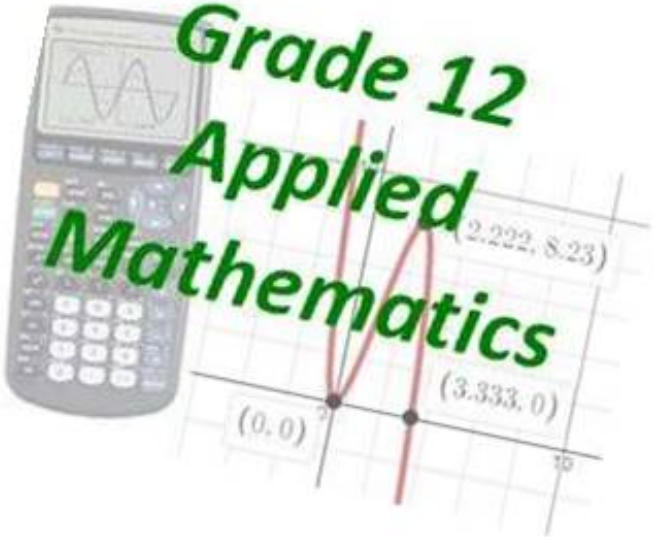


Grade 12 Applied TEST Debrief Week 6

23-03-02

MrF

GRADE 12 APPLIED
Mid-Term Test 23-03-02

Name:_____
Date: _____

CLOSED BOOK. Use the formulae in my (but preferably *your*) cheat sheet or both.

Missing the test requires negotiation with Natallie, tomorrow is an alternate date (with some penalty)

Round decimal and percent answers to nearest 0.01. All fractions are to be reduced.

Show organized work for best mark. A plain answer with no explanation is not sufficient. Showing *any reasonable work* is likely worth *some* marks. Pretend you are explaining to a nephew! ← !

If using an App, give *a hand-drawn 'screen shot'* of the App's entire display with your entries and the solution.

Each individual question is worth two marks unless otherwise indicated.

Should av taken 25'! Had an hour 15!

1. Cherokee has six different cute dolls. Her mom says she can bring any three of them with her on a car ride. Determine how many possible different groups of ~~three~~ dolls Cherokee can grab to throw in her knapsack.

4 ← I used 4, misread question 30 sec

Clearly an arrangement of different objects and the order does not matter (since just thrown into knapsack in no orderd arrangement)

$_6C_4$ = nCr(6,4) = 15

15 ways to select 4 dolls, in no particular order

If you had no nCr button:

$$_6C_4 = \frac{6!}{(6-4)!\,4!} = \frac{6!}{(2!\cdot 4!)} = \frac{\cancel{6}^{3}\cdot 5\cdot \cancel{4}\cdot \cancel{3}\cdot \cancel{2}\cdot \cancel{1}}{\cancel{2}\cdot \cancel{4}\cdot \cancel{3}\cdot \cancel{2}\cdot \cancel{1}} = 15$$

Here is a way to think about it too!

Combo!

	Doll A	Doll B	Doll C	Doll D	Doll E	Doll F
Chosen? or not? →	Y	N	Y	N	Y	Y ?

How many ways can you distinguishably arrange 4 Y's and 2 N's? lol

$$\frac{6!}{4!\,2!} = {}_6C_4 = 15$$

2. Determine how many we can we distinguishably arrange all the letters in the word 'DOLLARAMA'.

This should take 1 min

9 letters. If all different then 9! ways

But Not all different

$$\frac{9!}{(2! \cdot 3!)} = \frac{9!}{(2! \cdot 3!)}$$

2! → L's

3! → A's

$$= 30240$$

There are 30,240 distinguishable arrangements of the letters

3. **Compound Investment**. Chris puts $3,000 in an account that accumulates 4% interest, compounded weekly. How much money does he have after five years?
[*Solve using* ***formula*** *and do it also with an App and show the hand-drawn screenshot*] [1 mark each]

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

$$= 3{,}000 \cdot \left(1 + \frac{0.04}{52}\right)^{(5 \cdot 52)}$$

$$= 3000 \cdot \left(1 + \frac{0.04}{52}\right)^{(5 \cdot 52)}$$

$$= 3663.92656$$

$$= \$3{,}663.93$$

Present Value	-3,000
Payments	0
* **Future Value**	3,663.93 *
Annual Rate (%)	4
Periods	260
Compounding	Weekly

makes sense!
Simple Interest would have given $3,600

4. **Compound Investment**. Kyle gets an inheritance and invests $12,500 in a high-interest savings account. The account has an interest rate of 9%, compounded quarterly. When he takes it out of the account, he has $23,306.81. Determine how many ***years*** he had invested his money.

