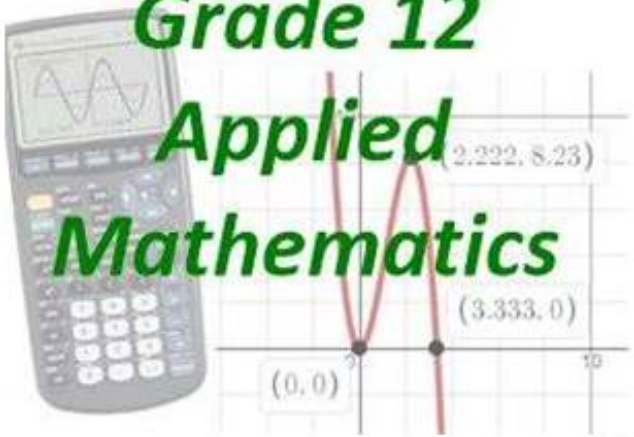


Grade 12 Applied Week 8 Quiz Debrief (Optional)

MrF

23-03-16

GRADE 12 Applied Weekly Quiz

Name:_____

Date: _____

Quiz Week 8. Optional. Any attempt will not make your mark worse. May elevate course mark by 2 – 4% for some or just lock in mark for those with better mark already.

Round decimal and percent answers to nearest 0.01

SHOW WORK. Each individual numbered or lettered question is worth 2 marks unless otherwise indicated.

Reduce all fractions. Round all decimal and percent answers to the nearest 0.01.

→ method you used!

You have my cheat sheet!

And hopefully your cheat sheet explains it in your own context!!

1. For the following **quadratic** function:

10

$$f(x) = x^2 - 6x + 3$$

a. Use a graphing tool. Make a representative sketch of the function. Significant points should be in correct quadrants.

b. State the Domain and the Range

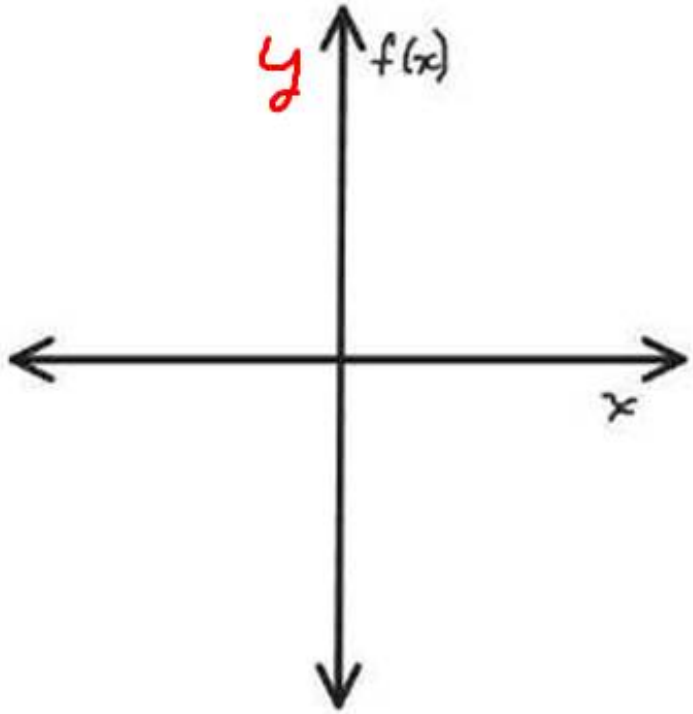
{ _____ < x < _____ }

{ _____ < f(x) < _____ }

c. Label on the sketch and state the following.

Vertex: (_____, _____)

Axis of Symmetry: x = _____



d. Label on the sketch and state:

y – intercept: (___, _____)

'zeros' [x- intercept(s)] if any

(____, __) ; (____, __)

f. Solve for x:

$$10 = x^2 - 6x + 3$$

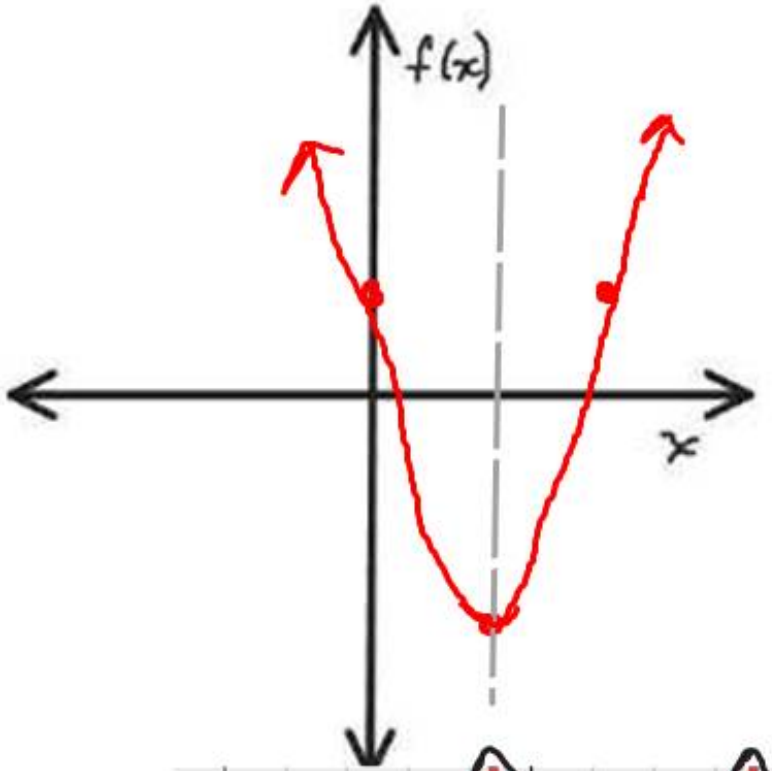
x = _____ & _____

1. For the following **quadratic** function:

10

$$f(x) = x^2 - 6x + 3$$

a. Use a graphing tool. Make a representative sketch of the function. Significant points should be in correct quadrants.



