1. In a random intercept model, $Y_{ij} = \beta_{0j} + \beta_1 x_{ij} + \varepsilon_{ij}$ with $\beta_{0j} = \gamma_{00} + \gamma_{01} z_j + u_{0j}$ and $\beta_1 = \gamma_{10}$

A. γ_{01} is a fixed effect for a group-level predictor and u_{0j} is group-level variance of the intercept.

B. γ_{01} is a random effect for a group-level predictor and u_{0j} is group-level variance of the intercept.

C. γ_{01} is a fixed effect for an individual-level predictor and u_{0j} is individual-level variance of the intercept.

D. γ_{01} is a random effect for an individual -level predictor and u_{0j} is group-level variance of the intercept.

2. In a random intercept model, $math_{ij} = \gamma_{00} + \gamma_{10} ses_{ij} + \gamma_{01} ses\_mean_j + \gamma_{02} per4yrc_j + \gamma_{03} public_j + u_{0j} + \varepsilon_{ij}$, we have the following output:

Model Dimension[a]

		Number of Levels	Covariance Structure	Number of Parameters	Subject Variables
Fixed Effects	Intercept	1		1	
	ses	1		1	
	ses_mean	1		1	
	per4yrc	1		1	
	public	1		1	
Random Effects	Intercept[b]	1	Variance Components	1	schcode
Residual				1	
Total		6		7	

a. Dependent Variable: math.

A. There are five individual-level predictors and two random/residual effects at group level

B. There are four fixed group level predictors, one random effect at group level and one individual-level residual

C. There are four fixed group level predictors, one random effect at individual level and one group-level residual

D. None of the above

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	56.441552	.474433	421.055	118.966	.000	55.509001	57.374104
ses	3.190801	.157803	6448.937	20.220	.000	2.881455	3.500147
ses_mean	2.473244	.306897	709.247	8.059	.000	1.870709	3.075779
per4yrc	1.419812	.471391	413.879	3.012	.003	.493192	2.346432
public	-.164264	.275903	409.345	-.595	.552	-.706627	.378098

a. Dependent Variable: math.

3. The best interpretation is:

A. Students with higher average *ses* and schools with higher *ses* will have higher scores on *math*; students with higher *per4yrc* and lower *public* will have higher scores on *math*

B. Students with higher *ses* and from schools with higher average *ses* will have higher scores on *math*; students from schools with higher *per4yrc* will have higher scores on *math*

C. Students with higher *ses* and from schools with higher average *ses* will have higher scores on *math*; students with higher *per4yrc* will have higher scores on *math*

D. Students with higher average *ses* and schools with high *ses* will have higher scores on *math*; students from schools with higher *per4yrc* and lower *public* will have higher scores on *math*

4. With a random slope model:

A. An individual level predictor will be both a fixed and random effect.

B. A group level predictor will be both a fixed and random effect.

C. There will be an interaction between a group level predictor and a random effect.

D. All of the above.

5. An interaction of group and individual effects indicates that:

A. The slope parameter is predicted by a group-level predictor

B. The intercept parameter is predicted by a group-level predictor

C. The slope parameter is correlated with the intercept parameter

D. The slope parameter is both a fixed and random effect.

6. For the data and variables of question 2, we obtain the following output

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	56.505254	.485329	450.229	116.427	.000	55.551462	57.459046
ses	3.757343	.605681	518.400	6.203	.000	2.567451	4.947235
ses_mean	2.706473	.324107	759.554	8.351	.000	2.070222	3.342724
per4yrc	1.361887	.479336	439.899	2.841	.005	.419814	2.303960
public	-.119925	.274238	405.467	-.437	.662	-.659031	.419182
ses * per4yrc	-.130132	.592163	479.307	-.220	.826	-1.293688	1.033423
ses * ses_mean	-.136539	.298571	303.798	-.457	.648	-.724069	.450990
ses * public	-.668237	.331145	404.838	-2.018	.044	-1.319216	-.017258

a. Dependent Variable: math.

Given that *public* =1 indicates a public school and *public* =0 indicates a private school

A. Higher *ses* is associated with higher performance on *math*

B. The slope for *ses* is higher for private schools

C. The higher *ses* students perform even better in private schools

D. All of the above.

7. Grand mean centring occurs when

A. A new variable is created by subtracting the group mean from the old variable

B. A new variable is created by subtracting the overall mean from the old variable

C. A new variable is created by subtracting the intercept mean from the old variable

D. A new variable is created by subtracting the group variance from the old variable