!! Read question

[*Use an App. Do hand-drawn screen shot of App solution*]

PV −12,500

PMT ∅

FV 23,306.81

% 9

* Pds 28 ?

Compounding Frequency Quarterly (4 times/yr)

Present Value	-12,500
Payments	0
Future Value	23,306.81
Annual Rate (%)	9
Periods	28.0
Compounding	Quarterly

28 quarterly periods = 28/4 = 7 years

You know easy to check, eh!

Check? $12{,}500 \cdot \left(1+\frac{0.09}{4}\right)^{(7 \cdot 4)} \overset{?}{=} \$23{,}306.81$

4. **Compound Investment**. Kyle gets an inheritance and invests $12,500 in a high-interest savings account. The account has an interest rate of 9%, compounded quarterly. When he takes it out of the account, he has $23,306.81. Determine how many ***years*** he had invested his money.

[*Use an App. Do hand-drawn screen shot of App solution*]

You could have "guessed and checked" if desperate

? ↓ ×

$$12500 \cdot \left(1 + \frac{0.09}{4}\right)^{(5 \cdot 4)}$$

$$= 19506.365008$$

$$12500 \cdot \left(1 + \frac{0.09}{4}\right)^{(6 \cdot 4)}$$

? ×

$$= 21322.082201$$

$$12500 \cdot \left(1 + \frac{0.09}{4}\right)^{(7 \cdot 4)}$$

? Yes 7 years works

$$= 23306.81237$$

You know easy to check, eh!

5. Using proper grammar and sentence structure, explain the difference between a Permutation and a Combination. An example is a good way to make the explanation even more clear! (Remember! Explaining to your 14 year old nephew!)

A Permutation is an arrangement of different objects in which the order matters. Example: Runners crossing finish line in a race, awarding different Burger King Coupons. Example: 10 student and we want to line up 3 of them at the door. ${}_{10}P_3$ = 720 ways to do it.

A Combination is an arrangement of different objects in which the order DOES NOT matter. Example: Being picked to go on a trip to New Zealand, you do not care what order you are picked in, just that you are in the chosen group! 10 Students, only four can be chosen: ${}_{10}C_4$ = 210 different possible groups can be formed.

6. A well-shuffled deck of cards is taken out. For the following different trials determine the probability of drawing: (1 mark each) [give answers as reduced fractions] [A sample space diagram of a deck of cards is attached at end of this test]

a) two queens **with** replacement. [ie: $P(Q_1, Q_2)$] $= P(Q_1) \cdot P(Q_2) = \frac{4}{52} \cdot \frac{4}{52} = \frac{1}{169}$

b) two queens ***without*** replacement. [ie: $P(Q_1, Q_2 | Q_1)$] $= \frac{4}{52} \cdot \frac{3}{51} = \frac{1}{221}$