b. State the Domain and the Range

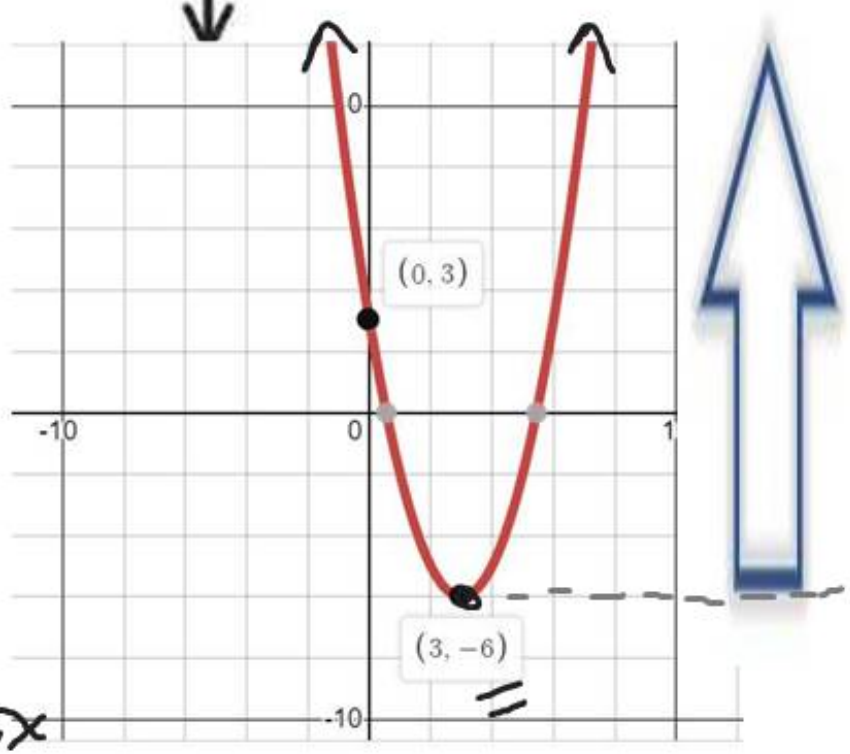
all values

{ $-\infty$ < x < ∞ }

{ -6 ≤ f(x) < ∞ }

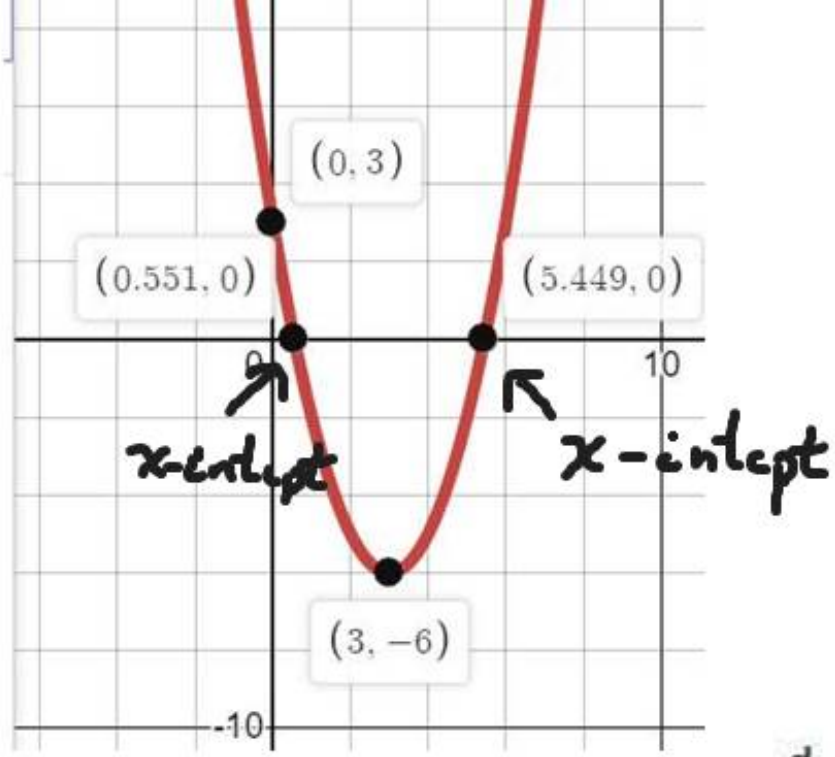
↑ how low

↑ how high



$f(x) \geq -6$

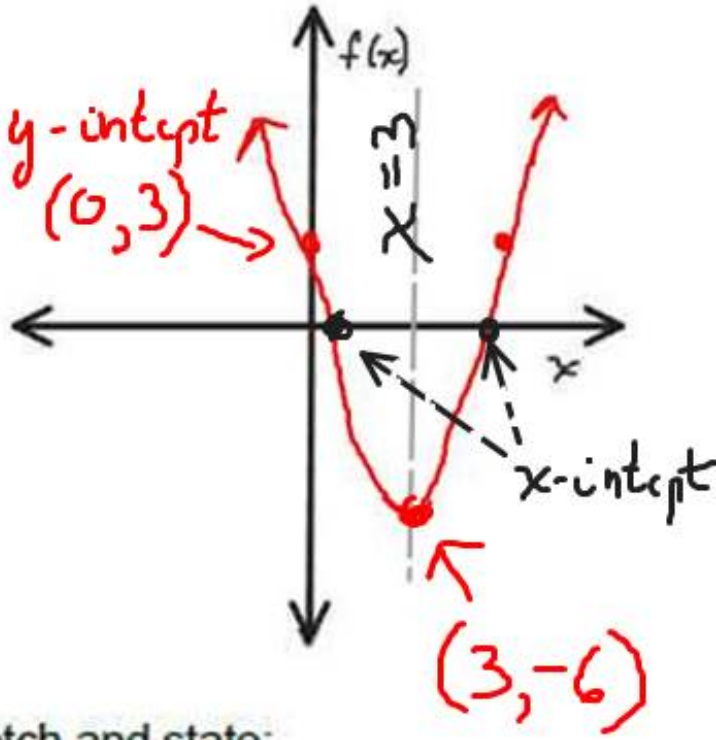
all values greater than or equal to negative six



c. Label on the sketch and state the following.

Vertex: (3 , −6)

Axis of Symmetry: x = 3



d. Label on the sketch and state:

y – intercept: (0 , 3)

'zeros' [x- intercept(s)] if any

(0.55, 0) ; (5.45, 0)

f. Solve for x:

