

Grade 12 Essential

Quiz Debrief

Week 3

MrF

23-04-20

**GRADE 12 ESSENTIAL
WEEKLY QUIZ 23 - 04 - 20**

Name: _____

Date: _____

NOT OPEN BOOK

Use a doubled – sided study notes (cheat sheet) to its full effect. Yours and or mine.

Each individual question is worth 2 marks each unless otherwise indicated

Formulae and tables have been provided

There is a **time limit of ~45 minutes** on this quiz.

MULTIPLE CHOICE (Select the one best or closest answer)
(2 marks each; no need to show work for Multiple Choice)

1. The daily high temperatures this week, in $^{\circ}\text{C}$, were $\{2; 7; 8; 3; 9; 16; 0\}$.
The mean daily high temperature for the week was:

a. 7°C

b. 45°C

c. 6.43°C

d. 7.5°C

Formulae:

Final New Vehicle Price =

(Dealer price after eco fees, freight, options, etc – Trade in)* tax factor +

← revised

~~down payment~~

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 * 0.85¹² = \$4267.25 for 15% depreciation after 12 yr.

Overall Cost of Financed Car = Total Loan Payments + Down Payment

Interest Paid = Total Loan Payments Paid Back – Amount Borrowed

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

Weighted Mean: $\frac{\sum(x_1 * wf_1 + x_2 * wf_2 + x_3 * wf_3 + \dots)}{(wf_1 + wf_2 + wf_3 + \dots)} = \frac{\sum x_i f_i}{\sum wf_i}$

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 the mean between the 10th and 11th place, value in 10 and a 'halfth' place.

Percentile Rank. $PR = \frac{B + \frac{1}{2}E}{N} * 100$; round up!; where **B** is the number of scores below, E is the number equal; and **N** is the total number.

1. The daily high temperatures this week, in °C, were {2; 7; 8; 3; 9; 16; 0}. The mean daily high temperature for the week was:

a. 7 °C

~~b. 45 °C~~

c. 6.43 °C

d. 7.5 °C

↑ Really?
A central value?

2. The measure of central tendency that is generally most affected by outliers is:

a. mode

b. mean

c. median

d. its TDSR

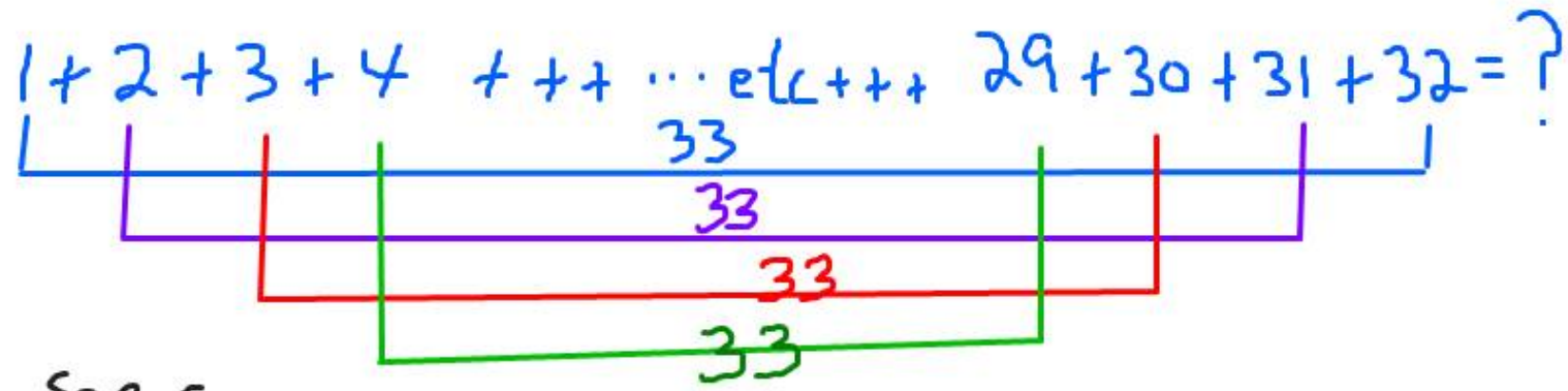
$$\textcircled{1} \bar{x} = \frac{\sum x}{n} = \frac{(2+7+8+3+9+16+0)}{7} = \frac{45}{7} = 6.43_{//}$$

② Outliers tend to affect the mean most.



