

**Grade 12 Essential
Week 3
Quiz Debrief**

23-09-21

MRF



GRADE 12 ESSENTIAL
WEEK 3 QUIZ – 23-04-13
VEHICLE PURCHASE AND STATISTICS

Name: _____

Date: _____

Study Notes; 'Cheat Sheet'. Use your (mine for now) doubled – sided study notes (cheat sheet) to its full effect.

CLOSED BOOK henceforth. **Show work / Show Method** for best mark (better marks if you make a brain fart and easier for you to organize your thoughts). Simply stating an answer gets no mark

Round decimal answers to nearest 0.01 unless otherwise indicated.

Each individual question is worth 2 marks each.

Formulae and tables have been provided in issued courseware.

Put a check mark here: if you read these instructions. [1 mark]

↑
l.o.l.

Useful Formulae:

$$\text{Fuel Economy} = \frac{\text{Liters Used}}{100 \text{ km Driven}}$$

Depreciated value of item = Original Value * retained percentage^{years}

Price of Car = (MSRP + Options + Eco Fees + etc - Trade-In) * Tax Factor

Overall Cost of Car = Down Payment + Total of Monthly Payments on Loan

MrF

Teacher's GRADE 12 ESSENTIAL - STUDY NOTES (Cheat Sheet)

My Study Notes (cheat sheet) Do your own, or copy these out, or add to them!
To Evaluate expression: BEDMAS order of operations (Brackets, Exponents, Mult & Divide, Add & Sub)

Algebra: work backwards, (un-evaluate, un-BEDMAS, reverse order)

Problem Solve: Guess and Check, Work Backwards, Use a Formula, Draw Diagram, Use Logic, Use a Table, Make a List and Count, Find a Pattern, Act it out (model it), etc....

VEHICLE FINANCE

Final New Vehicle Price = (Dealer price after eco fees, freight, options, etc - Trade in) * tax factor

Vehicle Finance. TDSR (Total Debt Service Ratio) = $\frac{\text{Debts and Expenses (monthly)}}{\text{Total Gross Income (monthly)}} * 100$; max 40%

Cannot have more than 40% of your gross income going towards debt and mandatory payments.

Monthly Amount = Weekly Amt * 52 / 12 = BiWeekly Amount * 26 / 12

Exponential Decay (depreciation) of a car's value:
Final Value = Original Value * (1 - annual depreciation rate)^{years}. Original Value does not include taxes. Eg: \$30,000 * 0.85^{12 years} = \$4267.25 for 15% depreciation after 12 yrs

Monthly Loan Payment = $\text{table value} * \frac{\text{borrowed amount}}{1,000}$

Overall Cost of Car = Total Loan Payments + Down Payment

Interest Paid = Total Loan Amount Paid Back - Amount Borrowed

One year = 52 weekly periods = 26 bi-weekly periods

Fuel Economy expressed as ratio: $\frac{\text{How many litres used}}{100 \text{ km}}$; Example: $\frac{31 \text{ L}}{390 \text{ km}} = \frac{x \text{ L}}{100}$, where x is the

consumption of fuel for 100km. Should be somewhere around 8 to 12L/100 for a normal family car!

Time. 1hr 45min = 1hr + 45/60hr = 1.75 hrs; 3hr20min = 3+20/60 = 3.33 hrs

Fuel Prices at pump already include taxes!!

STATISTICS

Mean. $\bar{x} = \frac{\sum x_i}{n}$; sum up all the data and divide by the data set size, n

Weighted Mean: $\frac{\sum (x_1 * w_{f_1} + x_2 * w_{f_2} + x_3 * w_{f_3} + \dots)}{(w_{f_1} + w_{f_2} + w_{f_3} + \dots)} = \frac{\sum x_i f_i}{\sum w_{f_i}}$

Median, \tilde{x} . Line data up in ascending order, find the data value at the middle place.

