SCHOOL OF COMPUTING

Faculty of Engineering

....

SECI2143-03: PROBABILITY AND STATISTICAL DATA ANALYSIS
2019/2020 – SEMESTER 2

PROJECT 1: STUDENTS' MOBILE PHONE EXPENSES

NO.	NAME	
1	AZ MUKHLIS ISKANDAR BIN AZLI	A19EC0183
2	MUHAMMAD ISYRAFF IRFAN BIN MOHAMMAD RIZAL	A19EC0099
3	AMEENUDDIN BIN ISMAIL	A19EC0016
4	MUHAMMAD HAZIQ BIN SULAIMAN	A19EC0196

LECTURER'S NAME   : Dr. Suhaila Mohamad Yusuf

DATE OF SUBMISSION   : 30 April 2020

Table of Contents

Introduction

Mobile phones have been improving countless times from first invention until today. In the early years of development of mobile phones, the cost for regular consumers to obtain a mobile phone was extremely high. For example, the first mobile phone, Motorola DynaTAC 800x, launched in 1983 was sold at a price of around $4000. It was obvious that no average Joe can afford to buy a mobile phone at that time. When compared to the price of mobile phones these days, the difference is astounding.

Mobile phones provide easy and simple ways to communicate with families and friends at all times and it can be used in any place. It is very convenient to use mobile phones because of the small weight and size.

Background of Study

The great advantages of mobile phone will make sure students' life become more efficient and easier. Because of universities learning program these days strongly depend on using of mobile phone, every student is encouraged to buy their own mobile phone. This project is to study whether students' income will affect the students' mobile phone expenses among School of Computing UTM students.

Objective

- To study universities students' expenses in buying mobile phone.
- To study the relationship between students' income and students' mobile phone expenses.
- To know students mobile phone brand preference.
- To study student's behaviour patterns in buying their own mobile phone.
- To know how much student is willing to spend for buying mobile data.

Method of Study

The method used to collect the data from 60 UTM students is through sharing the link of online survey in WhatsApp group. Multiple questions are formed to get more precise and more variation of data. After making a few discussions, we chose 17 questions to be put in the Google Form online survey.

Description of Data

Population : School of Computing students

Sample : 60 students

Description of variable :

| **Variables**	**Level of Measurement**	**Graphical Presentation**
Gender	Nominal	Bar plot
Year	Nominal	Pie chart
Faculty/School	Nominal	Pie chart / Frequency Distribution
Smartphone Brand	Nominal	Bar Plot
Total of income (monthly)	Ratio	Box plot / Scatter plot / Histogram
Monthly spent for Data Plan	Ratio	Stem & leaf / Scatter plot
Purpose of using a mobile phone	Nominal	**-**
Last time student brought mobile phone	Nominal	-
How often student change to a new mobile phone	Ordinal	**-**
Main reason for changing a mobile phone	Nominal	**-**
How much students mobile phone cost	Interval	**-**
Main source of income	Nominal	**-**

Analysis and Discussion

Gender of Respondents

Figure 1: Bar Plot (gender)

According to Figure 1 (Bar Plot), the highest number of gender of respondents is 31 which is male with percentage 51.7% from total value of respondents while female respondents is the lowest number which is 29 with 48.3%.

Year of Study
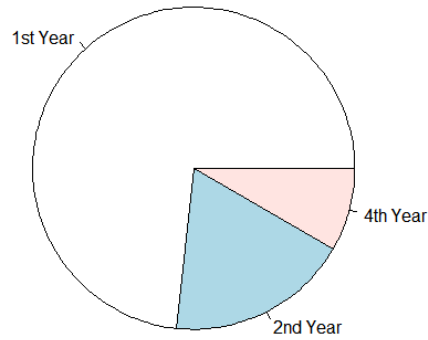
Figure 2: Pie Chart (Year of Study)