$$10 = x^2 - 6x + 3$$

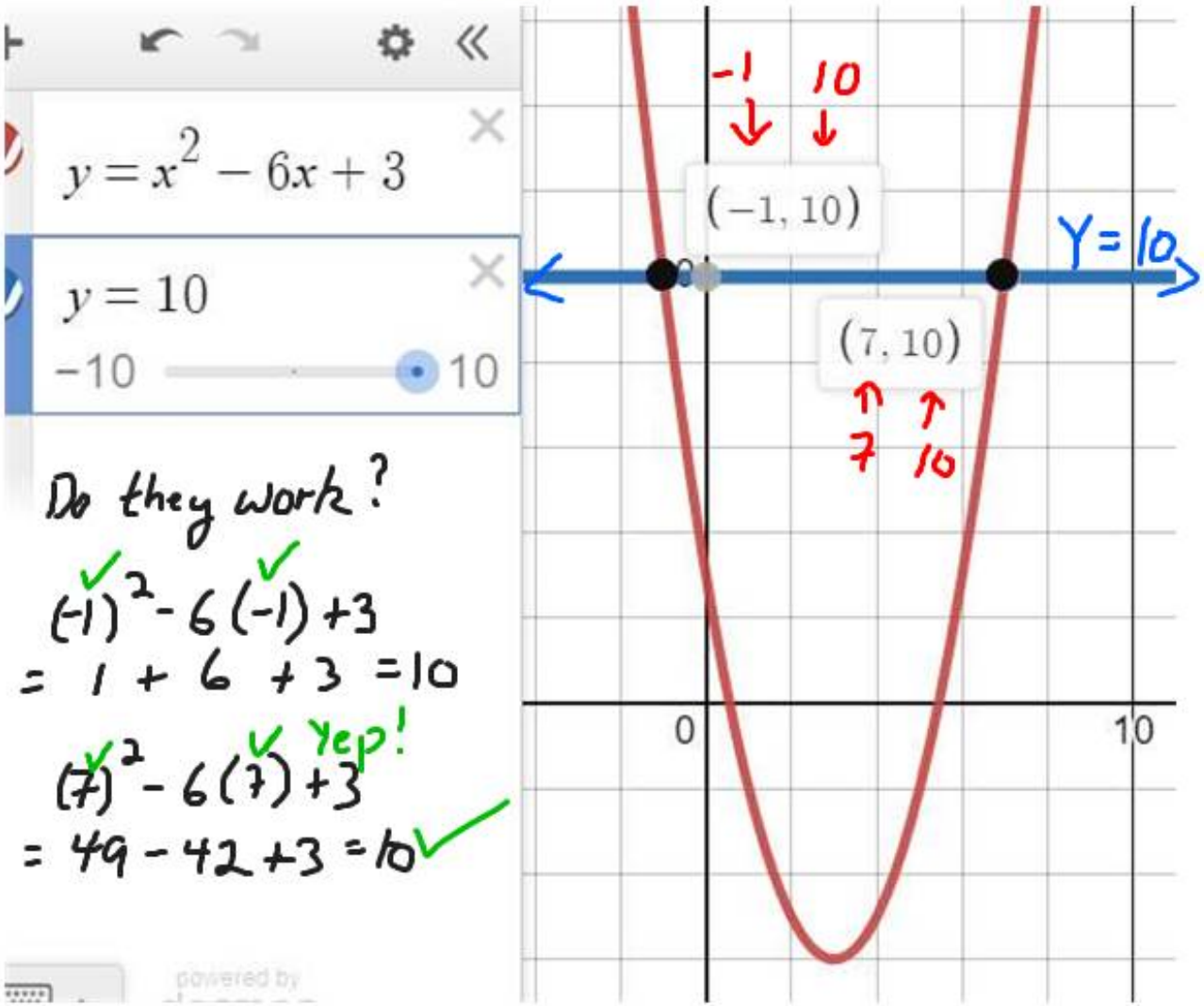
x = _____ & _____

f. Solve for x:

what value(s) of x do you need to get a 10?

$$10 = x^2 - 6x + 3$$

$x =$ -1 ✓ & 7 ✓



Do they work?

$(-1)^2 - 6(-1) + 3$

$= 1 + 6 + 3 = 10$ ✓

$(7)^2 - 6(7) + 3$ ✓ Yep!

$= 49 - 42 + 3 = 10$ ✓

2. The number of fans that attend a town's new hockey team's games is said to increase by 25% each game. At the first official game there were 200 fans.

$y = 160 \cdot 1.25^x$

8

a) State an equation that models the situation. [Hint: exponential]

b) What will attendance be after 5 games?

Table

Game	Fans
1	200
2	250
3	312.5
4	390.6
5	488

(+1 from each game; ×1.25 from each fans)

b) After 5 games
488 fans

x_1	y_1
1	200
2	250
3	312
4	390
5	488

160 1.2500

$y_1 \sim a \cdot b^{x_1}$

Log Mode

STATISTICS

$R^2 = 1$

RESIDUALS

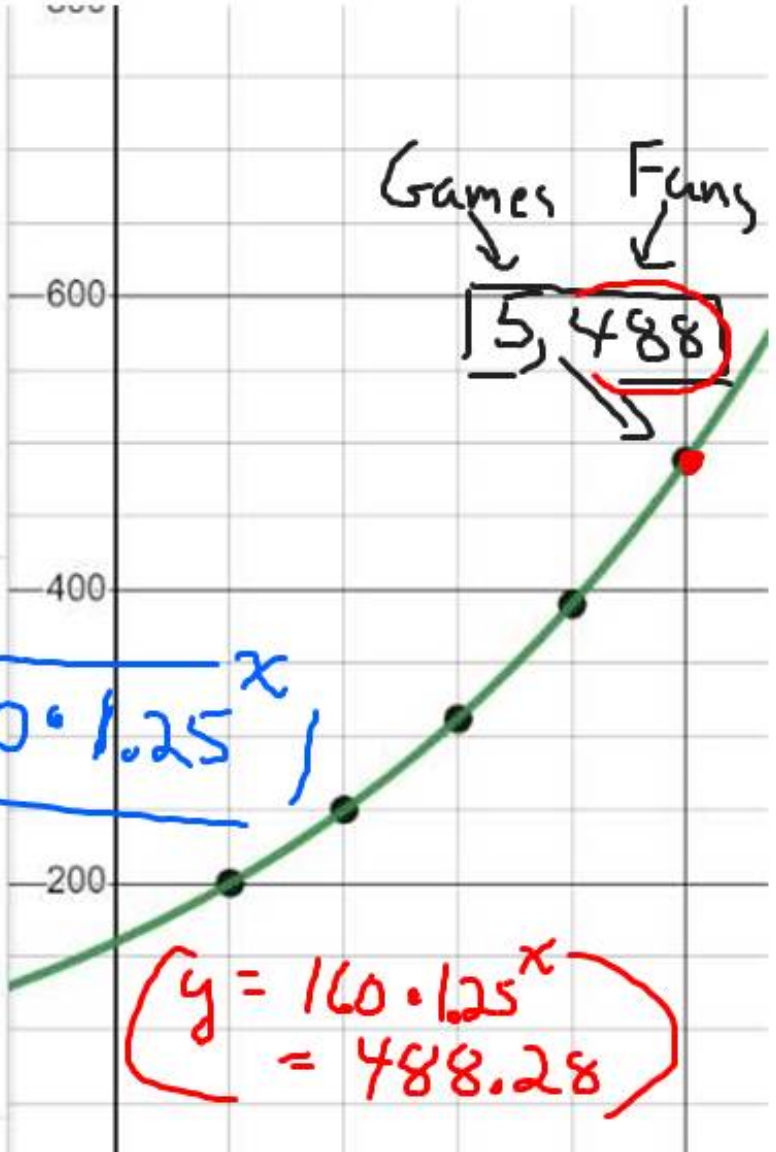
e_1 plot

PARAMETERS

$a = 159.905$

$b = 1.2499$

$y = 160 \cdot 1.25^x$



$y = 160 \cdot 1.25^x$
$= 488.28$

2. The number of fans that attend a town's new hockey team's games is said to increase by 25% each game. At the first official game there were 200 fans.

