

# Grade 12 Essentials

## MATH

### Week 4 Quiz Debrief



23-09-28

MrF



**GRADE 12 ESSENTIAL  
WEEKLY QUIZ 23 - 09 - 28**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

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

Use a calculator to its full effect.

Each individual question is worth 2 marks each

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. Carol is paid \$930 bi-weekly, she wants to determine her average monthly pay. Her equivalent monthly pay is:

a. \$2,015 / month

b. \$3,720 / month

c. \$1,860 / month

d. \$11,160

**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. 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)<sup>years</sup>.** Original Value does not include taxes. Eg: \$30,000 \* 0.85<sup>12years</sup> = \$4267.25 for 15% depreciation after 12 yrs

**STATISTICS**

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

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

**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 9<sup>th</sup> place. With 20 data → middle place is the mean between the 10<sup>th</sup> and 11<sup>th</sup> 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.

**Percentiles and Quartile Ranks.** P<sub>25</sub> = Q<sub>1</sub>; P<sub>50</sub> = Q<sub>2</sub> = Median; P<sub>75</sub> = Q<sub>3</sub>.

**Note:** some references simplify this too  $\frac{B}{N} * 100$  if N is large or E is small.

My cheat sheet

You do

Your own

1. Carol is paid \$930 bi-weekly, she wants to determine her average monthly pay. Her equivalent monthly pay is:  $\rightarrow 930 \cdot 4$  it looks like

a. \$2,015 / month *Probably*

b. \$3,720 / month

Bi-weekly  
 $\equiv$   
 Every second week

~~c. \$1,860 / month~~  
*only February (sometimes)*

~~d. \$11,160~~  
*seems a bit high!*

Let's do the numbers anyway

$$\begin{aligned}
 & \$930 / \cancel{\text{bi-week}} \cdot 26 \cancel{\text{ bi-weeks}} / \text{year} \\
 & = \$24,180 / \text{yr}
 \end{aligned}$$

Different months have different number of weeks!

Turn all bi-weekly into yearly

$$\$24,180 / \cancel{\text{yr}} \cdot \left( \frac{1 \cancel{\text{ yr}}}{12 \text{ mon}} \right) = \underline{\underline{\$2,015 / \text{month}}}$$

Now convert back to months

Notice! If the units cancel and work out the numbers will too!

2. Total Debt Service Ratio (TDSR) is:

- a. is a ratio of mandatory payments and debts and expenses compared to gross income; and should not exceed 40%
- b. should not exceed 32% as a general rule.
- c. is used to calculate the depreciation of an asset as it decays exponentially in value.
- d. does not apply in Manitoba, having been cancelled by the government in the most recent budget.

3. 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

$$\bar{x} \equiv \text{mean} = \frac{\sum x}{n}$$
$$= \frac{45}{7} = 6.43^{\circ}\text{C}$$

QUIZ  
Instructions said  
round to nearest  
0.01  
We will learn about  
proper rounding  
and "sig figs" later!

4. The sum of all the counting numbers from 1 to 100 is:

a. ~~101~~

b. 10,100

c. 5,050

d. 50,500

$$1 + 2 + 3 + 4 + \dots + \text{etc} + \dots + 97 + 98 + 99 + 100 = ?$$



OMG. Using a calculator would be insane!  
Maybe use a spreadsheet?

You know how to use a spreadsheet  
in your Microsoft of Google Account?

$$1 + 2 + 3 + 4 + \dots + \text{etc} + \dots + 97 + 98 + 99 + 100$$

$1 + 100 = 101$   
 $2 + 99 = 101$   
 $3 + 98 = 101$

See a pattern!

That is the definition of math  
Seeing patterns

How many 101's?  
50!

$$101 \cdot 50 = 100 \cdot 50 + 1 \cdot 50 = 5050$$

Mental math even!

4. The sum of all the counting numbers from 1 to 100 is:

a. 101

b. 10,100

c. 5,050

d. 50,500

OMG, I just thought of another way!

Sum	
1 → 10 = 55	
11 → 20 = 155	10 + 1 + 10 + 2 + ...
21 → 30 = 255	20 + 1 + 20 + 2
31 → 40 = 355	
41 → 50 = 455	
51 → 60 = 555	
61 → 70 = 655	
71 → 80 = 755	
81 → 90 = 855	
91 → 100 = 955	

5050  
OMG!!

I just thought of it that way too!

oh wait!!  
Turn the pattern into formula

$$\sum_{i=1}^{100} x_i = \frac{n \cdot (n+1)}{2}$$

$$\frac{100}{2} \cdot (50+1) = \textcircled{5050}$$

oh wait!! I have another idea!



