

Grade 12 Applied
Week 3
Quiz Debrief

23-02-09

MRF



MrF

11

**GRADE 12 APPLIED
WEEKLY QUIZ
WEEK 3 – 23 02 09**

Name: _____
Date: _____

Use your (and / or my) cheat sheet. NOT Open Book (which is why you are tweaking up mine or your cheat sheet)

Show work for best mark. Each individual question is worth 2 marks unless otherwise noted.

USE separate paper if necessary!

Unless otherwise indicated round all decimal answers (including %) to nearest 0.01. Simplify all fractions.

DO QUESTION 1 OR QUESTION 2; Not Both.

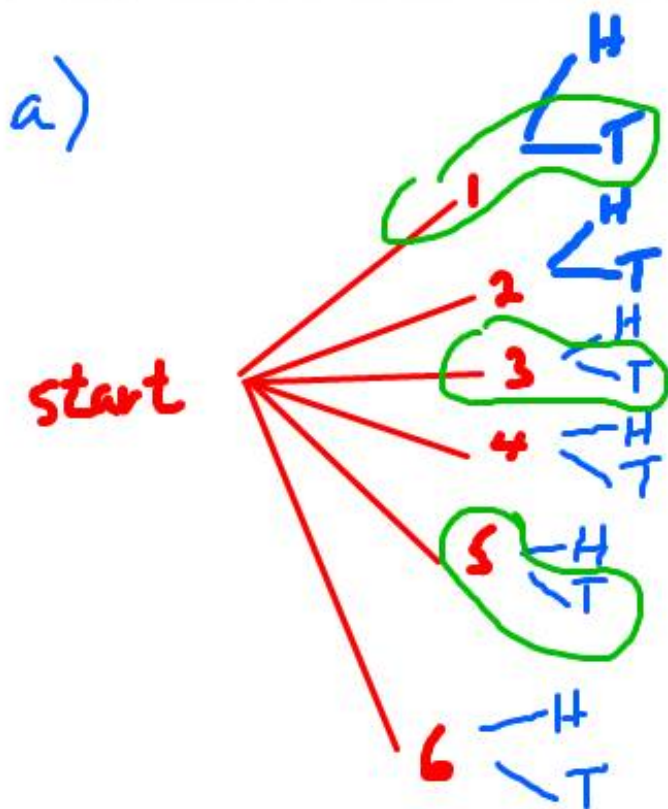
If you do both the better will be marked

1. Kaitlynn rolls a regular 6-sided die numbered 1 to 6 and she flips a coin.

a) Construct a sample space. (tree or table)

b) Determine the probability that she rolls an **Odd** number and flips a **Tail**? Express the probability as a % and as a reduced fraction.

[Prob(Roll odd # AND Flip a Tail)]



	1	2	3	4	5	6
H	1,H	2,H	3,H	4,H	5,H	6,H
T	1,T	2,T	3,T	4,T	5,T	6,T

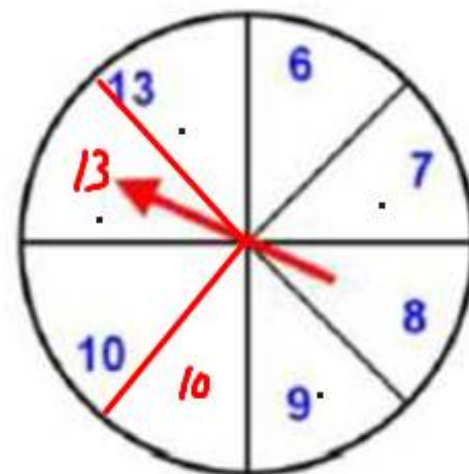
Counting:

b) $\text{Prob}(\text{odd AND Tail}) = \frac{3}{12}$
 $= \frac{1}{4} = 25\%$

OR Formula:

$$\begin{aligned}\text{Prob}(\text{odd} \cap \text{Tail}) &= \text{Prob}(\text{ODD}) \cdot P(\text{Tail}) \\ &= \frac{3}{6} \cdot \frac{1}{2} = \frac{3}{12} = \frac{1}{4} = 25\%\end{aligned}$$