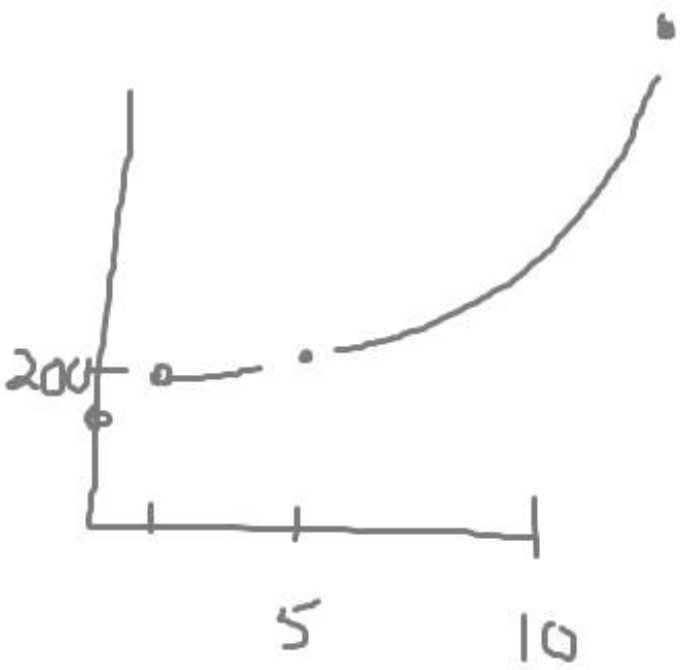
8

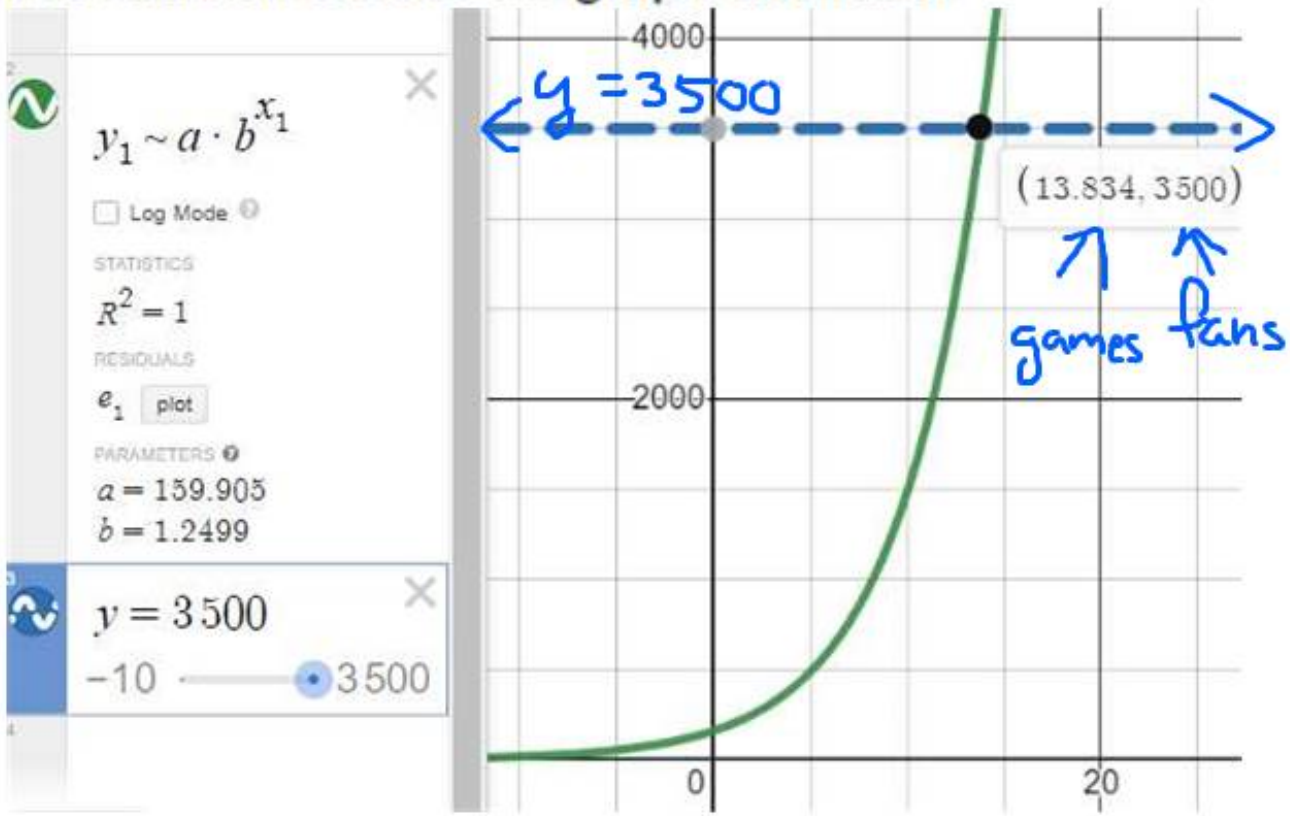
a) State an equation that models the situation. [Hint: exponential] ✓

b) What will attendance be after 5 games? ✓

c) Determine how many games will it take for the 3,500 seat arena to sell out. 13.834 games ; so 14 games

d) *Sketch* a Graphing Tool Screen shot of the graph and label solutions.





3. Trevor purchased a house for **$400,000.00**. At the time of purchase, he made a **Down Payment** of **$100,000.00**. The remaining balance was financed with a loan at an interest rate of 4.30%, compounded monthly, over 25 years.

Do either question 3 (this one) or question 4 (next)

6

a) Determine Trevor's monthly mortgage payment.

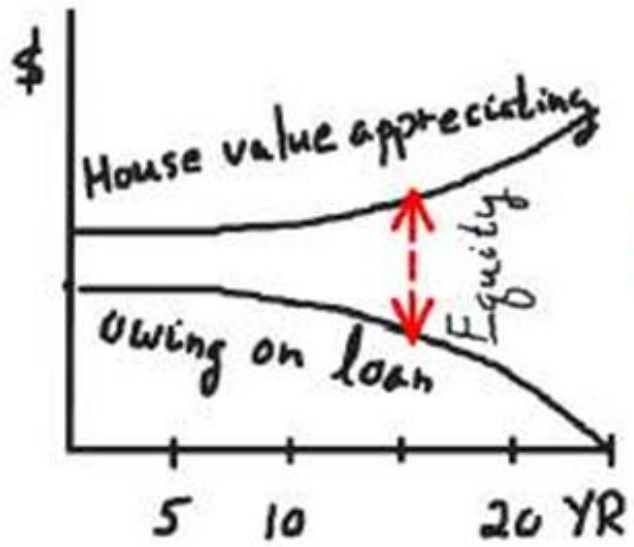
b) Trevor's house appreciates in value at an average rate of 2.50% per year. What will the value of his house be after the first 15 years? [Calculate with TVM App or with exponential function]

c) How much *equity* will Trevor have built up in the house after the first 15 years?

[Show a hand-drawn screenshot of any TVM App entries and solution]

a) PV 300,000
* PMT -1,633.22
FV 0
% 4.3
Pds 300 ← 25·12
Monthly

Present Value	300,000
Payments	-1,633.62
Future Value	0
Annual Rate (%)	4.3
Periods	300
Compounding	Monthly



3. Trevor purchased a house for **$400,000.00**. At the time of purchase, he made a **Down Payment** of **$100,000.00**. The remaining balance was financed with a loan at an interest rate of 4.30%, compounded monthly, over 25 years.

6

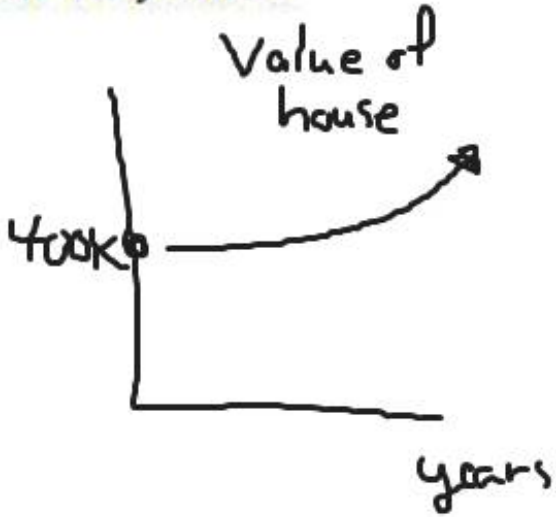
a) Determine Trevor's monthly mortgage payment.

b) Trevor's house appreciates in value at an average rate of 2.50% per year. What will the value of his house be after the first 15 years?
[Calculate with TVM App or with exponential function]

$A = 400K \cdot (1.025)^{15}$

$A = \$579,319$ value of house after 15 years

OR



Present Value	-400,000 ← you invest!
Payments	0
Future Value	579,319.27
Annual Rate (%)	2.5
Periods	15 years
Compounding	Annually

So buying a house is an investment!

3. Trevor purchased a house for **$400,000.00**. At the time of purchase, he made a **Down Payment** of **$100,000.00**. The remaining balance was financed with a loan at an interest rate of 4.30%, compounded monthly, over 25 years.

6

$400k

After 15 years his house (investment) is now worth $579,319.