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

→ you can always find exceptions

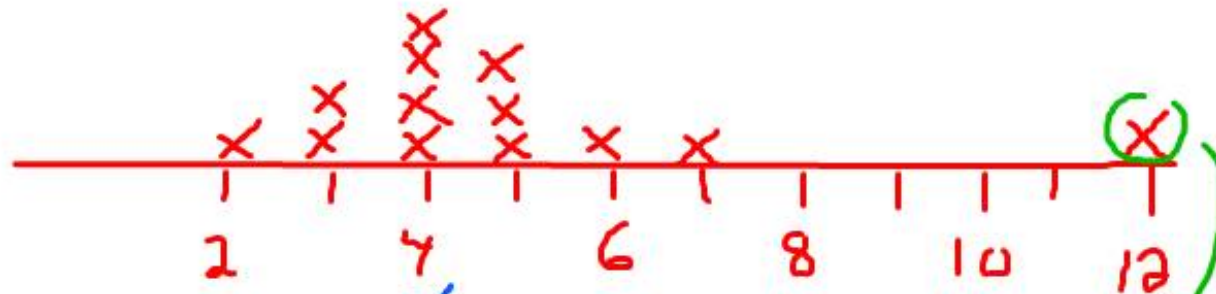
a. mode

b. mean

c. median

d. ~~its TDSR~~

but "generally"



median  
= 4  
mode  
= 4

moving the outlier around won't change the median or the mode generally. It will change the balance point!

## 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  
= ↖ Standard

Show work on separate paper if necessary

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.

$n = \underline{6 \text{ samples}}$        $\sum x = \underline{32 \text{ yr}}$

"Sum" symbol

$5.33 \text{ yr/person}$

$\bar{x} = \frac{\sum x}{n} = \frac{32}{6} = \underline{5.33}$

$\tilde{x} = \underline{5.5 \text{ yr}}$       Mode =  $\underline{7 \text{ yr}}$

Range:  $\underline{7 \text{ yr}}$

$X_{\max} - X_{\min}$   
 $9 - 2$

line 'em up  $\{\cancel{2}, \cancel{3}, 4, \tilde{x}, 7, \cancel{7}, \cancel{9}\}$

$\left(\frac{4+7}{2}\right)$   
 $= 5.5$

MrF

b. {32, 2, 2, 2, 2, 2, 3, 4, 4, 4, 5, 5, 6, 4, 2, 18}

The data is ages

= 6.06 yr/person

n = 16 people (Sample size)

Σx = 97 yr (Sum)

$\bar{x} = \frac{\Sigma x}{n} = \frac{97 \text{ yr}}{16 \text{ people}}$

$\tilde{x} = \frac{4 \text{ yr}}$   
↑  
OMG!

Mode = 2 yr  
most frequent

Range:  $\frac{32 - 2}{x_{\max} - x_{\min}} = 30 \text{ yr}$

There are apps that do this in Applied.

{~~2, 2, 2, 2, 2, 2, 3, 4, 4, 4, 5, 5, 6, 18, 32~~ }

↑  
find the mean of {4, 4}

$\tilde{x} = \frac{(4+4)}{2} = \textcircled{4}$

OMG!

## DO QUESTION 2 AND / OR QUESTION 3 BELOW

If you do both, the better one will be marked, the other will be bonus marks.

2. **OPTION.** In a school, 236 students wrote a test. Jesse and his friend Jarrod scored 60 out of 93 on the test and 127 students scored lower than 60.

