

# Grade 12 Essential Mid-Term Test Debrief

23-05-04

MRF

WEEK 5

**GRADE 12 ESSENTIAL  
MID TERM TEST 23-05-04**

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

This **Test** is worth ~10% of your course mark

CLOSED BOOK. Use your and or teacher's single sheet Reference Notes ('Cheat Sheet')

Formulae, have been provided in class and some at back

**!! It is possible to get up to 120% on this test! So, give the bonuses a try too!!**

**Time Limit 75 Mins.** Gauge your time allocation appropriately.

**CAUTION:** Diagrams are not drawn to exact scale.

**Part 1: Multiple Choice** (two marks each)

Circle the letter of the **best** or **closest** answer

The "eyeball" method  
only works if a diagram  
is drawn to proper proportion

1. The mean and median of the data set  $\{3, 5, 7, 7, 2, 1, 14\}$  is:

~~a.~~  $\bar{x} = \text{nil}; \tilde{x} = 7$  *of course there's a mean.*

~~b.~~  $\bar{x} = 7.5; \tilde{x} = 3$

~~c.~~  $\bar{x} = 39; \tilde{x} = 5$

**d.**  $\bar{x} = 5.57; \tilde{x} = 5$  ✓

ONE OF THESE!

how can 39 be "central tendency"?

leaning toward this one just looking

$$\text{Mean} \equiv \bar{x} = \frac{\sum x}{n} = \frac{39}{7} = 5.57$$

FYI: check  $\tilde{x}$  for fun?

$\{1, 2, 3, 5, 7, 7, 14\}$   
 $\tilde{x} = 5$

2. If Jayson drives 4,500 km and uses 360 L of gas, what was his vehicle's fuel economy?

~~a.~~ 8.0 km per litre

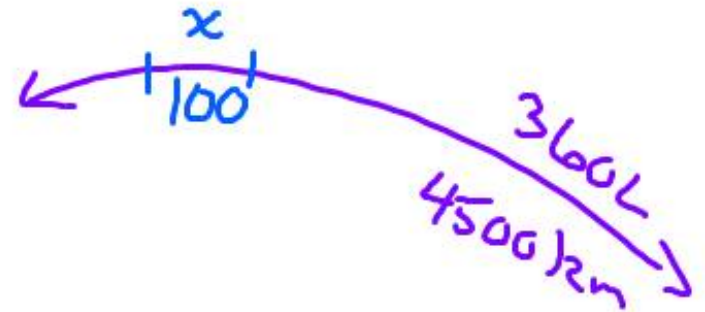
*km/L? we do L/km!*

b. 12.5L/100 km

c. 8.0 L/100 km

~~d.~~ 0.08 → *No units!!*

$$\frac{360\text{L}}{4500\text{km}} \quad \leftarrow \quad \frac{x\text{L}}{100\text{km}}$$



$$\frac{360\text{L} \cdot 100\cancel{\text{km}}}{4500\cancel{\text{km}}} = x\text{L}$$

8 L = x so the Fuel Economy is

$$\left( \frac{8\text{L}}{100\text{km}} \right)$$

*↑  
TLAR!  
6-12  
usually*

Doesn't a picture organize your thoughts?? Why does noboldy sketch the idea out??

Still have folks just using numbers! Without units!! The units will save your bacon!!

3. A car's value decays exponentially as it depreciates. If a \$46,000 car has a 20% rate of depreciation then the value of the car after eight years is approximately:

really?

~~a.~~ \$45,840

b. \$7720

c. \$36,800

~~d.~~ 80% ?

You can drive a car for 8 yr and only lose \$160 value?

Done this a dozen times!

↑ doesn't sound right

want \$

$$46,000 - \frac{20}{100} \cdot 46,000 = 36,800 \text{ end of 1 yr}$$

$$46,000 \cdot 0.8^8$$

$$36,800 - \frac{20}{100} \cdot 36,800 = 29,440 \text{ end of second yr}$$

$$= 46000 \cdot 0.8^8 = 7717.5193$$

$$29,440 - \frac{20}{100} \cdot 29,440 = 23,552 \text{ end of 3rd yr}$$

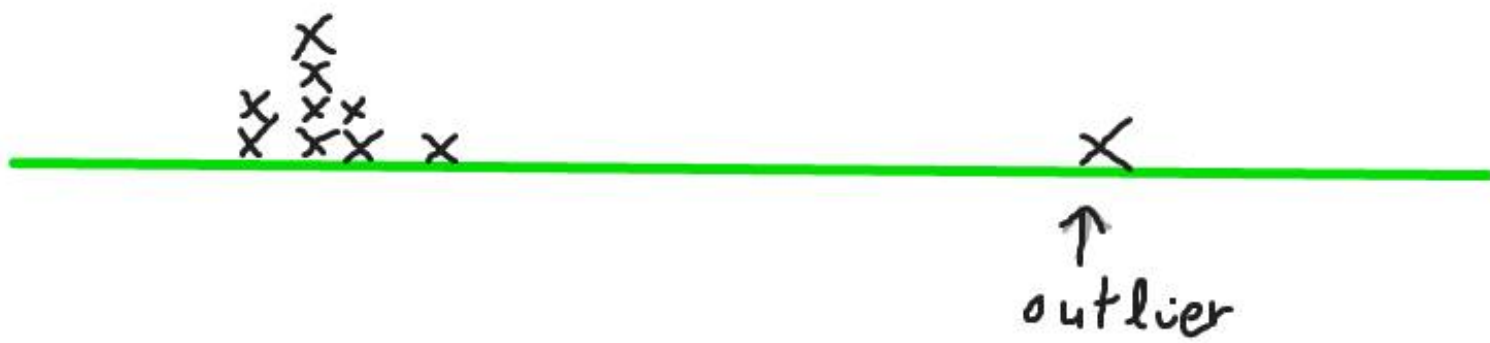
omg till end of 8 years!

