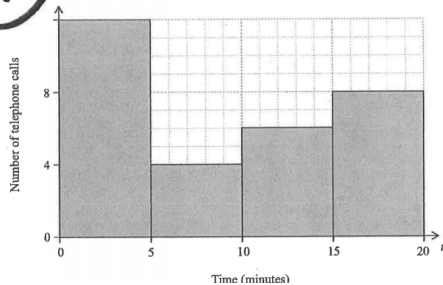Pick up the Warm UP
(4 questions from previous IB exams)

HW QUESTIONS
Should have already checked your answers from Solutions on the website.

---

① the frequency histogram for the distribution of the time, t, in minutes of calls that Helen made last week.

(a) Complete the frequency table for this distribution.

Time (minutes)	Number of telephone calls
2.5　$0 < t \le 5$	12
7.5　$5 < t \le 10$	4
12.5　$10 < t \le 15$	6
17.5　$15 < t \le 20$	8

(b) Write down the modal class.　$0 < t \le 5$　　　[1 mark]

(c) Write down the mid interval value of the $10 < t \le 15$ class.　12.5 min.　[1 mark]

(d) Use your graphic display calculator to find an estimate for the mean time.　[2 marks]

$$\bar{x} = \frac{275}{30} = 9.17 \text{ min.}$$

2 In a high school, 160 students completed a questionnaire which asked for the number of people they are following on a social media website. The results were recorded in the following box-and-whisker diagram.

25% of 160 = 4

40

40   40   40

(a) Write down the median.

Number of people they are following

Number of people they are following (x)	Number of high school students
$0 \le x \le 50$	4
$50 < x \le 100$	36
$100 < x \le 150$	34
$150 < x \le 200$	46
$200 < x \le 250$	24
$250 < x \le 300$	16

STAT / calc / 1 var

X
25
75
125
175
225
275

L1
L2

(b) Complete the table.

(c) (i) Write down the mid-interval value for the $100 < x \le 150$ group. *125*

(ii) Using the table, calculate an estimate for the mean number of people being followed on the social media website by these 160 students.

$$\bar{x} = \frac{24900}{160} = 155.625 \text{ peopl} \quad \text{or} \quad 156 \text{ people}$$

3 Each month the number of days of rain in Cardiff is recorded. The following data was collected over a period of 10 months.

median at $\frac{10}{2} = 5^{th}$ and 6th POSITIONS

11   13   8   11   8   7   8   14 x 15

For these data the **median** number of days of rain per month is 10.

7   8   8   8   ↑   11   11   13   14   15
x

(a) Find the value of x.

$x = 9$

(b) Find

(i) the standard deviation; *$S = 2.69$ days of rain*

(ii) the interquartile range. *IQR = 5 days*

$Q_3 - Q_1$
13 - 8

Answers:
(a) . . . .
(b) (i) . . . .
(ii) . . . .

4 Each year the soccer team, Peterson United, plays 25 games at their home stadium. The owner of Peterson United claimed that last year the mean attendance per game at their home stadium was 24 500.

(a) Based on the owner's claim, calculate the total attendance for the games at Peterson United's home stadium last year.

$$\left(24500 \; \frac{\text{people}}{\text{gam}}\right)\left(25 \; \text{games}\right) = 612{,}500 \; \text{total attend.}$$

The actual total attendance last year was 617 700.

(b) Calculate the percentage error in the owner's claim.

$$\varepsilon = \left|\frac{V_A - V_E}{V_E}\right| \times 100$$

(c) Write down your answer to **part (b)** in the form $a \times 10^k$ where $1 \le a < 10$, $k \in \mathbb{Z}$.

---

4 Each year the soccer team, Peterson United, plays 25 games at their home stadium. The owner of Peterson United claimed that last year the mean attendance per game at their home stadium was 24 500.

Approx.

(a) Based on the (owner's claim), calculate the total attendance for the games at Peterson United's home stadium last year.

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The actual total attendance last year was 617 700.