a. Calculate Jesse's mark on the test as a percentage;  $64.52\%$

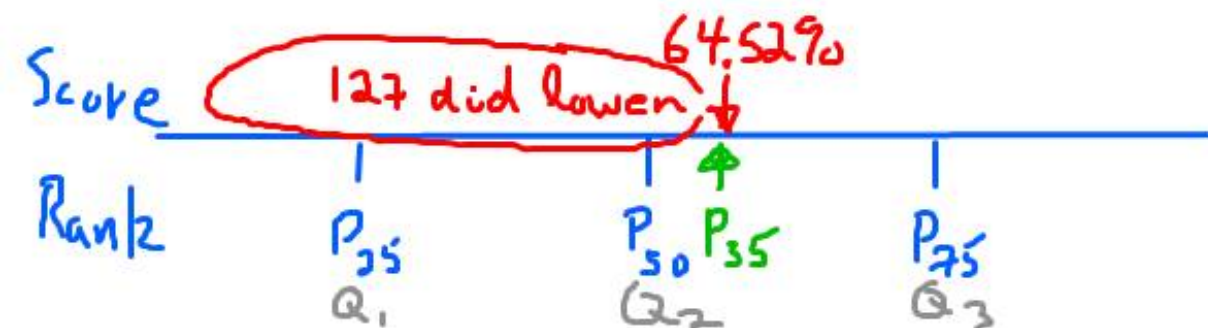
b. Calculate Jesse's percentile rank.  $P_{55}$

$$a) \quad 60/93 = \frac{x}{100} ; \quad x = \frac{60}{93} \cdot 100 = 64.52\%$$

$$b) \quad PR = \left[ \frac{B + \frac{1}{2}(E)}{n} \right] \cdot 100 \nearrow = \left[ \frac{127 + \frac{1}{2} \cdot 2}{236} \right] \cdot 100 = 54.24$$

Round up:  $55$

$P_{55}$ , 55<sup>th</sup> place  
Rank 55



3. **OPTION.** Juanita took a Physics course. The following table shows the marks she earned for a project and the weight for each category:

Category	Mark (%)	Weight (%)
Theories	90	40 <i>0.4</i>
Communication	45	10 <i>0.1</i>
Calculations	70	50 <i>0.5</i>

*OPTION!*  
*ONLY ONE*  
*Person did both!*

a. Calculate Juanita's final mark for the project using a weighted mean.

75.5%

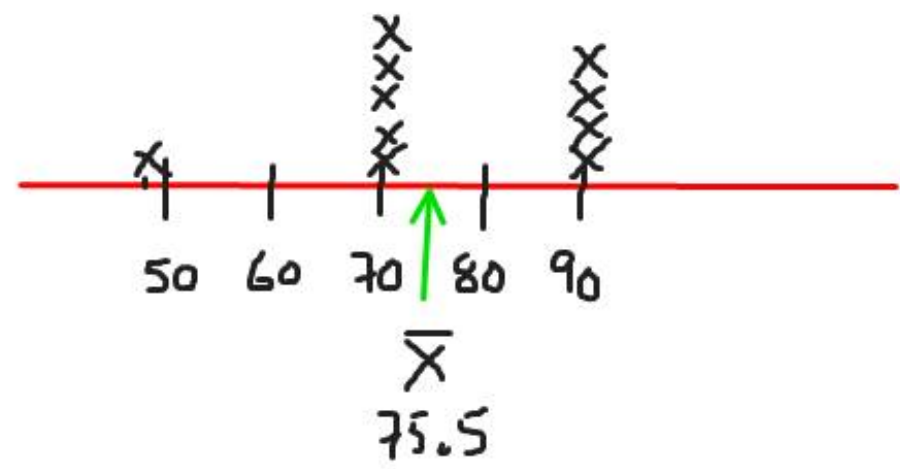
b. If Juanita wanted to improve her overall grade, explain in which category she should focus her efforts to improve her overall mark.

Justify (*explain*) your answer. ['*Explain*': use a coherent sentence or two] [Diagrams are a good way to help explain stuff too!]

$$\begin{aligned}
 a) \bar{x}_{\text{weighted}} &= \frac{\sum x \cdot wf}{\sum wf} = \frac{[90\% \cdot 0.4 + 45\% \cdot 0.1 + 70\% \cdot 0.5]}{[0.4 + 0.1 + 0.5]} \\
 &= 75.5\% / 1 = \boxed{75.5\%}
 \end{aligned}$$

b) Her calculations have the biggest weight factor, payoff. She still has room to improve too! So she should focus on improving her calculations if her aim is a better mark

Category	Mark (%)	Weight (%)
Theories	90	40 <i>0.4</i>
Communication	45	10 <i>0.1</i>
Calculations	70	50 <i>0.5</i>



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

Logic & work Backwards  
Undo the add 5 leaves 110.  
Undo the double ( $2 \cdot \underline{55} = 110$ )  
is 55 years old

Logic?  
Work backwards?  
Algebra?  
Graphing?  
Guess & check?

