SCHOOL OF EDUCATIONAL STUDIES

ACADEMIC SESSION 2019/2020

SEMESTER II

PGT202E

BASIC EDUCATIONAL MEASUREMENT AND EVALUATION

FINAL COURSEWORK

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UNIVERSITI SAINS MALAYSIA

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PGT 202E - BASIC EDUCATIONAL MEASUREMENT AND EVALUATION
[ASAS PENGUKURAN DAN PENILAIAN PENDIDIKAN]

Please ensure that this assignment consists of **NINE** pages of printed material.

*[Sila pastikan bahawa tugasan ini mengandungi **SEMBILAN** muka surat yang bercetak].*

INSTRUCTION:

Answer **ALL** questions.

[ARAHAN :

*Jawab **SEMUA** soalan].*

Answer **ALL** Questions

1. Identify and revise the weaknesses of multiple-choice items and essay items based on examples in the reference book. Apply the steps as follows:
   a. Refer to the reference books (for secondary school subjects only). No limit for the number of subjects referred.
   b. Identify **TWO (2)** examples of multiple-choice items and **THREE (3)** examples of essay items that have different weaknesses.
   c. State the source of reference book (book title, year and publisher) for **EACH** example identified.
   d. Explain the weaknesses of both formats.
   e. Revise the items.

ANSWER:

Multiple-choice items

1. The information below describes the material P.

The particles of substance P are hard to compress

What is P?

A. Nitrogen

B. Cooking oil

C. Oxygen

D. Carbon dioxide

Reference:(Kertas Model Pra-PT3 Formula A+ Tingkatan 1 Science, 2020, SASBADI Sdn.Bhd)

Weakness: This question contains obvious answer choices because answer option 'A', 'C' and 'D' show the same type of substances which are three of the options are substances type of gas. The only one option 'B' describe the substance is type of liquid. So, the students obviously will choose the answer 'B' because it is totally different from three other options.

Revised version:

1. The information below describes the material P.

The particles of substance P are hard to compress

Which is the most suitable to represent the substance P?

A. Mirror

B. Cooking oil

C. Oxygen

2. Which statement is true about the particles in gas?

   A. The particles move randomly

   B. The particles are arranged very close

   C. The particles vibrate at a fixed position

   D. The particles cannot collide with one another

Reference:(Eksplorasi PT3 Sains, 2020,Cemerlang Publications Sdn. Bhd.)

Weakness: This question contains the answer choices are redundant and similar which are the option answer for 'B' and 'D' are explaining the same things which is explaining about the particles are arranged orderly. In the other word, it is call as overlapping alternatives.

Revised version:

2. Which statement is true about the particles in gas?

   A. The particles move randomly

   B. The particles are arranged very close

   C. The particles vibrate at a fixed position

   D. The particles are hard to compress

Essay items

1. What is the advantages and disadvantages of the cloning technique to mankind.

Reference:(SUCCESS Biology SPM, 2010, Oxford Fajar Sdn. Bhd)

Weakness: The word 'what' in this question does not suitable for the essay question and it is generally lead to the task that require recall information and the question does not require complex thinking and reasoning.

Revised version:

1. Describe the advantages and disadvantages of the cloning technique to mankind.

2. The Internet is a useful tool. Yet, it can also be dangerous if misunderstood or used unwisely. Do you agree with this?

   Reference:*(131 Mode Compositions & Summaries,2012, Ilmu Bakti)*

Weakness: This question is too direct and short in length for the students. The question should be more specific and clear. Short question can lead to students giving simple responses. The word such as justify, describe, give reasons should be used. In this way, the students can develop their ideas in essay writing.

Revised version:

2. The Internet is a useful tool. Yet it can also be dangerous if misunderstood or used unwisely. In your opinion, do you agree with this statement? Give reasons to support your answer.

3. Farmers add chemical fertilisers and spray insecticides on their crops. Discuss the good and bad effects of both activities and their impact on agriculture and the environment.

   Reference: *(SUCCESS Biology SPM, 2010, Oxford Fajar Sdn. Bhd)*

Weakness: The question contains a lot of information in one sentence and sometimes it

will makes the student confuse with the question.

Revised version:

3. Farmers add chemical fertilisers and spray insecticides on their crops. Discuss the good and bad effects of both activities. Thus, explain their impact on agriculture and the environment.

2. a. For a topic of your choice, discuss the steps that a teacher needs to follow by implementing school based assessment.

ANSWER:

School based assessment is an assessment which is designed, constructed, managed, marked, recorded and reported by teachers. It is conducted by the students' own teacher and allows the teacher to give immediate and constructive feedback to students.

The topic of my choice is Science form 1 chapter 1 topic about physical quantities and their units. So, for implementing the school based assessment, the first step is planning, the teacher needs to know the purpose of assessment that want to implement which is either in the formative, diagnostic or summative form. Then, teacher needs to determine the learning outcome to be assessed and know the assessment methods that need to use. For example, the learning outcome of the topic is to make sure the students are able to identify and use the correct units for different physical quantities. So, the teacher implement the assessment based on the learning outcome.

Second steps is determining the instrument. The teacher needs to prepare the table of specification and develop or adapt the task or questions that align with learning objective that teacher stated in the first step of planning. The table of specification helps to ensure that there is a match between what is taught and what is tested.

Next step is implementing. The teacher needs to administer the assessment based on the procedures and directions professionally. The assessment should be fair to all students according to the appropriate level.

The forth step is analyzing. In this step, teacher grade the response based on the scoring prepared. After that, the students' result was interpret.

