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<b>Friday 12 June 2020</b>								
Morning (Time: 2 hours)					Paper Reference <b>9PS0/03</b>			
<b>Psychology</b>								
<b>Advanced</b>								
<b>Paper 3: Psychological skills</b>								
<b>You do not need any other materials.</b>							Total Marks	

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer ALL questions.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*

### Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*
- The list of formulae and statistical value tables are printed at the start of this paper.
- Candidates may use a calculator.

### Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Check your answers if you have time at the end.

Turn over ►

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## FORMULAE AND STATISTICAL TABLES

### Standard deviation (sample estimate)

$$\sqrt{\left(\frac{\sum(x - \bar{x})^2}{n - 1}\right)}$$

### Spearman's rank correlation coefficient

$$1 - \frac{6 \sum d^2}{n(n^2 - 1)}$$

### Critical values for Spearman's rank

N	Level of significance for a one-tailed test				
	0.05	0.025	0.01	0.005	0.0025
N	Level of significance for a two-tailed test				
	0.10	0.05	0.025	0.01	0.005
5	0.900	1.000	1.000	1.000	1.000
6	0.829	0.886	0.943	1.000	1.000
7	0.714	0.786	0.893	0.929	0.964
8	0.643	0.738	0.833	0.881	0.905
9	0.600	0.700	0.783	0.833	0.867
10	0.564	0.648	0.745	0.794	0.830
11	0.536	0.618	0.709	0.755	0.800
12	0.503	0.587	0.678	0.727	0.769
13	0.484	0.560	0.648	0.703	0.747
14	0.464	0.538	0.626	0.679	0.723
15	0.446	0.521	0.604	0.654	0.700
16	0.429	0.503	0.582	0.635	0.679
17	0.414	0.485	0.566	0.615	0.662
18	0.401	0.472	0.550	0.600	0.643
19	0.391	0.460	0.535	0.584	0.628
20	0.380	0.447	0.520	0.570	0.612
21	0.370	0.435	0.508	0.556	0.599
22	0.361	0.425	0.496	0.544	0.586
23	0.353	0.415	0.486	0.532	0.573
24	0.344	0.406	0.476	0.521	0.562
25	0.337	0.398	0.466	0.511	0.551
26	0.331	0.390	0.457	0.501	0.541
27	0.324	0.382	0.448	0.491	0.531
28	0.317	0.375	0.440	0.483	0.522
29	0.312	0.368	0.433	0.475	0.513
30	0.306	0.362	0.425	0.467	0.504

The calculated value must be equal to or exceed the critical value in this table for significance to be shown.



### Chi-squared distribution formula

$$X^2 = \sum \frac{(O-E)^2}{E}$$

$$df = (r - 1)(c - 1)$$

### Critical values for chi-squared distribution

Level of significance for a one-tailed test						
	0.10	0.05	0.025	0.01	0.005	0.0005
Level of significance for a two-tailed test						
df	0.20	0.10	0.05	0.025	0.01	0.001
1	1.64	2.71	3.84	5.02	6.64	10.83
2	3.22	4.61	5.99	7.38	9.21	13.82
3	4.64	6.25	7.82	9.35	11.35	16.27
4	5.99	7.78	9.49	11.14	13.28	18.47
5	7.29	9.24	11.07	12.83	15.09	20.52
6	8.56	10.65	12.59	14.45	16.81	22.46
7	9.80	12.02	14.07	16.01	18.48	24.32
8	11.03	13.36	15.51	17.54	20.09	26.12
9	12.24	14.68	16.92	19.02	21.67	27.88
10	13.44	15.99	18.31	20.48	23.21	29.59
11	14.63	17.28	19.68	21.92	24.73	31.26
12	15.81	18.55	21.03	23.34	26.22	32.91
13	16.99	19.81	22.36	24.74	27.69	34.53
14	18.15	21.06	23.69	26.12	29.14	36.12
15	19.31	22.31	25.00	27.49	30.58	37.70
16	20.47	23.54	26.30	28.85	32.00	39.25
17	21.62	24.77	27.59	30.19	33.41	40.79
18	22.76	25.99	28.87	31.53	34.81	42.31
19	23.90	27.20	30.14	32.85	36.19	43.82
20	25.04	28.41	31.41	34.17	37.57	45.32
21	26.17	29.62	32.67	35.48	38.93	46.80
22	27.30	30.81	33.92	36.78	40.29	48.27
23	28.43	32.01	35.17	38.08	41.64	49.73
24	29.55	33.20	36.42	39.36	42.98	51.18
25	30.68	34.38	37.65	40.65	44.31	52.62
26	31.80	35.56	38.89	41.92	45.64	54.05
27	32.91	36.74	40.11	43.20	46.96	55.48
28	34.03	37.92	41.34	44.46	48.28	56.89
29	35.14	39.09	42.56	45.72	49.59	58.30
30	36.25	40.26	43.77	46.98	50.89	59.70
40	47.27	51.81	55.76	59.34	63.69	73.40
50	58.16	63.17	67.51	71.42	76.15	86.66
60	68.97	74.40	79.08	83.30	88.38	99.61
70	79.72	85.53	90.53	95.02	100.43	112.32