(b) Calculate the percentage error in the owner's claim.

$$\varepsilon = \left|\frac{V_A - V_E}{V_E}\right| \times 100 = \left|\frac{612500 - 617700}{617700}\right| \times 100 = 0.842 \; \% \; \text{error}$$

(c) Write down your answer to **part (b)** in the form $a \times 10^k$ where $1 \le a < 10$, $k \in \mathbb{Z}$.

4 Each year the soccer team, Peterson United, plays 25 games at their home stadium. The owner of Peterson United claimed that last year the mean attendance per game at their home stadium was 24 500.

⟶ Approx.

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(c) Write down your answer to **part (b)** in the form $a \times 10^k$ where $1 \le a < 10$, $k \in \mathbb{Z}$.

Standard form = Scientific notation

$$8.42 \times 10^{-1}$$

Agenda

1. Questions on Homework

2. See your LCQ's

3. Protocol for tests

4. An introduction to the IB Math Studies project

   (Internal Assessment)

Tomorrow : TEST on Descriptive Statistics

HW
Questions

Review Day 1 Assignment   — Review Set A

#3 $\dfrac{a + (2+5+4+1+2+3+5)}{8} = 3$ ⟹ $\dfrac{a+22}{8} = 3$
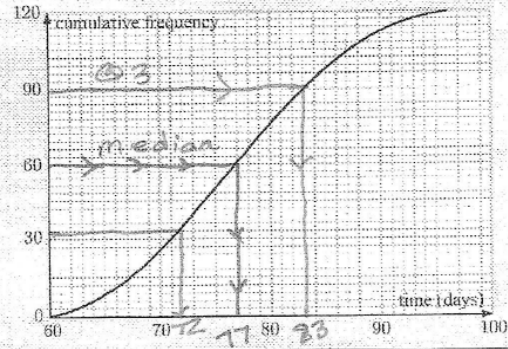
$a + 22 = 24$

$a = 2$

#6

120 people caught whooping cough in an outbreak. The times for them to recover were recorded and the results were used to produce the cumulative frequency graph shown.
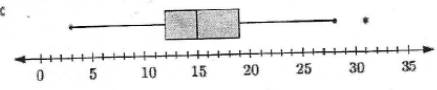Estimate:

a the median 77 days

b the interquartile range.

IQR = 83 - 72
= 11 days

cumulative frequency

Q3

median

120

90

60

30

0

60   70 72 77 80 83   90   100

time (days)

a min = 3; $Q_1 = 12$; med = 15; $Q_3 = 19$; max = 31

b range = 28; IQR = 7

c

0   5   10   15   20   25   30   35

Always place your box plot above the appropriately labeled number line

Review Set B

Review Set B

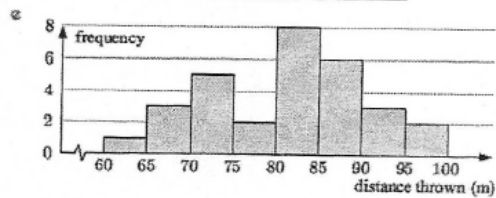(1) a quantitative continous   b categorical   c categorical
     d quantitative continous   e quantitative continous
     f quantitative discrete   g categorical

Set B #2

a minimum = 64.6 m,   maximum = 97.5 m
b   i mean ≈ 81.1 m   ii median ≈ 83.1 m

c, d

Distance (m)	Tally	Frequency
$60 \leqslant d < 65$	|	1
$65 \leqslant d < 70$	|||	3
$70 \leqslant d < 75$	ʃﬀ	5
$75 \leqslant d < 80$	||	2
$80 \leqslant d < 85$	ʃﬀ |||	8
$85 \leqslant d < 90$	ʃﬀ |	6
$90 \leqslant d < 95$	|||	3
$95 \leqslant d < 100$	||	2
	Total	30

e

#3

		L_2	L_1 mid-interval		
Scores		f	Scores	$\sum f \cdot x$	$\sum f(x_i - \bar{x})^2$
$0 \leq x < 10$		1	5	5	441
$10 \leq x < 20$		13	15		
$20 \leq x < 30$		27	25	$\vdots$	$\vdots$
$30 \leq x < 40$		17	35		
$40 \leq x < 50$		2	45	90	
		60		$\overline{1560}$	$\overline{4140}$

a)