Algebra? Pretty much work backward!

let  $x =$  teacher age

$$2x + 5 = 115$$

$$\begin{array}{r} -5 \quad -5 \\ \hline 2x = 110 \\ \hline \cancel{2}x = \frac{110}{\cancel{2}} \\ x = \boxed{55} \end{array}$$

un-add the 5

un-multiply the 2



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

Logic?  
 Work backwards?  
 Algebra?  
 Graphing?  
 → Guess & check?

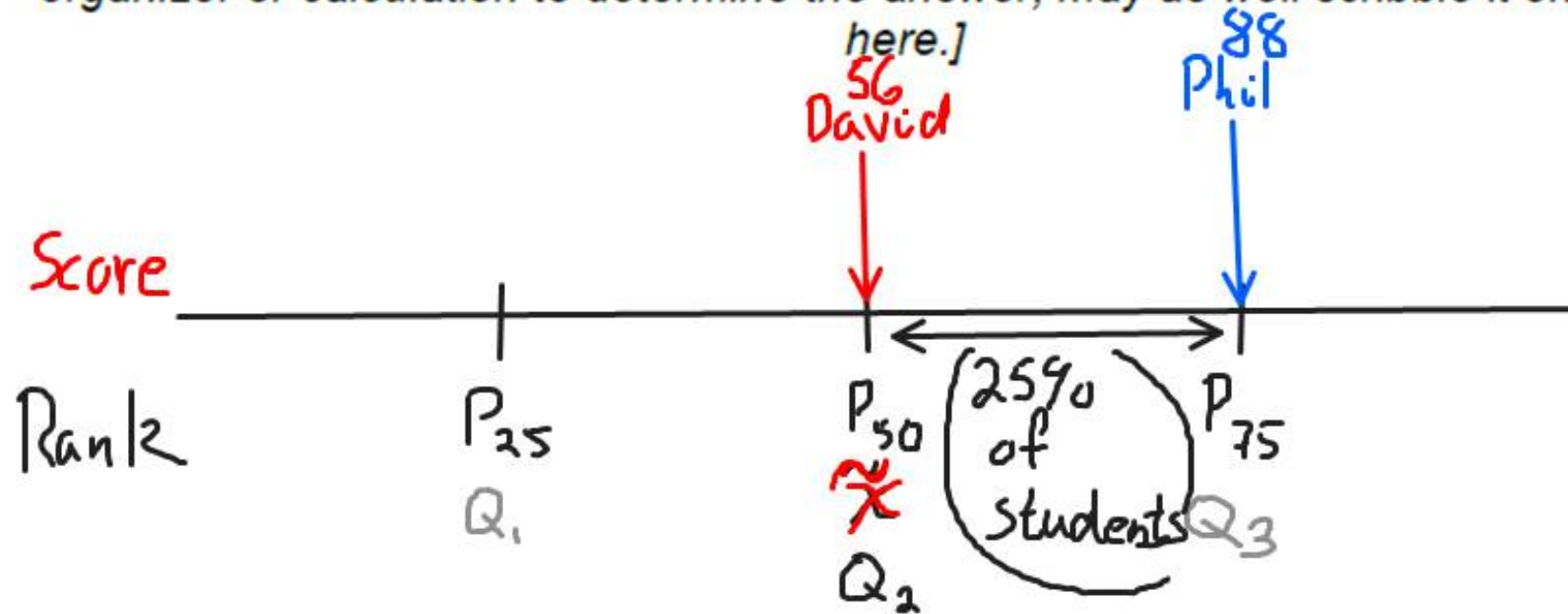
Teacher age	Double age	Add 5	
× 40?	80	85	hzzt
× 50?	100	<sup>100+5</sup> 105	hzzt!
<span style="border: 1px solid green; padding: 2px;">55?</span>	<sup>55·2</sup> 110	<sup>100+5</sup> (115)	Yes

↑ So 55 is the teacher's age.

$$55 \cdot 2 + 5 = 115 \checkmark$$

5. In a math class, David received the median score (56) on his math test. Phil's score (88) was at the 75th percentile. No students received the same score. **State** the approximate percentage of students who received a score between David's and Phil's.