Middle place = $\frac{(n+1)}{2}$. Eg: n = 17 data → middle place is the 9th place. With 20 data → middle place is between the 10th and 11th place, value in 10 and a 'halfth' place.

my
= \Rightarrow
cheat sheet

You will need to
adapt it and
make your own

1. The fuel 'economy' [fuel consumption rate] of a certain two-door convertible is 7.2 L/100 km.

a. Determine how many litres of gasoline are required to drive a normal yearly 22,000 km. 1,584L

b. Given the cost of gasoline averages \$1.479 per litre (which already includes all taxes), calculate the cost of fuel to drive the convertible on a road trip for 2,800 km total (to Edmonton and back). "Graphic organizer"

\$298.17

a) *Cross multiply; solve proportions*

$$\frac{7.2 \text{ L}}{100 \text{ km}} = \frac{x \text{ L}}{22,000 \text{ km}}$$

$$\frac{7.2 \text{ L} \cdot 22,000 \text{ km}}{100 \text{ km}} = x$$

Gas for road trip: 1584L = x

Conversion factor method:

$$22,000 \text{ km} = x \text{ L}$$

$$22,000 \cancel{\text{ km}} \cdot \left(\frac{7.2 \text{ L}}{100 \cancel{\text{ km}}} \right) = \underline{1,584 \text{ L}}$$

for a year

Graphic organizer

b) $\frac{7.2 \text{ L}}{100 \text{ km}} = \frac{x \text{ L}}{2,800 \text{ km}}$

$$x = 2,800 \text{ km} \cdot \frac{7.2 \text{ L}}{100 \text{ km}}$$

$$x = 201.6 \text{ L gas for Road trip}$$

but need another step

$$\frac{\$1.479}{\text{L}} = \frac{\$x}{201.6 \text{ L}} ; x = \underline{\$298.17}$$

$$2,800 \cancel{\text{ km}} \cdot \frac{7.2 \cancel{\text{ L}}}{100 \cancel{\text{ km}}} \cdot \frac{\$1.479}{\cancel{\text{ L}}} = \underline{\$298.17}$$

for road trip

How Pay?

c. You make the down payment of \$2,000 and then take a loan on the remaining balance at 8% for 5 years. Using Tables, determine your monthly payments. Check with an App if you like.

$$\begin{array}{r} 40,264 \\ - 2,000 \\ \hline 38,264 \end{array}$$

$$20.28 \cdot 38,264 / 1,000 = \$775.99 \text{ monthly payment}$$

→ amount to finance with loan

d. Determine how much you ended up paying total for the car overall.

Loan pmts: $\$775.99 / \text{mon} \cdot 60 \text{ mon}$
 $= \$46,559.40$
 in payments

down payment → $+ 2,000.00$
 Total cost of basic \$34,500 car!
 $\$48,559.40$

Monthly Vehicle Loan Payments per Thousand Borrowed

Interest Rate	Years to Repay Loan					
	1	2	3	4	5	6
4.00%	\$85.15	\$43.42	\$29.52	\$22.58	\$18.42	\$15.65
4.25%	\$85.26	\$43.54	\$29.64	\$22.69	\$18.53	\$15.76
4.50%	\$85.38	\$43.65	\$29.75	\$22.80	\$18.64	\$15.87
4.75%	\$85.49	\$43.76	\$29.86	\$22.92	\$18.76	\$15.99
5.00%	\$85.61	\$43.87	\$29.97	\$23.03	\$18.87	\$16.10
5.25%	\$85.72	\$43.98	\$30.08	\$23.14	\$18.99	\$16.22
5.50%	\$85.84	\$44.10	\$30.20	\$23.26	\$19.10	\$16.34
5.75%	\$85.95	\$44.21	\$30.31	\$23.37	\$19.22	\$16.46
6.00%	\$86.07	\$44.32	\$30.42	\$23.49	\$19.33	\$16.57
6.50%	\$86.30	\$44.55	\$30.65	\$23.71	\$19.57	\$16.81
7.00%	\$86.53	\$44.77	\$30.88	\$23.95	\$19.80	\$17.05
7.50%	\$86.76	\$45.00	\$31.11	\$24.18	\$20.04	\$17.29
8.00%	\$86.99	\$45.23	\$31.34	\$24.41	\$20.28	\$17.53
10.00%	\$87.92	\$46.14	\$32.27	\$25.36	\$21.25	\$18.53