The calculated value must be equal to or exceed the critical value in this table for significance to be shown.



**Mann-Whitney U test formulae**

$$U_a = n_a n_b + \frac{n_a(n_a+1)}{2} - \sum R_a$$

$$U_b = n_a n_b + \frac{n_b(n_b+1)}{2} - \sum R_b$$

(U is the smaller of  $U_a$  and  $U_b$ )

**Critical values for the Mann-Whitney U test**

		$N_b$																	
		5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
$N_a$																			
<b><math>p \leq 0.05</math> (one-tailed), <math>p \leq 0.10</math> (two-tailed)</b>																			
<b>5</b>	4	5	6	8	9	11	12	13	15	16	18	19	20	22	23	25			
<b>6</b>	5	7	8	10	12	14	16	17	19	21	23	25	26	28	30	32			
<b>7</b>	6	8	11	13	15	17	19	21	24	26	28	30	33	35	37	39			
<b>8</b>	8	10	13	15	18	20	23	26	28	31	33	36	39	41	44	47			
<b>9</b>	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54			
<b>10</b>	11	14	17	20	24	27	31	34	37	41	44	48	51	55	58	62			
<b>11</b>	12	16	19	23	27	31	34	38	42	46	50	54	57	61	65	69			
<b>12</b>	13	17	21	26	30	34	38	42	47	51	55	60	64	68	72	77			
<b>13</b>	15	19	24	28	33	37	42	47	51	56	61	65	70	75	80	84			
<b>14</b>	16	21	26	31	36	41	46	51	56	61	66	71	77	82	87	92			
<b>15</b>	18	23	28	33	39	44	50	55	61	66	72	77	83	88	94	100			
<b>16</b>	19	25	30	36	42	48	54	60	65	71	77	83	89	95	101	107			
<b>17</b>	20	26	33	39	45	51	57	64	70	77	83	89	96	102	109	115			
<b>18</b>	22	28	35	41	48	55	61	68	75	82	88	95	102	109	116	123			
<b>19</b>	23	30	37	44	51	58	65	72	80	87	94	101	109	116	123	130			
<b>20</b>	25	32	39	47	54	62	69	77	84	92	100	107	115	123	130	138			

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$N_a$	$N_b$															
	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b><math>p \leq 0.01</math> (one-tailed), <math>p \leq 0.02</math> (two-tailed)</b>																
5	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
6	2	3	4	6	7	8	9	11	12	13	15	16	18	19	20	22
7	3	4	6	7	9	11	12	14	16	17	19	21	23	24	26	28
8	4	6	7	9	11	13	15	17	20	22	24	26	28	30	32	34
9	5	7	9	11	14	16	18	21	23	26	28	31	33	36	38	40
10	6	8	11	13	16	19	22	24	27	30	33	36	38	41	44	47
11	7	9	12	15	18	22	25	28	31	34	37	41	44	47	50	53
12	8	11	14	17	21	24	28	31	35	38	42	46	49	53	56	60
13	9	12	16	20	23	27	31	35	39	43	47	51	55	59	63	67
14	10	13	17	22	26	30	34	38	43	47	51	56	60	65	69	73
15	11	15	19	24	28	33	37	42	47	51	56	61	66	70	75	80
16	12	16	21	26	31	36	41	46	51	56	61	66	71	76	82	87
17	13	18	23	28	33	38	44	49	55	60	66	71	77	82	88	93
18	14	19	24	30	36	41	47	53	59	65	70	76	82	88	94	100
19	15	20	26	32	38	44	50	56	63	69	75	82	88	94	101	107
20	16	22	28	34	40	47	53	60	67	73	80	87	93	100	107	114