[the instruction, **'STATE'**, means just give an answer; no explanation is necessary, no need to necessarily show any work. However, one likely needs some sort of graphical organizer or calculation to determine the answer, may as well scribble it on the page



25% of student  
were between  
56 and 88

**The test scores are  
completely irrelevant!**

6. **Vehicle Depreciation.** If your car is originally worth \$34,600 and depreciates at 23% per year, determine the expected value of your car after 10 years using the exponential decay of its value.

$$(34600 \cdot 0.77)$$

1yr

$$= 26642$$

$$(34600 \cdot 0.77) \cdot 0.77$$

2yr

$$= 20514.34$$

$$(((34600 \cdot 0.77) \cdot 0.77) \cdot 0.77)$$

3yr

$$= 15796.0418$$

$$((((34600 \cdot 0.77) \cdot 0.77) \cdot 0.77) \cdot 0.77)$$

4yr

$$= 12162.952186$$

↓  
keep going

use exponents!

$$34,600 \cdot 0.77^{10}$$

$$34600 \cdot 0.77^{10}$$

$$= 2535.03144$$

The car will be worth about  
**\$2,535**

Kelly blue book  
and others would  
say the same

Bonuses: (2 marks each) Do them!

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.

$$85 = \bar{x} = \frac{\sum x}{n} = \frac{[65 + 80 + 90 + 55 + x]}{5 \text{ tests}}$$

↖ final test

Target  
↓  
5 · 85 =  $\left( \frac{[290 + x]}{5} \right) \cdot 5$

↓  
425 = x  
-290  
Ⓢ135 = x   lol

She needs 135% on final

Check! ✓   ↖ checks!  
 $\frac{290 + 135}{5} = 85$  ✓ Yes

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

Successive conversions

$$15 \text{ days} \cdot \left( \frac{24 \text{ hr}}{1 \text{ days}} \right) \cdot \left( \frac{60 \text{ min}}{1 \text{ hr}} \right) \cdot \left( \frac{60 \text{ sec}}{1 \text{ min}} \right)$$