3. **Problem Solve.** The sum of all the counting numbers from 1 to 32 is:

- ~~a. 33~~ b. 32! ? c. 320 d. 528



See a pattern?

How many 33's?
16 thirty threes!

$33 \cdot 16 = 528$

Spreadsheet

1+2+3+4+5+6+7+8+
9+10+11+12+13+14
+15+16+17+18+19+
20+21+22+23+24+2
5+26+27+28+29+30
+31+32
528

528

4. **Problem Solve.** If four chairs plus a table cost \$420 and six of the same chairs plus the same table costs \$580. Then the tables costs:
[Hint: just check each answer see which one works]

a. \$80

b. \$100

c. \$105

d. \$145

Guess and check? No need to guess!
We give you four options! Just check to see which works

	<u>Table</u>	<u>1 Chair</u>	<u>4 Chairs + Table</u>	<u>1 Chair</u>	<u>6 Chairs</u>
✗	80?	$340/4 = \$85$	\$420	$500/6 = \$83.33$	580
✓	100?	$320/4 = \$80$ each	420	$480/6 = \$80$	580

\$100 FOR THE TABLE AND \$80 FOR EACH CHAIR WORKS

OPEN RESPONSE

Show your work for best mark. It helps you organize your calculations and allows me to provide part marks

Round decimal answers to nearest 0.01 unless otherwise indicated

1. Calculate the sample size, n ; the sum of the data, $\sum x$; the mean, \bar{x} ; the median, \tilde{x} ; the Mode, and the Range of the two given sets of data below: [individual questions are worth 1 mark each]

a. {3, 4, 9, 7, 2, 7} The ages, in years, of your nephews and nieces

$n = \underline{6}$

$\sum x = \underline{32 \text{ yr}}$
Sum "add em" all up

Mean
 $\bar{x} = \underline{5.33 \text{ yr}}$

$\tilde{x} = \underline{5.5 \text{ yr}}$

Mode = 7 yr

Range: 7 yr

$n=6$ size of sample or data set

$\sum x = 3+4+9+7+2+7 = 32 \text{ yr}$

$\bar{x} = \frac{\sum x}{n} = \frac{32}{6} = 5.3\bar{3} \text{ yr}$

\tilde{x} calculate: {~~2~~, ~~3~~, 4, 7, ~~7~~, ~~9~~}
 ↑ ↑
 3rd 4th

$(6+1)/2 = 3.5$ want the value between 3rd and 4th place
 $(4+7)/2 = 11/2 = 5.5$

Mode: "7" is more common

Range: $x_{\max} - x_{\min} = 9 - 2 = 7$

6

omg!

b. {32, 2, 2, 2, 2, 2, 3, 4, 4, 4, 5, 5, 6, 4, 2, 18} The data is ages (years) for children and workers at a day care.

n = 16 people

$\sum x =$ 97 yr ← add them all up

Mean $\bar{x} =$ 6.06 yr

$\tilde{x} =$ 4 yr

Mode = 2 yr

Range: 30 yr

6
□

$\bar{x} = \frac{\sum x}{n} = \frac{97}{16} = 6.0625 \approx 6.06$

determine median \tilde{x} { 2, 2, 2, 2, 2, 2, 3, 4, 4, 4, 4, 5, 5, 6, 18, 32 }
mode
8th place 9th place
 $\tilde{x} = \frac{(16+1)/2 = 8.5^{th} \text{ place}}{(4+4)/2} = \boxed{4}$
omg!!

mode = most frequent = 2

range = $x_{max} - x_{min} = 32 - 2 = 30 \text{ yr}$

FYI. There exist apps and websites that do this stuff too! But we have to do it the pencil and paper way with a calculator

`a = [32,2,2,2,2,2,2,3,4,4,4,5,5,6,4,2,18]`
`a = 16 element list`

`stats(a)`

Min	2
Q1	2
Median	4
Q3	5
Max	32

`mean(a)`
`= 6.0625`

`total(a)`
`= 97`

You may want to explore some of the Apps I have shared or find your own!

E.g: 13,23,12,44,55

32,2,2,2,2,2,3,4,4,4,5,5,6,4,2,18

Calculate

Total Numbers:
16

Mean (Average):
6.0625

Median:
 $(4+4)/2 = 4$

Mode:
2

Range:
30

Ascending Order:
2,2,2,2,2,2,3,4,4,4,4,5,5,6,18,32

4. **Problem Solve.** The teacher says : "Double my age and add 5 and the result is 115". Determine the age of the teacher.