2. Consider the spinner shown to the right.
Determine: [1 mark each]



- a) the number of *equally likely* !! outcomes
- b) the probability of spinning a '6'
- c) the Odds In Favour Of spinning a '6'.
- d) the Odds Against spinning an even number. *that is less than 10*

Need equally likely outcomes to calculate theoretical probability

a) There are 8 equally likely outcomes

b) $P(\text{spin "6"}) = \frac{\# \text{ of "6"s}}{\# \text{ Total Possible outcome}} = \frac{1}{8} = 12.5\%$

c) Odds in Favour of a "6"

1 : 7
"6" outcomes : NOT "6"

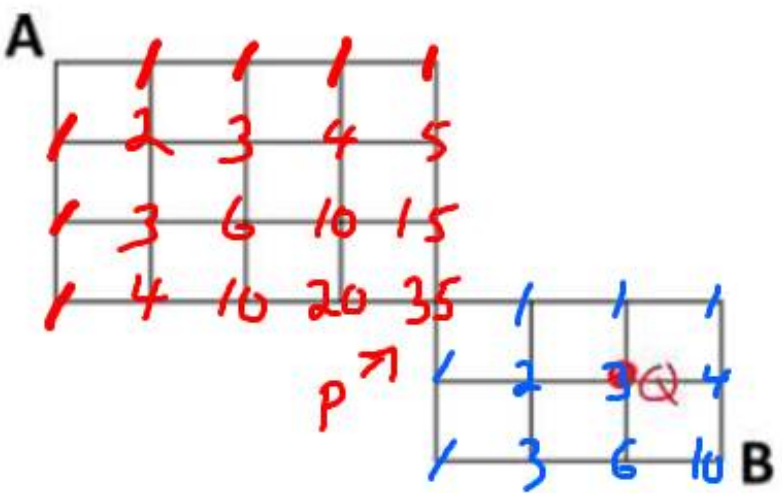
Odds are 1 to 7 for spinning a "6"

d) Odds Against Even

~~3~~ : ~~2~~
OF NOT EVEN : # of Even
<10 <10

3. Pathways.

a. Determine how many ways can you go from A to B in the diagram below if you can only move right or down.



b. Determine the probability you randomly wander past point Q.

Work Area: a) **Pascal Method**

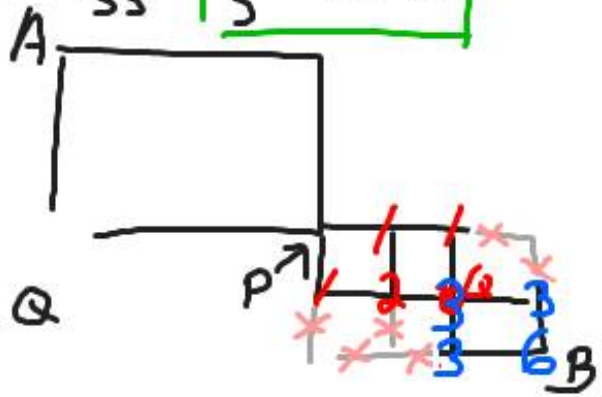
$A \rightarrow P = 35$ Paths
 $P \rightarrow B = 10$ Paths

FCP: $35 \cdot 10 = 350$ Paths
 A to B
 unrestricted

$$b) P(\text{Pass } Q) = \frac{\text{\# of paths passing } Q}{\text{\# of paths total}} = \frac{210}{350} = \frac{21}{35} = \frac{3}{5} = 60\%$$

