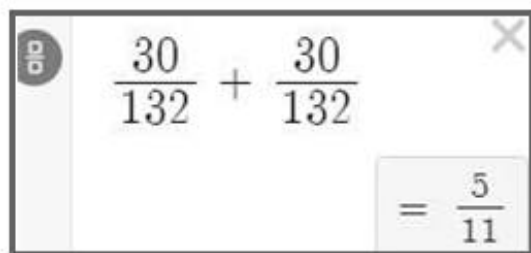
How about just the formula!?

$$P((W_1, W_2) \text{ OR } (B_1, B_2)) = P(W_1) \cdot P(W_2|W_1) + P(B_1) \cdot P(B_2|B_1)$$

$$= \frac{6}{12} \cdot \frac{5}{11} + \frac{6}{12} \cdot \frac{5}{11}$$

$$= \frac{30}{132} + \frac{30}{132} = \frac{5}{11} \text{ or } \sim 45.46\%$$

Weird! less than 50%

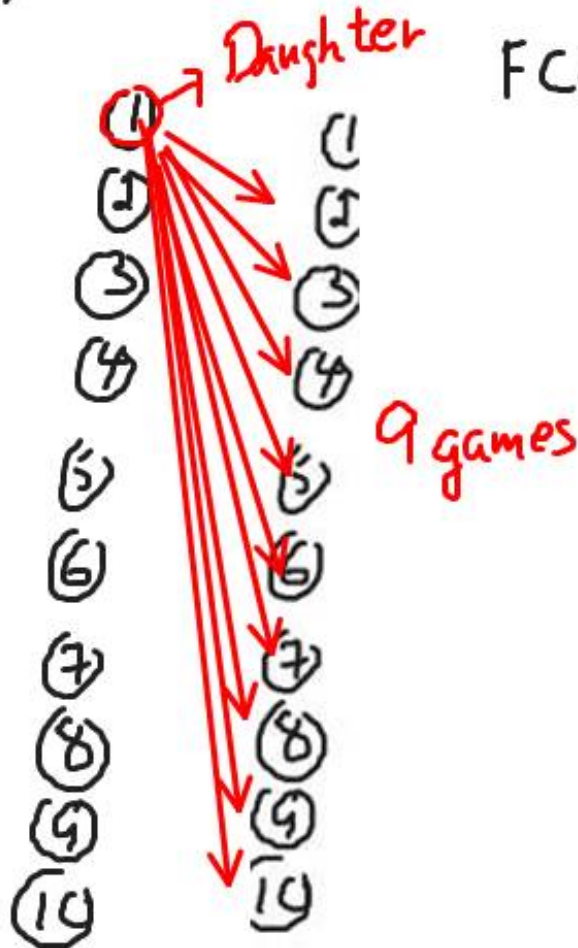


There are 10 teams in your daughters ringette league. If every team plays every other team:

- how many games will your daughter play?
- how many games will be on the schedule for all the teams?

a) l.o.l. Her team can't play itself! So 9 games!

Warmup/Practice



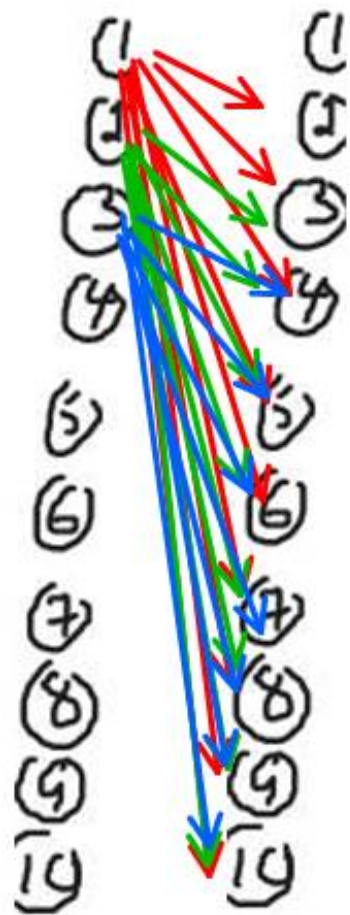
FCP $\frac{1}{1} \cdot \frac{9}{1} = 9$

↑ ↑
daughter other
team teams

b) Game schedule for all the league is combos!

10 teams $\binom{10}{2}$ at a time
The league schedule has 45 games!

$10 \binom{10}{2} = 45$
games
in the
league



9 with team 1
 9 with team 2
 9 with team 3

Messy!

$10C_2$ is easier!