Guess & check? Logic? Algebra?

2

Guess and Check

Teacher	Double	Add 5	
X 40 ?	80	85	BZZT want 115
X 50 ?	100	105	getting close
X 54 ?	108	+5 = 113	really close! close enuff?

55 ? $\times 2 = 110 + 5 = 115 \checkmark$

Yes! Teacher is 55

4. **Problem Solve.** The teacher says : "Double my age and add 5 and the result is 115". Determine the age of the teacher.

Logic? Algebra?

2

How about a bit of logic and work backwards??

$$115 - 5 = 110 \quad \text{"undid" the add 5}$$

$$110 \text{ undouble} \Rightarrow 110/2 = \textcircled{55}$$

Check?

$$\textcircled{55} \cdot 2 + 5 = 110 + 5 = 115$$

Yes! 55 works!

Algebra

$$2x + 5 = 115$$

$$\begin{array}{r} -5 \quad -5 \end{array}$$

$$\begin{array}{r} 2x = 110 \\ \hline x = \textcircled{55} \end{array}$$

Algebra is really logic
and working backwards

5. **Car Purchase.** The car you chose costs **\$29,500 MSRP** (Manufacturer's Suggested Retail Price). You want the fancy stereo system option for an extra **\$500**. The car has to be shipped from Toronto and incurs a freight charge of **\$750**. There is an ecology 'fee' (excise tax) of **\$100** on its air conditioner. You have a trade-in that is worth **\$3,500**.

a. Determine the final dealer **price** of your car with the options and freight and ecology 'fee' and allowing for the trade-in. **\$27,350**

b. Calculate the final **price** of the car with the retail taxes included. (7% PST and 5% GST) **\$30,632**

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

a) $29,500 + 500 + 750 + 100 - 3500 = \$27,350$ ← What dealer wants
but dealer has to collect taxes from us too to submit to gov't

b) Total we pay dealer is $27,350 \cdot 1.12 = \$30,632$

if we were going thru a private seller we would pay the PST when we register the car. And btw, there is no GST on used vehicles (yet?)

5. **Car Purchase.** The car you chose costs **\$29,500 MSRP** (Manufacturer's Suggested Retail Price). You want the fancy stereo system option for an extra **\$500**. The car has to be shipped from Toronto and incurs a freight charge of **\$750**. There is an ecology 'fee' (excise tax) of **\$100** on its air conditioner. You have a trade-in that is worth **\$3,500**.

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Final Price ←
Down Payment ←
→ 30,632 - 2,000
= 28,632 LOAN

6

c. You make the down payment of **\$2,000** and then take a loan on the remainder at **8%** for **5 years**. Calculate your monthly payments [use loan tables or an App, if you use an App give a hand-drawn 'screenshot' of your inputs and result].

20.28 $\frac{28,632}{1000} = 28.632$ **\$580.66/month**

TVM Calculator

Mode End Beginning

Present Value 28,632

Payments **-580.55**

Future Value 0

Annual Rate (%) 8

Periods 60

Compounding Monthly

Lots of Apps and websites give the same ~ answer! A bit more accurately too!

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

6. **Vehicle Depreciation.** If your car is originally worth \$38,600 and depreciates at 25% per year, determine the expected value of your car after 10 years using the exponential decay of its value.

2

$$\begin{aligned}
 & \$ 38,600 - 25\% \text{ of } 38,600 \\
 & 38,600 - \frac{25}{100} \cdot 38,600 \\
 & 38,600 - 9,650 \\
 & \quad = 28,950
 \end{aligned}$$

The car loses \$9,650 of value in the first year

year	value	depreciate	value end of year
1	\$ 38,600.00	\$ 9,650.00	\$ 28,950.00
2	\$ 28,950.00	\$ 7,237.50	\$ 21,712.50
3	\$ 21,712.50	\$ 5,428.13	\$ 16,284.38
4	\$ 16,284.38	\$ 4,071.09	\$ 12,213.28
5	\$ 12,213.28	\$ 3,053.32	\$ 9,159.96
6	\$ 9,159.96	\$ 2,289.99	\$ 6,869.97
7	\$ 6,869.97	\$ 1,717.49	\$ 5,152.48
8	\$ 5,152.48	\$ 1,288.12	\$ 3,864.36
9	\$ 3,864.36	\$ 966.09	\$ 2,898.27
10	\$ 2,898.27	\$ 724.57	\$ 2,173.70

Better way using an exponent
 $38,600 \cdot 0.75^{10}$
 value it keeps
 exponent

$$38600 \cdot 0.75^{10} = 2173.7016$$

h.o.l.