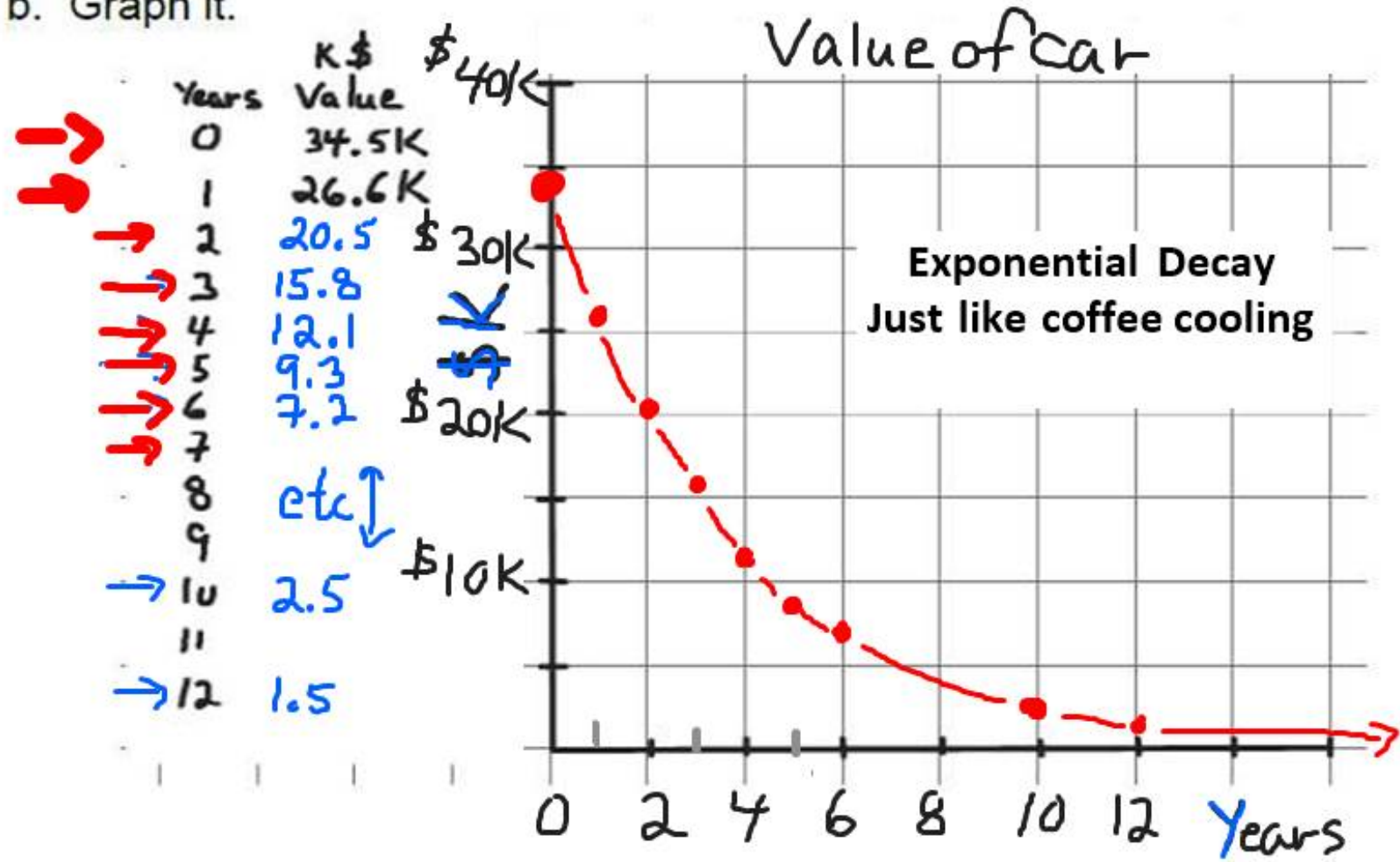
3. **Depreciation.** You buy a car that is valued at \$34,500. You wonder what your car will be worth after 12 years in case you want to trade it in for a newer one. The model you bought depreciates in value at about 23% per year, year on year ('exponential decay'), from its original value.

keep
77%

Grade II
Graphing

a. Determine the value of your car after the 12 years to the nearest hundred \$. Value = _____