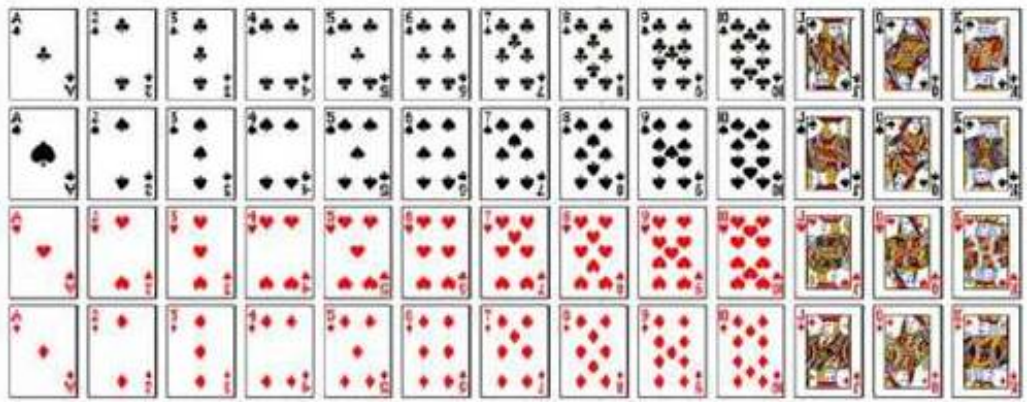
c) three Red cards **with** replacement.

d) a Queen and then a King ***without*** replacement.

c) $P(R,R,R) = P(R) \cdot P(R) \cdot P(R) = \frac{26}{52} \cdot \frac{26}{52} \cdot \frac{26}{52} = \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{8}$

d) $P(Q_1, K_1) = P(Q_1) \cdot P(K_2 | Q_1) = \frac{4}{52} \cdot \frac{4}{51} = \frac{16}{2652} = \frac{4}{663}$ chance

Deck of 52 cards



7. **Problem Solve / Logic**. A farmer has 25 animals; chickens and pigs only. He forgets how many he has of each, but he does remember for some weird reason that there are 80 legs amongst all his animals. Determine how many chickens the farmer has. [Show some work, ie: check, even if you guessed in your head!]

Guess & check! (Much better ways though) ♡ these!

Chicks	Pigs	Animals	Legs
10 ?	15	25	10 chicks · 2 legs/chick = 20 + 60 = 80 legs + 15 pigs · 4 legs/pig

Wow! Nailed it on first guess

Check: $10 \cdot 2 + 15 \cdot 4 = 80$ ✓

Answer: The farmer has 10 Chickens

7. **Problem Solve / Logic**. A farmer has 25 animals; chickens and pigs only. He forgets how many he has of each, but he does remember for some weird reason that there are 80 legs amongst all his animals. Determine how many chickens the farmer has. [Show some work, ie: check, even if you guessed in your head!]

Algebra?! (Grade 9)

Let x be the "number of chickens"

