



**ZIAUDDIN UNIVERSITY**  
EXAMINATION BOARD

**RESOURCES FOR**  
**“HSC-I MATHEMATICS”**  
**ZUEB EXAMINATIONS 2021**



**PREFACE:**

The ZUEB examination board acknowledges the serious problems encountered by the schools and colleges in smooth execution of the teaching and learning processes due to sudden and prolonged school closures during the covid-19 spread. The board also recognizes the health, psychological and financial issues encountered by students due to the spread of covid-19.

Considering all these problems and issues the ZUEB Board has developed these resources based on the condensed syllabus 2021 to facilitate students in learning the content through quality resource materials.

The schools and students could download these materials from [www.zueb.pk](http://www.zueb.pk) to prepare their students for the high quality and standardized ZUEB examinations 2021.

The materials consist of examination syllabus with specific students learning outcomes per topic, Multiple Choice Questions (MCQs) to assess different thinking levels, Constructed Response Questions (CRQs) with possible answers, Extended Response Questions (ERQs) with possible answers and learning materials.

**ACADEMIC UNIT ZUEB:**



S.#	CRQ	ANSWER	CL	DL
<b>EXERCISE 2.2</b>				
3.	<b>Evaluate:</b> i. $ 5z_1 - 4z_2 _1$ ii. $\frac{z_1}{z_2}$ Where $z_1 = 1 + i$ and $z_2 = 3 - 2i$	i. $\sqrt{218}$ ii. $\frac{1}{13} + \frac{5}{13}t$	K/A	60%
4.	<b>Verify that:</b> i. $(\sqrt{2} - i) + i(\sqrt{2}i - 1) = -2i$ ii. $(1 - i)^4 = -4$ iii. $i^3 = -i$ and $i^4 = 1$ iv. $\frac{1+2i}{3-4i} + \frac{2}{5} = \frac{i-2}{5i}$	<b>VERIFY</b>	K/A	70%

S.#	CRQ	ANSWER	CL	DL
<b>EXERCISE 2.3</b>				
5.	<b>Find the real and imaginary parts of:</b> a. $i(3 + 2i)$ b. $\frac{2-i}{3i}$ c. $\frac{3a+2bi}{a-bi}$ d. $\frac{\sqrt{3}+i}{\sqrt{3}-i}$ e. $(a + 3bi)^4$	a. -2,3 b. $-\frac{1}{3}, \frac{-2}{3}$ c. $\frac{3a^2-2b^2}{a^2+b^2}, \frac{5ab}{a^2+b^2}$ d. $\frac{1}{2}, \frac{\sqrt{3}}{2}$ e. Real part = $a^4 - 54a^2b^2 + 81b^4$ Imaginary part = $12a^3b - 108ab^3$	K/A	40%

S.#	CRQ	ANSWER	CL	DL
<b>EXERCISE 3.3</b>				
6.	<b>Prove that:</b> a. $\left(\frac{-1+\sqrt{3}}{2}\right)^7 + \left(\frac{-1-\sqrt{3}}{2}\right)^7 + 1 = 0$ b. $\omega^{32} + \omega^{37} = -1$ c. $(1 - \omega - \omega^2)^5 = 32$ d. $(2 + \omega^2) = \frac{3}{2 + \omega}$ e. $(1 + \omega^2)^{18} = 1$ f. $(1 + \omega^2)^5 = -\omega^2$ g. $(1 + \omega)^7 = -\omega^2$ h. $(7 + \omega)(7 + \omega^2) = 43$	<b>PROOF</b>	K/A	50%

S.#	CRQ	ANSWER	CL	DL
<b>EXERCISE 3.4</b>				
7.	<b>Solve the following equation:</b> i. $\sqrt{\frac{t+16}{t}} + \sqrt{\frac{t+16}{t}} = 2\frac{1}{12}$	$\left\{-\frac{256}{7}, \frac{144}{7}\right\}$	K/A	60%

S#	CRQ	ANSWER	CL	DL
<b>EXERCISE 3.5</b>				
8	Determine the value of K in each of the following equation that will make the roots equal. a. $x^2 - 2x(1 + 3k) + 7(3 + 2k) = 0$ b. $9y^2 + ky + 16 = 0$ c. $(k + 1)x^2 + 2(k + 3)x + (2k + 3) = 0$ Provided $k \neq -1$ .	a. $2, \frac{-10}{9}$ b. $\pm 24$ c. $-2, 3$	K/A	70%
9	Show that the roots of: $(x - p)(x - q) + (x - q)(x - r)$ $+ (x - r)(x - p) = 0$ And real and they cannot be equal unless $p=q=r$	PROOF	K/A	40%