The fifth step in implementing school based assessment is recording. In this step, teacher assess the development, ability, progression, achievement of the students and record it whether in the student's achievement record book, performance record, profile record, teacher record book or notebook.

Next is reporting which is the presentation of assessment information about achievement and learning development, strengths and weaknesses, performance academic, attitude, and interest of the students.

The last step is follow-up. In this step, the teacher needs to alert with the students achievement. If the students unable to master the content, remediation is needed but if the student able to master the content, reinforcement training or enrichment will give to the students.

b. Create the raw score data for a monthly test that involved 40 students, then:

i. Calculate the PR (percentile rank) for each raw score. Show your solutions on a table.

ANSWER:

Raw Score	Frequency	Percentile Rank (PR) $PR = \frac{(B + \frac{1}{2}E)}{n} \times 100$
90	3	$\frac{37 + \frac{1}{2}(3)}{40} \times 100 = 96.25$
85	5	$\frac{32 + \frac{1}{2}(5)}{40} \times 100 = 86.25$
80	5	$\frac{27 + \frac{1}{2}(5)}{40} \times 100 = 73.75$
76	4	$\frac{23 + \frac{1}{2}(4)}{40} \times 100 = 62.50$
70	5	$\frac{18 + \frac{1}{2}(5)}{40} \times 100 = 51.25$
67	3	$\frac{15 + \frac{1}{2}(3)}{40} \times 100 = 41.25$
65	5	$\frac{10 + \frac{1}{2}(5)}{40} \times 100 = 31.25$
55	2	$\frac{8 + \frac{1}{2}(2)}{40} \times 100 = 22.50$
49	5	$\frac{3 + \frac{1}{2}(5)}{40} \times 100 = 13.75$
40	3	$\frac{0 + \frac{1}{2}(3)}{40} \times 100 = 3.75$
	$\sum f = 40$	

ii. Interpret the PR values.

ANSWER:

Percentile rank is the percentage of score below the given score point.

Raw score 90: Students who obtained raw score 90 is at the percentile rank 96.25. That's mean there are 96.25% of the students who sit the same monthly test obtain score of less than 90. Therefore, if the student get the raw score 90, so the student's position relative of his/her classmate in the test is higher among them.

Raw score 85: Students who obtained raw score 85 is at the percentile rank 86.25. That's mean there are 86.25% of the students who sit the same monthly test obtain score of lower than 85.

Raw score 80: Students who obtained raw score 80 is at the percentile rank 73.75. That's mean there are 73.75% of the students who sit the same

monthly test obtain score of less than 80. This meant, 26.25% of students scores higher than 80.

Raw score 76: Students who obtained raw score 76 is at the percentile rank 62.50. That's mean there are 62.50% of the students who sit the same monthly test obtain score of less than 76.

Raw score 70: Students who obtained raw score 70 is at the percentile rank 51.25. That's mean there are 51.25% of the students who sit the same monthly test obtain score of less than 70.

Raw score 67: Students who obtained raw score 67 is at the percentile rank 41.25. That's mean there are 41.25% of the students who sit the same monthly test obtain score of less than 67. In other word, 58.75% of students scores higher than 67.

Raw score 65: Students who obtained raw score 65 is at the percentile rank 31.25. That's mean there are 31.25% of the students who sit the same monthly test obtain score of less than 65.

Raw score 55: Students who obtained raw score 55 is at the percentile rank 22.50. That's mean there are 22.50% of the students who sit the same monthly test obtain score of less than 55.

Raw score 49: Students who obtained raw score 49 is at the percentile rank 13.75. That's mean there are 13.75% of the students who sit the same monthly test obtain score of less than 49.

Raw score 40: Students who obtained raw score 40 is at the percentile rank 3.75. That's mean there are 3.75% of the students who sit the same monthly test obtain score of less than 40. This meant, there are 96.25% of students obtain score higher than 40.

3. Table 1 shows score data for 50 students in a mixed-format 18-item mathematics test. Item 1-13 are in multiple choice form. Item 14 and Item 16 are 2-marks partial credit items, Item 15 and 17 are 3-marks partial credit items while Item 18 is a 1-mark partial credit item.

Calculate difficulty and discrimination indices for each item . indicate the solution for each index.