(b)

i. Median from graph ≈ 26. ±

ii $Q_3 = 32$ $Q_1 = 20$
   so IQR = 12 ±

iii Mean $\bar{X} = \dfrac{1560}{60} = 26$

iv std. Deviation $S = \sqrt{\dfrac{4140}{60}} \doteq 8.31$

---

5 This cumulative frequency curve shows the times taken for 200 students to travel to school by bus.
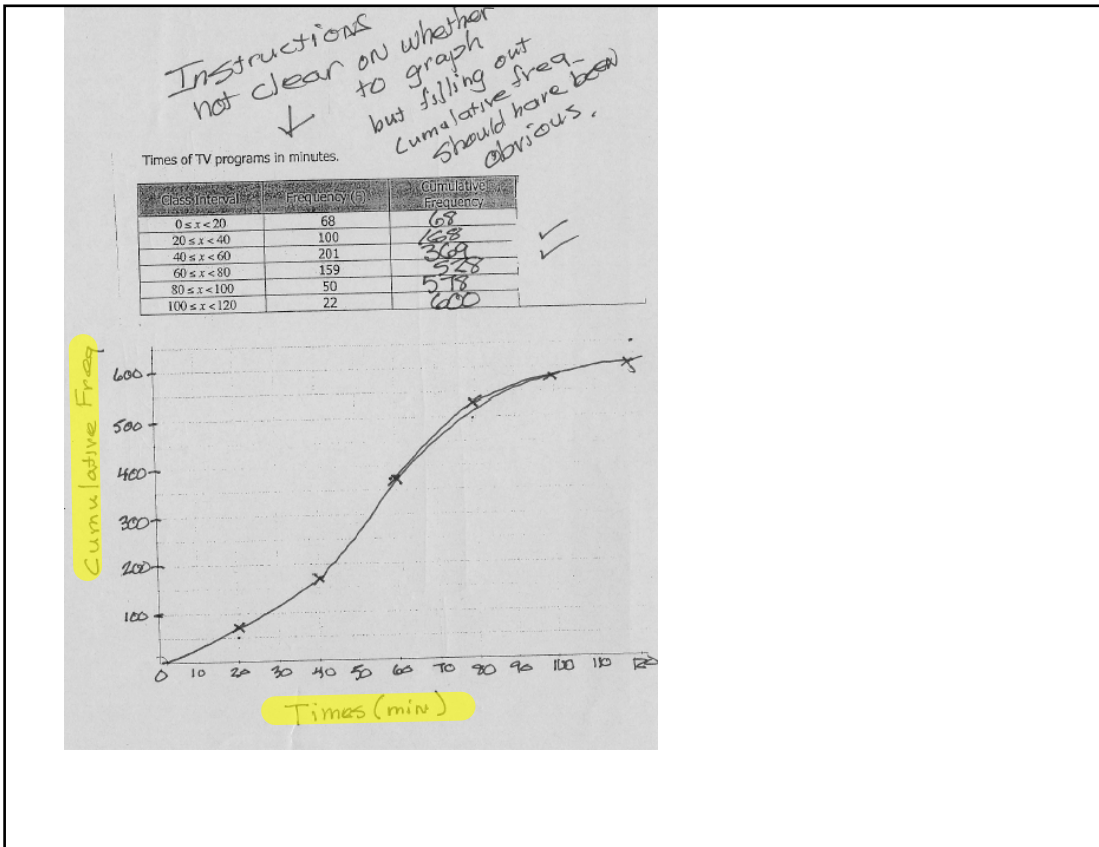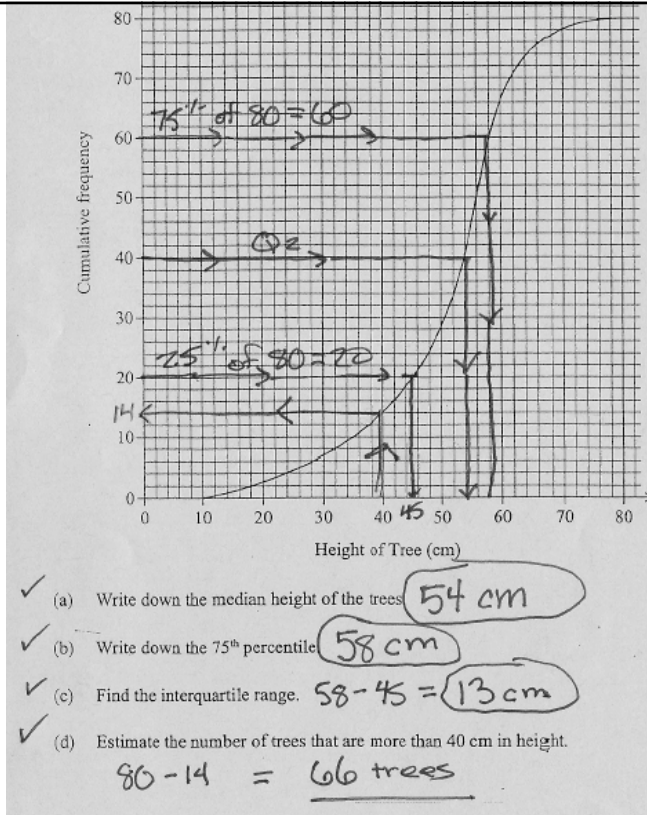
a Estimate how many of the students spent between 10 and 20 minutes travelling to school.