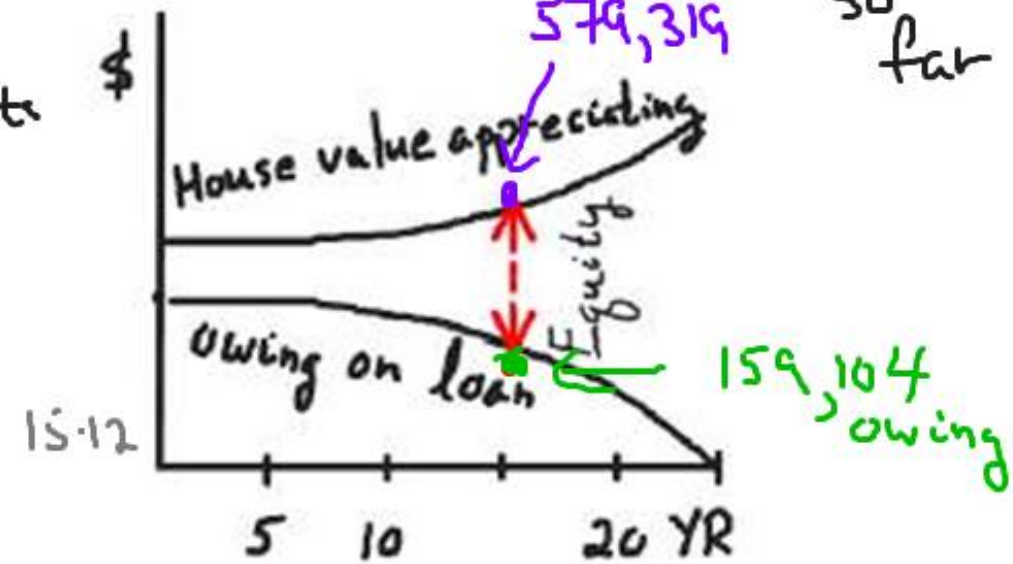
He still owes the bank another 10 years of payments! Owes $159,104 still

c) How much *equity* will Trevor have built up in the house after the first 15 years?

still owes!

Trevor's "equity" is 579,319 - 159,104 = $420,215 so far

Present Value	300,000
Payments	-1,633.62 ← been making monthly pmts
Future Value	-159,104.46 ← still owe bank!!
Annual Rate (%)	4.3
Periods	180 ← for 15 years
Compounding	Monthly



The App you download has a Mortgage Loan Payment Schedule

Bell 8:41 AM

TVM Calculator

your first payment

Period	PV	PMT	FV
1	300,000.00	-1,633.62	-299,441.38
2	299,441.38	-1,633.62	-298,880.76
3	298,880.76	-1,633.62	-298,318.13
4	298,318.13	-1,633.62	-297,753.48
5	297,753.48	-1,633.62	-297,186.81
6	297,186.81	-1,633.62	-296,618.11
7	296,618.11	-1,633.62	-296,047.37
8	296,047.37	-1,633.62	-295,474.59
9	295,474.59	-1,633.62	-294,899.75
10	294,899.75	-1,633.62	-294,322.86

← the "balance you owe"

Bell 8:41 AM

TVM Calculator

Period	PV	PMT	FV
175	165,406.16	-1,633.62	-164,365.25
176	164,365.25	-1,633.62	-163,320.60
177	163,320.60	-1,633.62	-162,272.22
178	162,272.22	-1,633.62	-161,220.07
179	161,220.07	-1,633.62	-160,164.16
180	160,164.16	-1,633.62	-159,104.46
181	159,104.46	-1,633.62	-158,040.96
182	158,040.96	-1,633.62	-156,973.66
183	156,973.66	-1,633.62	-155,902.52
184	155,902.52	-1,633.62	-154,827.56
185	154,827.56	-1,633.62	-153,748.73

after your 180th period you still owe $159K

No Question 3 or 4

4. **Statistics**. Karen works as a sales clerk at Cycle Sports. During the first 12 days of the month, the store sold the following numbers of bikes:

16 ✓	32 ✓	27 ✓	19 ✓
19 ✓	23 ✓	19 ✓	32 ✓
25 ✓	20 ✓	35 ✓	33 ✓

6

$\Sigma = 60 + 75 + 81 + 84 = 300$

Manually **show** your determination of the mean, median and the mode(s) of this data. [1 mark each]

$\bar{x} = \frac{\Sigma x}{n} = \frac{300}{12} = 25$

Mean: 25 daily bikes sold

$\tilde{x}$ Median: 24 daily bikes sold

16, 19, 19, 19, 20, 23, 25, 27, 32, 32, 33, 35

3 of these

24

Mode: 19 daily bikes sold

$\frac{(23+25)}{2} = 24$

such as Desmos].

$L = [16,19,25,32,23,20,27,19,35,19,32,33]$

L = 12 element list

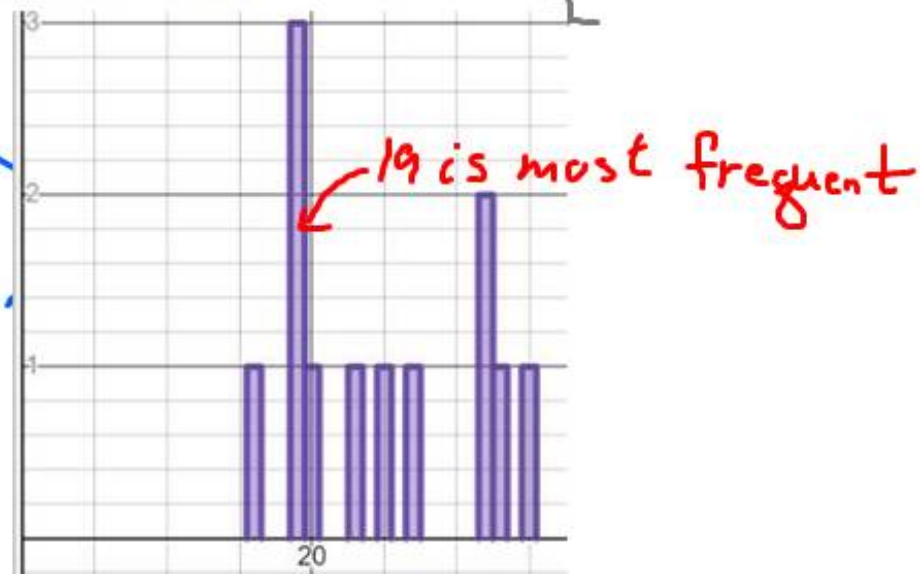
stats(L)

Min	16
Q1	19
Median	24
Q3	32
Max	35

$\tilde{x}$

mean(L)

$\bar{x}$ = 25



19 is most frequent

5. In a bag of marbles there are three Green marbles, two Blue marbles, and one Red marble. In the *three separate experiments* below determine:

6

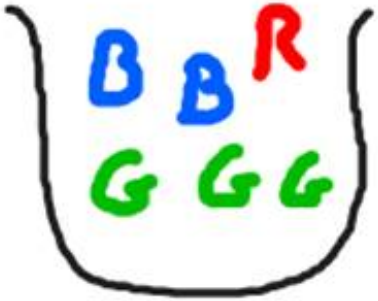
a. the probability of drawing, in one draw, a Blue marble. [P(Blue)]

b. the probability, in one draw, of drawing out a Blue **or** a Green Marble. [P(Blue OR Green)]

c. the probability, in two draws *without replacement*, of drawing a Green marble and then a Red marble *without replacing* the first marble. [$P(G_1, R_2)$]

[express all answers as reduced fractions and as a percentage]

a) $P(\text{Blue}) = \frac{\#\text{ of Blue}}{\#\text{ Total}} = \frac{2}{6} = \frac{1}{3} = 33.\overline{3}\%$