Table 1: Score Data

		Item Number																	
	Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Nur Athilia	1	0	0	0	1	1	0	0	0	0	1	0	1	2	2	1	0	0
2	Danish Farhan	0	1	0	0	1	0	1	1	0	0	0	1	0	0	1	0	3	0
3	Azrul Izafiq	0	1	1	1	0	0	0	0	0	0	0	0	0	0	2	1	3	0
4	M Aiman	1	1	1	0	0	1	1	0	1	0	1	1	0	2	2	1	3	0
5	M Raziq Irfan	1	1	1	0	0	0	1	0	1	0	1	0	1	2	2	2	3	0
6	Eissyam	1	1	1	1	0	1	1	0	1	1	1	0	0	2	2	2	3	1
7	M Harris Irfan	1	1	0	0	0	1	0	0	1	0	1	1	0	2	1	1	3	0
8	Nur Arifah	1	1	0	1	1	1	0	1	1	1	1	0	1	1	2	1	1	1
9	Nur Eka	1	1	1	1	0	0	0	1	1	0	1	1	0	2	2	0	3	1
10	Nur Amani	1	1	0	0	0	1	0	1	1	1	0	0	0	2	2	1	3	0
11	Nur Shahiffah	1	1	0	0	0	1	0	1	1	1	0	0	0	2	0	2	3	0
12	Nur Husnina	1	1	1	0	0	0	0	0	0	0	1	0	0	2	1	1	0	1
13	Alif Saifudeen	1	1	1	1	0	1	1	1	1	1	1	0	1	2	3	1	1	0
14	Ainun Shafina	0	0	1	0	0	0	0	1	0	0	1	0	1	2	1	1	3	0
15	M Afiq Fahmi	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0
16	Aiman Hakim	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
17	M Azril Haiqal	0	0	0	1	1	1	0	0	1	1	0	0	1	2	1	1	3	0
18	Sharip Haziq	0	0	0	1	0	1	0	0	1	1	1	0	0	0	1	1	1	0
19	M Danish Khan	1	1	1	1	0	0	1	0	1	1	1	0	1	2	3	1	3	0
20	M Adam	0	1	1	1	0	1	1	0	0	0	1	0	0	2	3	2	0	0
21	M Arif	1	0	1	1	1	0	1	1	0	0	0	1	1	0	0	0	3	0
22	Nur Syazwani	0	0	1	0	0	1	0	0	1	1	0	0	0	1	1	0	0	0
23	Nurmusrifah	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	2	3	1
24	Nur Hudiya	1	0	1	1	0	1	0	0	1	0	1	0	1	2	3	1	3	1
25	Raja Zarith	1	1	1	0	0	0	1	0	0	1	0	0	0	2	3	2	1	1
26	M Hadif	1	0	1	1	0	1	1	1	1	0	1	0	1	2	2	1	3	0
27	Nur Natasha	1	1	1	1	0	1	1	1	1	0	1	0	1	2	3	1	3	1
28	Nur Atiqah	0	1	1	1	0	0	0	0	0	1	1	0	0	2	0	0	3	0
29	M Amierul	0	1	1	0	0	1	0	0	1	0	0	0	0	1	1	1	2	0
30	Aireen	1	0	0	1	0	0	0	0	0	1	0	0	0	2	0	0	1	0
31	M Naufal	1	1	1	1	0	1	0	1	1	0	1	0	1	2	3	2	3	1

32	Ibnu Mubarak	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	3	0
33	M Danish	0	1	1	0	0	1	0	0	0	0	0	0	0	1	2	1	3	0
34	Siti Nur	1	1	1	1	0	1	0	1	0	0	1	0	1	0	0	0	3	0
35	Fazirah	1	1	1	0	1	1	1	1	1	1	1	0	1	2	3	2	3	1
36	Erfana	1	1	1	1	1	1	1	1	1	1	1	1	1	2	3	2	3	1
37	A Hanif Haikal	1	1	1	1	0	1	1	0	1	1	1	1	1	2	3	1	3	1
38	Siti	1	1	1	1	0	1	1	0	1	1	0	0	1	1	0	2	3	1
39	M Irfan Hakimi	1	1	1	1	1	1	1	0	1	1	1	0	0	2	3	2	1	1
40	Nur Izzah	1	0	0	1	0	1	1	0	1	0	1	0	0	2	3	2	1	0
41	Nur Arisya	1	1	1	1	0	0	1	0	1	1	1	0	0	2	3	2	0	0
42	Ahmad Ikhwan	1	1	1	1	0	0	0	0	1	1	1	0	0	2	3	2	3	1
43	Nur Batrisyia	1	1	1	0	0	1	1	0	1	1	1	0	1	2	3	2	1	0
44	Nur Syazana	1	0	1	1	1	1	1	1	1	0	1	0	0	1	1	2	3	0
45	Puteri Nurin	1	1	0	1	0	1	1	0	1	1	1	0	0	2	2	2	3	0
46	Nur Munirah	1	1	1	0	0	1	1	0	0	1	1	0	1	2	3	2	0	0
47	Nur Alya	1	1	1	1	0	1	1	1	1	1	1	0	1	1	3	2	3	1
48	Nurdiyana	0	1	0	1	0	0	1	0	0	0	1	0	0	1	1	2	1	0
49	Anis Natasha	1	0	1	1	0	0	1	0	1	0	0	1	0	2	3	2	3	0
50	Syasya	1	1	1	1	0	1	1	0	1	1	1	0	0	2	0	2	3	0

ANSWER:

Difficulty index, p

Item	No of student answered correctly	Difficulty index
1	36	$\frac{36}{50} = 0.72$
2	35	$\frac{35}{50} = 0.70$
3	37	$\frac{37}{50} = 0.74$
4	31	$\frac{31}{50} = 0.62$
5	10	$\frac{10}{50} = 0.20$
6	33	$\frac{33}{50} = 0.66$
7	27	$\frac{27}{50} = 0.54$
8	18	$\frac{18}{50} = 0.36$
9	33	$\frac{33}{50} = 0.66$
10	24	$\frac{24}{50} = 0.48$
11	33	$\frac{33}{50} = 0.66$
12	8	$\frac{8}{50} = 0.16$
13	21	$\frac{21}{50} = 0.42$

Difficulty index (Partial credits)			
Item	**Earn marks**	**Full marks**	**Difficulty index, p**
14(2m)	75	$50 \times 2 = 100$	$\frac{75}{100} = 0.75$
15(3m)	88	$50 \times 3 = 150$	$\frac{88}{150} = 0.59$
16(2m)	64	$50 \times 2 = 100$	$\frac{64}{100} = 0.64$
17(3m)	108	$50 \times 3 = 150$	$\frac{108}{150} = 0.72$

18	16	$\frac{16}{50} = 0.32$

Discrimination index, D

- The number of students are less than 60, so 50% of upper and lower group are selected.