Bonuses: (2 marks each)

A. If Alyssa gets an 85% mean on her entire math course her mom will take her shopping for new winter boots! Presently Alyssa has test marks of **65%, 80%, 90%, and 55%** on the first four tests and there is one more test remaining. All the test marks on the course are **equally weighted**. Determine the mark that Alyssa needs on her final (fifth) test to get to go shopping. [Hint: Guess and Check or maybe logic such as 'algebra']

$$\bar{x} = \frac{\sum x}{n}$$

want \downarrow

$$85\% = \frac{290 + 65\% + 80\% + 90\% + 55\% + x\%}{5}$$

$$5 \cdot 85\% = \frac{(290 + x\%) \cdot 5}{5}$$

$$425\% = 290\% + x\%$$

-290 -290

$$x = 425 - 290 = 135\%$$

She need 135%

LOL NO WAY WILL SHE Go Shopping!

$$\text{Check } \frac{65 + 80 + 90 + 55 + 135}{5} = 85\% \checkmark$$

If you don't
"do algebra"
just keep
guessing
till you get 85

$\frac{(290 + 80)}{5}$ \times $= 74$

$\frac{(290 + 90)}{5}$ \times $= 76$

$\frac{(290 + 100)}{5}$ \times $= 78$

$\frac{(290 + 130)}{5}$ \times $= 84$

$\frac{(290 + 135)}{5}$ \times $= 85$

Guess

135 works

B. determine how many seconds are equivalent to 15 days.

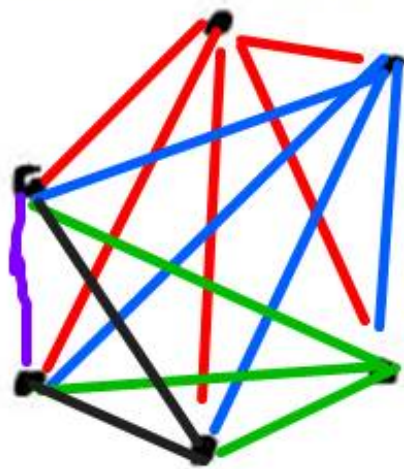
$$\cancel{15 \text{ days}} \cdot \frac{\cancel{24 \text{ hr}}}{\cancel{1 \text{ day}}} \cdot \frac{\cancel{60 \text{ min}}}{\cancel{1 \text{ hr}}} \cdot \frac{60 \text{ sec}}{\cancel{1 \text{ min}}}$$

$$= 1,296,000 \text{ seconds}$$

equal 15 days

"1 million
296 thousand"

C. Determine how many connections there would be if we make a single connection between each and every one of these dots:



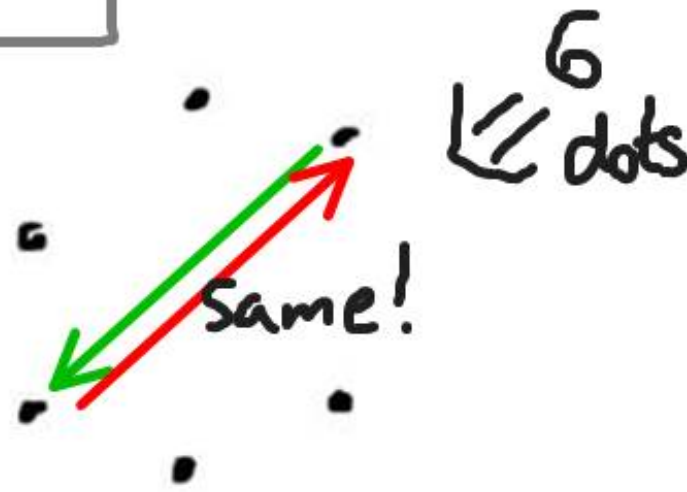
5
4
3
2

+ 1

15
connection

lol! connect em!

See a pattern?



How about a formula?
Doesn't each dot connect to 5 other dots. $6 \cdot 5 = 30$
but half of them would double counted

$$\frac{n \cdot (n-1)}{2}$$

$$30/2 = 15$$