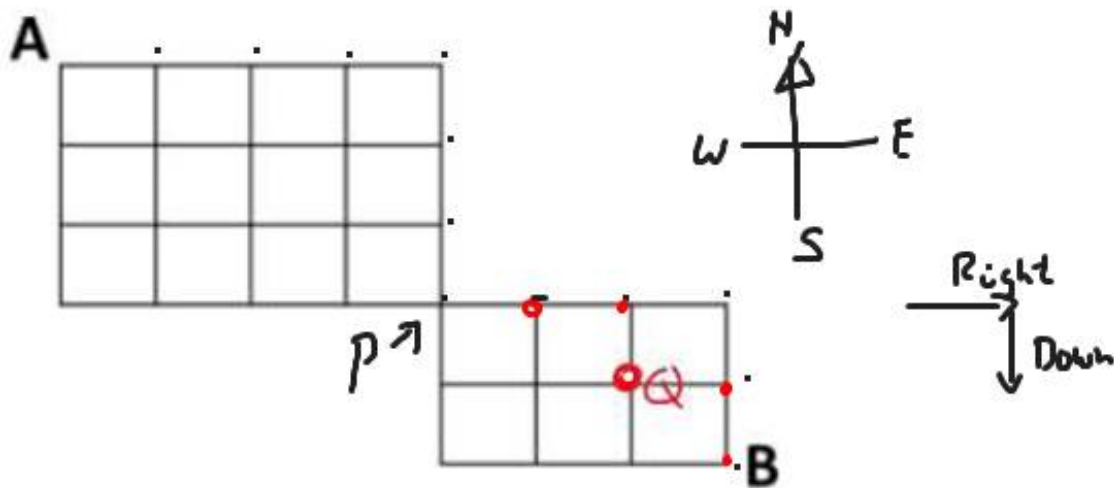
$A \rightarrow P$ 35 Paths
 $P \rightarrow B$: 6 Paths
 thru Q

$35 \cdot 6 = 210$
 paths
 through Q



3. Pathways.

a. Determine how many ways can you go from A to B in the diagram below if you can only move right or down.



b. Determine the probability you randomly wander past point Q.

Work Area:

Use Distinguishable Arrangements

$$A \rightarrow P = \frac{7!}{4!3!} \rightarrow 7 \text{ moves} = 35 \text{ paths } A \rightarrow P$$

$\rightarrow 4 \text{ must be East, } 3 \text{ must be South}$

$$P \rightarrow B_{\text{unrestricted}} = \frac{5!}{3!2!} = 10 \text{ paths} \quad \therefore A \rightarrow B = 35 \cdot 10 = 350 \text{ Possible Paths}$$

$$P(\text{Pass } Q) = \frac{\# \text{ of paths passing } Q}{\# \text{ of paths total}} = \frac{210}{350} = \frac{21}{35} = \frac{3}{5} = 60\%$$

$$P \rightarrow Q = \frac{3!}{2!1!} = 3 \quad Q \rightarrow B = \frac{2!}{1!1!} = 2 \quad \therefore A \rightarrow B \text{ thru } Q = 35 \cdot 3 \cdot 2 = 210$$

4. Gina wants to decorate her living room arranging some different family portraits on a shelf. She has twelve family portraits and only has room to line up four of them (in some order) on the shelf.

a. In how many ways can Gina do this?

b. Gina randomly selects and places the four pictures. Determine the probability that Aunt Mathilde is on the left?

a) choices \rightarrow $12 \cdot 11 \cdot 10 \cdot 9 = 11,880$ ways
shelf places

OR ${}_{12}P_4 = 11,880$

Select 4

12 pics

b) choices \uparrow shelf
mathilde $1 \cdot 11 \cdot 10 \cdot 9 = 990$ ways
with mathilde on left

$\therefore P(\text{Mathilde on left}) = \frac{990}{11,880} = \left(\frac{1}{12}\right)$