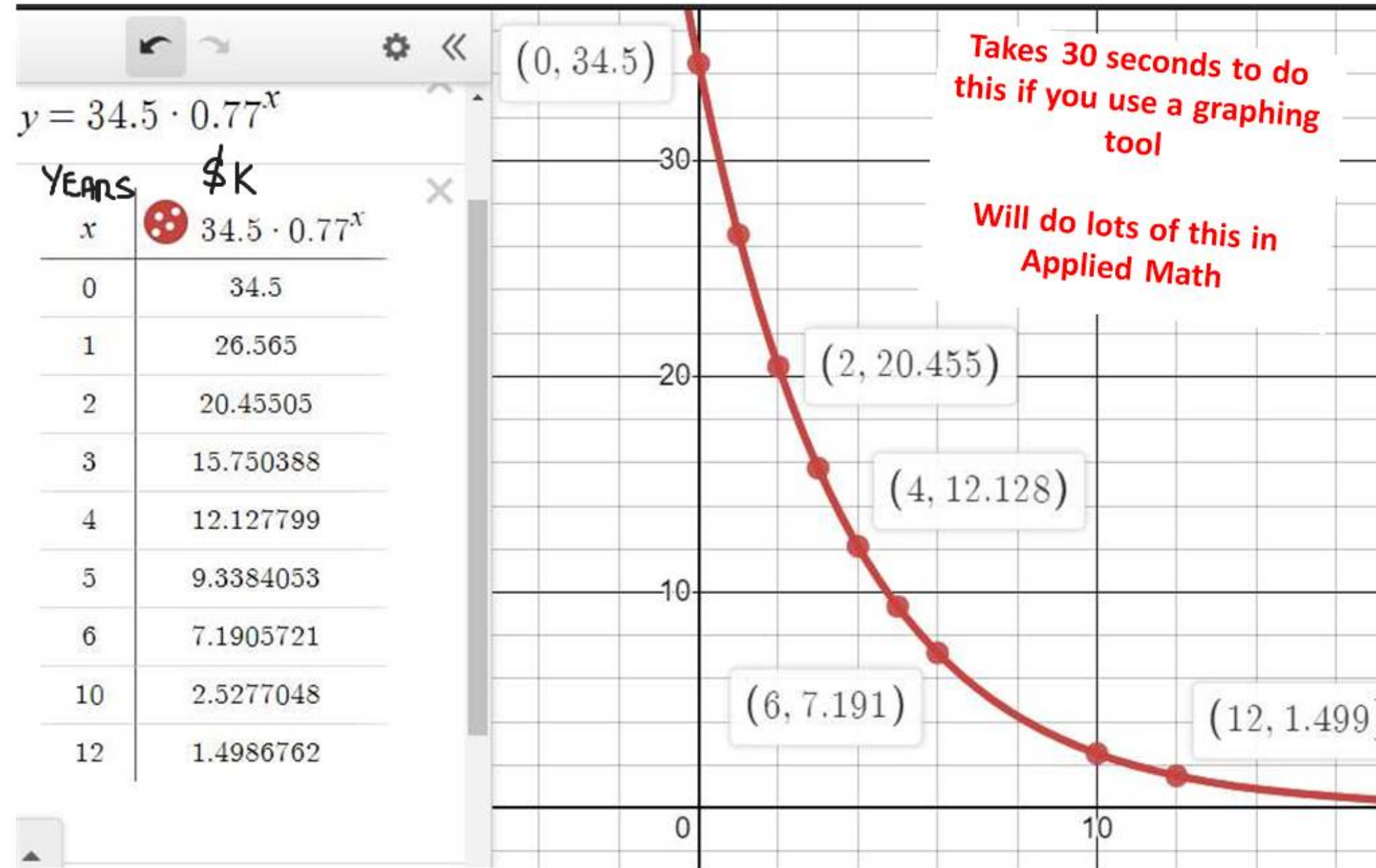
b. Graph it.



Exponential Decay
Just like coffee cooling

Now need to "scale" the graph, fit the data in
Try to fill it
Label axis!