b 30% of the students spent more than m minutes travelling to school. Estimate the value of m.

30% of 200 is 60

a) at 10 minutes → 20 students   so $\overset{112-20}{=}$ 88 students
   at 20 minute → 112 students

b) 30% of 200 (= 60) students
   had a higher time than m.

   so 70% of 200 (=140) had less

   so around   24 minutes

75% of 80 = 60

Q2

25% of 80 = 20

14

Height of Tree (cm)

✓ (a) Write down the median height of the trees 54 cm

✓ (b) Write down the 75th percentile 58 cm

✓ (c) Find the interquartile range. 58 - 45 = 13 cm

✓ (d) Estimate the number of trees that are more than 40 cm in height.

80 - 14 = 66 trees

Instructions not clear on whether to graph out but filling out Cumalative freq. Should have been obvious.

Times of TV programs in minutes.

Class Interval	Frequency (f)	Cumulative Frequency
0 ≤ x < 20	68	68
20 ≤ x < 40	100	168
40 ≤ x < 60	201	369
60 ≤ x < 80	159	528
80 ≤ x < 100	50	578
100 ≤ x < 120	22	600

Cumulative Freq

Times (min)

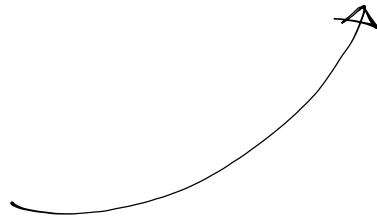| /		
/		
/		
/		
/		

Staple on top of your HW, with the most recent assignment, last. I reserve the right to adjust scores if they are found to be incorrectly marked. Turn in the packet on test day to avoid a 40% penalty.

Totals: ___ / 28

7 assignments
at 4 each = 28

HW Sheet + Recording Sheets

Turn in Prior to Test
to avoid capping score at 80%
[up to 3 days]

After 3 days → cap at 60%

Protocol for Tests

Make sure your batteries are fresh (or charged).

No bathroom trips during the test.

We'll start the test immediately.

Absolutely no cell phones during the entire class.

There will be an assignment after. Work quietly.