$N_a$	$N_b$															
	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b><math>p \leq 0.025</math> (one-tailed), <math>p \leq 0.05</math> (two-tailed)</b>																
5	2	3	5	6	7	8	9	11	12	13	14	15	17	18	19	20
6	3	5	6	8	10	11	13	14	16	17	19	21	22	24	25	27
7	5	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34
8	6	8	10	13	15	17	19	22	24	26	29	31	34	36	38	41
9	7	10	12	15	17	20	23	26	28	31	34	37	39	42	45	48
10	8	11	14	17	20	23	26	29	33	36	39	42	45	48	52	55
11	9	13	16	19	23	26	30	33	37	40	44	47	51	55	58	62
12	11	14	18	22	26	29	33	37	41	45	49	53	57	61	65	69
13	12	16	20	24	28	33	37	41	45	50	54	59	63	67	72	76
14	13	17	22	26	31	36	40	45	50	55	59	64	67	74	78	83
15	14	19	24	29	34	39	44	49	54	59	64	70	75	80	85	90
16	15	21	26	31	37	42	47	53	59	64	70	75	81	86	92	98
17	17	22	28	34	39	45	51	57	63	67	75	81	87	93	99	105
18	18	24	30	36	42	48	55	61	67	74	80	86	93	99	106	112
19	19	25	32	38	45	52	58	65	72	78	85	92	99	106	113	119
20	20	27	34	41	48	55	62	69	76	83	90	98	105	112	119	127



$N_a$	$N_b$															
	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b><math>p \leq 0.005</math> (one-tailed), <math>p \leq 0.01</math> (two-tailed)</b>																
<b>5</b>	0	1	1	2	3	4	5	6	7	7	8	9	10	11	12	13
<b>6</b>	1	2	3	4	5	6	7	9	10	11	12	13	15	16	17	18
<b>7</b>	1	3	4	6	7	9	10	12	13	15	16	18	19	21	22	24
<b>8</b>	2	4	6	7	9	11	13	15	17	18	20	22	24	26	28	30
<b>9</b>	3	5	7	9	11	13	16	18	20	22	24	27	29	31	33	36
<b>10</b>	4	6	9	11	13	16	18	21	24	26	29	31	34	37	39	42
<b>11</b>	5	7	10	13	16	18	21	24	27	30	33	36	39	42	45	48
<b>12</b>	6	9	12	15	18	21	24	27	31	34	37	41	44	47	51	54
<b>13</b>	7	10	13	17	20	24	27	31	34	38	42	45	49	53	56	60
<b>14</b>	7	11	15	18	22	26	30	34	38	42	46	50	54	58	63	67
<b>15</b>	8	12	16	20	24	29	33	37	42	46	51	55	60	64	69	73
<b>16</b>	9	13	18	22	27	31	36	41	45	50	55	60	65	70	74	79
<b>17</b>	10	15	19	24	29	34	39	44	49	54	60	65	70	75	81	86
<b>18</b>	11	16	21	26	31	37	42	47	53	58	64	70	75	81	87	92
<b>19</b>	12	17	22	28	33	39	45	51	56	63	69	74	81	87	93	99
<b>20</b>	13	18	24	30	36	42	48	54	60	67	73	79	86	92	99	105

The calculated value must be equal to or less than the critical value in this table for significance to be shown.

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### Wilcoxon Signed Ranks test process

- Calculate the difference between two scores by taking one from the other
- Rank the differences giving the smallest difference Rank 1

Note: do not rank any differences of 0 and when adding the number of scores, do not count those with a difference of 0, and ignore the signs when calculating the difference

- Add up the ranks for positive differences
- Add up the ranks for negative differences
- T is the figure that is the smallest when the ranks are totalled (may be positive or negative)
- N is the number of scores left, ignore those with 0 difference

### Critical values for the Wilcoxon Signed Ranks test

<i>n</i>	Level of significance for a one-tailed test		
	0.05	0.025	0.01
	Level of significance for a two-tailed test		
	0.1	0.05	0.02
N=5	0	-	-
6	2	0	-
7	3	2	0
8	5	3	1
9	8	5	3
10	11	8	5
11	13	10	7
12	17	13	9

The calculated value must be equal to or less than the critical value in this table for significance to be shown.



Answer ALL questions.

## SECTION A: RESEARCH METHODS

### 1 Twitter and Facebook study

Twitter and Facebook are popular social media platforms with many regular users. A group of researchers wanted to investigate whether personality was related to those who commonly used Twitter and Facebook.