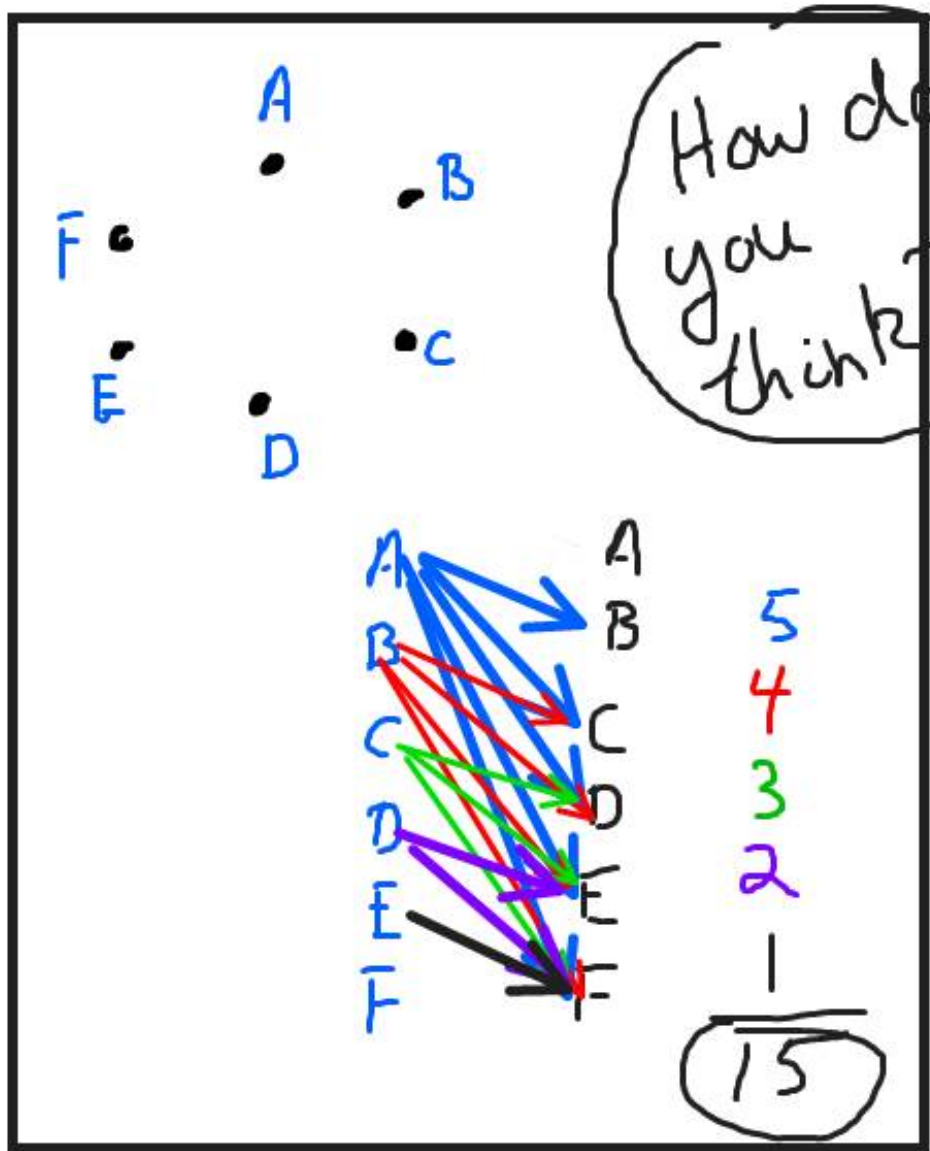
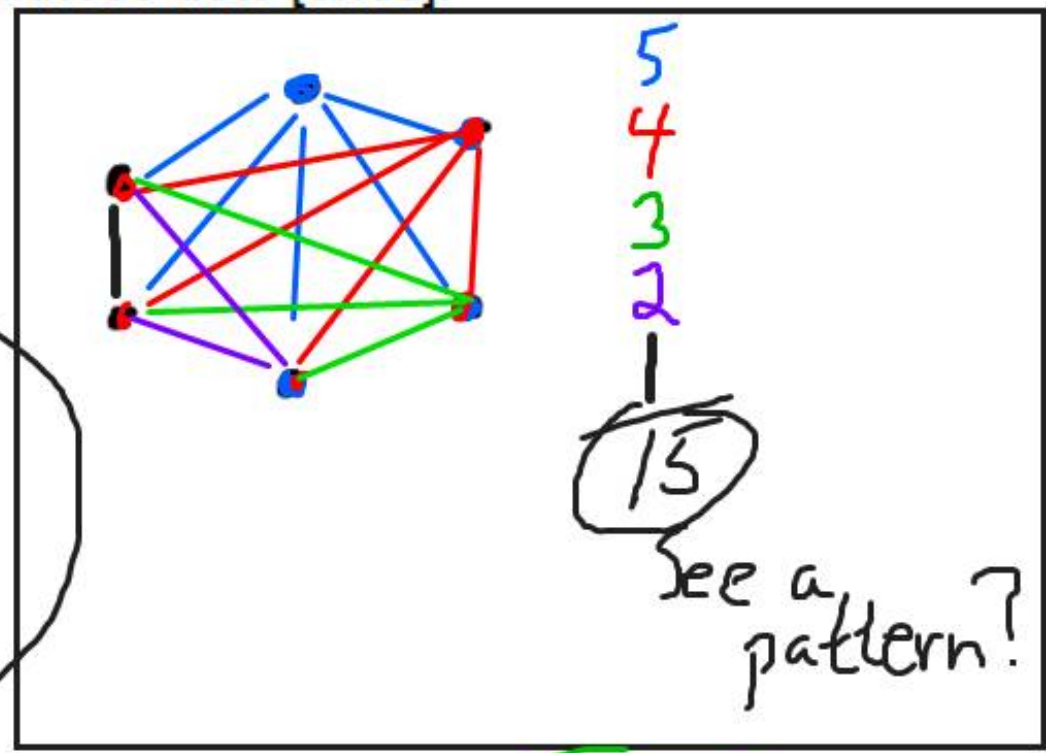
$$= 15 \cdot 24 \cdot 60 \cdot 60$$

$$= 1,296,000$$

ONE million,  
Two hundred ninety six  
thousand

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

to Q. A couple folks cannot read??



**15 WAYS**

	A	B	C	D	E	F
A	x	✓	✓	✓	✓	✓
B	x	x	✓	✓	✓	✓
C	x	x	x	✓	✓	✓
D	x	x	x	x	✓	✓
E	x	x	x	x	x	✓
F	x	x	x	x	x	x



**DETERMINED TO DELIVER**  
**UP HILL! REAL GOOD!**  
**LOAD CLEAR!**



**On Time! On Target!**