If you do Spreadsheets or use Graphing tools it would look like this:



4. **Statistics:** Determine the mean, median, mode and range of the following data set: $\{2, 4, 3, 5, 6, 5, 7, 5, 12, 5\}$. Show work of course as always!

$$\text{mean} = \bar{x} = \frac{\sum x}{n} = \frac{54}{10} = \boxed{5.4}$$

$$\text{median} = \tilde{x} = \boxed{5}$$

$\{2, 3, 4, 5, 5, 5, 6, 7, 12\}$

$\frac{(10+1)}{2} = 5\frac{1}{2}$ th place when data in order

"5 and a half" place would have "5" $\frac{(5+5)}{2} = 5$

mode: most frequent data value; $\boxed{5}$

$$\text{range: } x_{\max} - x_{\min} = 12 - 2 = \boxed{10}$$

6. **Problem Solving.** A farmer has 60 animals, pigs and chickens. She forgets how many of each she has, but she does remember there are 150 legs. Determine how many pigs the farmer has. [Guess and check? Algebra if you know it?]

Try Guess and Check
(for now)

These are classic!

<u># of pigs</u>	<u># of chickens</u>	<u>Total Animals</u>
x10?	50	= 60
x20?	40	= 60
25?	35	= 60
22?	38	= 60
18?	42	= 60
<u>15?</u>	45	= 60

<u>LEGS</u>		
pigs $4 \cdot 50 = 200$	chicks $2 \cdot 10 = 20$	} 220 legs xWant, 150.
pigs $4 \cdot 20 = 80$	chicks $2 \cdot 40 = 80$	} 160 legs close!!
pigs $4 \cdot 25 = 100$	chicks $2 \cdot 35 = 70$	} 170 legs OMG Too much now!
pig legs 88	chick legs 76	} 164 legs
pig legs 72	chick legs 88	} 160 legs
pig legs 60	chick legs 90	} 150 legs YES!!

Try again
Try again
lol

The farmer has 15 pigs

$15 \cdot 4 + 45 \cdot 2 = 150$

BONUSES (one mark each if you need them)

1. **Convert:** Determine the number of minutes in six weeks.

Just keep using successive conversion factors
(Grade 10)

Just keep 'whittling' down the
units

$$6 \text{ wk} = \frac{?}{1} \text{ min}$$
$$6 \cancel{\text{wk}} \cdot \left(\frac{7 \cancel{\text{day}}}{1 \cancel{\text{wk}}} \right) \cdot \left(\frac{24 \cancel{\text{hr}}}{1 \cancel{\text{day}}} \right) \cdot \left(\frac{60 \checkmark \text{min}}{1 \cancel{\text{hr}}} \right) = \textcircled{60,480 \text{ min}}$$

Sixty Thousand, Four Hundred Eighty

Unless you felt like solving proportions three different times:

$$\frac{x}{6 \text{ wk}} = \frac{7 \text{ day}}{1 \text{ wk}} ; x = 42 \text{ day}$$
$$\frac{x}{42 \text{ day}} = \frac{24 \text{ hr}}{1 \text{ day}} ; x = 1,008 \text{ hr}$$
$$\frac{x}{1,008 \text{ hr}} = \frac{60 \text{ min}}{1 \text{ hr}} ; x = \textcircled{60,480 \text{ min}}$$

Notice we do not make abbreviations
plural

English teacher would
tell you that

2. **Problem Solve.** Your truck had an initial value of **\$70,000** when you bought it. It depreciates ('exponential decay') at a rate of 25% per year. When it gets down to a value of **\$10,000** you are going to give it to your favourite nephew, Jarrod. Determine how many years it will take for the value of your truck to get down to \$10,000 value give or take a couple hundred bucks. [Solve by *guess and check* or by any method you may have learned in other math courses]

Guess & Check?

Ahh! Thinking!!

Evaluate

$70000 \cdot 0.75^x$
with different values
of x till you get
close to
10,000!!

~6.7 years works

"Close" counts often!!