$$50 \times 50\% = 25 \; students \; each \; upper \; and \; lower$$

Upper group

	Name	Item Number																		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	**Total marks**
1	Erfana	1	1	1	1	1	1	1	1	1	1	1	1	1	2	3	2	3	1	**24**
2	Fazirah	1	1	1	0	1	1	1	1	1	1	1	0	1	2	3	2	3	1	**22**
3	A Hanif Haikal	1	1	1	1	0	1	1	0	1	1	1	1	1	2	3	1	3	1	**21**
4	Nur Alya	1	1	1	1	0	1	1	1	1	1	1	0	1	1	3	2	3	1	**21**
5	Nur Natasha	1	1	1	1	0	1	1	1	1	0	1	0	1	2	3	1	3	1	**20**
6	M Naufal	1	1	1	1	0	1	0	1	1	0	1	0	1	2	3	2	3	1	**20**
7	Eissyam	1	1	1	1	0	1	1	0	1	1	1	0	0	2	2	2	3	1	**19**
8	M Irfan Hakimi	1	1	1	1	1	1	1	0	1	1	1	0	0	2	3	2	1	1	**19**
9	Alif Saifudeen	1	1	1	1	0	1	1	1	1	1	1	0	1	2	3	1	1	0	**18**
10	M Danish Khan	1	1	1	1	0	0	1	0	1	1	1	0	1	2	3	1	3	0	**18**
11	Ahmad Ikhwan	1	1	1	1	0	0	0	0	1	1	1	0	0	2	3	2	3	1	**18**
12	Nurmusrifah	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	2	3	1	**17**
13	Nur Hudiya	1	0	1	1	0	1	0	0	1	0	1	0	1	2	3	1	3	1	**17**
14	M Hadif	1	0	1	1	0	1	1	1	1	0	1	0	1	2	2	1	3	0	**17**
15	Nur Batrisyia	1	1	1	0	0	1	1	0	1	1	1	0	1	2	3	2	1	0	**17**
16	Puteri Nurin	1	1	0	1	0	1	1	0	1	1	1	0	0	2	2	2	3	0	**17**
17	M Aiman	1	1	1	0	0	1	1	0	1	0	1	1	0	2	2	1	3	0	**16**
18	M Raziq Irfan	1	1	1	0	0	0	1	0	1	0	1	0	1	2	2	2	3	0	**16**
19	Nur Arifah	1	1	0	1	1	1	0	1	1	1	1	0	1	1	2	1	1	1	**16**
20	Nur Eka	1	1	1	1	0	0	0	1	1	0	1	1	0	2	2	0	3	1	**16**
21	Siti	1	1	1	1	0	1	1	0	1	1	0	0	1	1	0	2	3	1	**16**
22	Nur Syazana	1	0	1	1	1	1	1	1	1	0	1	0	0	1	1	2	3	0	**16**
23	Anis Natasha	1	0	1	1	0	0	1	0	1	0	0	1	0	2	3	2	3	0	**16**
24	Syasya	1	1	1	1	0	1	1	0	1	1	1	0	0	2	0	2	3	0	**16**
25	Nur Arisya	1	1	1	1	0	0	1	0	1	1	1	0	0	2	3	2	0	0	**15**
26	Nur Munirah	1	1	1	0	0	1	1	0	0	1	1	0	1	2	3	2	0	0	**15**
	Earn marks	**26**	**22**	**24**	**21**	**6**	**20**	**21**	**11**	**24**	**16**	**23**	**5**	**16**	**47**	**61**	**42**	**64**	**14**	
	Full marks	**26× 1 = 26**	**26**	**26**	**26**	**26**	**26**	**26**	**26**	**26**	**26**	**26**	**26**	**26**	**26× 2 = 52**	**26× 3 = 78**	**26× 2 = 52**	**26× 3 = 78**	**26**	

	***P*upper**	$\frac{26}{26}$ = 1.00	$\frac{22}{26}$ = 0.85	$\frac{24}{26}$ = 0.92	$\frac{21}{26}$ = 0.81	$\frac{6}{26}$ = 0.23	$\frac{20}{26}$ = 0.77	$\frac{21}{26}$ = 0.81	$\frac{11}{26}$ = 0.42	$\frac{24}{26}$ = 0.92	$\frac{16}{26}$ = 0.62	$\frac{23}{26}$ = 0.88	$\frac{5}{26}$ = 0.19	$\frac{16}{26}$ = 0.62	$\frac{47}{52}$ = 0.90	$\frac{61}{78}$ = 0.78	$\frac{42}{52}$ = 0.81	$\frac{64}{78}$ = 0.82	$\frac{14}{26}$ = 0.54	