NOT!

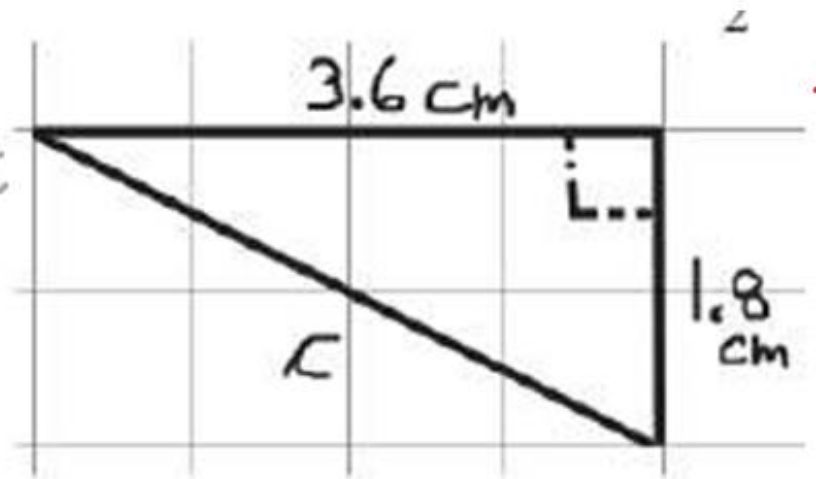
4. Data that has an 'outlier' or 'outliers' is data that has:

- a. some really big values
- b. value(s) that don't fit closely with most of the others
- c. low deviation or variance
- d. oblique and transcendental without resolution

lol. WTH? Meaningless!!



5. Side c has a length of:
- a. ~~6.48 cm<sup>2</sup>~~      b. 5.4 cm
- c. 4.02 cm      d. ~~3.24~~
- ← doesn't quite look right?



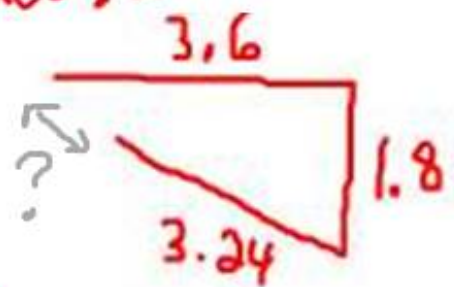
a) length is NOT measured in squares!

d) Doesn't make sense!  
How can a hypotenuse be shorter than the other two sides? l.o.l

Pythagoras Grade 10

$$c^2 = a^2 + b^2$$

↑ hypotenuse      ↑ short legs



$$c^2 = 3.6^2 + 1.8^2 = 16.20$$

$$c = \sqrt{16.20} \approx \textcircled{4.02 \text{ cm}} \quad \text{TLAR}$$

The only answer that made sense

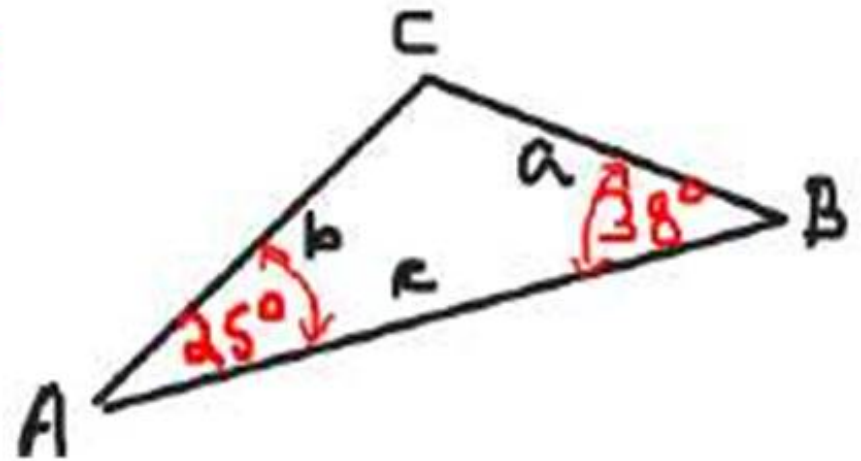
6. Angle C has a measure of:

~~a~~ 90° right?  
*Doesn't look like*

~~b~~ 63 cm  
*doesn't make sense?*

~~c~~  $25^2 + 38^2$   
WTH?