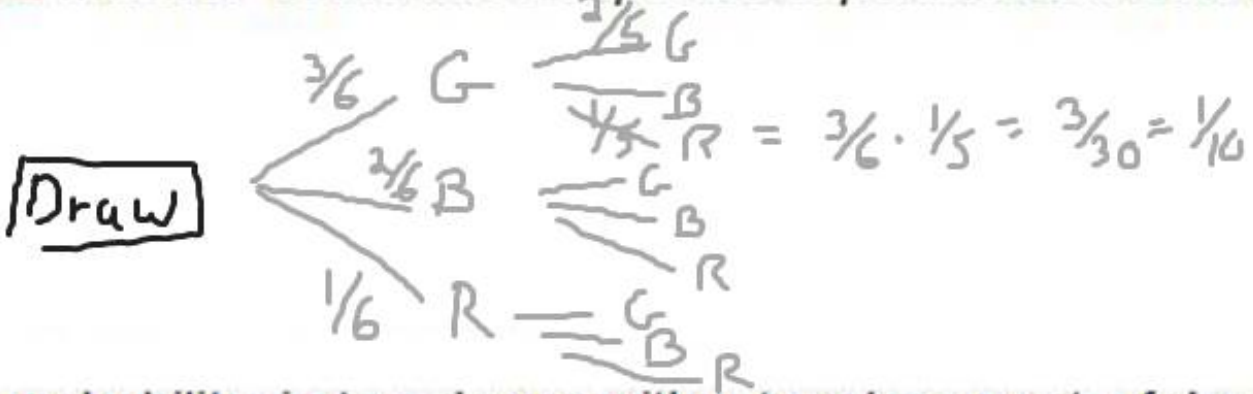


b) $P(\text{B OR G}) = \frac{\#(\text{B OR G})}{\#\text{ Total}} = \frac{5}{6} = 83.33\%$

$= P(B) + P(G) = \frac{2}{6} + \frac{3}{6} = \frac{5}{6}$ .....

5. In a bag of marbles there are three **Green** marbles, two **Blue** marbles, and one **Red** marble. In the *three separate experiments* below determine:

6



c. the probability, in two draws *without replacement*, of drawing a **Green** marble and then a **Red** marble *without replacing* the first marble. [$P(G_1, R_2)$]

AND = MULTIPLY

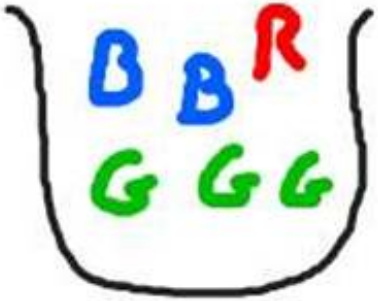
[express all answers as reduced fractions and as a percentage]

c) $P(G_1, R_2) = P(G_1) \cdot P(R_2 | G_1)$

$= \frac{3}{6} \cdot \frac{1}{5} = \frac{3}{30} = \frac{1}{10} = 10\%$

First draw

Second draw has one less marble



6. **Problem Solve**. You buy three burgers and two cokes for $13.00. Your friend buys two burgers and one coke for $8.00. Determine the price of a burger.

2

Guess and check is probably the only tool available!

ONE Burger	FRIEND Two Burger	ME Three Burger
X $2 ?	$4	$6
x $4 ?	$8	$12
$3 ✔ For one burger?	$6	$9

So one burger costs 3.00

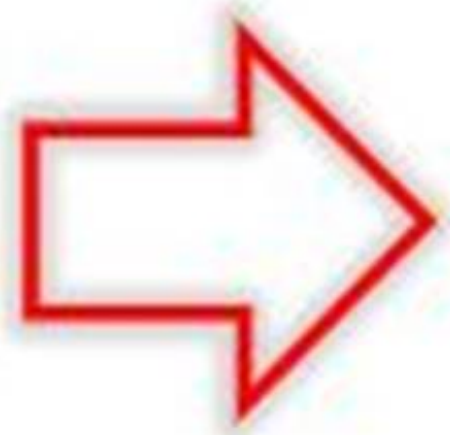
Several ways to solve problems like this
Would have done lots of this in Grade 10 Applied

Friend ONE COKE	ME 2 Cokes	ME 1 Coke
8-4	13-6	7/2
$4	$7	$3.50
8-8	13-12	$1/2
$0 Free!	$1	$0.50
8-6	13-9	
$2 For one coke	$4 for Two Cokes	$2 for ONE Coke

nope!

Takes a bit of work this method; not practicable if a burger were to cost $2.57

Here are some of the more expediant and effective ways to solve these types of problems that have two unknown amounts!



We would have learned these if we had done Grade 10 and Grade 11 Applied or Pre-Calculus

They are all logical!

But skip ahead a couple minutes if you do not care!

6. **Problem Solve**. You buy three burgers and two cokes for $13.00. Your friend buys two burgers and one coke for $8.00. Determine the price of a burger.

FYI: GRADE 10 APPLIED METHOD
ALGEBRA
SYSTEMS OF LINEAR EQUATIONS

2

Let x = price of one burger, let y = price of one coke

You: $3x + 2y = 13$ ✓
Friend: $2x + 1y = 8$ ✓

This is a much more powerful method from Grade 10 Applied

You $2 \cdot (3x + 2y) = 2 \cdot 13 \rightarrow 6x + 4y = 26$
Friend $3 \cdot (2x + y) = 3 \cdot 8 \rightarrow 6x + 3y = 24$

$$\begin{array}{r} 6x + 4y = 26 \\ -(6x + 3y = 24) \\ \hline 0x + 1y = 2 \end{array}$$

$\therefore$ one coke = $2

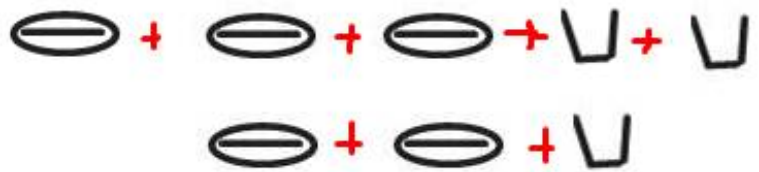
$\$2$

$\therefore$ If $3x + 2y = 13$
then $3x + 2 \cdot (\$2) = 13$
and $3x + 4 = 13$
$3x = 9$
$\therefore$ $x = \$3$
A burger is $3

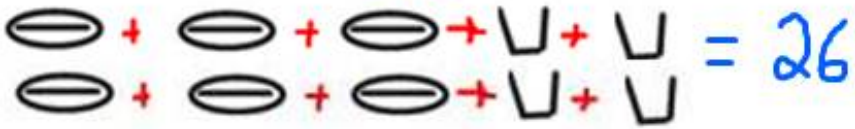
6. **Problem Solve**. You buy three burgers and two cokes for $13.00. Your friend buys two burgers and one coke for $8.00. Determine the price of a burger.

Draw it?