Lower group

	Name	Item Number																		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total marks
1	Nur Amani	1	1	0	0	0	1	0	1	1	1	0	0	0	2	2	1	3	0	**14**
2	Raja Zarith	1	1	1	0	0	0	1	0	0	1	0	0	0	2	3	2	1	1	**14**
3	Nur Izzah	1	0	0	1	0	1	1	0	1	0	1	0	0	2	3	2	1	0	**14**
4	M Harris Irfan	1	1	0	0	0	1	0	0	1	0	1	1	0	2	1	1	3	0	**13**
5	Nur Shahiffah	1	1	0	0	0	1	0	1	1	1	0	0	0	2	0	2	3	0	**13**
6	M Azril Haiqal	0	0	0	1	1	1	0	0	1	1	0	0	1	2	1	1	3	0	**13**
7	M Adam	0	1	1	1	0	1	1	0	0	0	1	0	0	2	3	2	0	0	**13**
8	Ainun Shafina	0	0	1	0	0	0	0	1	0	0	1	0	1	2	1	1	3	0	**11**
9	M Arif	1	0	1	1	1	0	1	1	0	0	0	1	1	0	0	0	3	0	**11**
10	Siti Nur	1	1	1	1	0	1	0	1	0	0	1	0	1	0	0	0	3	0	**11**
11	Nur Athilia	1	0	0	0	1	1	0	0	0	0	1	0	1	2	2	1	0	0	**10**
12	Nur Atiqah	0	1	1	1	0	0	0	0	0	1	1	0	0	2	0	0	3	0	**10**
13	M Danish	0	1	1	0	0	1	0	0	0	0	0	0	0	1	2	1	3	0	**10**
14	Danish	0	1	0	0	1	0	1	1	0	0	0	1	0	0	1	0	3	0	**9**
15	Azrul Izafiq	0	1	1	1	0	0	0	0	0	0	0	0	0	0	2	1	3	0	**9**
16	Nur Husnina	1	1	1	0	0	0	0	0	0	0	1	0	0	2	1	1	0	1	**9**
17	M Amierul	0	1	1	0	0	1	0	0	1	0	0	0	0	1	1	1	2	0	**9**
18	Nurdiyana	0	1	0	1	0	0	1	0	0	0	1	0	0	1	1	2	1	0	**9**
19	Sharip Haziq	0	0	0	1	0	1	0	0	1	1	1	0	0	0	1	1	1	0	**8**
20	Nur Syazwani	0	0	1	0	0	1	0	0	1	1	0	0	0	1	1	0	0	0	**6**
21	Aireen	1	0	0	1	0	0	0	0	0	1	0	0	0	2	0	0	1	0	**6**
22	Ibnu Mubarak	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	3	0	**6**
23	M Afiq Fahmi	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	**4**
24	Aiman Hakim	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	**2**
	Earn marks	**10**	**13**	**13**	**10**	**4**	**13**	**6**	**7**	**9**	**8**	**10**	**3**	**5**	**28**	**27**	**22**	**44**	**2**	
	Full marks	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**48**	**72**	**48**	**72**	**24**	
	***P*lower**	$\frac{10}{24}$ = 0.42	$\frac{13}{24}$ = 0.54	$\frac{13}{24}$ = 0.54	$\frac{10}{24}$ = 0.42	$\frac{4}{24}$ = 0.17	$\frac{13}{24}$ = 0.54	$\frac{6}{24}$ = 0.25	$\frac{7}{24}$ = 0.29	$\frac{9}{24}$ = 0.38	$\frac{8}{24}$ = 0.33	$\frac{10}{24}$ = 0.42	$\frac{3}{24}$ = 0.13	$\frac{5}{24}$ = 0.21	$\frac{28}{48}$ = 0.58	$\frac{27}{72}$ = 0.38	$\frac{22}{48}$ = 0.46	$\frac{44}{72}$ = 0.61	$\frac{2}{24}$ = 0.08	

	Discrimination Index, D=*P*upper-*P*lower	**1.00 - 0.42 = 0.58**	**0.85 - 0.54 = 0.31**	**0.92 – 0.54 = 0.38**	**0.81 - 0.42 = 0.39**	**0.23 - 0.17 = 0.06**	**0.77 - 0.54 = 0.23**	**0.81 - 0.25 = 0.56**	**0.42 - 0.29 = 0.13**	**0.92 - 0.38 = 0.54**	**0.62 - 0.33 = 0.29**	**0.88 - 0.42 = 0.46**	**0.19 - 0.13 = 0.06**	**0.62 - 0.21 = 0.41**	**0.90 - 0.58 = 0.32**	**0.78 - 0.38 = 0.40**	**0.81 - 0.46 = 0.35**	**0.82 - 0.61 = 0.21**	**0.54 - 0.08 = 0.46**	

3. Table 2 shows a set of score data for 42 students in a 18 multiple choice item test.

Compute the split half and the KR21 reliability coefficients. Provide steps in performing your computation. You can use excel spreadsheet to facilitate the task.

Table 2: Score Data

	Name	Item																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	M Aqil	1	1	0	1	1	0	1	0	1	1	1	0	1	1	0	0	0	1
2	M Hunaidi	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0	0	0	1
3	Nurul Ain	1	1	1	1	0	1	0	1	1	0	1	0	0	0	0	0	0	1
4	Firas Irdina	1	1	0	1	0	1	1	0	1	1	1	0	0	1	0	0	0	1
5	M Adib	1	1	1	1	0	1	0	1	1	1	1	0	1	1	0	0	0	1
6	M Irfan	1	1	0	1	0	1	1	0	1	1	1	0	0	1	0	1	0	1
7	Eiman	1	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	0	0
8	M Akmal	1	1	1	0	0	0	1	0	1	0	1	0	1	1	0	0	0	1
9	M Fariqq	1	1	1	1	0	1	1	0	1	1	1	0	0	1	0	0	0	1
10	Mimi	1	0	1	0	0	1	1	0	0	1	1	0	1	1	1	0	0	1
11	Nur Auni	1	0	1	1	0	0	0	0	1	0	1	0	0	1	0	0	0	1
12	Afif Nazran	0	0	1	0	0	1	0	0	1	1	0	0	1	1	0	0	0	1
13	M Zuhairi	1	1	1	1	0	1	0	1	1	0	0	1	1	1	0	0	0	1
14	Nur Auni	1	1	1	1	0	1	1	0	1	1	1	0	0	1	0	1	0	1
15	M Faris	0	1	0	0	1	1	0	0	0	1	1	0	0	1	0	0	0	1
16	Manatul	1	1	0	0	0	0	1	0	1	0	1	1	1	1	0	0	0	1
17	Dayana	1	1	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	1
18	Naufal	1	1	1	1	1	0	0	0	1	1	1	0	0	1	0	0	0	1
19	Nor Izz	1	1	1	1	1	1	0	0	1	1	1	0	0	1	0	1	0	1
20	Salahuddin	1	1	1	0	0	1	1	1	1	1	1	0	1	1	1	1	0	1
21	Nurin	1	1	1	0	0	0	1	0	1	0	1	0	1	1	1	0	0	1
22	M Haizal	1	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	1
23	M Harith	1	1	1	1	0	1	0	0	0	1	0	0	0	0	1	0	1	1
24	Syafiq Alif	1	1	0	1	0	1	1	1	0	0	1	0	0	0	1	0	1	0
25	Umaira	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
26	Zhaufan	1	1	0	1	0	1	1	1	1	1	0	0	1	0	1	0	0	1
27	Nur	1	0	0	0	0	0	0	1	1	1	0	1	1	0	0	0	0	1
28	Nur Aina	1	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	1
29	Alif Iman	1	1	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	1
30	Noor	1	1	1	1	0	0	1	0	1	1	1	0	0	1	0	0	0	1