The researchers recruited 300 participants from England via an advertisement posted on both Twitter and Facebook. There were 93 males and 207 females aged 18 – 63, with a mean age of 27. The participants gave informed consent and were asked a number of questions which were designed to measure three personality characteristics:

- **Need for cognition:** the tendency for a person to engage in and enjoy thinking. Items measuring the need for cognition included statements such as 'I like to solve complex problems'.
- **Sociability:** the extent to which someone enjoys the company of others. Items measuring sociability included statements such as 'I like being part of a loud crowd'.
- **Neuroticism:** the extent to which someone experiences feelings such as anxiety, worry, fear, jealousy, and guilt. Items measuring neuroticism included statements such as 'I have frequent mood swings'.

Statements were scored using ranked scale questions with seven options ranging from 'Strongly Disagree (1)' to 'Strongly Agree (7)'. The responses for need for cognition, sociability, and neuroticism were averaged for each participant to give a score from 1 to 7, where a high score indicated a high need for cognition, high sociability, or high neuroticism.

(Source: adapted from Hughes et al. (2012))

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(a) Explain **one** strength and **one** weakness of the sampling technique used for the Twitter and Facebook study.

(4)

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Strength .....

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Weakness .....

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A summary of the results from the Twitter and Facebook study are shown in **Table 1**.

	Twitter users		Facebook users	
	Mean (1–7)	Standard deviation	Mean (1–7)	Standard deviation
Need for cognition	6.60	0.87	5.00	0.94
Sociability	3.39	0.87	4.99	0.82
Neuroticism	2.69	0.99	4.03	1.12

**Table 1**

(b) Analyse the data provided in **Table 1** to explain **two** conclusions that the researchers in the Twitter and Facebook study might draw from these results.

(4)

Conclusion 1 .....

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Conclusion 2 .....

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(c) The Twitter and Facebook study used primary data.

Explain **one** strength of using primary data for the Twitter and Facebook study. (2)

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(d) The researchers in the Twitter and Facebook study used the mean score to analyse the data from their ranked scale questions.

Explain **one** weakness of using the mean score to analyse the data in the Twitter and Facebook study. (2)

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**(Total for Question 1 = 12 marks)**



## 2 Open plan office study

Researchers wanted to see the impact that removing walls in a workplace office had on human interaction.

The researchers visited a company that had 'spatial boundaries' at work – such as office or cubicle walls – and observed the interaction between employees. At a later date they revisited the same company who had created an open office where the walls were removed, to create an 'unbounded' office space. The researchers again observed the interaction between employees.

The researchers observed the employees using hidden cameras both before and after the office space was changed by the company.

Two types of interaction were measured between employees:

- Face-to-face communication was recorded by tallying each time employees engaged in a conversation.
- Electronic communication was recorded by using the company server and totalling the number of emails or instant messages sent by employees throughout the study.

(Source: adapted from Bernstein and Turban (2018))

- (a) The researchers in the open plan office study used a covert, naturalistic, non-participant observation when measuring face-to-face communication.

Explain **two** strengths of using this type of observation for the open plan office study in terms of validity.

(4)

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(b) The researchers in the open plan office study measured electronic communication (emails or instant messages) using quantitative data.

Explain **one** strength and **one** weakness of using quantitative data in the open plan office study.

(4)

Strength .....

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Weakness .....

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(c) Explain **one** weakness of the open plan office study in terms of generalisability.

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The results of the open plan office study are shown in **Table 2**.

	<b>Before the open plan office was introduced</b>	<b>After the open plan office was introduced</b>
Face-to-face communication (average minutes over the course of the study, per employee)	5260	1490
Electronic communication through email (average messages over the course of the study, per employee)	Sent 150 Received 170	Sent 210 Received 250
Electronic communication through instant messenger (activity over the course of the study, per employee)	480 messages	580 messages

**Table 2**

- (d) Explain **one** conclusion you can make regarding the open plan office study using the data in **Table 2**.