I am available for help after school today and tomorrow morning.

Generally I would like you to finish the test in one single sitting. If you run out of time, I will give you a few extra minutes at lunch. See me today if you have special concerns about this.

IB Math Studies Project

(Internal Assessment)
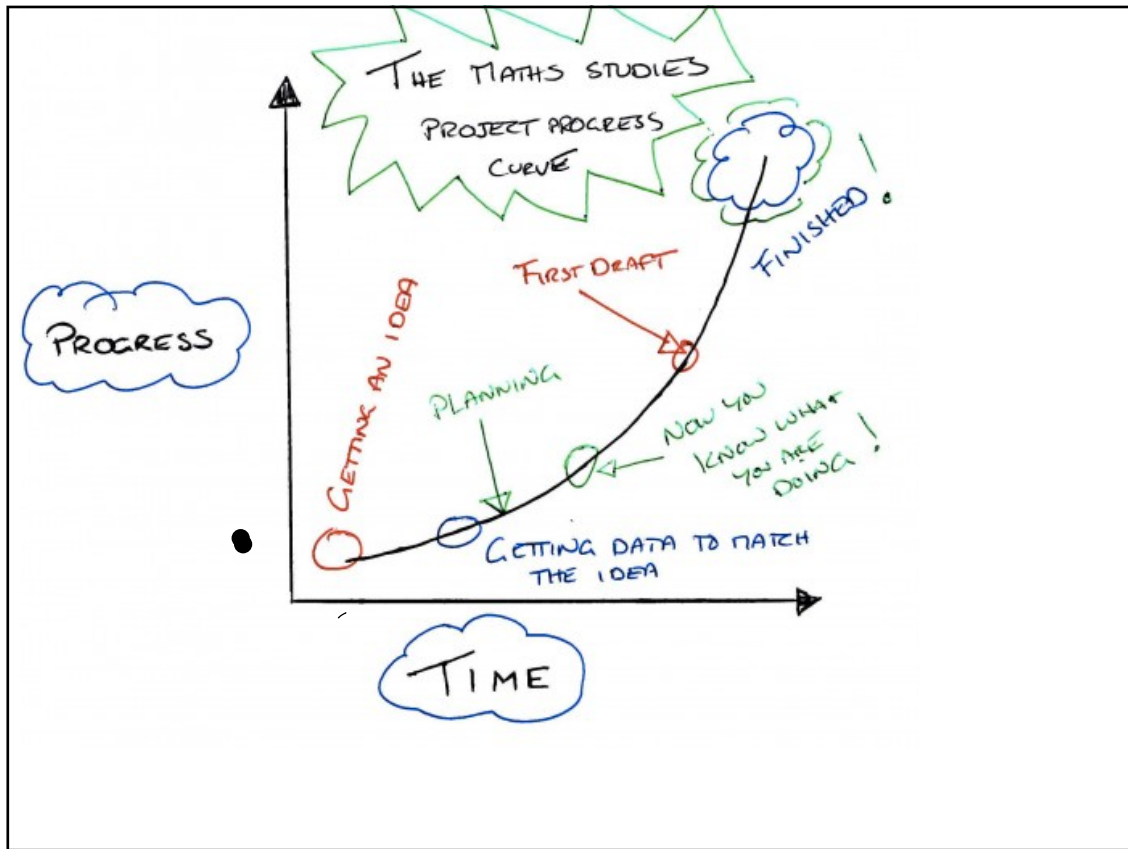
First 3 Units

Descriptive Stats

Normal Distrib

Stat Applications

Today

Overiew of Project to see
what is on the horizon

Start thinking

Data collection

Year	Price per liter(in pence)	Retail Prices Index
1983	36.7	83.1
1984	38.7	87.5
1985	42.8	92.8
1986	38.2	96.7
1987	37.8	100.6
1988	34.7	104.1
1989	38.4	112.3
1990	40.2	121.4
1991	39.5	131.4
1992	40.3	136.7
1993	45.9	139.3
1994	48.9	133.1
1995	50.9	147.5
1996	52.9	151.5
1997	57.9	155.4
1998	60.9	160.8
1999	61.9	164.1

1

Can we predict the height of water in a bath tub from how long we leave the faucet on?