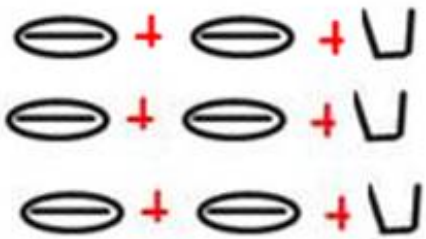
2



ME



FRIEND



ME

one coke ↓ $

FRIEND

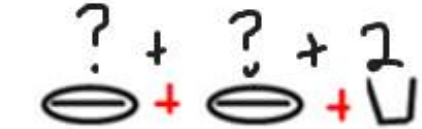
=

ONE BURGER COSTS $3

$3(3)+2(2)=13$ ✓

$2(3)+1(2)=8$ ✓

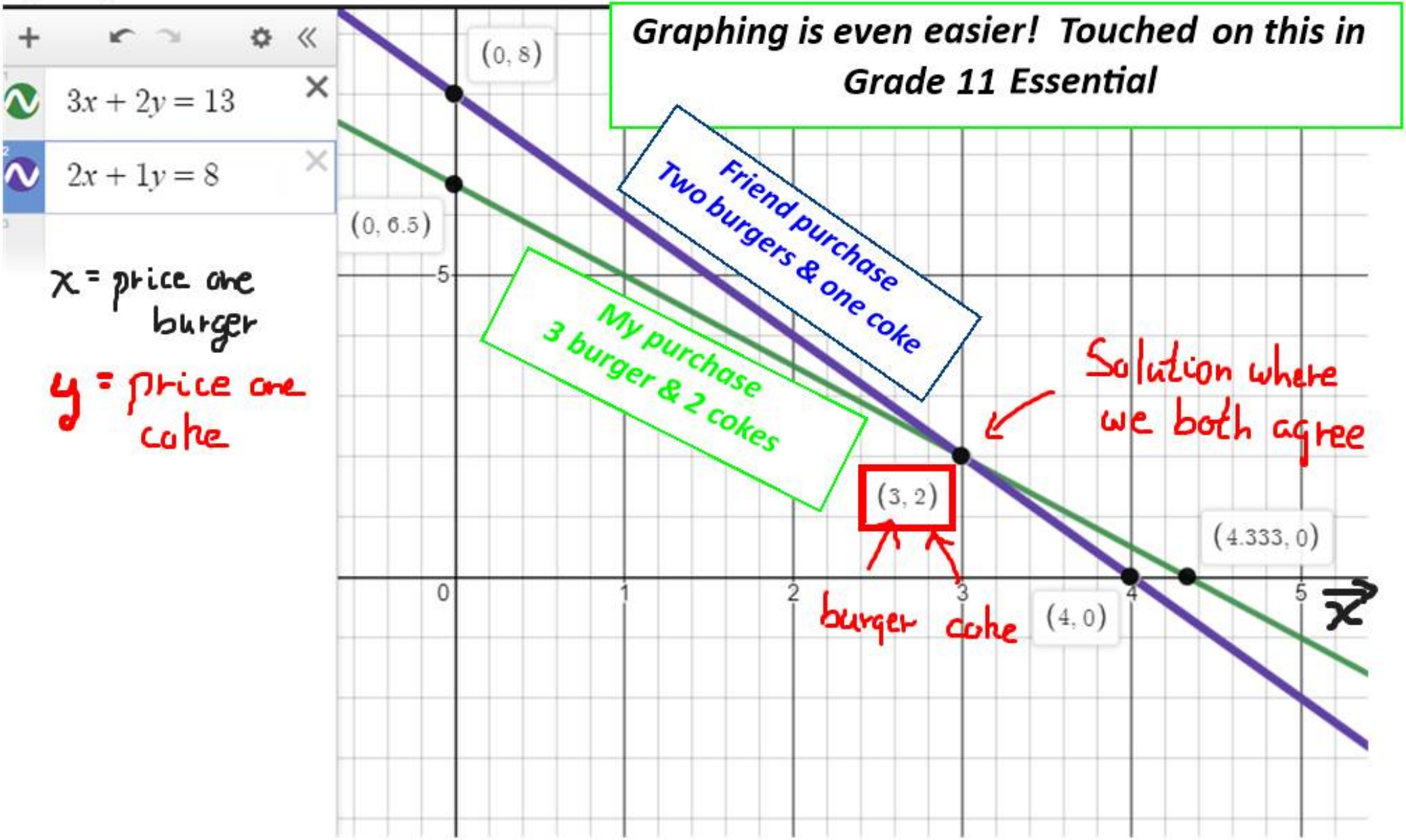
Burger coke



3 + 3 = 6

6/2=3

6. **Problem Solve**. You buy three burgers and two cokes for $13.00. Your friend buys two burgers and one coke for $8.00. Determine the price of a burger.



6. **Problem Solve**. You buy three burgers and two cokes for $13.00. Your friend buys two burgers and one coke for $8.00. Determine the price of a burger.

or! Also from Grade 10!

2

$3x + 2y = 13$ & $2x + y = 8$

$y = 8 - 2x$

$\therefore \quad 3x + 2 \cdot (8 - 2x) = 13$

$3x + 16 - 4x = 13$

$3x - 4x = 13 - 16$

$-1x = -3$

$\frac{-1x}{-1} = \frac{-3}{-1}$

$x = 3$

Determine how many ways all the letters in the word 'WAYWAYSEECAPPO' can be distinguishably arranged.

+2

OMG!

14 letters. If they were all different then 14! ways to arrange them.

Choices $14 \cdot 13 \cdot 12 \cdot 11 \cdot 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$

$= 87{,}178{,}291{,}200 \approx 87$ Billion ways!

But we have 2W's, 3A's, 2Y's, 2E's and 2P's which can juggle places and we would not be able to distinguish any difference

So distinguishabe arrangements are $\frac{14!}{(2!\,3!\,2!\,2!\,2!)}$ (use the brackets!)

W A Y E P

$$\frac{14!}{(2! \cdot 3! \cdot 2! \cdot 2! \cdot 2!)}$$

$= 908{,}107{,}200$

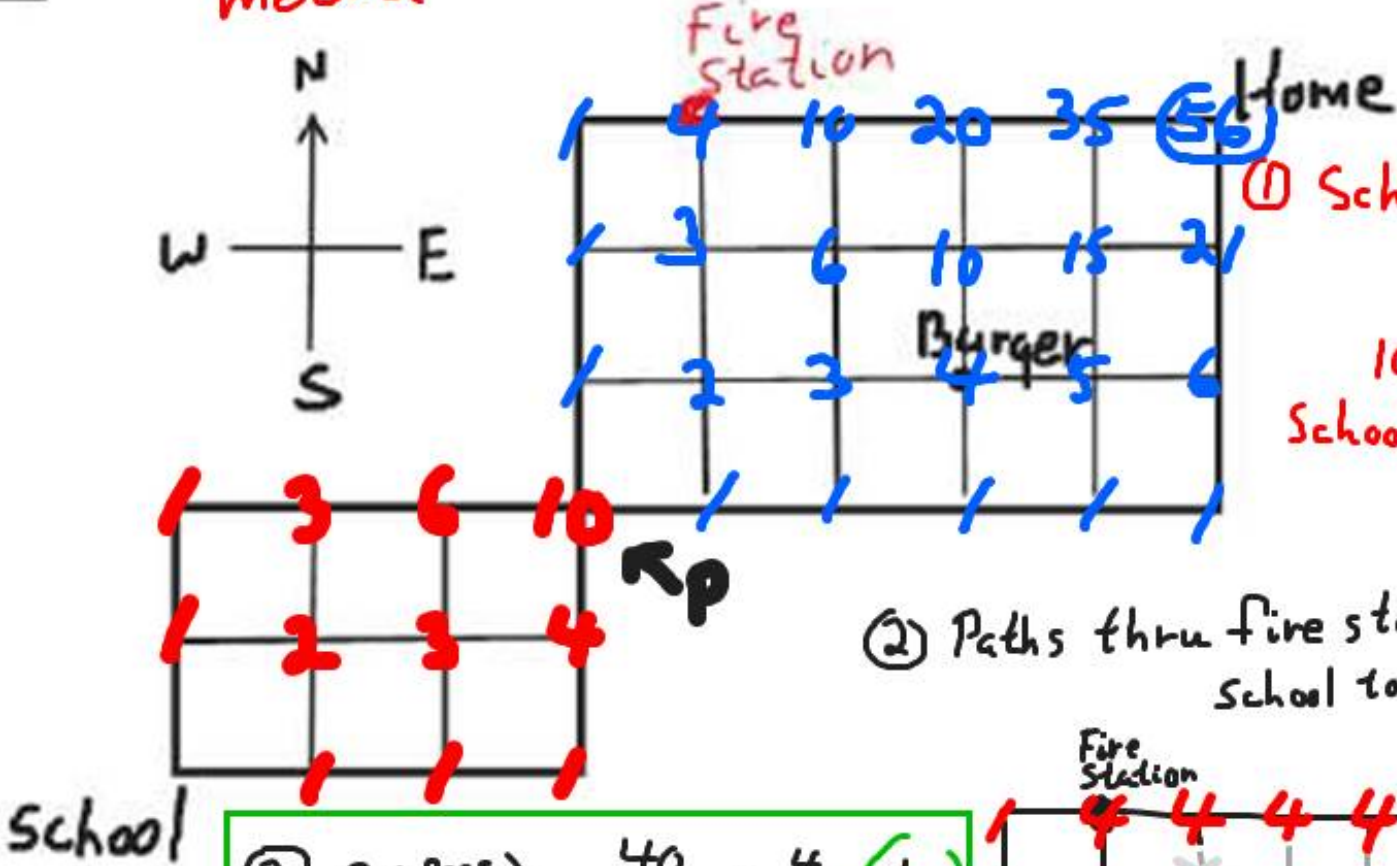
ONLY 908 MILLION, 107 Thousand, 2 Hundred arrangements that are distinguishable!