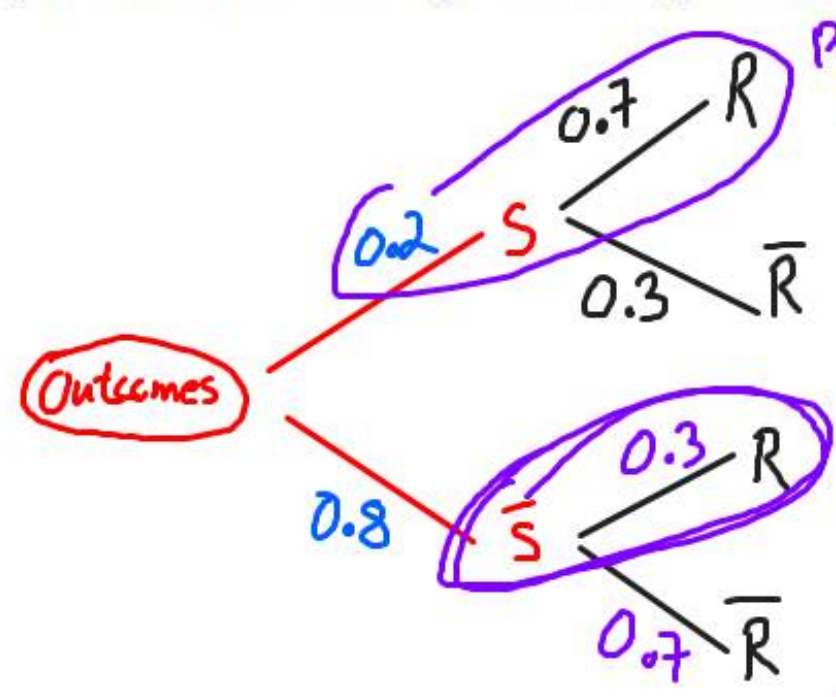
OR Formula: $P(\text{mathilde drawn first}) = \frac{1 \text{ mathilde}}{12 \text{ family}} = \left(\frac{1}{12}\right)$

5. **Conditional Probability.** Lena runs every day. (If it is sunny, then probability she will run outside is 70%) If it is not sunny, then the probability that she will run outside is 30%. A 20% probability of sunshine has been announced for tomorrow's weather forecast.

Did in warm up!!

a) Use a graphic organizer (probability tree) to show all the possible outcomes for this situation

b) Determine the probability that Lena does run outside tomorrow.



Prob (Sunny & Run)
 $0.2 \cdot 0.7 = 0.14$

S = Sunny
 R = Run

OR

Prob (Not Sunny, Run)
 $= 0.8 \cdot 0.3 = 0.24$

Add $\frac{0.14}{0.38} = 38\%$ chance she will run

OR

$$P(\text{Run}) = P(S, R) + P(\bar{S}, R)$$

$$= 0.2 \cdot 0.7 + 0.8 \cdot 0.3 = 0.38$$

$$= 38\%$$

6. **Distinguishable Arrangements.** Determine how many ways we can distinguishably arrange all the letters in the word COFFEE?

C O F F E E
↻ ↻

Did this
in warmup
for
Goofball

6 letters.

If all different then $6!$ ways
ie 720 arrangements

but there are 2 "E" and 2 "F" that are
indistinguishable

$$\frac{6!}{(2! \cdot 2!)} = \frac{720}{4} = 180 \text{ distinguishable arrangements}$$

↑ ↑
E's F's

7. Mr.F has been asked to assemble any five of his students to go to the lounge to set up chairs! Mr.F has 12 students in the class.

a. how many different groups of five are possible?