chicken legs: $(2 \cdot x)$ ← Chickens

# of pig legs: $4 \cdot (25 - x)$ ← # of pigs

$= 80$ legs

$$2x + (100 - 4x) = 80$$

like terms

$4 \cdot (25 - x)$

$100 - 4x$

$$-2x + 100 = 80 \quad (-100 \text{ from both sides})$$

$$-2x = -20$$

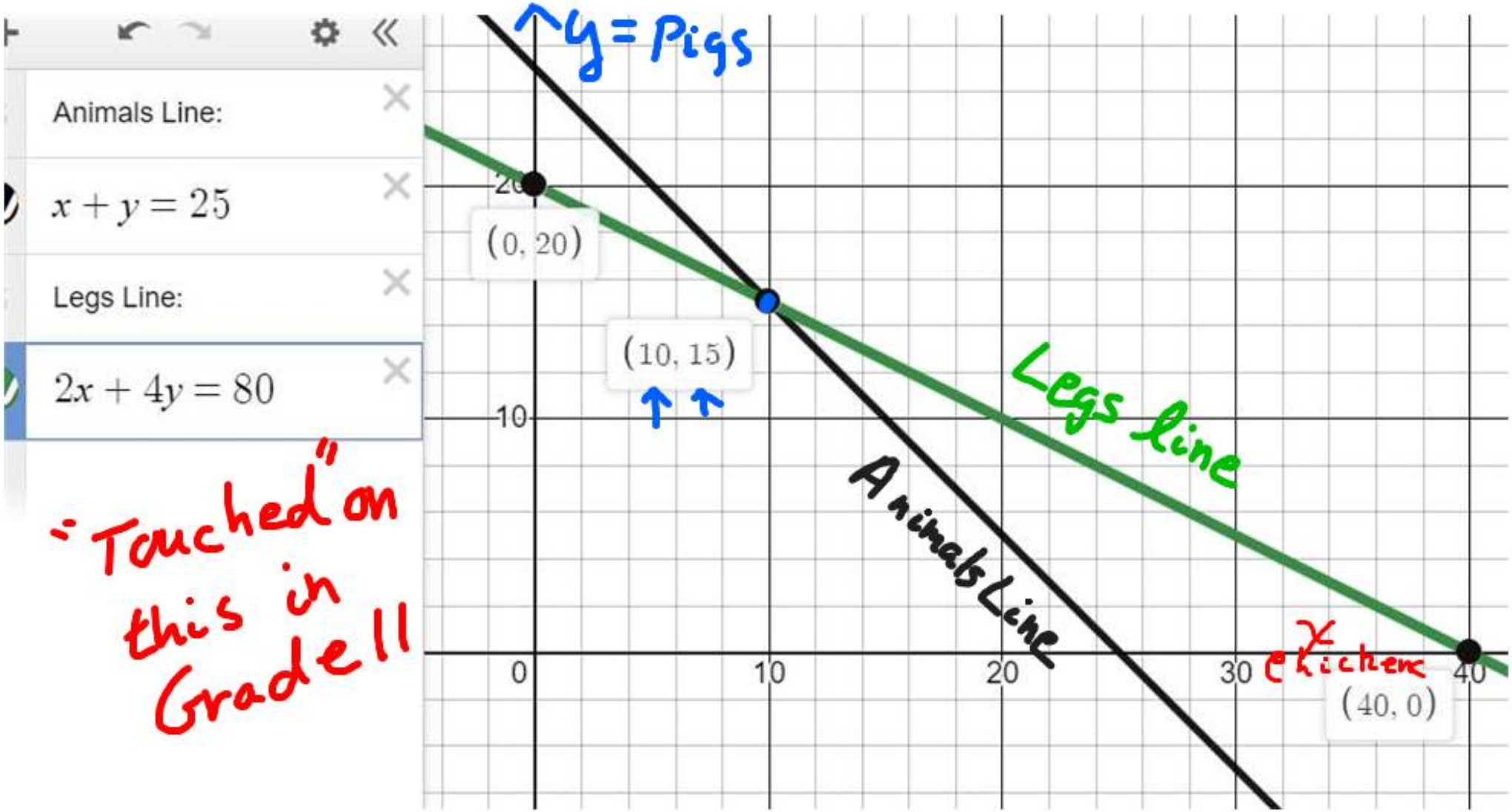
$(\div -2$ from both sides$)$

$$x = 10$$

10 Chickens

7. **Problem Solve / Logic**. A farmer has 25 animals; chickens and pigs only. He forgets how many he has of each, but he does remember for some weird reason that there are 80 legs amongst all his animals. Determine how many chickens the farmer has. [Show some work, ie: check, even if you guessed in your head!]

Can we graph the solution?



- Touched on this in Grade 11

8. A well shuffled deck of cards is used to deal out a single card. For the following two situations determine the probability of dealing: [answers as reduced fractions and percents]

a. a King **or** a Club?

b. a nine **or** a face card?

a) $P(K \text{ OR } \text{CLUB}) = P(K) + P(\text{club}) - P(K \text{ and } \text{Club})$

$= 4/52 + 13/52 - 1/52 = \frac{16}{52} = 4/13$

$= 30.77\%$

b) $P(\text{"9" or Face}) = P(\text{"9"}) + P(\text{Face}) - P(\text{the 9 has a face})$