d. 117°



**Euclid! Triangle Sum Theorem!**

The interior angles of any triangle add up to 180°

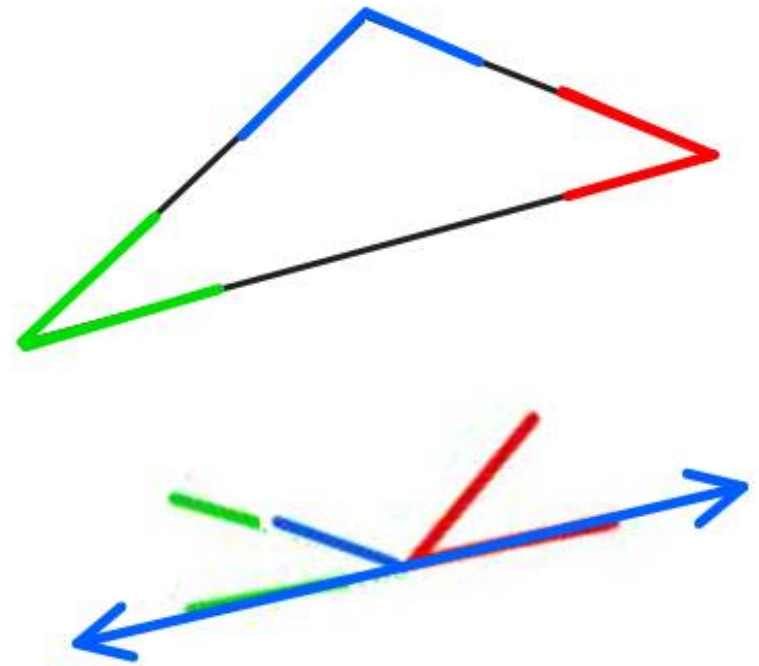
$$\angle A + \angle B + \angle C = 180^\circ$$

$$25 + 38 + \angle C = 180$$

$$63 + \angle C = 180$$

$$\begin{array}{r} -63 \\ -63 \end{array}$$

$$\angle C = 117^\circ$$





7. **SOH** CAH TOA. The length of side b is:

~~x~~ 120 lol

~~x~~ 13.33 ft

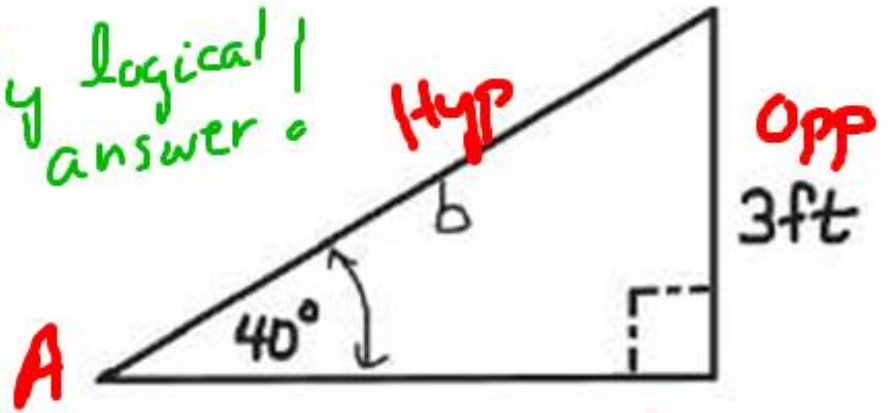
↑  
doesn't look right!

**b. 4.67 ft**

~~x~~ 60° lol!

↖ We don't measure lengths in degrees!

← only logical answer!



$$\sin A = \frac{\text{OPP}}{\text{HYP}}$$
$$\sin(40) = \frac{3}{b}$$

$$b = \frac{3}{\sin(40)} = \mathbf{4.67}$$

$$b \cdot \sin(40) = \frac{3}{b}$$
$$\frac{b \cdot \sin 40}{\sin 40} = \frac{3}{\sin 40}$$
$$b = \frac{3}{\sin 40}$$

From Grade 10 and Grade 11 and Grade 12 Studies. So obviously important

Starting to get the idea of how to do multiple choice?  
Eliminate the bogus responses  
Look at the forest not the trees

## OPEN RESPONSE

### INSTRUCTIONS

Show your work for best marks! Use separate paper if necessary

Round decimal and percentage answers to nearest hundredth (0.01) where appropriate.

Each individual question is worth 2 marks or as indicated.

Should be easy  
by now?

1. **Problem Solve Guess and Check (or whatever method works).**

The sum of two sisters' ages is **55**, the *product* (ie: multiply their ages) of their ages is **750**. How old is the younger sister?

2

Younger	Older	Sum=55	Product
<del>20</del> ?	35	= 55	$20 \cdot 35 = 700$ <del>725</del> ! X
25	<u>30</u>	= 55 ✓	$25 \cdot 30 = 750$ ✓

Yes! Nailed it on second guess!

→ The younger sister is 25 years old.

There is a fancier way to do this using quadratic equations if you were in Applied Math

2. Write a set of 5 data values whose mean is more than the median.

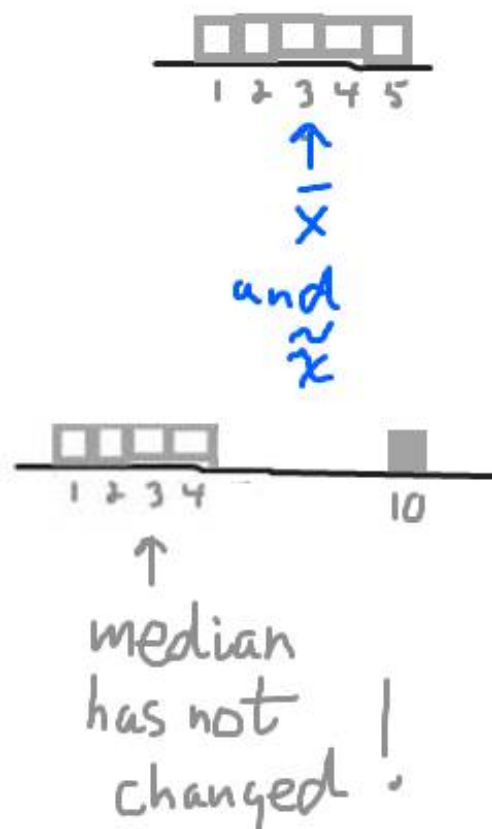
2

Well

$$\begin{array}{cccccc} 1 & 2 & 3 & 4 & 5 & \\ \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \\ \bar{x} & = & \tilde{x} & = & 3 & \end{array}$$