Group, gaggle!
No order!

b. Mr.F randomly selects the five students; determine the probability that Katelynn, one of the students, is in the group going to set up chairs.

a) $12C_5 = 792$ ways to randomly select a group (no order) of students out of 12

b) $\frac{1}{12} \left(\frac{11C_4}{\text{---}} \right)$

↑
must have Katelynn = 330 groups with Katelynn

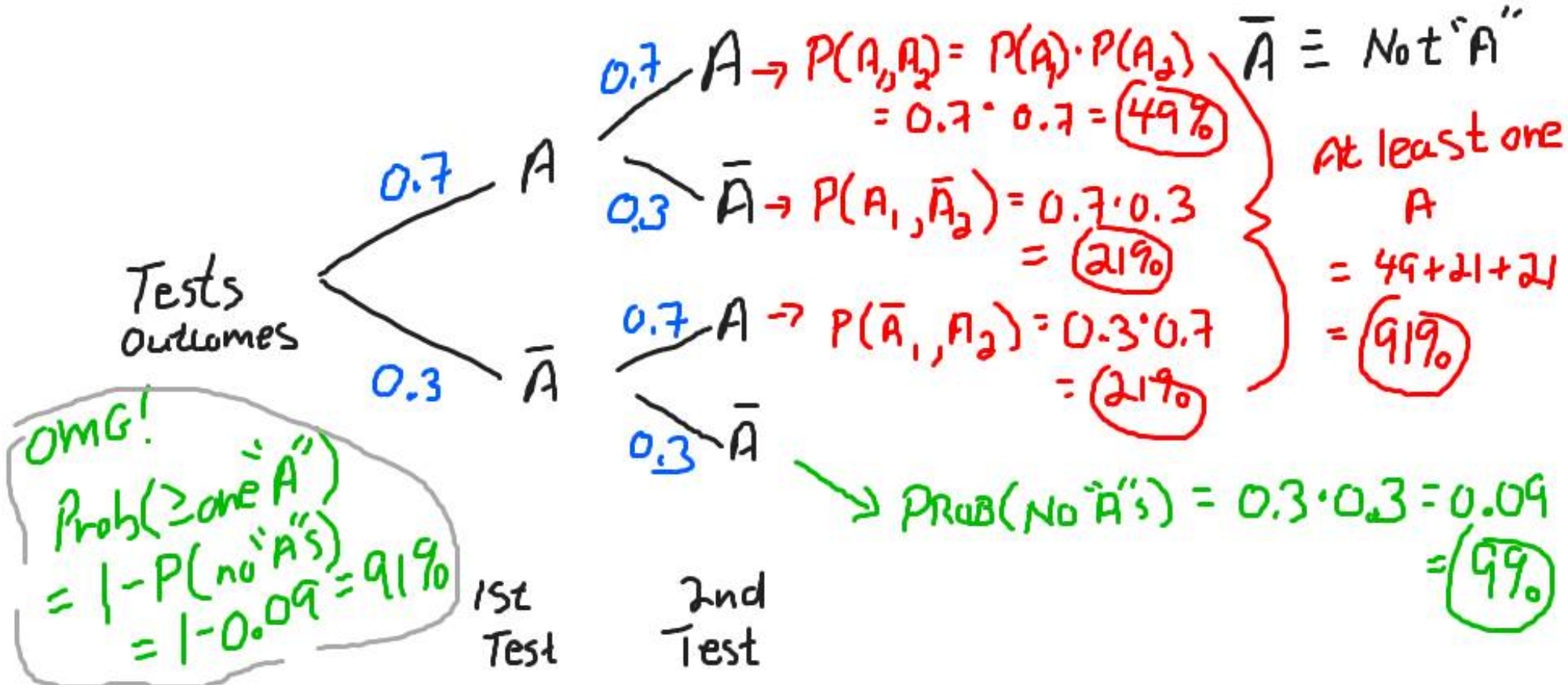
Already decided
Katelynn is going
So only need to select 4 students out of 11

BONUS MARKS (1 Mark each individual question)

Winston has a 70% chance of getting an 'A' on each and every math test. He has two tests remaining till the end of the course. Determine the probability, as a percent rounded to the nearest tenth, that:

- a) He gets an A on both remaining tests; ie: $\text{Prob}(A_1, A_2)$ **49%**
- b) He gets an A on at least one test; [ie: $\text{Prob}(\geq \text{one 'A'})$] **91%**
at least one; one or more; not none!