Josh is heading to home from school. He randomly selects his route home. He is only allowed to make moves North or East. Determine the probability he wanders past the Fire Station.

lol. Maybe the 15th time we have done on of these!

+4

Pascal Triangle method



① School to Home all paths

10 School to P

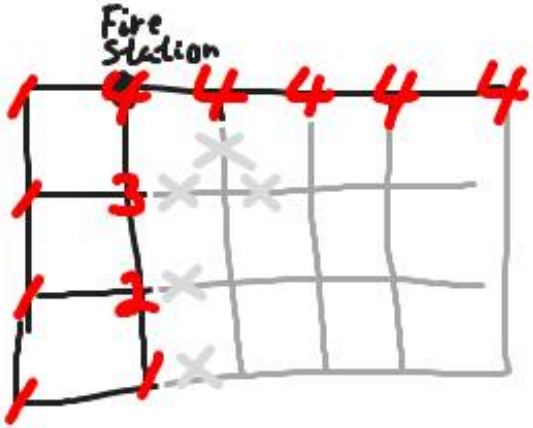
56 P to home

$10 \cdot 56 = 560$ paths

② Paths thru fire station

School to P = 10

P to home = 4 thru FS



$10 \cdot 4 = 40$ paths School to home via Fire Station

③ $P(\text{Pass F.S.}) = \frac{40}{560} = \frac{4}{56} = \frac{1}{14}$

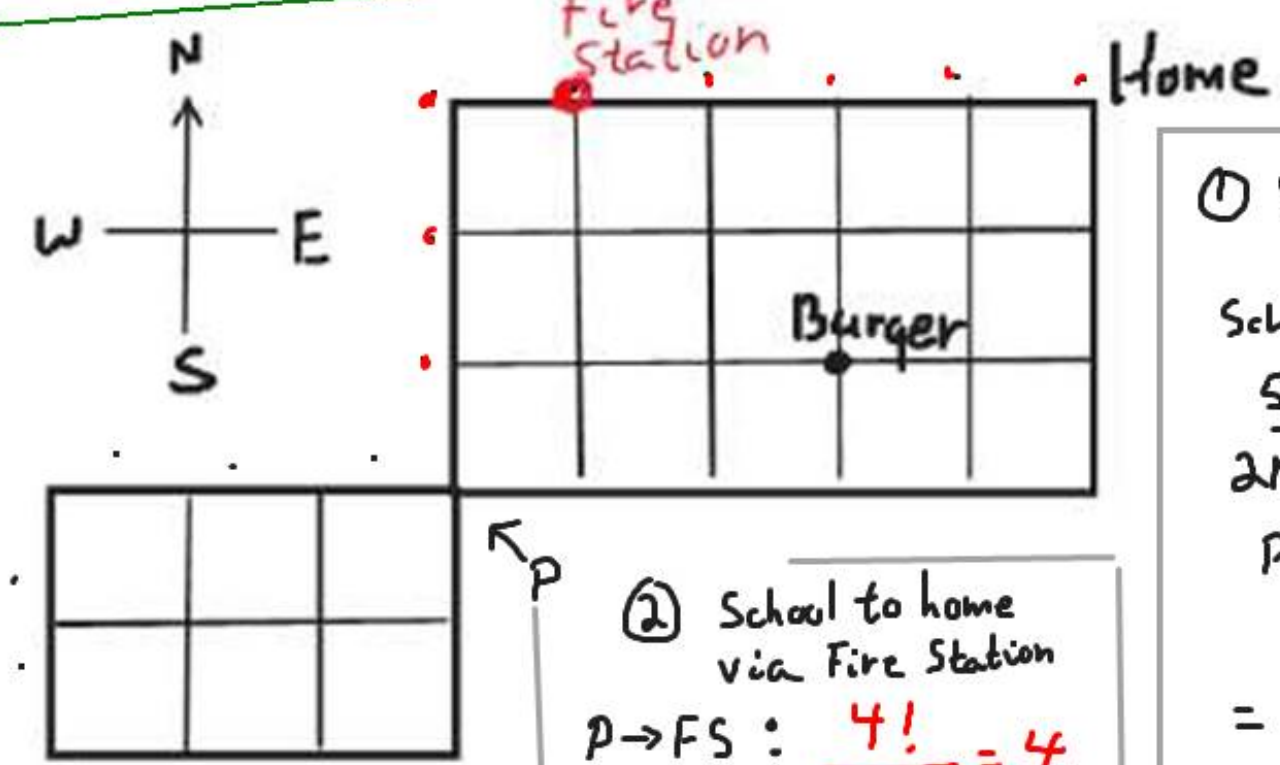
$\approx 7.14\%$

Josh is heading to home from school. He randomly selects his route home. He is only allowed to make moves North or East. Determine the probability he wanders past the Fire Station.

+4

The Pascal Method works fine until the numbers get too cumbersome!

(Distinguishable arrangements method)



① School to Home all paths

School to P

5 moves: 2N & 3E $\frac{5!}{(2!3!)} = 10$

P to Home $\frac{8!}{(3!5!)} = 56$

= 560 paths

② School to home via Fire Station

P → FS : $\frac{4!}{(3!1!)} = 4$ (N, E)

FS → Home : $\frac{4!}{(4!0!)} = 1$

$0! = 1$

$\frac{10}{\text{School} \to P} \cdot \frac{4}{P \to FS} \cdot \frac{1}{FS \to \text{Home}} = 40$ Paths passing Fire Station

③ $\text{Prob}\left(\begin{smallmatrix}\text{Pass}\\ \text{F.S}\end{smallmatrix}\right) = \frac{40}{560}$

$= 1/14 \approx 7.14\%$

Again

LOAD CLEAR !