(2)

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**(Total for Question 2 = 12 marks)**

**TOTAL FOR SECTION A = 24 MARKS**



## SECTION B: REVIEW OF STUDIES

### 3 Computer video games study

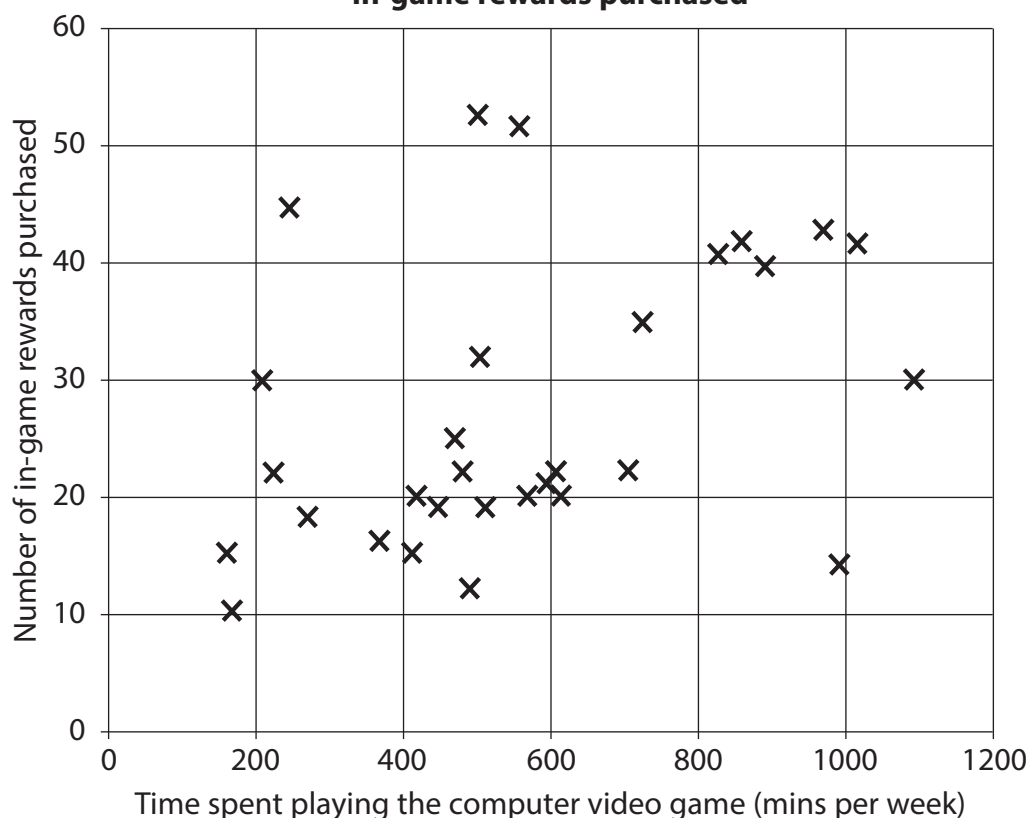
Playing computer video games is a popular leisure activity, and has been claimed to be the fastest growing form of recreation in humans, with annual revenues from video games having surpassed those of Hollywood (Yi, 2004).

Popular computer video games can enable players to connect online via the Internet and allow individuals to purchase in-game rewards with either real or virtual money. The in-game rewards can benefit players by providing resources which give them a better chance to complete objectives within the game successfully.

A group of researchers wanted to see if the number of in-game purchases correlated with the time spent playing the online games against others. The researchers asked 30 participants how much time they spent playing online against others and the number of in-game rewards they purchased for money.

The results of the computer video games study are shown in **Figure 1**.

**Scattergraph to show the relationship between the time spent playing the computer video game and the number of in-game rewards purchased**



**Figure 1**

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(a) The researchers decided to use a statistical test for their data to determine significance. They calculated an observed / calculated value of 0.411 for a Spearman's rho at the 5% level of significance for a two-tailed (non-directional) test.

Explain what this shows in terms of in-game purchases for the participants who played computer video games.

(2)

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**(Total for Question 3 = 8 marks)**



P 6 2 5 7 9 A 0 1 9 3 2

4 Evaluate the classic studies by Raine et al. (1997) and Sherif et al. (1954/1961) in terms of their scientific status.

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(Total for Question 4 = 16 marks)

**TOTAL FOR SECTION B = 24 MARKS**







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**(Total for Question 5 = 12 marks)**



6 Assess how far psychology could be considered a reductionist explanation of human behaviour.

(20)

Area with horizontal dotted lines for writing the answer.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Large writing area with horizontal dotted lines.



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Handwriting practice area with 25 horizontal dotted lines.



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Large writing area with horizontal dotted lines.



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(Total for Question 6 = 20 marks)

**TOTAL FOR SECTION C = 32 MARKS**  
**TOTAL FOR PAPER = 80 MARKS**