31	M Ezzriey	1	0	0	0	0	1	1	1	1	0	1	0	0	1	0	0	0	1
32	M Hadif	1	0	1	1	1	1	0	0	0	1	1	0	0	1	0	1	0	1
33	Nur Ain	1	0	1	1	0	1	1	0	1	0	0	0	0	0	0	0	0	1
34	M Adie	1	1	1	1	0	1	0	0	1	1	1	0	0	1	0	0	0	1
35	Nur Ainaa	1	1	1	1	0	1	0	0	1	1	0	0	1	1	0	0	0	1
36	Nurul Ain	1	1	1	0	0	0	0	0	1	0	1	0	0	1	0	1	0	1
37	M Hariz	1	1	1	1	1	1	0	0	1	1	1	0	0	1	0	0	0	1
38	M Fakhul	0	1	1	1	0	0	0	0	0	1	0	0	1	1	0	0	0	1
39	Syazana	0	1	0	1	0	0	1	0	1	0	0	1	1	1	0	0	0	1
40	Afnansabhi	1	1	0	1	0	1	0		1	1	1	0	0	1	0	1	0	1
41	M Azim	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	1
42	Nur Alyaa	1	1	1	1	0	1	0	0	1	1	1	0	0	1	1	0	0	1

ANSWER:

Split-half

		Item Number																						
	Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	**Even (x)**	**Odd (y)**	x^2	y^2	xy
1	M Aqil	1	1	0	1	1	0	1	0	1	1	1	0	1	1	0	0	0	1	**5**	**6**	**25**	**36**	**30**
2	M Hunaidi	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0	0	0	1	**7**	**6**	**49**	**36**	**42**
3	Nurul Ain	1	1	1	1	0	1	0	1	1	0	1	0	0	0	0	0	0	1	**5**	**4**	**25**	**16**	**20**
4	Firas Irdina	1	1	0	1	0	1	1	0	1	1	1	0	0	1	0	0	0	1	**6**	**4**	**36**	**16**	**24**
5	M Adib	1	1	1	1	0	1	0	1	1	1	1	0	1	1	0	0	0	1	**7**	**5**	**49**	**25**	**35**
6	M Irfan	1	1	0	1	0	1	1	0	1	1	1	0	0	1	0	1	0	1	**7**	**4**	**49**	**16**	**28**
7	Eiman	1	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	0	0	**4**	**7**	**16**	**49**	**28**
8	M Akmal	1	1	1	0	0	0	1	0	1	0	1	0	1	1	0	0	0	1	**3**	**6**	**9**	**36**	**18**
9	M Fariqq	1	1	1	1	0	1	1	0	1	1	1	0	0	1	0	0	0	1	**6**	**5**	**36**	**25**	**30**
10	Mimi	1	0	1	0	0	1	1	0	0	1	1	0	1	1	1	0	0	1	**4**	**6**	**16**	**36**	**24**
11	Nur Auni	1	0	1	1	0	0	0	0	1	0	1	0	0	1	0	0	0	1	**3**	**4**	**9**	**16**	**12**
12	Afif Nazran	0	0	1	0	0	1	0	0	1	1	0	0	1	1	0	0	0	1	**4**	**3**	**16**	**9**	**12**
13	M Zuhairi	1	1	1	1	0	1	0	1	1	0	0	1	1	1	0	0	0	1	**7**	**4**	**49**	**16**	**28**
14	Nur Auni	1	1	1	1	0	1	1	0	1	1	1	0	0	1	0	1	0	1	**7**	**5**	**49**	**25**	**35**
15	M Faris	0	1	0	0	1	1	0	0	0	1	1	0	0	1	0	0	0	1	**5**	**2**	**25**	**4**	**10**
16	Manatul	1	1	0	0	0	0	1	0	1	0	1	1	1	1	0	0	0	1	**4**	**5**	**16**	**25**	**20**
17	Dayana	1	1	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	1	**4**	**2**	**16**	**4**	**8**
18	Naufal	1	1	1	1	1	0	0	0	1	1	1	0	0	1	0	0	0	1	**5**	**5**	**25**	**25**	**25**
19	Nor Izz	1	1	1	1	1	1	0	0	1	1	1	0	0	1	0	1	0	1	**7**	**5**	**49**	**25**	**35**
20	Salahuddin	1	1	1	0	0	1	1	1	1	1	1	0	1	1	1	1	0	1	**7**	**7**	**49**	**49**	**49**
21	Nurin	1	1	1	0	0	0	1	0	1	0	1	0	1	1	1	0	0	1	**3**	**7**	**9**	**49**	**21**
22	M Haizal	1	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	1	**6**	**6**	**36**	**36**	**36**
23	M Harith	1	1	1	1	0	1	0	0	0	1	0	0	0	0	1	0	1	1	**5**	**4**	**25**	**16**	**20**
24	Syafiq Alif	1	1	0	1	0	1	1	1	0	0	1	0	0	0	1	0	1	0	**4**	**5**	**16**	**25**	**20**
25	Umaira	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	**1**	**2**	**1**	**4**	**2**
26	Zhaufan	1	1	0	1	0	1	1	1	1	1	0	0	1	0	1	0	0	1	**6**	**5**	**36**	**25**	**30**
27	Nur	1	0	0	0	0	0	0	1	1	1	0	1	1	0	0	0	0	1	**4**	**3**	**16**	**9**	**12**