According to the Pie chart in Figure 2, 4th year students has the lowest percentage with only 5 students with a percentage of 8.3%. The second lowest is 2nd year students with 11 students (18.3%). Meanwhile, 1st year students hold the highest percentage with 73.4% and a total of 44 students.
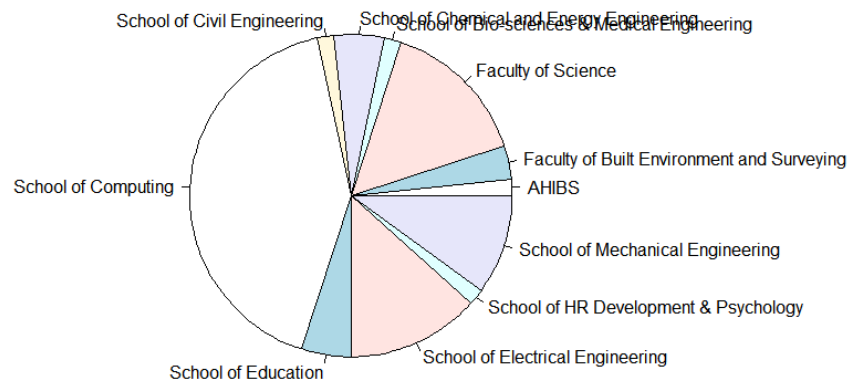
Faculty

Figure 3: Pie Chart (Faculty)

	Faculties	Freq
1	AHIBS	1
2	Faculty of Built Environment and Surveying	2
3	Faculty of Science	9
4	School of Bio-sciences & Medical Engineering	1
5	School of Chemical and Energy Engineering	3
6	School of Civil Engineering	1
7	School of Computing	25
8	School of Education	3
9	School of Electrical Engineering	8
10	School of HR Development & Psychology	1

Figure 4: Frequency Distribution

According to the pie chart in Figure 3 and frequency distribution in Figure 4, the highest number of students is 25 (41.7%) from School of Computing while the lowest number of students is 1 which is 1.7% from four schools, AHIBS, School of Bio-Science & Medical Engineering, School of Civil Engineering and School of HR Development & Psychology. There are two schools with 3 students (5%) which are from School of Chemical and Energy Engineering and School of Education.

7
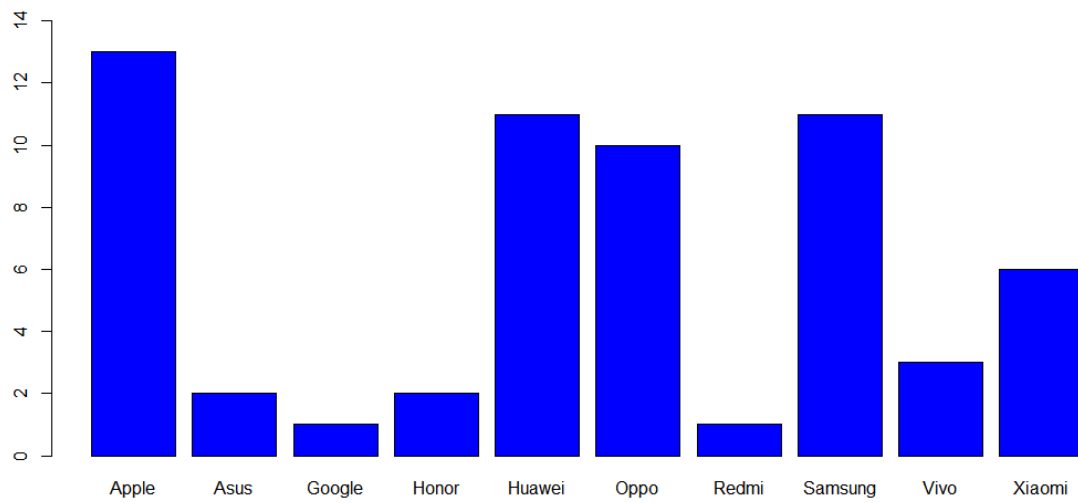
Smartphone Brand

Figure 5: Bar plot (smartphone brand)

From the bar plot in Figure 5, we know that there are two brands with only 1 student each (1.7%) which are brand Google and Redmi while Apple recorded the highest value which is 13 students (21.7%). We also have Huawei and Samsung obtaining the same frequency which is 11 students (18.3%) and became the second highest value. Asus and Honor recorded the second lowest value that have the same number of students which is only 2 students (3.3%).