$= 4/52 + 12/52 - 0/52$

$= 16/52 = 4/13 = 30.77\%$

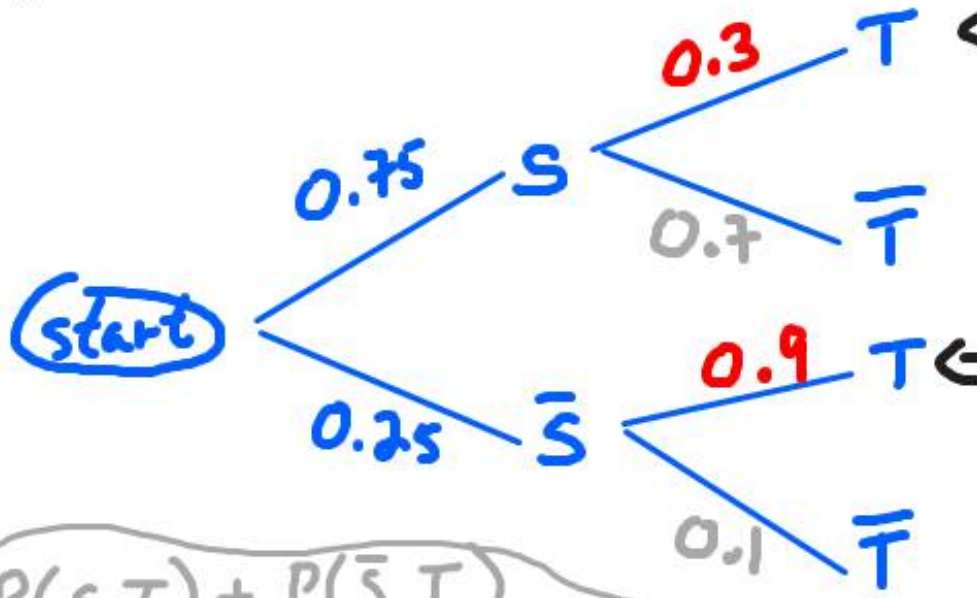
DO QUESTION 9 OR 10 below but not Both.
(if you do both the better one will be marked)

9. **Dependent Probability**. The weather report calls for a 75% probability of snow in northern Manitoba on Tuesday. The flight from Thompson to Flin Flon has a 30% probability of being on time **when it is snowing**. There is an 90% probability of the flight being on time **when it is not snowing**.

a) Draw a graphic organizer (probability tree) to show all possible outcomes for the situation.

b) Determine the probability that the flight on Tuesday will **be on time**.

♡These



$0.75 \cdot 0.3 = 0.225$ ← on Time

$0.25 \cdot 0.9 = 0.225$ ← on Time

OR

S ≡ snow

T ≡ on time

$P(S,T) + P(\bar{S},T)$

$P(S) \cdot P(T|S) + P(\bar{S}) \cdot P(T|\bar{S})$

$= 0.75 \cdot 0.3 + 0.25 \cdot 0.9 = 45\%$

$0.225 + 0.225 = 45\%$ probability ontime

10. **Annuity Payments**. Evan has $4,000 in his savings account but he wants to add more every month to save up for a boat. He is able to deposit $350 monthly. The bank offers him a 5.4% interest rate compounded monthly. He estimates he wants to buy the boat in four years.

a) How much will he have saved for the boat after 4 years?

b) How much interest does he earn in this account over the 4 years?

Straight out of workbook

[*Use an App. Do hand-drawn screen shot*]

PV -4000 ← start

PMT -350 Regular top ups monthly

? FV 23,667.65

% 5.4

Pds 48 ← 4 yr · 12 pmts/yr

Compounding monthly

Present Value	-4,000
Payments	-350
Future Value	23,667.65
Annual Rate (%)	5.4
Periods	48
Compounding	Monthly

b) 23,667.65
− 20,800.00
2,867.65 Interest Earned

make sense?
(with zero interest would have been 20,800)

BONUSES (one mark for each individual question)

11. A pair of dice is placed in a container and shaken well. What is the probability of rolling: [*hint: a sample space is on the wall up front*]

a. a sum of three **or** a sum of 9?

b. a sum less than 8 **or** doubles?