So  $\{1, 2, 3, 4, 10\}$   
would shift the  
mean bigger

$$\begin{array}{l} \bar{x} = 4 \\ \tilde{x} = 3 \text{ No change} \end{array}$$



All you want to do is  
make  $\sum x$  bigger!  
The median doesn't change  
if the "n" is still the same

3. Kevin wants a new car that the dealer sells for a basic price of **\$29,200** which includes delivery. He gets an **extra \$780** in extra options.

8

He has **no trade-in**.

- calculate the final price he pays for the car with PST (7%) and GST (5%) taxes that will be added also.
- he pays down \$5,000 and takes a loan on the remainder. Determine the amount of the loan he will finance.
- he negotiates a five year loan at 6%. Determine his monthly payments (using tables)
- after *all* his payments determine how much he has paid in **total** for his car? (including down payment)

a)  $29,200 + 780 = 29,980$  <sup>\$ Price of car</sup>       $29,980 \cdot 1.12 = 33,577.60$  <sup>\$ Price with taxes</sup>

b) 
$$\begin{array}{r} 33,577.60 \\ - 5,000.00 \leftarrow \text{Down Pmt} \\ \hline 28,577.60 \leftarrow \text{Loan} \end{array}$$

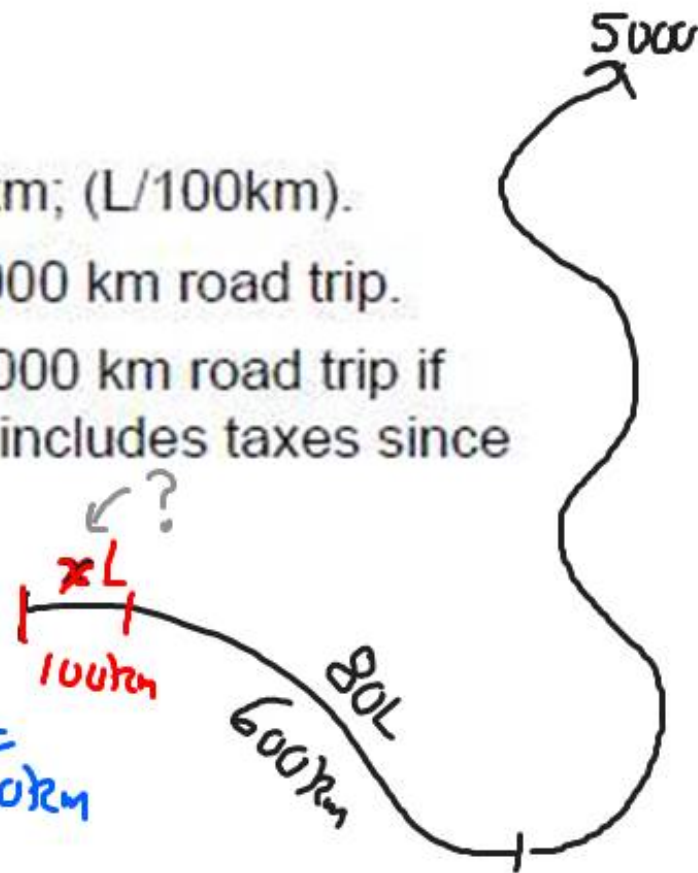
c)  $19.33 \cdot \frac{28,577.60}{1,000} = 552.41$  <sup>monthly loan pmt</sup>

d) Total \$ spent:  
 $552.41/\text{month} \cdot 60 \text{ months} = 33,144.60$   
 plus! down pmt  $5,000.00$   
 Total paid  $\Rightarrow 38,144.60$

Annual Rate	1 Year Monthl y	2 Years Monthl y	3 Years Monthl y	4 Years Monthl y	5 Years Monthl y
2%	\$84.24	\$42.54	\$28.64	\$21.70	\$17.53
3%	\$84.69	\$42.98	\$29.08	\$22.13	\$17.97
4%	\$85.15	\$43.42	\$29.52	\$22.58	\$18.42
5%	\$85.61	\$43.87	\$29.97	\$23.03	\$18.87
6%	\$86.07	\$44.32	\$30.42	\$23.49	\$19.33
7%	\$86.53	\$44.77	\$30.88	\$23.95	\$19.80

4. A car travels 600 km using 80 litres of gas.

- a. determine the fuel economy in Litres per 100 km; (L/100km).
- b. calculate how many litres will be used for a 5,000 km road trip.
- c. determine how much the cost will be for the 5,000 km road trip if gas costs 1.09 per litre. (the price of gas already includes taxes since there are so many different taxes on gas)