Raw Data collection

Table 1 "Raw data collection – water height in cm against duration of drainage"

Water height cm	Duration of drainage: Trial 1	Duration of drainage: Trial 2	Duration of drainage: Trial 3
1 cm	0,17,11	0,15,84	0,15,36
2 cm	0,27,27	0,27,47	0,28,02
3 cm	0,51,61	0,48,09	0,47,44
4 cm	1,04,94	1,04,76	1,05,24
5 cm	1,28,26	1,26,95	1,28,01
6 cm	1,44,27	1,47,34	1,45,65
7 cm	2,05,11	2,07,32	2,06,22
8 cm	2,18,92	2,21,26	2,20,43
9 cm	2,37,42	2,35,47	2,36,65

Multiple Variables

What is the relationship between the weight of a car, its CO_2 emissions and its fuel consumption?

Raw Data

	Combined Fuel Consumption (L/100km)	CO_2 emissions (g/km)	Weight (kg)
Audi TT Roadster 2.0 TFSI S-Tronic	9.4	188	1345
Audi A4 B7 2.0 Tfsi Quattro	8.3	226	1535
Audi A4 B7 2.0 Tfsi Exclusive	9.7	194	1450
BMW 120i E87 hatch	7.9	190	1300
Citroën C5 Saloon	8.6	206	1958
Citroën C4 Exclusive	8.1	193	1292

Part 1

60

Part 1 + Part 2

80

Part 3

●

Assignment Tonight

Read "P2-Generating Data for Your Project"

Go to the class website....

.... to "**IB-Math Project Support**"

..... to "Project Handouts"....

Browse Project Resources

•

Assignment Tomorrow after the Test

Will be a one page handout. It will be the first assignment for the next unit.

Flexibility. You can have two days for tonight's reading assignment if you want to devote tonight for studying for the test.

IB Math

IB Math Information
IB Math Extra Practice Links
IB Math -Project Support
IB Math: Preparation for May 2020
IB Math Studies Exam
IB Math: Data Sources for IA

Project Handouts

P1 Project Overview

P2_Generating Data for Your Project

P3_Choosing a Project_Writing Intro for Draft 1

P4_Revise_Collect_Describe Data for Draft 2A

P5_Final Draft Requirements NEW

IB Project Writing Guide

official-project-scoring-guide_ib-math-studies

Who Wrote the Federalist Papers ?

An data sampling activity to illustrate an important point when collecting data.

Activity   Who Wrote *The Federalist Papers?*   *Sampling*

The Federalist Papers are a series of 85 essays supporting the ratification of the U.S. Constitution. At the time they were published, the identity of the authors was a secret known to just a few people. Over time, however, the authors were identified as Alexander Hamilton, James Madison, and John Jay. The authorship of 73 of the essays is fairly certain, leaving 12 in dispute. However, thanks in some part to statistical analysis, most scholars now believe that the 12 disputed essays were written by Madison alone or in collaboration with Hamilton.

There are several ways to use statistics to help determine the authorship of a disputed text. One method is to estimate the average word length in a disputed text and compare it to the average word lengths of works where the authorship is not in dispute.

The following passage is the opening paragraph of *Federalist Paper #51*, one of the disputed essays. The theme of this essay is the separation of powers between the three branches of government.

To what expedient, then, shall we finally resort, for maintaining in practice the necessary partition of power among the several departments, as laid down in the Constitution? The only answer that can be given is, that as all these exterior provisions are found to be inadequate, the defect must be supplied, by so contriving the interior structure of the government as that its several constituent parts may, by their mutual relations, be the means of keeping each other in their proper places. Without presuming to undertake a full development of this important idea, I will hazard a few general observations, which may perhaps place it in a clearer light, and enable us to form a more correct judgment of the principles and structure of the government planned by the convention.

