Developing Ideas



The data for the line plot is from two classes in a school. The sample size is n = 59.

1. Describe the data in as many ways as you can using numerical and shape descriptions. Words, fractions, decimals and percentages can be used in your description.

2. One person was absent on the day of the survey. Someone said they would give you €100 if you could guess the number of people in that student's household. What number would you guess?

3. Explain why you chose this number.

4. Describe your chances of winning the €100 by picking this number. Words, fractions, decimals and percentages can be used in your description.

5. Describe how you might you increase your chances of winning the €100?

6. Describe your chances of winning the €100 now.

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7. Explain how you could further increase your chances of winning.

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8. Is it possible that the student who was absent could have 8 people in their household?

9. Is it probable that the student who was absent could have 8 people in their household? Explain.

Analysing Distributions

The distribution of weights of school bags of all 200 students in a school is shown in the diagram. We will call this our *population distribution*.



1. Describe the population distribution by making one statement about each of the three characteristics indicated below:

(a)	hape of distribution:
(b)	ocation of data (central tendency):
(C)	pread of data (dispersion):

- **2.** Before you take some samples from the distribution, you must make two predictions.
 - (a) If you took a sample of size 30 and found the mean of the sample describe the chances of getting a mean between 1 kg and 2 kg.

(b))	If	'yo	u t	ook	k a s	san	nple	e of	siz	ae 3	0 a	nd	fou	ınd	the	e m	ieai	ı of	fth	e sa	amj	ple	wh	at	nur	nb	er v	vou	ıld	you	ı
		e	хре	ect	to g	get?	?																									

3. How many different samples of size 30 can be taken from a population of size 200?

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Sample Number					Data	Sets					Mean	Standard Deviation
	5.2	9.5	2	3.5	3.5	7.9	5	2.5	3	6		
1	5	7	2	5.5	5.1	1	5.6	1.7	1.5	2	4.9	2.4
	8.1	7.1	4	8.8	6.8	6.5	4	4	5.5	8		
2	0.8	6	5	5	4	57	6.5	5.2	68	2	19	25
2	2.5	3	2	8.9	6.5	3.7	1	3	8	2.5	4.0	2.3
	8	4	8	1.5	8.8	6	3.5	9.5	9	6.7		
3	7	4	4.1	2	4	5	7.9	2	4	1	4.6	2.6
	2	4	3.5	4	3	7.1	1.1	5.1	0.5	3		
	3	2	5	6.2	8	6.5	3	5.1	9	1		
4	2	6.8	2.5	3	5	7.5	6.8	2	2.5	2	4.7	2.5
	1.7	3.5 E	9.9	8	5.8	8	1.5	3.5 E	4	5		
5	9.9	6	5	68	7.4	2.5	0 5.4	97	35	5.1 4	53	24
5	2	6.6	7	3	5	1.6	5	8	1.1	5.6	5.5	2.4
	0.1	2	5	9.7	6.9	7.8	2	6.7	4	5		
6	9	8	6	9	9	3	3	2.5	5.6	8	5.4	2.7
	7.4	1	4	9.9	2	5	6.5	4	4	5		
_	3	4.6	9.7	2.6	9	5	2	5.1	7	9		
7	4	9	4	7.8	5	8	0.5	8.9	3	7	5.6	2.9
	9.9	3	2	8.5	4	1.3	3.5	9.5	8.1	3		
8	5	9	68	97	0.8	89	5.0	59	4	9.9	5.8	26
Ū	8.8	3	2.5	6	9.9	8	8	3.5	3.5	5.5	5.0	2.0
	6	2	7.1	5.4	5	3	6.8	9	8	8		
9	7.8	8	9	1.2	3	5	3	5	5	9	5.4	2.5
	5.7	0.1	2	2	5.1	7	3	8.1	5.6	5.9		
	4	5	6	9.9	9	1	5	9.4	4	6.5		
10	4	4	4	0.1	6.5	2	7.5	1.5	4	3	4.9	2.9
	4	0.5	5	9	2.5	6	3	9	9.5	1		
11	3 9.4	4 8.4	1	55	5	15	5	8	5 8	6.5	50	20
11	3.5	6.7	0.5	2	4	8.8	9	1	62	9	5.0	2.0
	7	6.5	6	4	9	6.5	8	4	1.3	3		
12	1.9	0.5	3	1.1	6	5.3	9.7	5.9	9.5	4.1	5.0	2.8
	8.1	5	4	7.9	1.1	4	8	0.5	3	7.1		
	2.5	1	7.9	3	5	1.1	2.5	4	8.8	4		
13	1	6.9	9.1	5.2	5.8	8.4	7.4	2.5	4	6.5	4.8	2.6
	7	5.3	6.8	1.7	1.5	2	3	5	6.8	8		
14	1.7	5	6	6	7.5	5	6	9	9.3	4	Fo	26
14	8	4	4.8	4.1	25	3.9	0.2 8.8	1.1	67	/	5.2	2.0
	1	4	2	2.5	5.6	3.5	6	3.9	4	3.5		
15	4	8.8	9.7	2	1	9.9	5	5	8	3	4.4	2.6
	4.5	4	3	9	5	1	5	1.1	1.7	5		
	4	4	6	0.5	2.5	4	5.6	9.9	6.2	1.6		
16	6.2	4	4	7.8	5	8.4	3	6.5	3	5	4.9	2.4
	4	3	4.9	1	7	8	7.9	8	2	5		
17	0.5	9 25	4	6 2 E	6.5 1	5.1	5	67	7 2 E	1.6	47	25
1/	5	6	4./ 9.7	5.5	5	0.5	3	8.1	3.5	0.0	4.7	2.5
	9.5	1.1	7	5	1	1.6	6	9.7	8	4		
18	6.7	6	6.8	7.5	4	8	4	6	7.1	4	5.5	2.5
	5.2	7.8	6.8	4.8	8	4	0.5	1.3	5	8		
	3.9	8.4	7	3	6	5.4	9.9	5	5	3		
19	2	8.8	4	9	5	7	1.2	1.1	7.8	5	4.9	2.7
	3.5	3	5.5	2	3	9.9	6.8	0.5	4	2		
20												
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4. The table below shows the results of 19 samples each of size n = 30. Create one more sample of size 30 and record the results in the table.

