Mathematics study guide on the Egyptian Knowledge Bank (EKB) - secondary stage

Subject: Algebra and Solid Geometry   **Grade: third secondary**   **2021/2022**

Lesson	Learning Outcomes	The digital resources available on EKB	
		Student Book	**Najwa Limited**
First: Algebra		
Permutations, combinations and Binomial theorem		
Fundamental counting principle- permutations - combinations	• To recognize and solve problems on the counting principle (addition rule).	https://d3sk34bfh9epsl.cloudfront.net/mathematics/algebra/g12/english/unit-1-lesson-1.pdf	https://lms.ekb.eg/repository/resource/feffdf2a-815f-47d4-b614-2a5cd0ad6b49/en
	• To recognize and solve problems on several methods of sampling with or without substitution.		https://lms.ekb.eg/repository/resource/5cdfad37-6b6c-4720-be7d-87bcdc119311/en
	• To recognize and solve problems on the relation between permutations and combinations as methods and ways of counting.		https://lms.ekb.eg/repository/resource/ddb38253-d481-4606-a23a-48dc8c162f92/en
	• To conclude the rules and results of permutations and combinations, and solve numerical problems on permutations and combinations.		https://lms.ekb.eg/repository/resource/d5760803-400f-47e1-8641-327404e3f19f/en
	• To solve different applications on permutations and combinations.		https://lms.ekb.eg/repository/resource/7f1f1ea2-bdf9-4edc-b133-5ab975ca0d27/en
			https://lms.ekb.eg/repository/resource/62e16ce0-54c4-4b7f-82d4-f2522dd7fe3c/en
Binomial theorem for integer positive power	• To recognize and solve problems on the binomial theorem by a positive integral index and its results.	https://d3sk34bfh9epsl.cloudfront.net/mathematics/algebra/g12/english/unit-1-lesson-2.pdf	https://lms.ekb.eg/repository/resource/6be570fa-af09-47c8-8672-a013bf73a98d/en
	• To find the general term in a binomial expansion		
	• To find the coefficient of any binomial expansion term according to the degree of that term.		https://lms.ekb.eg/repository/resource/9b234f8b-b500-4a77-aafa-a34e229481a5/en
	• To find the middle term of a binomial expansion when n is an even number, and find the two middle terms when n is an odd number.		

Lesson	Learning Outcomes	The digital resources available on EKB	
		Student Book	**Najwa Limited**
Finding the term containing xR in the expansion of binomial	• To find the coefficient of any force to the variable (x) in a binomial expansion. • To find the clear term of (x) in the binomial expansion. • To find the coefficient of the biggest term in the binomial expansion.	https://d3sk34bfh9epsl.cloudfront.net/mathematics/algebra/g12/english/unit-1-lesson-3.pdf	https://lms.ekb.eg/repository/resource/46dc7ed9-cfd1-4301-9013-8ecd222a1c45/en
Ratio between two consecutive terms of the Binomial expansion	• To find the ratio between each term and its previous term in the binomial expansion. • To find the ratio between two coefficients of two consecutive terms in the binomial expansion. • To solve problems on the binomial theorem. • To solve different applications on the binomial theorem.	https://d3sk34bfh9epsl.cloudfront.net/mathematics/algebra/g12/english/unit-1-lesson-4.pdf	https://lms.ekb.eg/repository/resource/46dc7ed9-cfd1-4301-9013-8ecd222a1c45/en