28	Nur Aina	1	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	1	**3**	**2**	**9**	**4**	**6**
29	Alif Iman	1	1	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	1	**6**	**1**	**36**	**1**	**6**
30	Noor	1	1	1	1	0	0	1	0	1	1	1	0	0	1	0	0	0	1	**5**	**5**	**25**	**25**	**25**
31	M Ezzriey	1	0	0	0	0	1	1	1	1	0	1	0	0	1	0	0	0	1	**4**	**4**	**16**	**16**	**16**
32	M Hadif	1	0	1	1	1	1	0	0	0	1	1	0	0	1	0	1	0	1	**6**	**4**	**36**	**16**	**24**
33	Nur Ain	1	0	1	1	0	1	1	0	1	0	0	0	0	0	0	0	0	1	**3**	**4**	**9**	**16**	**12**
34	M Adie	1	1	1	1	0	1	0	0	1	1	1	0	0	1	0	0	0	1	**6**	**4**	**36**	**16**	**24**
35	Nur Ainaa	1	1	1	1	0	1	0	0	1	1	0	0	1	1	0	0	0	1	**6**	**4**	**36**	**16**	**24**
36	Nurul Ain	1	1	1	0	0	0	0	0	1	0	1	0	0	1	0	1	0	1	**4**	**4**	**16**	**16**	**16**
37	M Hariz	1	1	1	1	1	1	0	0	1	1	1	0	0	1	0	0	0	1	**6**	**5**	**36**	**25**	**30**
38	M Fakhul	0	1	1	1	0	0	0	0	0	1	0	0	1	1	0	0	0	1	**5**	**2**	**25**	**4**	**10**
39	Syazana	0	1	0	1	0	0	1	0	1	0	0	1	1	1	0	0	0	1	**5**	**3**	**25**	**9**	**15**
40	Afnansabhi	1	1	0	1	0	1	0		1	1	1	0	0	1	0	1	0	1	**7**	**3**	**49**	**9**	**21**
41	M Azim	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	1	**7**	**6**	**49**	**36**	**42**
42	Nur Alyaa	1	1	1	1	0	1	0	0	1	1	1	0	0	1	1	0	0	1	**6**	**5**	**36**	**25**	**30**
																				$\sum \mathbf{x} = 215$	$\sum \mathbf{y} = 183$	$\sum \mathbf{x^2} = 1191$	$\sum \mathbf{y^2} = 887$	$\sum \mathbf{xy} = 955$

Correlation Coefficient between half assessment,

$$r_{xy} = \frac{N(\sum XY) - (\sum X)(\sum Y)}{\sqrt{\left[N(\sum X^2) - (\sum X)^2\right]\left[N(\sum Y^2) - (\sum Y)^2\right]}}$$

$$r_{xy} = \frac{42(955) - (215)(183)}{\sqrt{\left[42(1191) - (215)^2\right]\left[42(887) - (183)^2\right]}}$$

$$r_{xy} = \frac{765}{\sqrt{(3797)(3765)}}$$

$$r_{xy} = 0.2023$$

Reliability coefficient,

$$r_c = \frac{2r}{1 + r}$$

$$r_c = \frac{2(0.2023)}{1 + 0.2023}$$

r_c = 0.3365

KR21 Reliability coefficient

	Name	Item Number																				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	**X**	**X-m**	$(\mathbf{X - m})^2$
1	M Aqil	1	1	0	1	1	0	1	0	1	1	1	0	1	1	0	0	0	1	**11**	**11-9.48 =1.52**	$(\mathbf{1.52})^2 = \mathbf{2.31}$
2	M Hunaidi	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0	0	0	1	**13**	**3.52**	**12.39**
3	Nurul Ain	1	1	1	1	0	1	0	1	1	0	1	0	0	0	0	0	0	1	**9**	**-0.48**	**0.23**
4	Firas Irdina	1	1	0	1	0	1	1	0	1	1	1	0	0	1	0	0	0	1	**10**	**0.52**	**0.27**
5	M Adib	1	1	1	1	0	1	0	1	1	1	1	0	1	1	0	0	0	1	**12**	**2.52**	**6.35**
6	M Irfan	1	1	0	1	0	1	1	0	1	1	1	0	0	1	0	1	0	1	**11**	**1.52**	**2.31**