Total of Income
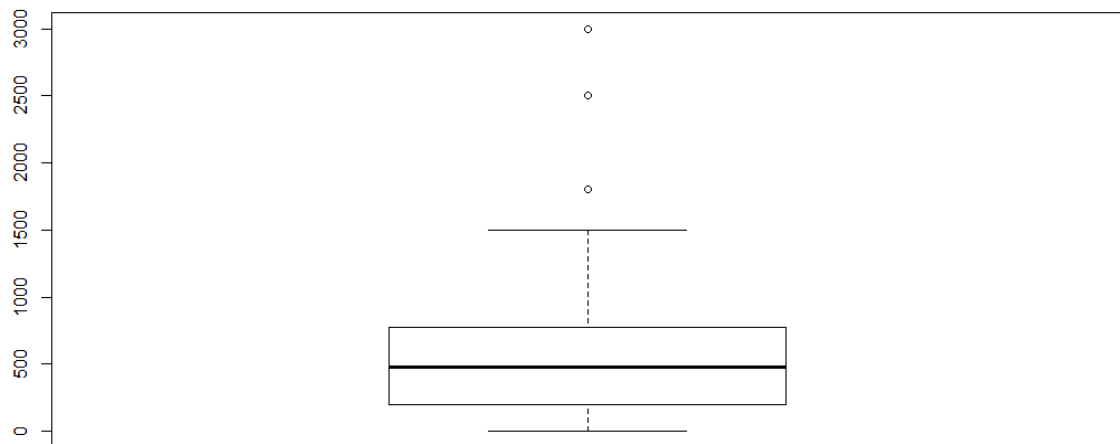
Figure 6: Box plot (total of income)

Histogram of Monthly Income
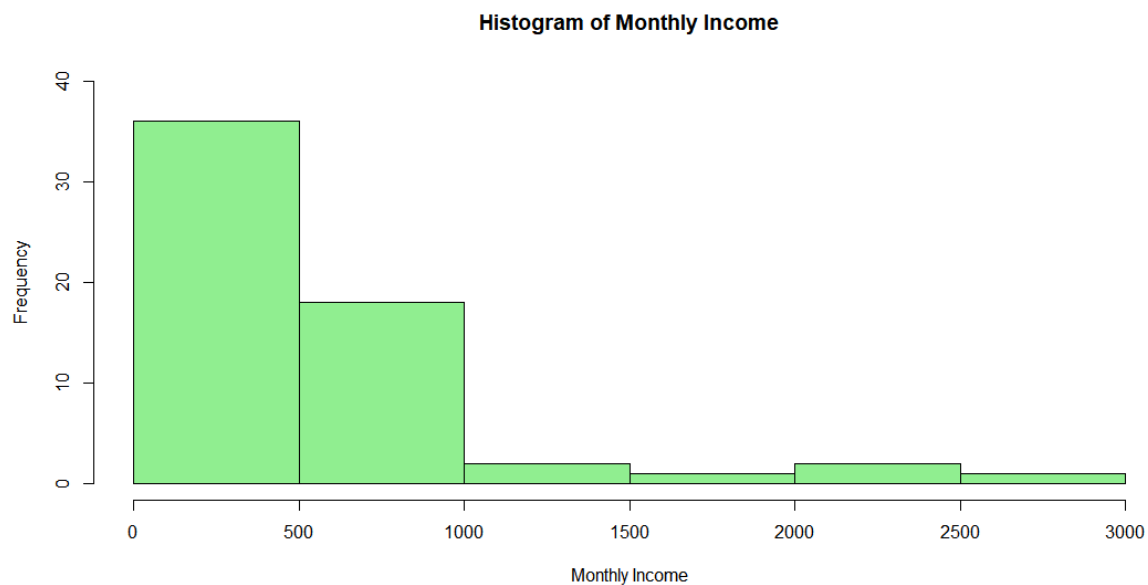
Figure 7: Histogram (Monthly Income)

According to box plot in Figure 6, we know that the maximum value of monthly income is RM3000.00 and the minimum value is RM0.00. The first quartile (Q1), median (Q2), third quartile (Q3) and interquartile range for monthly income is 175, 475, 787.5 and 612.5 respectively. From the histogram in Figure 7, the highest frequency is 36 students (60%) which is the income is range RM0 – RM500 while the lowest is range RM1500-RM2000 and RM2500-RM3000 with frequency of 3 (5%).