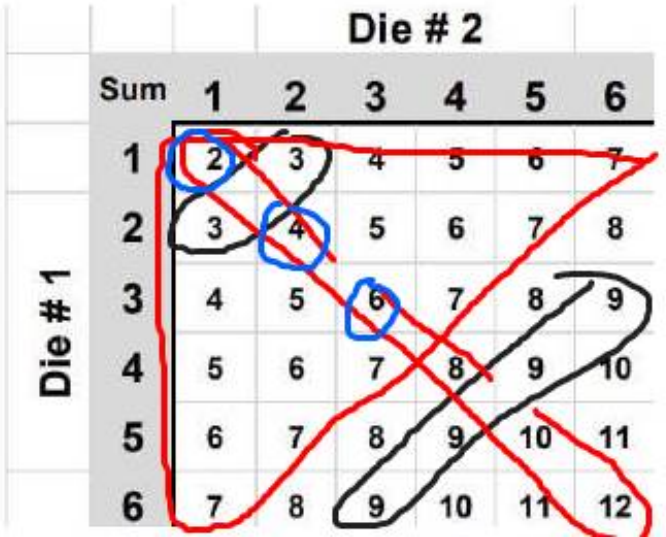
a) $P(\text{sum}=3 \text{ or } \text{sum}=9) = P(\text{sum}=3) + P(\text{sum}=9) - P(3=9)$

$= \frac{2}{36} + \frac{4}{36} + \frac{0}{36} = \frac{6}{36} \left(\frac{1}{6}\right)$

b) $P(\text{sum}<8 \text{ OR DOUBLES})$

$= \frac{21}{36} + \frac{6}{36} - \frac{3}{36}$

$= \frac{24}{36} = \left(\frac{2}{3}\right)$



Sum	Die # 2: 1	2	3	4	5	6
Die # 1: 1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

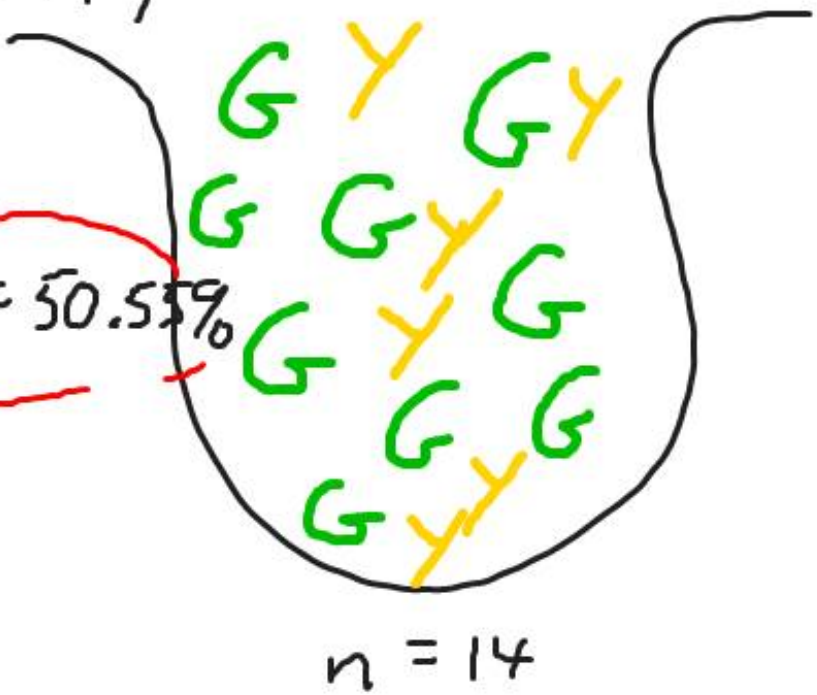
12. **Nine** green marbles and five yellow marbles are placed in a bag. A marble is drawn, **not placed back** in the bag and then a second marble is chosen. Determine the probability of drawing two green marbles **or** two yellow marbles? [*ie*: $P(G_1,G_2)$ OR (Y_1,Y_2)] (ie: matching marbles).