Lesson	Learning Outcomes	The digital resources available on EKB	
		Student Book	**Najwa Limited**
over	Complex number		
The trigonometric form of a complex number	• To recognize the complex number and its conjugate, and graphically represent the complex number and its conjugate in points (ordered pairs) in a coordinate plane (Argand plane)	https://d3sk34bfh9epsl.cloudfront.net/mathematics/algebra/g12/english/unit-2-lesson-1.pdf	https://lms.ekb.eg/repository/resource/00ca3f78-0643-4a6c-b750-b6821f9a6d03/en
	• To recognize and find the magnitude and angles of the complex number.		https://lms.ekb.eg/repository/resource/a3caf254-ec3a-447f-a896-5ed9bcce50e0/en https://lms.ekb.eg/repository/resource/74e9c432-30f7-4d63-b35f-5b354b9bc9cd/en
	• To recognize the trigonometric (polar) forms of the complex number, and solve problems on how to convert the algebraic form into trigonometric form and vice versa.		https://lms.ekb.eg/repository/resource/045d8b37-8ca2-422e-ad3a-0ec385f030f4/en https://lms.ekb.eg/repository/resource/6d73289a-97eb-47d9-a96b-86f36ad78469/en
	• To recognize the exponential form of the complex number (Euler's formula), and solve problems on how to convert the different forms of a complex number (algebraic, trigonometric, and exponential).		https://lms.ekb.eg/repository/resource/9888ae56-e939-443a-bd31-4d5e43c6a415/en
	• To recognize and find the magnitude and angle of two complex numbers product and quotient in trigonometric form.		https://lms.ekb.eg/repository/resource/5bddc7f0-d764-4160-8264-5f1f702457a5/en
	• To recognize and find the magnitude and angle of two complex numbers product and quotient in exponential form.		

Lesson	Learning Outcomes	The digital resources available on EKB	
		Student Book	**Najwa Limited**
De Moivre's theorem	• To recognize and solve problems on De Moivre's theorem.	https://d3sk34bfh9epsl.cloudfront.net/mathematics/algebra/g12/english/unit-2-lesson-2.pdf	https://lms.ekb.eg/repository/resource/798d51e1-1dd3-4e3b-a665-d9f80dbf8815/en https://lms.ekb.eg/repository/resource/5db124de-f07d-417e-98d3-ab2cafc7f458/en
	• To recognize and solve problems on finding the square roots of the complex number without using De Moivre's theorem.		
The cubic roots of unity	• To solve problems that include finding the nth roots of the complex number in its different forms "trigonometric and exponential".	https://d3sk34bfh9epsl.cloudfront.net/mathematics/algebra/g12/english/unit-2-lesson-3.pdf	https://lms.ekb.eg/repository/resource/7695d96f-3822-4580-96b8-7b7ee4478366/en
	• To solve applications on the cube root of the integer.		https://lms.ekb.eg/repository/resource/09ee4a85-8725-4417-b476-a6ce9378585c/en
	• To solve different applications on the complex numbers.		
	• To recognize and solve problems on the cube roots of the integer and their properties.		https://lms.ekb.eg/repository/resource/1d4da963-bc7a-4d4d-afc4-b8c2032bbe04/en
	• To solve third-degree equation whose solutions shall use the cube roots of the integer.		

Lesson	Learning Outcomes	The digital resources available on EKB	
		Student Book	**Najwa Limited**
Determinants and Matrices			
Determinants	• To recognize the determinants properties and solve different problems using the determinants properties. • To solve problems on converting the determinant into trigonometric form, expand the determinant in the trigonometric form and solve equations that include trigonometric forms. • To use the determinants properties in solving some applications in geometry and trigonometry. • To use the determinants properties and the trigonometric form in proving some relations. • To solve different mathematical applications on the determinants.	https://d3sk34bfh9epsl.cloudfront.net/mathematics/algebra/g12/english/unit-3-lesson-1.pdf	https://lms.ekb.eg/repository/resource/89dd03cb-bac5-4e09-ba73-5f191b0dae9f/en
Matrices	• To specify the type of square matrix in terms of being singular or nonsingular and solve problems on specifying the type of matrix. • To recognize and find the conjugate matrix and the matrix attached to a ٣x٣ matrix. • To use some properties of the inverse of matrix to prove some relations. • To specify the inverse of a third-order square matrix using the cofactor matrix.	https://d3sk34bfh9epsl.cloudfront.net/mathematics/algebra/g12/english/unit-3-lesson-2.pdf	https://lms.ekb.eg/repository/resource/1af83b03-5738-40cb-8fae-8dc926374632/en https://lms.ekb.eg/repository/resource/7db05cc3-acdf-4433-855a-97745afe9ea2/en