For the next few questions use the STAT mode on your calculator.

- **5.** Calculate, correct to one decimal place, the mean of your sample and write it in the **2**nd **last column**.
- **6.** Calculate, correct to one decimal place, the standard deviation of your sample and write it in the **last column**.

7. ((a)	Calculate.	correct to	one decimal	place.	the mean	of the 2	2 nd last colum	ın
/ · ·	uj	Guiculuce,		one accimu	piace,	the mean			

(b))	W	/ha	at c	ou	ld v	we	cal	ll tl	nis	me	ean	ı?																			
(c)		С	om	пра	re	thi	s n	iea	n t	o t	he	me	ean	of	the	e p	орι	ıla	tio	n d	ist	rib	uti	on	(μ)), v	vhi	ch	is S	5.1	kg.	

8. (a) Write down the range for the values in the **2**nd last column.

(b)	Ν	/ha	it c	ou	ld	we	cal	l tł	nis	rai	nge	?																		
(c)	С	om	ра	re	thi	s ra	ang	ge t	t o	he	rai	ıge	e of	fth	e p	op	ula	tio	n c	list	rit	ut	ion	, w	hic	ch i	s 9	.8 I	kg.	

9. (a) Calculate, correct to one decimal place, the standard deviation of the 2nd last column.

(b)	What co	uld we	call th	nis sta	ndar	d devi	atio	n?									
(c)	Compare	e this s	tandai	rd dev	riatio	n to tl	ne st	anda	ard d	levia	tion	of tl	ne p	opu	lati	ion	
	distribut	tion (σ)), whio	ch is 2	.6 kg												

10. Fill in the table below using your sample means. There is a row provided if you want to use tally marks. [Note that 5.0–5.5 means at least 5.0 kg but less than 5.5 kg etc.]

-	_					-					
Sample Means	2.5 - 3.0	3.0 - 3.5	3.5 - 4.0	4.0 - 4.5	4.5 - 5.0	5.0 – 5.5	5.5 - 6.0	6.0 - 6.5	6.5 - 7.0	7.0 – 7.5	7.5 - 8.0
Tally											
Frequency											



Compare the distribution of the sample means to the population distribution by making 12. one statement about each of the three characteristics indicated below:

(a)	Shape of distribution:
(b)	Location of data (central tendency):
(C)	Spread of data (dispersion):

13. In **Q2** above you described the chances of getting a mean between 1 kg and 2 kg (a) from a sample of size 30. How good was your prediction?

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(3)	si	ize	30). F	lov	v g	000	l w	vas	yo	ur	pre	edi	ctio	on?)		-p ·			80,			10 1			01	ab		·P	. 01
	si	ze	30). F	lov	v g	000	ł w	vas	yo	ur	pre	edi	ctio	on?			-P \												-p	

Using a Sample to Make a Statement about the Population Mean, (μ)

N.B. Ignore any findings from the earlier investigation about the school bags.

We are going to see if we can use a sample to make a statement about the (unknown) population mean.

A sample of size 30 was taken of the weights of school bags of post-primary students. The mean of the sample(\bar{x}) is 4.5 kg. The standard deviation of the sample is 2.5 kg.

1. Make a statement about the value of the population mean.

2. There are 3 spaces (Sample, Population, Sampling Distribution of the Means) provided below for any sketches you would like to draw.

(a) Write down and (b) sketch everything you know about each distribution where possible.

Hints
What do we know and what do we not know?
What do we need to know to find what we do not know?
What do I know that can be helpful?
What's similar about this problem to what I already know, and what's different?



3. Write a statement about the population mean (stating the level of confidence being used).

Summary of Our Findings

Fill in what you know about the Shape, Centre and Spread of each of the distributions in the table below. Words, numbers and symbols can be used.

	Shape	Centre	Spread
Population		μ	σ
One Large Sample			
All Sample Means			