$$P(G_1, G_2) + P(Y_1, Y_2)$$

$$P(G_1) \cdot P(G_2|G_1) + P(Y_1) \cdot P(Y_2|Y_1)$$

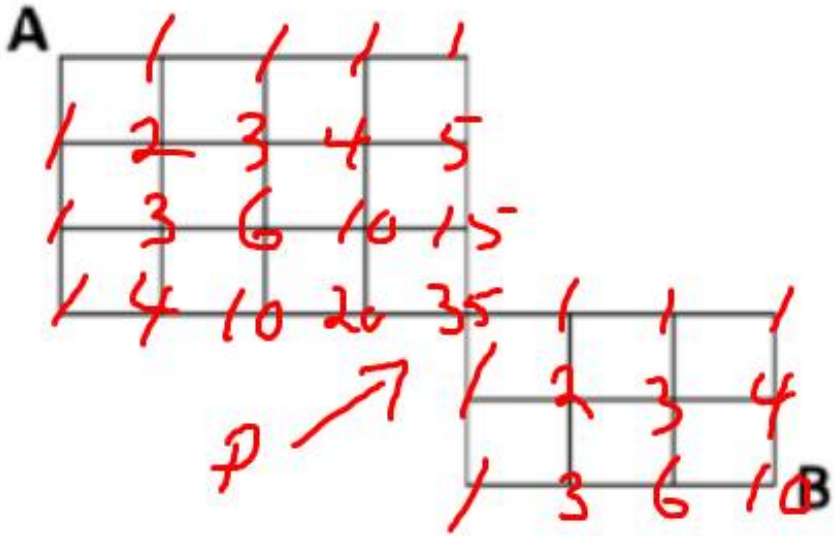
$$= \frac{9}{14} \cdot \frac{8}{13} + \frac{5}{14} \cdot \frac{4}{13}$$

$$= \frac{72}{182} + \frac{20}{182} = \frac{92}{182} = \frac{46}{91} = 50.55\%$$



$n = 14$

13. **Pathways**. How many ways can you go from A to B in the diagram below if you can only move right or down?



A freebie!

$A \to P = 35$

then $P \to B = 10$

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

(or) $\frac{7!}{(4!3!)} \cdot \frac{5!}{(3!2!)} = 35 \cdot 10$

$A \to P$ $\quad P \to B$

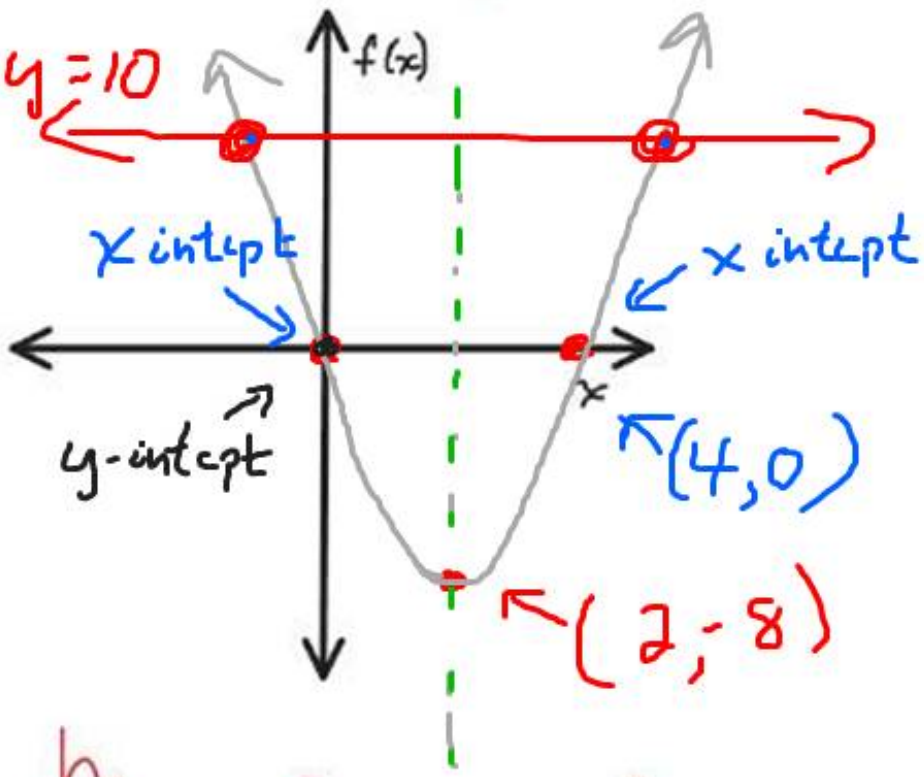
$= 350$ paths A to B

14. Given the quadratic function:

$$f(x) = 2x^2 - 8x$$

a. *Sketch* the parabola to the right.