Lesson	Learning Outcomes	The digital resources available on EKB	
		Student Book	**Najwa Limited**
Solving linear equations using the multiplicative inverse of the matrix	• To solve linear equations using the multiplicative inverse of a matrix.	https://d3sk34bfh9epsl.cloudfront.net/mathematics/algebra/g12/english/unit-3-lesson-3.pdf	https://lms.ekb.eg/repository/resource/1e2d750b-275e-46cc-80e8-d51b4d5f9593/en

https://lms.ekb.eg/repository/resource/e9f22c92-9306-4b23-b2e2-fd6f6cbadb62/en |
| | • To specify and solve problems on the order of the parameter matrix and the order of the expanded parameter matrix. | | https://lms.ekb.eg/repository/resource/f3c191d7-ee91-4478-89e6-4c78f936095c/en

https://lms.ekb.eg/repository/resource/fc67738e-b391-4b35-b246-489bd983b55e/en |
| | • To figure out a possible solution to the first-degree equations for several unknowns using the matrices algebraically and find the solution (if found). | | |

Lesson	Learning Outcomes	The digital resources available on EKB	
		Student Book	**Najwa Limited**
Second: Solid Goemetry			
Goemetry and Measurment in Two and Three dimensions.			
the 3D orthogonal coordinate system	• To recognize the three-dimensional orthogonal coordinate system and determine the position or coordinates of a point in space, and specify the distance of a point in space off a coordinate plane. • To find the distance between two points in space, and specify the coordinates of the midpoint of a line segment that connects two points in space. • To find the equation of a sphere in space by using the center coordinates and radius length. • To find the equation of a sphere in space by using the center coordinates and coordinates of a point on the sphere or by using the coordinates of the two ends of a diameter in it. • To specify the sphere center and radius length if the sphere general equation is known. • To solve problems on the equation of a sphere in space.	https://d3sk34bfh9epsl.cloudfront.net/mathematics/solid-geometry/g12/english/unit-1-lesson-1-small.pdf	https://lms.ekb.eg/repository/resource/c64df6c5-87af-4ec7-b4e0-89a010255abc/en https://lms.ekb.eg/repository/resource/a59c7cc2-a0ef-4104-98ab-1932273b0c59/en

Lesson	Learning Outcomes	The digital resources available on EKB	
		Student Book	**Najwa Limited**
Vectors in space			
Center of gravity	• To recognize the position vector in the space, and find the vector norm in space.	https://d3sk34bfh9epsl. cloudfront.net/mathematics/ solid-geometry/g12/english/ unit-1-lesson-2.pdf	https://lms.ekb.eg/repository/ resource/3af843e4-7fd6-4ff0- 9c22-af7fe0d89ae9/en
	• To find the sum of vectors in space, and multiply vectors by a real number.		
	• To recognize and solve problems of equal vectors in space.		https://lms.ekb.eg/repository/ resource/3169cd62-1f3f-4495- b026-c20dcd69ac4e/en
	• To express any vector in space, using the fundamental unit vectors.		
	• To express the vectored straight in space by using the coordinates of its endpoints.		https://lms.ekb.eg/repository/ resource/1c01a6e5-bde9-4b73- 9d9f-435383894e43/en
	• To recognize and find the unit vector in the direction of any known vector in space.		
	• To recognize and determine the direction angles and the cosine of a vector in space.		https://lms.ekb.eg/repository/ resource/9aa6f64c-20f0-4225- b856-66231d582ed1/en
	• To solve non-typical problems on the vectors in space.		