$$70000 \cdot 0.75^5$$

$$= 16611.328125$$

$$70000 \cdot 0.75^6$$

$$= 12458.4960938$$

$$70000 \cdot 0.75^7$$

$$= 9343.87207031$$

$$70000 \cdot 0.75^{6.5}$$

$$= 10789.3741101$$

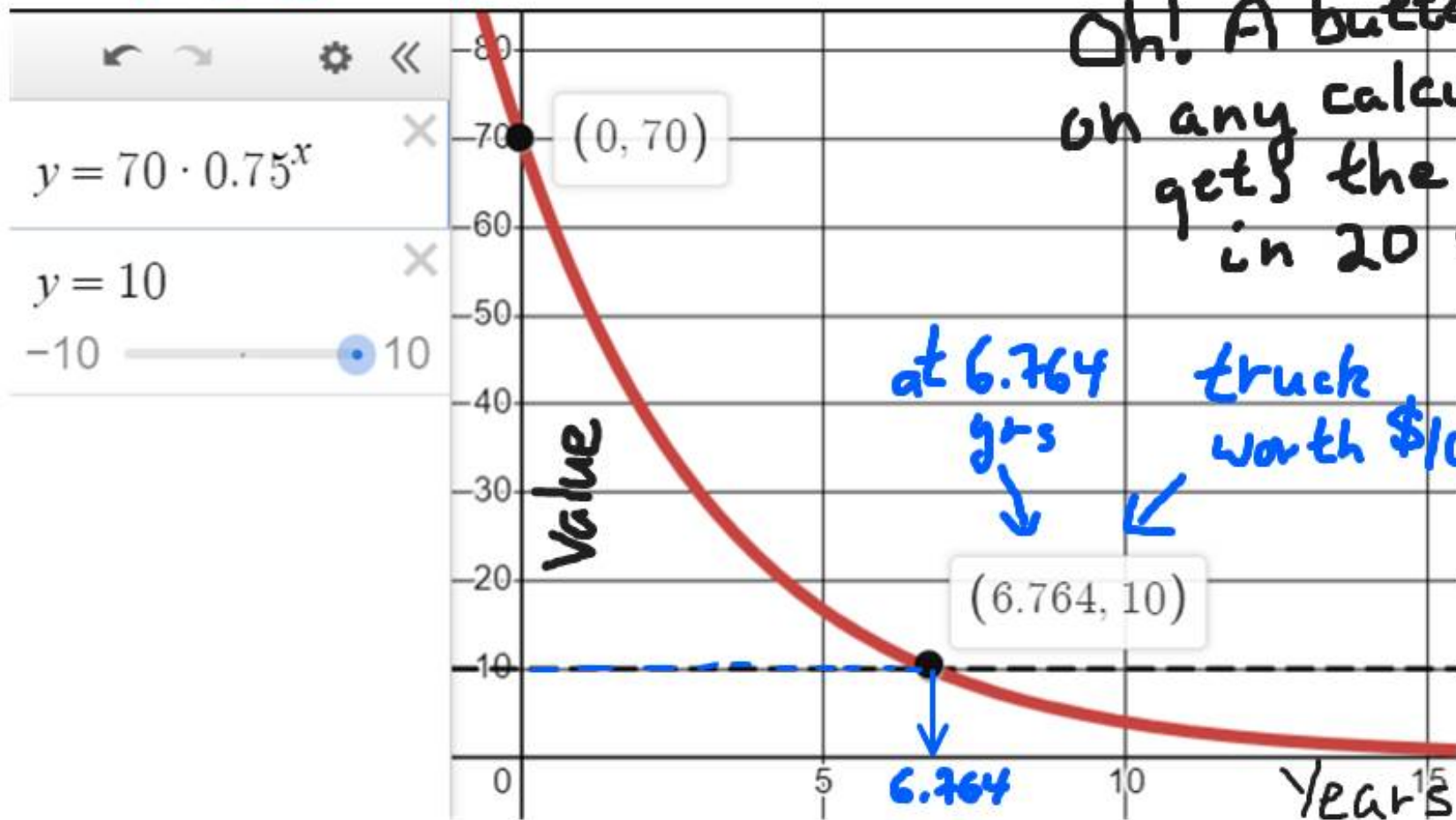
$$70000 \cdot 0.75^{6.7}$$

$$= 10186.1133521$$

2. **Problem Solve.** Your truck had an initial value of \$70,000 when you bought it. It depreciates ('exponential decay') at a rate of 25% per year. When it gets down to a value of \$10,000 you are going to give it to your favourite nephew, Jarrod. Determine how many years it will take for the value of your truck to get down to \$10,000 value give or take a couple hundred bucks. [Solve by *guess and check* or by any method you may have learned in other math courses]

Ahh! Thinking!!

Graphing is good way too! Did some in Grade 11!



Oh! A button on any calculator get the answer in 20 seconds!

at 6.764 yrs truck worth \$10k

That is the Week 3 Quiz Debrief

Do not miss too many Quizzes,
they have a Double Weight Factor



LOAD CLEAR!