label significant points on the sketch



State the following
(0.5 mark each lettered question)

b. Vertex Point: (2 , -8)

c. State the Line of Symmetry:
x = _____ x = 2

d. State the **y**-intercept: (0 , 0)

e. State the x-intercept(s): (*if any*)

(0 , 0) & (4 , 0)

h.
Domain: $\{-\infty < x < \infty\}$
Range: $\{-8 \le f(x) < \infty\}$

f. Solve for the value(s) of x that make the function have a value of 10, *ie:* solve for:

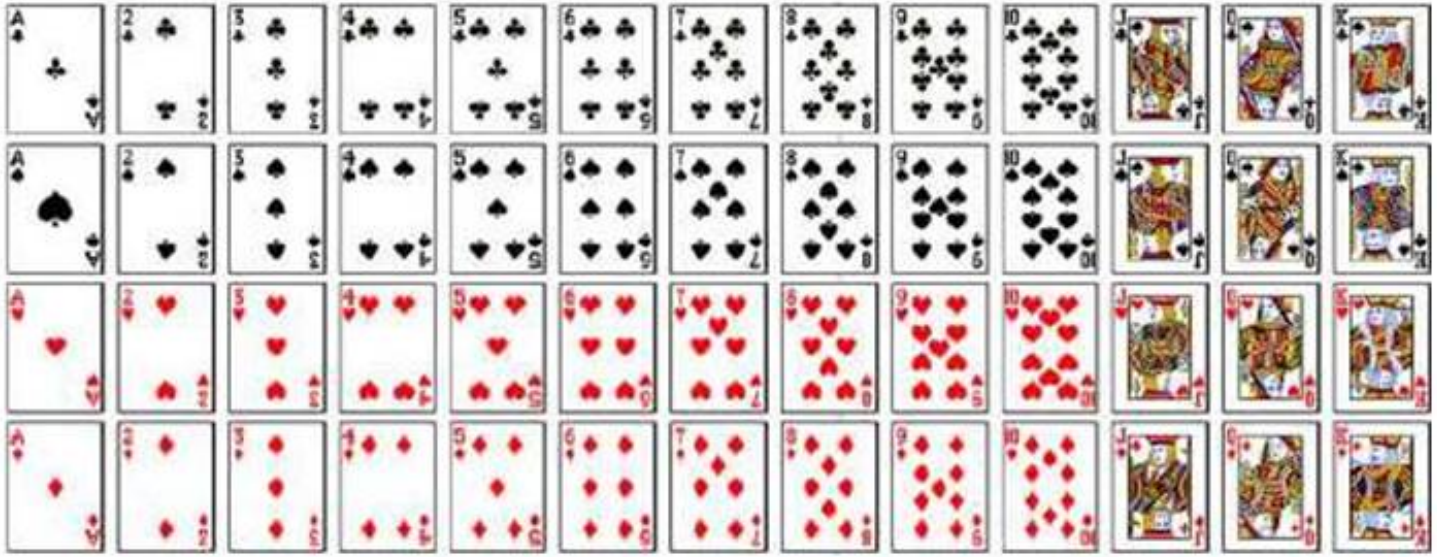
$2x^2 - 8x = 10$

g. x = 5 and -1 ← check?

$2(5)^2 - 8(5) = 10$ ✓
$2(-1)^2 - 8(-1) = 10$ ✓

(0.5 mark each, each lettered question)

Deck of 52 cards



		Die # 2					
	Sum	1	2	3	4	5	6
Die # 1	1	2	3	4	5	6	7
	2	3	4	5	6	7	8
	3	4	5	6	7	8	9
	4	5	6	7	8	9	10
	5	6	7	8	9	10	11
	6	7	8	9	10	11	12

LOAD CLEAR !

Through adversity, we'll conquer!

Blaze into the sky!

A trail of glory!