Solve proportions method:  
(cross multiply)

a) 
$$\frac{80L}{600km} = \frac{xL}{100km}$$

$$\frac{80L \cdot 100km}{600km} = 13.33L$$
F.E = 13.33L/100km

Pretty high? Car needs a tune up or your driving is SCARY!

b) 
$$\frac{13.33L}{100km} = \frac{xL}{5,000km}$$

$$\frac{13.33L \cdot 5,000km}{100km} = xL$$

$$\sim 666.5L = x$$
 gas need for road trip

c) Cost: 
$$666.5L \cdot \frac{\$1.09}{1L}$$

$$\approx \$726.49 \text{ for road trip}$$

OR 
$$\frac{\$1.09}{1L} = \frac{x}{666.5L}$$

$$x = 666.5 \cdot 1.09 = 726.49$$

DO QUESTION 5 OR 6 BUT NOT BOTH. If you do both I will select the better one

Everybody did this question

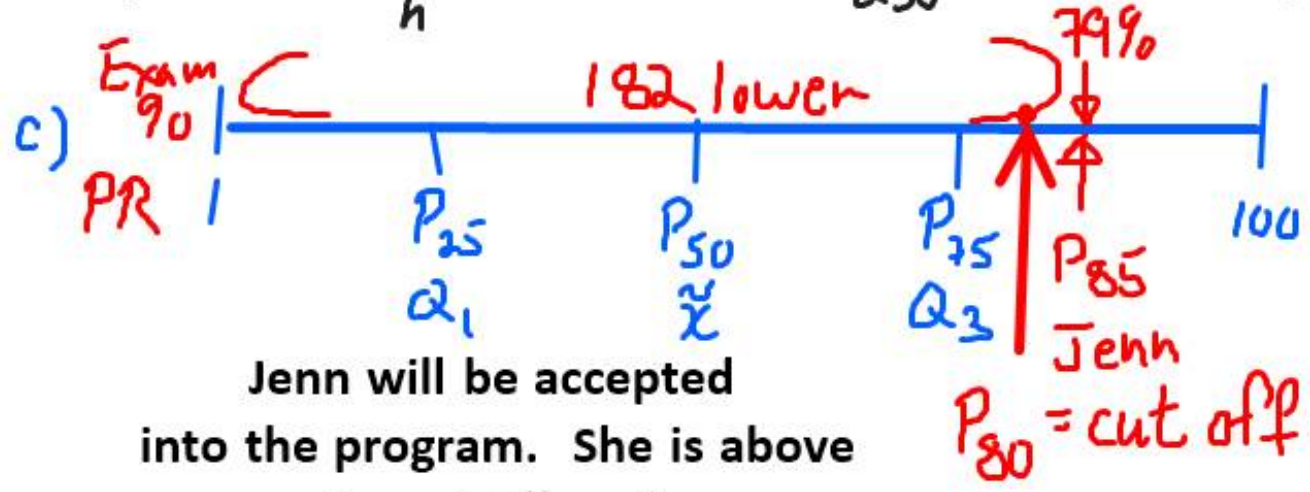
5. Jenn scores 65 points out of 82 possible points on the exam on her exam for entrance into a law program. A total of 230 students. 26 other students plus Jenn received the same score on their exam, but 182 students received a lower score.

- 6
- a) Determine the mark that Jenn got on her exam as a percent. **79.27%**
  - b) Determine Jenn's Percentile Rank.  **$P_{85}$  or 85 or 85<sup>th</sup> place**
  - c) If the cut-off for entry to law school is a rank of 80 [ie:  $P_{80}$ ]. Explain whether Jenn will be admitted to law school. Include a diagram.

a) Exam %  $\frac{65}{82} = \frac{x}{100}$  ;  $x = 79.27$  so  $\frac{79.27}{100} = \text{79.27\%}$

b)  $P = \frac{B + \frac{1}{2}(E)}{h} \cdot 100 = \frac{[182 + \frac{1}{2}(27)]}{230} \cdot 100 = \frac{195.5}{230} \cdot 100 = \text{85}$

She is in place 85  
85<sup>th</sup> place  
 $P_{85}$



Jenn will be accepted into the program. She is above the cut off rank



6. Terrance has the following marks for his four tests on a course: 40%, 75%, 78%, and he missed the fourth test and got a 0% on it. The final exam for the entire course is worth **three times** (weight factor) what a regular test is worth. The course average is based on only the **four tests** and the **final exam**.

*Nobody did this question!*

a. determine Terrance's mark before the Final Exam.

b. What will be Terrance's overall average if he gets a 65% on his final exam?

c. What mark would Terrance need on his final exam if he wants an overall course mark of at least 70%.

$$a) \bar{x} = \frac{\sum x}{n} = \frac{(40+75+78+0)}{4} = \frac{193}{4} = 48.25\%$$

Average before Exam

$$b) \bar{x} = \frac{\sum x_i \cdot wf_i}{\sum wf_i} = \frac{(40 \cdot 1 + 75 \cdot 1 + 78 \cdot 1 + 0 \cdot 1 + 65 \cdot 3)}{(1+1+1+1+3)} = \frac{388}{7} = 55.43\%$$

Final Exam worth 3 times  
Final Course average!

$$c) 70 = \frac{(40 \cdot 1 + 75 \cdot 1 + 78 \cdot 1 + 0 \cdot 1 + x \cdot 3)}{(1+1+1+1+3)}$$