$A \equiv \text{'A'}$
 $\bar{A} \equiv \text{Not 'A'}$



BONUS. You are given a 3-question multiple-choice quiz. Each question has four possible answers, only one of which is correct. You did not study, you figured you could just randomly guess. If you *randomly* pick an answer for each of the three questions, what is the probability that all 3 answers are wrong? [Multiple Choice: Circle best or closest answers].

a) 42%

really? This is not can't be this!
~~b) 25%~~ only 25%? ~~c) 50:50~~ it! ~~d) ~4%~~

A thinker
Stinker!

What is the probability you pass (ie: 50% or more) the three-question math quiz. [ie: you need at least two quiz questions correct]

? \searrow needs two correct to pass

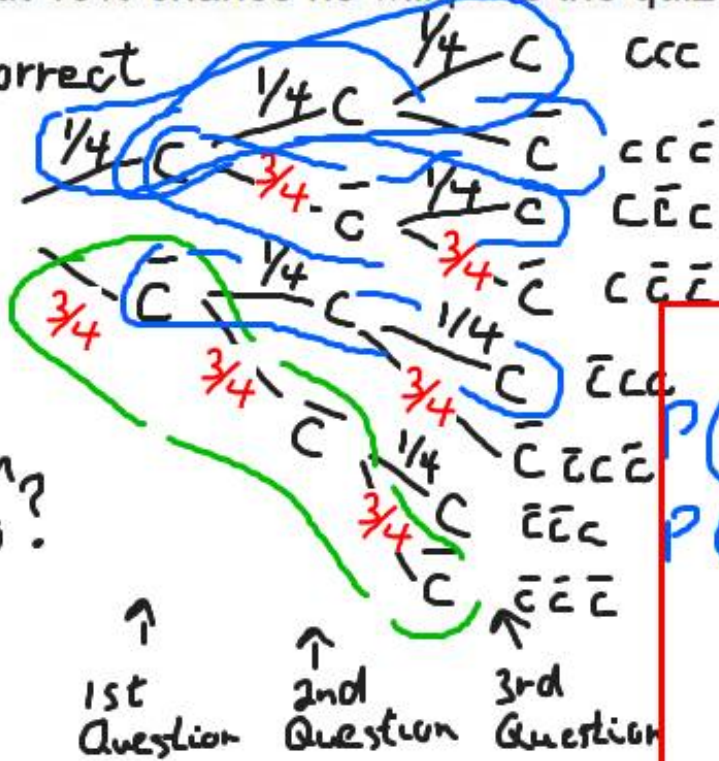
Intuitive!
guess
What makes?
Really? sense

Are the
answers not
intuitively??
obvious??

- a) about 45% he will pass the quiz
- ~~b) no way will he pass~~ he could
- ~~c) about 75% chance he will pass the quiz~~
- d) about 15% chance he will pass the quiz

a) $P(\text{all three wrong}) = \frac{3}{4} \cdot \frac{3}{4} \cdot \frac{3}{4}$
 $= \frac{27}{64} \approx 42\%$

ANSWER



b) $P(\text{get at least two correct})$
 $P(\text{All 3 correct}) = (\frac{1}{4})^3 = \frac{1}{64} = 1.56\%$
 $P(2 \text{ correct}) = (\frac{1}{4} \cdot \frac{1}{4} \cdot \frac{3}{4}) \cdot 3 = 0.14$
 So: $14\% + 1.56\% \approx 15.56\% \approx 16\%$
 Yes! It takes some work!

Did you
not even?
do this?

BONUS. You are given a 3-question multiple-choice quiz. Each question has four possible answers, only one of which is correct. You did not study, you figured you could just randomly guess. If you *randomly* pick an answer for each of the three questions, what is the probability that all 3 answers are wrong? [Multiple Choice: Circle best or closest answers].