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<b>EXERCISE 3.6</b>				
10.	If $\alpha, \beta$ are the roots of $ax^2 + bx + c = 0, a \neq 0$ find the value of: a. $\alpha - \beta$ b. $\frac{1}{\alpha^2} - \frac{1}{\beta^2}$ c. $\frac{\alpha}{\beta} - \frac{\beta}{\alpha}$ d. $\alpha^4 - \beta^4$	a. $\frac{\sqrt{b^2 - 4ca}}{a}$ b. $\frac{-b}{ca} \sqrt{b^2 - 4ac}$ c. $\frac{b}{c^2} \sqrt{b^2 - 4ac}$ d. $-\frac{b}{a^4} (b^2 - 2ca) \sqrt{b^2 - 4ac}$	K/A	50%

S#	CRQ	ANSWER	CL	DL
<b>EXERCISE 3.8</b>				
11.	Solve the following system of equation: a. $2x^2 + xy - 2 = 0$ $x^2 + t^2 = 34$	$\{(\pm 1, 0), (2, -3), (-2, 3)\}$	K/A	60%

S#	CRQ	ANSWER	CL	DL
<b>EXERCISE 6.1</b>				
12.	Find the nth term (rule of formation) of each of the following sequences. a. 2, 4, 6, ... b. $1^2, 3^2, 5^2, \dots$ c. 3, 9, 27, ... d. 2, 8, 26, ... e. $1 \cdot 2^2, 2 \cdot 3^2, 3 \cdot 4^2, \dots$ f. 2, 5, 10, ... g. $1^3, 5^3, 9^3, \dots$ h. 7.1, 9.4, 11.7, ... i. $0, \frac{1}{3}, \frac{2}{4}, \dots$ j. $\frac{1}{9}, \frac{1}{7}, \frac{1}{5}, \dots$ k. $(a + x)^2, (a^2 + x^2), (a - x)^2, \dots$	a. $2n$ b. $(2n - 1)^2$ c. $3^n$ d. $3^n - 1$ e. $N(n + 1)^2$ f. $n^2 + 1$ g. $(4n - 3)^3$ h. $7.1 + (n - 1)(2.3)$ i. $\frac{n - 1}{n + 2}$ j. $\frac{1}{11 - 2n}$ k. $a^2 + x^2 + 2ax(2 - n)$	K/A	70%

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<b>EXERCISE 6.4</b>				
13.	Which term of the sequence a. 18, 12, 8, ... is $\frac{512}{729}$ b. $\frac{1}{4}, -\frac{1}{2}, 1, \dots$ is - 128?	a. 9 <sup>th</sup> b. 10 <sup>th</sup>	K/A	40%

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<b>EXERCISE 6.5</b>				
14.	In the following questions three of the five elements a, l, r, n, S <sub>n</sub> of a G.P are given. Find the missing elements i. $a = 12, r = \frac{1}{2}, n = 7$ ii. $a = \frac{27}{4}, r = \frac{2}{3}, l = \frac{8}{9}$ iii. $a = \frac{1}{2}, n = 10, l = \frac{1}{1024}$ iv. $a = 3, n = 3, S_n = 63$ v. $a = \sqrt{3}, r = \sqrt{3}, S_n = 39 + 13\sqrt{3}$ vi. $r = \frac{1}{3}, n = 5, S_n = \frac{4}{9}$ vii. $l = 486, r = 3, S_n = 728$	i. $l = \frac{3}{16}; S_7 = \frac{381}{16}$ ii. $n = 6; S_6 = \frac{665}{36}$ iii. $r = \frac{1}{2}; S_{10} = \frac{1023}{1024}$ iv. $r = 4, l = 48$ or $r = -5, l = 75$ v. $n=6 \quad l=27$ vi. $a = \frac{36}{121}; l = \frac{4}{1089}$ vii. $a = 2; n = 6$	K/A	50%

S#	CRQ	ANSWER	CL	DL
<b>EXERCISE 6.8</b>				
15.	Which term of the H.P. $6, 2\frac{6}{5}, \dots$ is equal to $\frac{2}{33}$ ?	50 <sup>th</sup>	K/A	60%

S#	CRQ	ANSWER	CL	DL
<b>EXERCISE 7.1</b>				
16.	Compute the following: (i) 9! (ii) $6! - 6^2$ (iii) $\frac{8!}{48 - (5!)}$ (iv) $\frac{(39)!}{(38)!}$ (v) $\frac{(\eta+1)!}{(\eta-1)!}$	i. 362880 ii. 684 iii. 7 iv. 39 v. n(n+1)	K/A	70%

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<b>EXERCISE 7.2</b>				
17.	Find the value of: (i) ${}^{40}P_4$ (ii) ${}^{20}P_5$ (iii) ${}^8P_2$ (iv) $\binom{5}{3, 2}$ (v) $\binom{6}{2, 3, 1}$ (vi) $\binom{200}{2, 198}$	i. 2193360 ii. 1860480 iii. 56 iv. 10 v. 60 vi. 19900	K/A	60%