Lesson	Learning Outcomes	The digital resources available on EKB	
		Student Book	**Najwa Limited**
Vector multiplication	• To recognize and solve problems on the dot product of two vectors in plane and in space and its properties.	https://d3sk34bfh9epsl.cloudfront.net/mathematics/solid-geometry/g12/english/unit-1-lesson-3.pdf	https://lms.ekb.eg/repository/resource/13946841-cb84-40ec-8568-3399223724db/en https://lms.ekb.eg/repository/resource/36218b97-c509-4996-b103-839006c19e7b/en
	• To recognize and find the measurement of the angle between two vectors in space.		https://lms.ekb.eg/repository/resource/815827c1-bfb8-4c1e-a84d-3ad303c3f110/en https://lms.ekb.eg/courses/47cd306f-943e-4ebc-ab3e-9241a2762324/units/09bcd159-d946-4d66-a0ee-550fe89ef24e/lessons/84b45f85-5a63-4548-b0fe-895fe7786d62/additional
	• To find the algebraic complex of a vector in the direction of another vector by using the dot product.		https://lms.ekb.eg/repository/resource/11a734d7-188e-4b54-bdf0-e520dcee2e4d/en
	• To recognize and solve problems on the cross product of two vectors in plane and in space and its properties.		https://lms.ekb.eg/repository/resource/6334f5cc-f36e-41cf-951e-590973dcd800/en https://lms.ekb.eg/repository/resource/bfde9e69-a9fd-4b49-b317-4f7d94170bb4/en
	• To recognize the conditions of vector parallelism in space.		https://lms.ekb.eg/repository/resource/7ad4010c-b639-44e0-a7b6-d46ceba2d49b/en
	• To recognize and solve applications on the scalar triple product and its properties, and identify the geometric meaning of the scalar triple product.		https://lms.ekb.eg/repository/resource/8b06d113-7f58-4909-ad52-0c02dd5dbcd4/en

Lesson	Learning Outcomes	The digital resources available on EKB	
		Student Book	**Najwa Limited**
Straight Lines and planes in space			
The equation of a straight line in space	• To recognize and find a straight line direction vector in space.		https://lms.ekb.eg/repository/resource/817b67cb-0c9c-4bb7-b77c-e64f85bdc625/en
	• To recognize and find different forms of the equation of straight line space {vector equation a, parametric equation a, and coordinate equation}.	https://d3sk34bfh9epsl.cloudfront.net/mathematics/solid-geometry/g12/english/unit-2-lesson-1.pdf	https://lms.ekb.eg/repository/resource/da8ec586-2d24-42eb-8b8a-46dcdb2f9540/en
	• To recognize and find the angle between two straight lines in space.		https://lms.ekb.eg/repository/resource/3f382fc7-96fc-4aa9-beee-fc2187578a54/en
	• To recognize and conclude the conditions of two parallel or perpendicular straight lines in space and to solve problems thereon.		https://lms.ekb.eg/repository/resource/70d5727f-866f-4737-a5b3-6aff22f0deeb/en
	• To specify the distance between a point and a straight line in space.		https://lms.ekb.eg/repository/resource/f67211aa-3e73-468d-86d6-60cfc0a7242f/en
	• To solve different applications on the equation of straight line in space.		https://lms.ekb.eg/repository/resource/3f382fc7-96fc-4aa9-beee-fc2187578a54/en

Lesson	Learning Outcomes	The digital resources available on EKB	
		Student Book	**Najwa Limited**
The equation of a plane in space	• To recognize and find different forms of the equation of a plane in space {vector form a, standard form a, and general form}.	https://d3sk34bfh9epsl.cloudfront.net/mathematics/solid-geometry/g12/english/unit-2-lesson-2.pdf	https://lms.ekb.eg/repository/resource/ba38ea27-accd-4c26-b3f4-c8c8c81d8da9/en
	• To recognize and find the angle between two planes in space.		https://lms.ekb.eg/repository/resource/8c8f7888-1064-447b-8fb7-04c7d82fbefd/en
	• To recognize and conclude the conditions of two parallel or perpendicular planes in space and to solve problems thereon.		https://lms.ekb.eg/repository/resource/9016d665-a24c-4784-9862-4f830727eb39/en
	• To find the equation of the intersection line of two planes in space.		
	• To find the distance between a point and a plane in space by using the dot product and by using the coordinate "Cartesian" form.		https://lms.ekb.eg/repository/resource/e5a1336b-465a-4f03-9047-6ade66eead55/en
	• To specify the distance between two parallel planes in space.		https://lms.ekb.eg/repository/resource/334ef449-c428-421b-8c02-568d57f0f2a2/en
	• To find the equation of a plane having the lengths of coordinate axes cross-sections given, and to find the sections intercepted by a plane in the coordinate axes.		https://lms.ekb.eg/repository/resource/c2794eb5-f2fa-41f6-acd2-45ed67025c89/en
	• To solve different applications on the equation of a plane in space.		