1. Choose 5 words from this passage. Count the number of letters in each of the words you selected, and find the average word length.

2. Your teacher will draw and label a horizontal axis for a class dotplot. Plot the mean word length you obtained in Step 1 on the graph.

Average Word Length

Convenience

Average Word Length

Simple random Sample
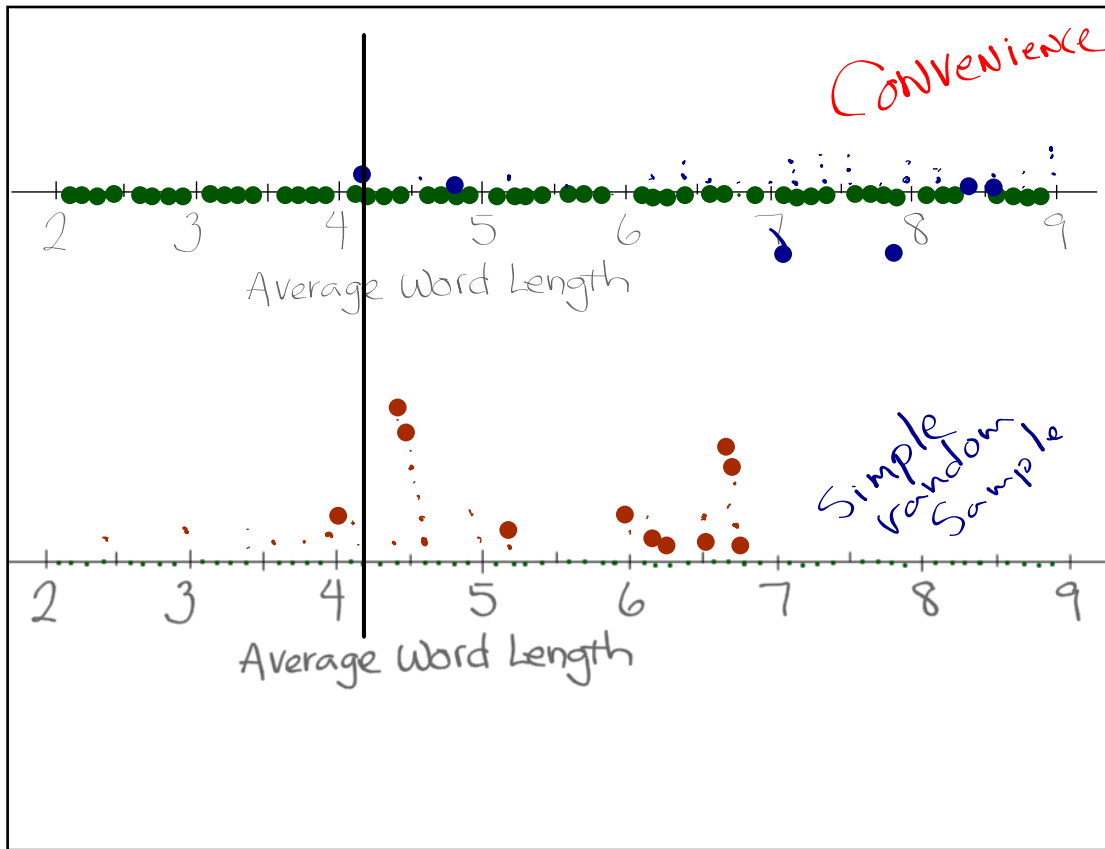
3. Use a random integer generator on your GDC to select a sample of 5 words from the 130 words in the opening passage. Use the back side to find the words from your 5 numbers. Count the number of letters in each of the words you selected, and find the average word length.

4. Your teacher will draw and label another horizontal axis with the same scale for a comparative class dotplot. Plot the mean word length you obtained in Step 3 on the graph.

5. How do the dotplots compare? Which is more representative of the actual word lengths.