10 teams selecting two at a time, the order they are selected does not matter! A comb

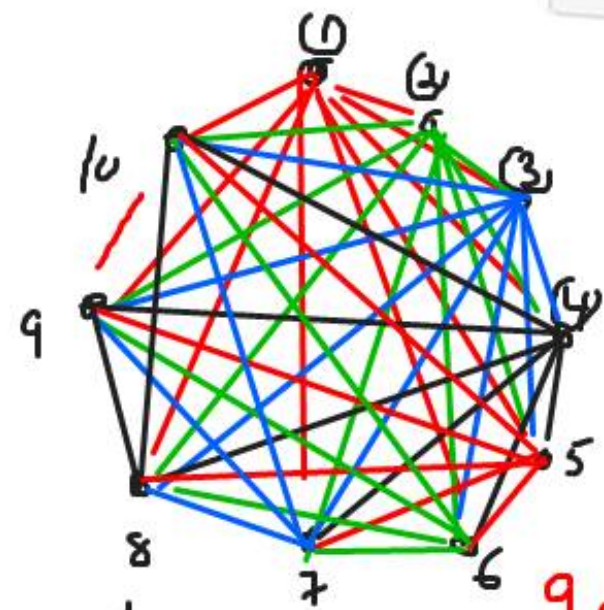
$$10 nCr 2$$

$$nCr(10,2)$$

45

x

$$= 45$$



- 9 games
- 8 games
- 7 games
- 6 games
- 5
- 4
- 3
- 2
- 1

Total = 45

		Team									
		1	2	3	4	5	6	7	8	9	10
Team	1	x	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2	x	x	✓	✓	✓	✓	✓	✓	✓	✓
	3	x	x	x	✓	✓	✓	✓	✓	✓	✓
	4	x	x	x	x	✓	✓	✓	✓	✓	✓
	5	x	x	x		x	✓	✓	✓	✓	✓
	6	x					x	✓	✓	✓	✓
	7	x						x	✓	✓	✓
	8	x							x	✓	✓
	9	x								x	✓
	10	x									x

45 ✓

+ 9
8
7
6
5
4
3
2
1
45

Examine the word 'SCHOOL'

- how many different (distinguishable) arrangements of the letters can be made?
- if the first letter in the arrangement above has to be an 'L', how many arrangements can be made?

a) 6 letters. So $\underline{6} \cdot \underline{5} \cdot \underline{4} \cdot \underline{3} \cdot \underline{2} \cdot \underline{1} = 6! = 720$ ways **IF** all the letters were different! But two "o"s

So $\frac{6!}{2!} = \frac{720}{2} = 360$ ways to distinguishably arrange the letters

b) $\frac{\underline{1}}{\uparrow} \left(\frac{\underline{5!}}{\underline{2!}} \right) \leftarrow \text{Choices}$

only one L

↑
must be "L"

↑
remainder
 $\frac{5!}{2!} = 60$

so $1 \cdot 60 = 60$ ways if start with L



Amanda invests \$10,000 in Dylan's new software company! Dylan promises an annual return (APR) of 8% on her investment, compounded monthly, and will pay Amanda back after 9 years. Determine how much (the future value) Amanda will receive in 9 years. [use the formula manually, and also use an App]

$$A = P_0 \left(1 + \frac{r}{s} \right)^{n \cdot s}$$

$$A = 10,000 \cdot \left(1 + \frac{0.08}{12} \right)^{(9 \cdot 12)}$$

forgot parenthesis!

Warmup/Practice

$$= \$ \text{12,739.50}$$

? Doesn't make sense! Should

$$\$ \text{20,495.30}$$

have doubled (rule of 72)
That makes sense!

I forgot the -ve sign! Important later

-10,000	PV
0	PMT
+20,495.30	FV
8	Rate
108	Periods
Monthly	

You give hand-drawn screen shot:

-10,000 PV
0 PMT
20,495.30 FV*?
8 r%
12 * 9 Pds
= 108
monthly

Debbie just cashed - in her shares in Sandra's 'Photos R Us' photography company. Debbie had loaned Sandra some money to set up a studio five years ago. Sandra promised the shares would make 10% compounded quarterly. Debbie gets a cheque for \$20,000 when she cashes in her shares. Determine the Principal (PV) amount of money that Debbie had invested those 5 years ago . [Just use an App. You *may* want to try using the formula and some algebra too]

Debbie had invested!

-12,205.42

PV

0

PMT

20,000

FV

10

Rate

20

Periods

Quarterly

Warmup/Practice

$$A = P \cdot \left(1 + \frac{r}{s}\right)^{n \cdot s}$$

$$20000 = P \cdot \left[1 + \frac{0.1}{4}\right]^{5 \cdot 4}$$

$$20000 = P \cdot [1.63861644]$$

$$\therefore P = \frac{20,000}{1.63861644}$$

$$P = 12,205.41886$$

$$= \$12,205.42$$