Monthly Spent for Data Plan

```
The decimal point is 1 digit(s) to the right of the |

  2 | 9000000000000000000000000555555
  4 | 000008800000000000088
  6 | 30
  8 | 000
 10 | 000
 12 |
 14 |
 16 |
 18 | 8
```

Figure 8: Stem and Leaf (Monthly Spent for Data Plan)

According to Stem and Leaf graph in figure 8, the maximum value of monthly spent is 188 while the lowest is 29. Twenties has the highest frequency with longest leaf.

Monthly Income & Monthly Spent
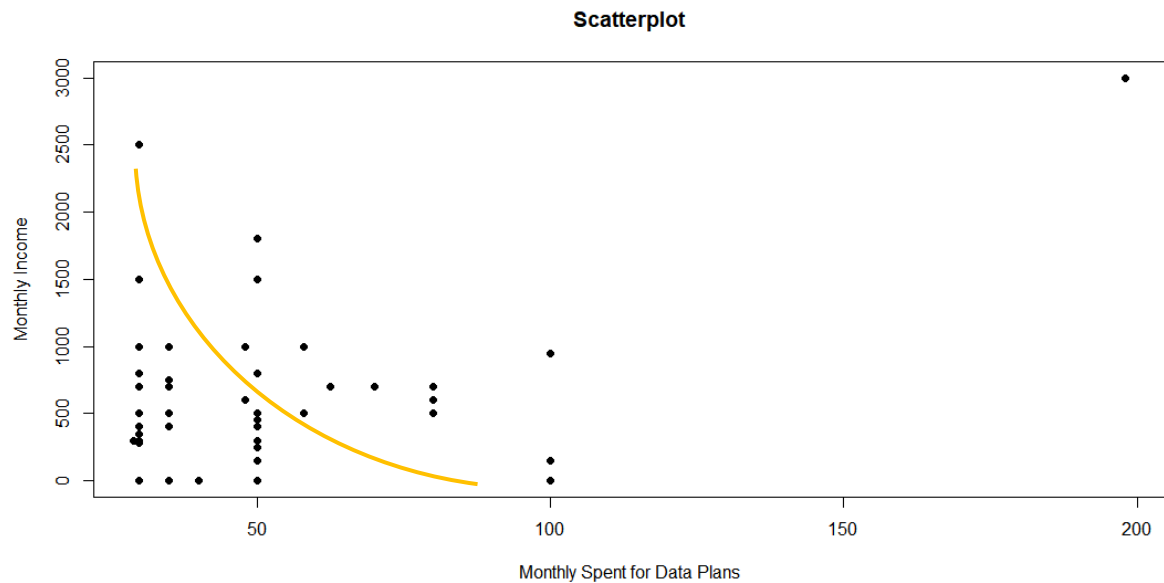
Figure 9:Scatter Plot with line

According to the Scatter Plot graph with line in figure 9, the graph is non-linear graph with weak negative relationship. When the value of variable Monthly Spent for Data Plans increase, the value of Monthly Income is decrease. We can also know that the majority of the students that have monthly income below RM2000.00 has more tendency to spend RM50 and below for data plans every month.

Conclusion

To conclude, we have recorded 60 students' response as a sample of data with 31 male respondents and 29 female respondents. The majority of respondents are 1st year students with 44 respondents and followed by 11 respondents from 2nd year students and only 5 students from 4th year students.

The most preferred smartphone brand is Apple with 13 students (21.7%) while the least preferred smartphone brands are Google and Redmi with only 1 student each (1.7%)

The highest frequency of monthly income of students each month is RM500 and below with 36 students (60%) and the lowest frequency is range RM1500-RM2000 and RM2500-RM3000 with frequency of 3 students (5%) each range.

Last but not least, the relationship between students' monthly income and monthly spending for data plans has weak negative relationship and non-linear. From this, we can know that when the students' monthly income decrease, monthly spending for data plans by students is increasing.