;  $70 \leftarrow \frac{193 + 3x}{7}$   
 $490 = 193 + 3x - 193$   
 $297 = 3x$ ;  $x = 99$

Terrance needs a 99% to get a 70 overall

## BONUS QUESTIONS

Bonus Marks if you need them

You will be allowed a **test mark of up to 120%** if you also attempt and are successful at some of these

1. **Bonus** (1 mark each): Solve for the unknown,  $x$ :

a.  $2x + 6 = 30$

guess  
↓  
guess?  
↑

×	$2 \cdot 5 + 6$	16
×	$2 \cdot 10 + 6$	26
✓	$2 \cdot 12 + 6$	30

$x=12$   
Checked!

$$\begin{array}{r} 2x + 6 = 30 \\ -6 \quad -6 \\ \hline 2x = 24 \end{array}$$

$$\frac{2x}{2} = \frac{24}{2} \quad \cdot \quad (x=12)$$

b.  $80 = \frac{50 + 70 + 100 + x}{4}$

$$80 = \frac{(220 + x)}{4}$$

$$320 = 220 + x \quad -220$$

$$(100) = x$$

check:

works  
↓

$$\frac{50 + 70 + 100 + 100}{4} = \frac{320}{4} = 80$$

✓ checks!



2. **BONUS (1 mark ea).** A statistics person for a professional football team decides to track the number of touchdown passes thrown by the quarterback during a period of 20 games. She records the following numbers of touchdown passes during each game.

3	3	2	1	2	2	1	4	3	2
12	3	4	0	5	0	4	1	8	3

Totals

$$= 23$$

$$= 40$$

63 touchdowns

a) Calculate the mean of the number of touchdown passes per game.

b) Calculate the median of all 20 scores

Half the time they get 3 or less, half the time 3 or more

c) If your friend says that: "half the games they played, they do not even have two touchdown passes", is he correct?

Circle one response: Yes or **No.**

d) Calculate the 10% trimmed mean of the number of touchdown passes per game. (ie: 2 of the highest and two of the lowest scores trimmed off)

$$a) \bar{x} = \frac{\sum x}{n} = \frac{63 \text{ td}}{20 \text{ games}} = 3.15 \text{ touchdowns per game (on average)}$$

$$\frac{n}{2} = \frac{20}{2} = 10$$

b) Median { 0, 0, 1, 1, 1, 2, 2, 2, 2, 3, 3, 3, 3, 4, 4, 4, 5, 8, 12 }

$$d) \{ \cancel{0}, \cancel{0}, 1, 1, 1, 2, 2, 2, 2, 3, 3, 3, 3, 4, 4, 4, \cancel{5}, \cancel{8}, \cancel{12} \} \quad \bar{x} = \frac{43}{16} = 2.69 \text{ td/game}$$

3. Given the table of data below for some kids shoe sizes:  $n = 5 \cdot 4 = 20$

2	4	4	3	5
2	4	3	2	5
5	2	5	4	4
4	6	6	5	1

10

a. Draw a properly labeled histogram.

b. Calculate the:

Mean: Size 3.8

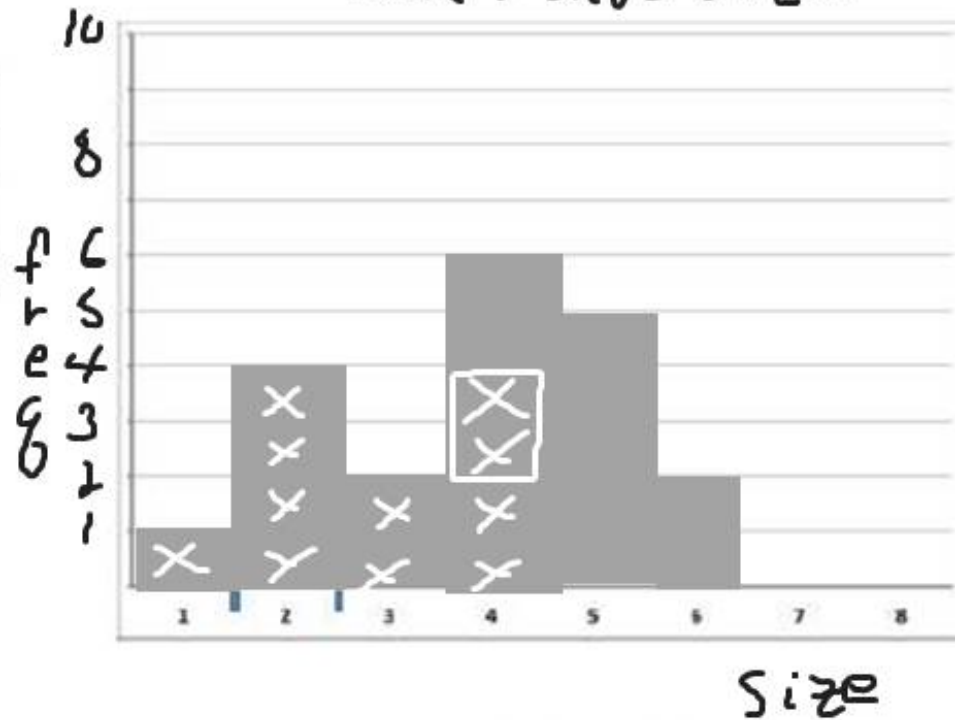
Median: Size 4

Mode: Size 4

Range: 6-1  
5 sizes

Find  $\bar{x}$   $n=20$   
we want the  
"10 1/2" data  
value

Kid's shoe sizes



If it is easier here is a little template you may want to use:

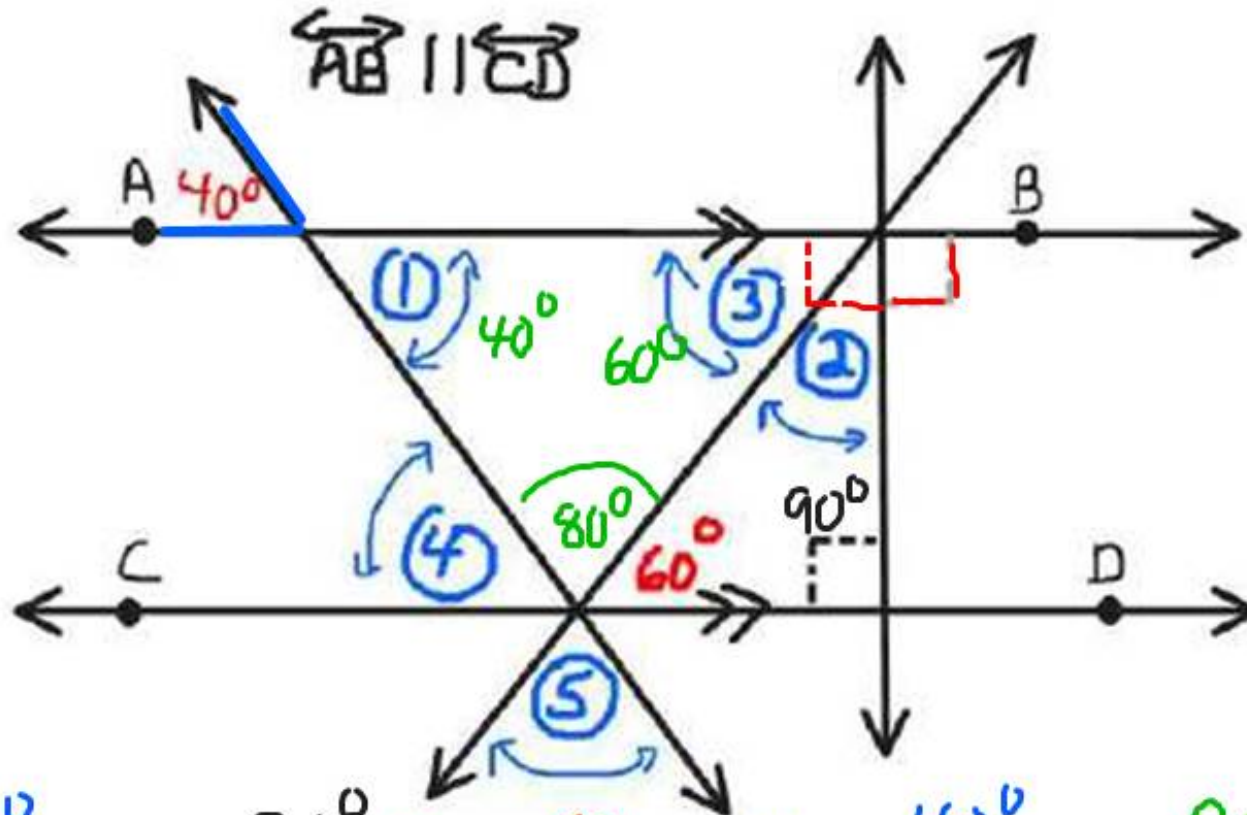
x	f(x)	Running Total f	x*f(x)
1	1	1	1
2	4	5	8
3	2	7	6
4	6	13	24
5	5		25
6	2		12
Totals	n = 20 ✓		$\Sigma x \cdot f = 76$

$$\bar{x} = \frac{\Sigma fx}{n} = \frac{76}{20}$$

$$\bar{x} = 3.8$$

4. Lines AB and CD are parallel [ $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$ ]. Using Euclidian Geometry rules, state the measure of the five numbered angles. (1 Mark each)

FUN



1 =  $40^\circ$     2 =  $30^\circ$     3 =  $60^\circ$     4 =  $40^\circ$     5 =  $80^\circ$