7	Eiman	1	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	0	0	**11**	**1.52**	**2.31**
8	M Akmal	1	1	1	0	0	0	1	0	1	0	1	0	1	1	0	0	0	1	**9**	**-0.48**	**0.23**
9	M Fariqq	1	1	1	1	0	1	1	0	1	1	1	0	0	1	0	0	0	1	**11**	**1.52**	**2.31**
10	Mimi	1	0	1	0	0	1	1	0	0	1	1	0	1	1	1	0	0	1	**10**	**0.52**	**0.27**
11	Nur Auni	1	0	1	1	0	0	0	0	1	0	1	0	0	1	0	0	0	1	**7**	**-2.48**	**6.15**
12	Afif Nazran	0	0	1	0	0	1	0	0	1	1	0	0	1	1	0	0	0	1	**7**	**-2.48**	**6.15**
13	M Zuhairi	1	1	1	1	0	1	0	1	1	0	0	1	1	1	0	0	0	1	**11**	**1.52**	**2.31**
14	Nur Auni	1	1	1	1	0	1	1	0	1	1	1	0	0	1	0	1	0	1	**12**	**2.52**	**6.35**
15	M Faris	0	1	0	0	1	1	0	0	0	1	1	0	0	1	0	0	0	1	**7**	**-2.48**	**6.15**
16	Manatul	1	1	0	0	0	0	1	0	1	0	1	1	1	1	0	0	0	1	**9**	**-0.48**	**0.23**
17	Dayana	1	1	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	1	**6**	**-3.48**	**12.11**
18	Naufal	1	1	1	1	1	0	0	0	1	1	1	0	0	1	0	0	0	1	**10**	**0.52**	**0.27**
19	Nor Izz	1	1	1	1	1	1	0	0	1	1	1	0	0	1	0	1	0	1	**12**	**2.52**	**6.35**
20	Salahuddin	1	1	1	0	0	1	1	1	1	1	1	0	1	1	1	1	0	1	**14**	**4.52**	**20.43**
21	Nurin	1	1	1	0	0	0	1	0	1	0	1	0	1	1	1	0	0	1	**10**	**0.52**	**0.27**
22	M Haizal	1	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	1	**12**	**2.52**	**6.35**
23	M Harith	1	1	1	1	0	1	0	0	0	1	0	0	0	0	1	0	1	1	**9**	**-0.48**	**0.23**
24	Syafiq Alif	1	1	0	1	0	1	1	1	0	0	1	0	0	0	1	0	1	0	**9**	**-0.48**	**0.23**
25	Umaira	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	**3**	**-6.48**	**41.99**
26	Zhaufan	1	1	0	1	0	1	1	1	1	1	0	0	1	0	1	0	0	1	**11**	**1.52**	**2.31**
27	Nur	1	0	0	0	0	0	0	1	1	1	0	1	1	0	0	0	0	1	**7**	**-2.48**	**6.15**
28	Nur Aina	1	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	1	**5**	**-4.48**	**20.07**
29	Alif Iman	1	1	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	1	**7**	**-2.48**	**6.15**
30	Noor	1	1	1	1	0	0	1	0	1	1	1	0	0	1	0	0	0	1	**10**	**0.52**	**0.27**
31	M Ezzriey	1	0	0	0	0	1	1	1	1	0	1	0	0	1	0	0	0	1	**8**	**-1.48**	**2.19**
32	M Hadif	1	0	1	1	1	1	0	0	0	1	1	0	0	1	0	1	0	1	**10**	**0.52**	**0.27**
33	Nur Ain	1	0	1	1	0	1	1	0	1	0	0	0	0	0	0	0	0	1	**7**	**-2.48**	**6.15**
34	M Adie	1	1	1	1	0	1	0	0	1	1	1	0	0	1	0	0	0	1	**10**	**0.52**	**0.27**
35	Nur Ainaa	1	1	1	1	0	1	0	0	1	1	0	0	1	1	0	0	0	1	**10**	**0.52**	**0.27**
36	Nurul Ain	1	1	1	0	0	0	0	0	1	0	1	0	0	1	0	1	0	1	**8**	**-1.48**	**2.19**
37	M Hariz	1	1	1	1	1	1	0	0	1	1	1	0	0	1	0	0	0	1	**11**	**1.52**	**2.31**
38	M Fakhul	0	1	1	1	0	0	0	0	0	1	0	0	1	1	0	0	0	1	**7**	**-2.48**	**6.15**
39	Syazana	0	1	0	1	0	0	1	0	1	0	0	1	1	1	0	0	0	1	**8**	**-1.48**	**2.19**
40	Afnansabhi	1	1	0	1	0	1	0		1	1	1	0	0	1	0	1	0	1	**10**	**0.52**	**0.27**
41	M Azim	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	1	**13**	**3.52**	**12.39**
42	Nur Alyaa	1	1	1	1	0	1	0	0	1	1	1	0	0	1	1	0	0	1	**11**	**1.52**	**2.31**
																				$\sum \mathbf{X} = \mathbf{398}$		$\sum (\mathbf{X} - \mathbf{m})^2 = \mathbf{216.47}$
	Right	38	33	28	29	9	28	19	10	33	28	30	5	17	33	7	9	2	40			

$$m, mean, \frac{\sum X}{N} = \quad = \frac{398}{42}$$
$$= 9.48$$

$$s^2, varians, \frac{\sum(X-m)^2}{N} = \frac{216.47}{42}$$

$$= 5.15$$

$$KR_{21} = \frac{k}{k-1}\left[1 - \frac{m(k-m)}{ks^2}\right]$$

$$KR_{21} = \frac{18}{18-1}\left[1 - \frac{9.48(18-9.48)}{18(5.15)}\right]$$

$$KR_{21} = 0.14$$