Reference

Appendix A - Questionnaire

Final Questionnaire:

1. Gender
   a. Male
   b. Female

2. Year
   a. 1st Year
   b. 2nd Year
   c. 3rd Year
   d. 4th Year
   e. Postgraduate

3. Faculty/School
   a. Faculty of Science
   b. Faculty of Built Environment and Surveying
   c. School of Computing
   d. School of Civil Engineering
   e. School of Electrical Engineering
   f. School of Mechanical Engineering
   g. School of Chemical and Energy Engineering
   h. School of Bio-sciences & Medical Engineering
   i. School of Education
   j. School of HR Development & Psychology
   k. Other:

4. What is the brand of smartphone are you using?

    a. Samsung

    b. Apple

    c. Huawei

    d. Xiaomi

    e. Oppo

    f. Other, please state:

5. What is your main purpose of using a smartphone?

    a. Necessity (Calling, messaging, email, etc.)

    b. Gaming

    c. Social Media (Influencer, networking, etc.)

    d. Business

    e. Other(s), please state:

6. When is the last time you brought your smartphone?

    a. Last 6 months

    b. Last year

    c. Last 2 years

    d. Last 3 years

    e. Other:

7. How often do you change to a new smartphone?

    a. Once every 6 months

    b. Once a year

    c. Once every 2 years

    d. Once every 3 years

    e. Other, please state:

8. How many times you had changed your smartphone since you start use it?

State(Number) :

9. What is your main reason for changing to a new smartphone? (Optional)

    a. State:

10. How much does your smartphone cost?

    a. <RM499

    b. RM500 – RM999

    c. RM1000 – RM1499

    d. RM1500 – RM1999

    e. RM2000 – RM2499

    f. >RM3000

11. What is the main source of your income?

    a. Parents

    b. Scholarship/sponsorship

    c. Part-time work (Courier, e-hailing driver, IG shop owner, etc.)

    d. Other, please state:

12. What is the range of your monthly income?

    a. <RM499

    b. RM500 – RM999

    c. RM1000 – RM1500

    d. >RM1500

13. What is the maximum amount of money you are willing to spend to buy a new smartphone based on your income?

    a. State (in RM):

14. Which do you prefer:

    a. New smartphone

    b. Second-hand smartphone

15. What type of mobile internet plan do you use?

    a. Postpaid

      b. Prepaid

16. Which provider do you use?

      a. Maxis

      b. Celcom

      c. Umobile

      d. Digi

      e. Others :- State:

17. How much do you pay for your mobile internet plan?

      a. State (in RM):