Opposite  
Angles are  
congruent

Triangle  
Sum  
Theorem  
 $\Delta \text{ Sum} = 180^\circ$

Complement  
of  $30^\circ$

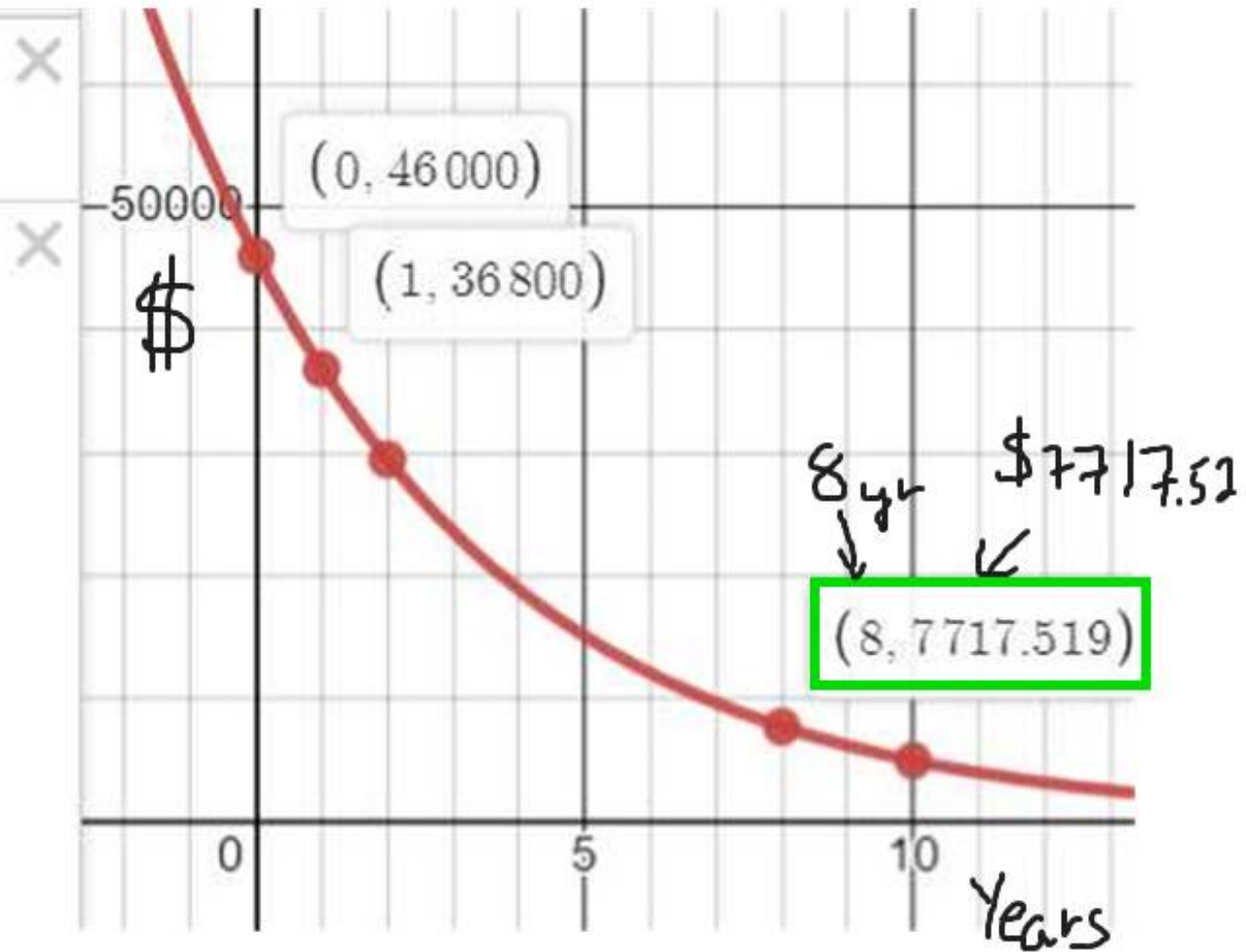
Corresponds  
with the  
 $40^\circ$

All just  
logic!  
If...  
then...

# Grade 12 Applied Graph Method

$$y = 46000 \cdot 0.8^x$$

$x$	$46000 \cdot 0.8^x$
0	46000
1	36800
2	29440
8	7717.5194
10	4939.2124



# Spreadsheet Demo

**Built into you Google Account and  
Your MicroSoft Account!**

**Useful especially for *iterative* calculations  
The same *recursive* calculations over and  
over**

# A spreadsheet does repetitive calculations really easily and automatically

Year	Start of yr Value [\$]	Depreciation [\$]	Value at end of yr	Years of depreciator
0	46,000.0	9,200.00	36,800.0	1
1	36,800.0	7,360.00	29,440.0	2
2	29,440.0	5,888.00	23,552.0	3
3	23,552.0	4,710.40	18,841.6	4
4	18,841.6	3,768.32	15,073.3	5
5	15,073.3	3,014.66	12,058.6	6
6	12,058.6	2,411.72	9,646.9	7
7	9,646.9	1,929.38	7,717.5	8
8	7,717.5	1,543.50	6,174.0	9
9	6,174.0	1,234.80	4,939.2	10
10	4,939.2	987.84	3,951.4	11
11	3,951.4	790.27	3,161.1	12
12	3,161.1	632.22	2,528.9	13
13	2,528.9	505.78	2,023.1	14
14	2,023.1	404.62	1,618.5	15
15	1,618.5	323.70	1,294.8	16

1. **Problem Solve** **Guess and Check** (or whatever method works).  
 The sum of two sisters' ages is **55**, the *product* (ie: multiply their ages) of their ages is **750**. How old is the younger sister?

↑  
 "x"

Using Pre-Calculus or Applied Math

$$\begin{array}{c}
 \uparrow \qquad \qquad \uparrow \\
 \text{one} \qquad \qquad \text{other} \\
 \text{sister} \qquad \qquad \text{sister} \\
 x \cdot (55 - x) = 55x - x^2 = 750
 \end{array}$$

OR:

$$x^2 - 55x + 750 = 0$$

$$x = \frac{55 \pm \sqrt{55^2 - 4(1)750}}{2 \cdot 1}$$

$$= 27.5 \pm 2.5$$

$$= \boxed{25} \text{ or } 30$$