- a) 42% b) 25% c) 50:50 d) ~4%

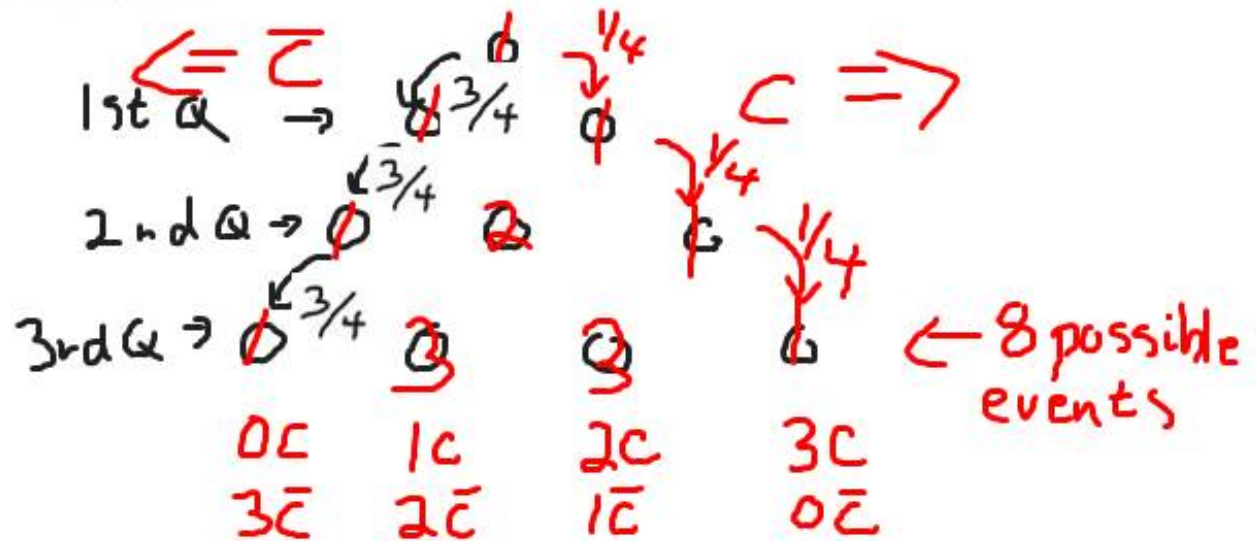
A thinker
Stinker!

What is the probability you pass (ie: 50% or more) the three-question math quiz. [ie: you need at least two quiz questions correct]

- a) about 45% he will pass the quiz
b) no way will he pass
c) about 75% chance he will pass the quiz
d) about 15% chance he will pass the quiz

Intuitive!
guess
What makes?
sense.

OR Pascal
method since
only two outcomes



We will do
lots of this
"Binomial" stuff in statistics!

BONUS. You have a stack of ten cards numbered 11 to 20. Determine the probability that a randomly drawn card is an odd number OR a multiple of three?

11	$\div \text{by } 3$	13		$\div \text{by } 3$		$\div \text{by } 3$				
12		14		15		16		17	18	19
odd		odd		odd				odd		

duplicate ↙

$$\text{Prob}(\text{odd OR divisible by } 3) = \frac{(5 + 3 - 1)}{10}$$

Count the sample space = $\frac{7}{10} = 70\%$

Formula method for non-mutually exclusive events

$$\begin{aligned} \text{Prob}(\text{odd OR divisible by } 3) &= P(\text{odd}) + P(\text{multiple of } 3) \\ &= \frac{5}{10} + \frac{3}{10} - \frac{1}{10} \\ &= \frac{7}{10} = 70\% \end{aligned}$$

- P(Both odd and $\div \text{by } 3$)

Well thank goodness that is done! ?



**There are still a couple workbooks
you may want to explore.**



**The Mid-Term Test will have some
probability, so do not do a brain
dump just yet**

We do a bit more of this type of stuff in Statistics too