Appendix B - Response

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Male	2nd Year	FS	Huawei	a,c	Last 3 years	Broken	3	Damaged phone,	499	Scholarship / S|	700	1000	New	Post-paid	Umobile	80
Male	1st Year	FME	Xiaomi	a,b	Last 2 years	once every 3 years	4	For better spec	500 – 999	Parents	280	900	New	Pre-paid	Umobile	30
Female	1st Year	FBME	Apple	a,c	Last 2 years	once every 3 years	3	Gets broken	1500 – 1999	Parents	500	3000	New	Post-paid	Digi	50
Male	1st Year	FC	Huawei	a,b,c	Last year	Until enough money c	5	Broke	500 – 999	Parents	500	1000	New	Post-paid	Umobile	58
Female	1st Year	FKE	Huawei	a,c	Last 2 years	Depends	1	Broken phone	500 – 999	Parents, Part-tir	400	0	New	Pre-paid	Xox	50
Male	2nd Year	FME	Apple	a,c	Last 3 years	Every 4 years	4	Old one stopped v	3000	Parents	750	1200	New	Pre-paid	Umobile	35
Male	1st Year	FC	Xiaomi	a,c	Last 6 month	once a year	4		1000 – 1499	Part-time work	700	2000	New	Pre-paid	Maxis	35
Male	1st Year	FME	Apple	a,b,c	Last 2 years	once every 3 years	5	Phone broke	2000 – 2499	Parents	150	1500	New	Pre-paid	Digi	50
Female	2nd Year	FS	Apple	a,b,c	Last 6 month	once every 2 years	2	Better camera	3000	Scholarship / S|	1000	3000	New	Pre-paid	Tune talk	48
Male	4th Year	FC	Samsung	a,b,c,d	Last 2 years	once every 2 years	4		1000 – 1499	Parents, Schola	1000	1600	New	Pre-paid	Umobile	30
Male	1st Year	FCEE	Huawei	a,b,c	Last year	If broken	6	Broken or missing	1000 – 1499	Parents, Part-tir	2500	1500	Second-hand s	Pre-paid	Umobile	30
Female	1st Year	FC	Oppo	a	Last 2 years	once every 2 years	4		1500 – 1999	Parents, Part-tir	300	1000	New	Pre-paid	Umobile	30
Male	1st Year	FC	Huawei	a,b,c	Last 6 month	once every 3 years	1	Old phone laggy :	500 – 999	Scholarship / S|	400	10000	New	Pre-paid	Celcom	35
Male	1st Year	FS	Xiaomi	a,b,c	Last 6 month	once a year	4	Camera ,gb, ram,	1500 – 1999	Parents	0	1500	New	Pre-paid	Celcom	30
Male	2nd Year	FKE	Samsung	a,b,c,d	Last 2 years	When needed	1	Broken	3000	Parents	3000	5500	New	Post-paid	Celcom	198
Female	1st Year	FC	Asus	a,c	Last 6 years	Never	0		499	Parents, Loan	300	500	New	Pre-paid	OneXOX	30
Female	1st Year	FC	Samsung	a,c	Last year	once every 3 years	3		2000 – 2499	Parents	1500	3000	New	Pre-paid	Umobile	30
Male	1st Year	FKE	Apple	a,b,c,d	Last 3 years	once every 3 years	7	faulty or outdated	1000 – 1499	Parents	0	0	New	Pre-paid	Umobile	30
Male	1st Year	FC	Oppo	a,b,c	Last 2 years	once every 3 years	4	Broken	499	Parents, Schola	400	600	New	Pre-paid	Umobile	30
Female	1st Year	FS	Samsung	a,c	Last 6 month	once every 3 years	4		2000 – 2499	Parents	0	2000	New	Pre-paid	Maxis	35
Male	1st Year	FKE	Xiaomi	a,b	Last 3 years	once every 3 years	3	Old phone slow	500 – 999	Part-time work	0	2000	New	Pre-paid	Celcom	40
Male	1st Year	FME	Asus	a,c	Last 3 years	once every 3 years	2		500 – 999	Parents	500	700	New	Pre-paid	Maxis	35
Male	1st Year	FC	Huawei	a,b,c,d	Last year	once every 2 years	2		1000 – 1499	Part-time work,	2500	2000	New	Pre-paid	Umobile	30
Female	1st Year	FC	Apple	a,c	Last year	once every 3 years	4	No reason	3000	Parents	600	4000	New	Post-paid	Digi	80
Female	1st Year	FC	Oppo	a,c	Last 3 years	When broken	4	Its broken	500 – 999	Parents	300	0	New	Pre-paid	Umobile	30
Female	4th Year	FS	Vivo	a,b,c	Last 2 years	When broken	2	It broke.	500 – 999	Parents, Schola	450	800	New	Pre-paid	Digi	50
Male	4th Year	FABU	Apple	a,c	Last 6 month	once every 2 years	4	Newer version	3000	Parents, Part-tir	1500	5000	New	Post-paid	Digi	50
Male	1st Year	FC	Apple	a,c	Last 6 month	When it cannot use	2	Storage full	3000	Parents	400	4000	New	Pre-paid	Umobile	30
Female	1st Year	FC	Oppo	a,b,c,d	Last year	once every 2 years	5	more function	1000 – 1499	Scholarship / S|	0	1200	New	Post-paid	Umobile	50
Male	1st Year	FKE	Google	a,b,c	Last year	once every 2 years	4	Up to date	500 – 999	Part-time work	1000	1000	New	Pre-paid	Yes 4G	30