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<b>EXERCISE 7.3</b>				
18.	Find n and r, if i. ${}^n P_r = 240$ and ${}^n C_r = 120$ ii. ${}^n P_r = {}^n P_{r+1}$ and ${}^n C_r = n {}^n C_{r-1}$	i. $n=16, r=2$ ii. $n=2, r=1$	K/A	50%

S#	CRQ	ANSWER	CL	DL
<b>EXERCISE 8.3</b>				
19.	Evaluate: (i). $(1+2\sqrt{x^5}) + (1-2\sqrt{x^5})$ (ii). $(2-\sqrt{1-x^7}) + (2+\sqrt{1-x^7})$ (iii). $(3+\sqrt{2^4}) - (3-\sqrt{2^4})$ (iv). $(2+3!)^8 + (2-3!)^8$ (v). $(a\sqrt{a^2} - 1)^6 + (a\sqrt{a^2} + 1)^6$	-	K/A	40%
20.	Find the two middle terms of: (i). $(x + \frac{1}{x^2})^{15}$ (ii). $(x - \frac{2}{x})^{10}$ (iii). $(\sqrt{x} + \frac{2}{x^2})^{10}$ (iv). $(\frac{4x^2}{3} - \frac{3}{2x})^9$	-	K/A	70%

S#	CRQ	ANSWER	CL	DL
<b>EXERCISE 9.1</b>				
22.	How far does a boy on a bicycle travel in 10 revolutions if the diameter of the wheels of his bicycle each equals to 56cm?	17.6meters (approx.)	K/A	50%

S#	CRQ	ANSWER	CL	DL
<b>EXERCISE 9.3</b>				
23.	Evaluate: I. $\frac{\tan \frac{\pi}{4} - \tan \frac{\pi}{6}}{1 + \tan \frac{\pi}{4} \tan \frac{\pi}{6}}$	$\frac{\sqrt{3}-1}{\sqrt{3}+1}$	K/A	40%

S#	CRQ	ANSWER	CL	DL
<b>EXERCISE 10.2</b>				
24.	Without using tables, find the value of (i) $\cos 15^\circ$ (ii) $\sin \frac{13\pi}{12}$ (iii) $\tan 375^\circ$	1. $\frac{1+\sqrt{3}}{2\sqrt{2}}$ 2. $\frac{1-\sqrt{3}}{2\sqrt{2}}$ 3. $\frac{\sqrt{3}-1}{\sqrt{3}+1}$	K/A	50%

S#	CRQ	ANSWER	CL	DL
<b>EXERCISE 10.3</b>				
25.	$\frac{\sin 2\theta}{1-\cos 2\theta} = \cot \theta$	PROOF	K/A	50%

S#	CRQ	ANSWER	CL	DL
<b>EXERCISE 12.2</b>				
26.	Solve the following triangles i. a=100cm, b=125cm, c=80cm. ii. $\alpha=25^\circ$ , a=40cm, b=20cm. iii. $\alpha=29^\circ$ , $\beta=60^\circ$ , c=39cm. iv. $\beta=55^\circ$ , c=58cm, a=70cm. v. $\beta=78^\circ$ , $\gamma=58^\circ$ , a=317cm.	i. $\alpha = 53^\circ 02'26''$ , $\beta = 87^\circ 13'25''$ , $\gamma = 39^\circ 44'09''$ ii. $\beta = 12.20^\circ$ , $\gamma = 142.80^\circ$ , $c = 57.22cm$ iii. $\gamma = 71^\circ$ , $a = 31.13 cm$ , $b = 35.72cm$ iv. $b=60.05 cm$ , $\alpha = 72.74^\circ$ , $\gamma = 52.26^\circ$ v. $\alpha = 44^\circ$ , $b = 446.37cm$ , $c = 387cm$	K/A	60%
27.	If the length of larger side of a parallelogram is 55cm and one diagonal of the parallelogram makes angles of measure $30^\circ$ and $50^\circ$ with a pair of adjacent sides, find the length of the diagonal.	70.7 cm (approx.)	K/A	70%

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<b>EXERCISE 12.3</b>				
28.	Find the measure of the largest angle in triangle ABC with sides a=5cm, b=10cm and c=14cm.	The measure of the largest angle is $135.2349^\circ$	K/A	40%

S#	CRQ	ANSWER	CL	DL
<b>EXERCISE 12.4</b>				
29.	Find the area of triangle ABC, when: $a=\sqrt{13}cm$ , $b= \sqrt{17}cm$ , $c=\sqrt{26}cm$	7.3655 sq.cm	K/A	50%

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<b>EXERCISE 13.2</b>				
30.	Solve: i. $\tan^2\theta + \tan \theta = 2$ ii. $\cos\theta - 2 \sin\theta = 0$	i. $\left\{n\pi + \frac{\pi}{4}\right\} \cup \left\{n\pi + \tan^{-1}(-2)\right\}, n \in Z$ ii. $\left\{n\pi + \tan^{-1}\frac{1}{2}\right\}, n \in Z$	K/A	60%