Male	1st Year	FC	Huawei	a,b	Last year	once every 3 years	1	Better specs	1000 – 1499	Parents, Loan	700	600	New	Pre-paid	Umobile	30
Male	4th Year	AHIBS	Honor	a,c	Last 3 years	when broken	5	Broken	1500 – 1999	Part-time work	600	2000	New	Pre-paid	Tunetalk	48
Male	2nd Year	FCEE	Vivo	a,b,c	Last 6 month	once every 3 years	3		500 – 999	Parents, Loan	1000	600	New	Pre-paid	Umobile	30
Male	1st Year	FC	Oppo	a,b,c,d	Last 3 years	Untill can't use	3	Rosak	500 – 999	Parents, Part-tir	500	200	New	Post-paid	Celcom	80
Female	1st Year	FC	Samsung	a,c	Last year	once every 3 years	3	Broken	500 – 999	Parents	0	1200	New	Pre-paid	Digi	40
Male	1st Year	FKA	Samsung	a,b,c	Last 6 month	Once every 5 years	2	Broken	2000 – 2499	Parents	0	0	New	Post-paid	Celcom	30
Female	1st Year	FC	Apple	a,b	Last 2 years	when broke	2		1000 – 1499	Parents	300	1300	New	Pre-paid	Umobile	29
Male	1st Year	FCEE	Huawei	a,b,c	Last 2 years	Up to me	3		500 – 999	Parents, Loan	0	0	New	Post-paid	Digi	40
Male	1st Year	FME	Huawei	b,c	Last year	once every 2 years	3	Broken	3000	Part-time work	150	1000	New	Post-paid	Unifi	100
Female	2nd Year	FS	Oppo	a	Last year	once every 3 years	3	Hilang	500 – 999	Parents	350	300	New	Post-paid	Umobile	30
Male	2nd Year	FME	Xiaomi	a,c	Last 2 years	once every 3 years	4		500 – 999	Parents	700	800	New	Pre-paid	Yes4g	30
Male	1st Year	FC	Honor	a,b,c	Last year	once every 2 years	3	Dah tkleh pakai ki	1000 – 1499	Parents	700	2000	New	Post-paid	Unifi	63
Female	1st Year	SHARPS	Apple	a,c	Last 2 years	once every 5 years	3	previous phone nc	3000	Parents	800	4000	New	Pre-paid	Digi	50
Female	1st Year	FC	Oppo	a,c	Last year	When i become a rich	2		500 – 999	Parents	0	1000	New	Post-paid	Umobile	30
Female	1st Year	FC	Huawei	b,c	Last 6 month	Once every 5 years	4	The previous sma	1000 – 1499	Parents, Schola	950	1300	New	Post-paid	Maxis	100
Female	1st Year	FC	Samsung	a,c,	Last 6 month	once every 3 years	3		1000 – 1499	Parents	300	1200	New	Pre-paid	Digi	50
Male	1st Year	FC	Xiaomi	a,c	Last year	once every 2 years	6	New Phone is out	3000	Parents	1000	5000	New	Pre-paid	Maxis	35
Female	2nd Year	FC	Samsung	a,c	Last 2 years	once every 3 years	4		1500 – 1999	Parents, Part-tir	700	2000	New	Post-paid	Umobile	70
Female	2nd Year	FC	Apple	a,c	Last 2 years	Depends	2		500 – 999	Scholarship / S|	0	0	New	Pre-paid	Digi	40
Female	1st Year	FS	Huawei	a,c	Last 3 years	once every 3 years	3		500 – 999	Parents	250	2000	New	Post-paid	Umobile	50
Male	2nd Year	FKE	Apple	a,b,c	Last 6 month	once every 2 years	4		500 – 999	Scholarship / S|	400	1000	New	Post-paid	Umobile	30
Female	1st Year	FS	Apple	a,c,d	Last 2 month	Once every 5 years	2		3000	Parents	1000	1000	New	Post-paid	Umobile	58
Male	2nd Year	FKE	Samsung	a,c	last 4 years	once the phone is not	1	when the old phor	2000 – 2499	Parents	800	2500	New	Post-paid	Digi	30
Female	1st Year	FKE	Vivo	a,d	Last 2 years	once every 3 years	3		500 – 999	Scholarship / S|	0	Below 1	New	Pre-paid	Umobile	30
Female	1st Year	FS	Samsung	a,c	Last 2 years	once every 3 years	5		1000 – 1499	Parents, Schola	250	1000	New	Post-paid	Celcom	50
Female	1st Year	FABU	Oppo	a,c	Last 6 month	once every 3 years	3		500 – 999	Parents	0	800	New	Post-paid	Celcom	100
Female	1st Year	FSSH	Samsung	a,b,c,d	Last 2 years	When broken	2	Broken that i cann	500 – 999	Parents, Part-tir	0	1000	New	Pre-paid	Digi	40
Female	1st Year	FSSH	Redmi	a	Last 6 month	once every 3 years	3	Telefon rosak	500 – 999	Loan	500	500	New	Pre-paid	Maxis	30
Female	4th Year	FC	Oppo	a,b,c	Last 2 years	When it is broken	3	My phone got stol	500 – 999	Parents	500	0	New	Pre-paid	Celcom	50
Female	1st Year	FSSH	Oppo	a,c	Last year	I will still use the phor	2	For a better stora	500 – 999	Scholarship / S|	1800	700	New	Pre-paid	Maxis	50