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ФИО: Стегний Кирилл Владимирович
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Federal State Budget Educational Institution
of Higher Education
Pacific State Medical University
of the Ministry of Health of the Russian Federation

APPROVED BY
Director of the Institute of
Fundamentals and Information
Technologies in Medicine
_____ / Bagryantsev V.N./
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COLLECTION OF ASSESSMENT TOOLS
Б1.О.05 Mathematics in dentistry
of the basic educational program
of Higher Education

Specialty	**31.05.03 Dentistry** **for international students (in English)** (code, name)
Degree	Specialist's degree
Profile	02 "Healthcare" (in the field of providing health care in patients with dental pathology)
Mode of study	**Full-time**
Period of mastering the BEP	**5 years** (nominal length of study)
Institute	of Fundamentals and Information Technologies in Medicine

Vladivostok, 2025

1. INTRODUCTION

1.1. **Collection of Assessment Tools** is a document that regulates the format, content, and types of assessment tools for continuous assessment, interim examination and final (state final) examination, and graded criteria for each type of assessment tools.

1.2. Assessment tools allows to evaluate the development of universal, general professional, and professional competencies (UCs, GPCs and PCs respectively) outlined in Federal State Educational Standard of Higher Education and defined in the basic educational program of higher education for the specialty 31.05.03 Dentistry for international students (in English), profile 02 "Healthcare" (in the field of providing health care in patients with dental pathology).

(BEP HE for the 31.05.03 Dentistry for international students (in English) specialty, section 3.2.3 General professional competencies of graduates and indicators of achieving them)

2. DOCUMENT BODY

2.1. Types of Assessment, Formats of Assessment Tools

No.	**Types of assessment**	**Assessment Tools Format**
1	**Continuous assessment**	**Tests**
		Practice problems
2	**Interim assessment**	**Tests**
		Checklists

3. The contents of assessment tools for continuous and interim examination are prepared by the teacher of the course

Tests for continuous assessment

	Code	**Competence description / name of labor function / name of work activity / text**
S	31.05.03	Dentistry for international students (in English)
C	GPC-8	Is able to use basic concepts and methods of physics, chemistry, mathematics and natural sciences when working to achieve objectives of professional activities
C	GPC-13	Is able to achieve objectives of professional activity using information and bibliographic resources, biomedical terminology, as well as information and communication technologies, while observing basic information security procedures
F	A/06.7	Management, administrative work
I		**ANSWER TEST QUESTIONS**
		1. Coordinates of the vector produced by subtraction Vector 2 · (2; -1; 3) - Vector 3· (1; 4; -5) are a) (4; 2; -5) +b) (1; -14; 21) c) (2; -3; -1) d) (1; -4; -9) 2. Cross product of vectors (3; -1; 2) and (-2; 5; 3) is +a) (-13; -1**3; 13)** b) (-6; 5; 6)

		c) -6 d) (7; -5; 16) 3. The angle between the vector $\bar{a} = (-2; 4; 1)$ and Z-axis is a) $\gamma = 0$ b) $\gamma = \pi/2$ +c) $0 < \gamma < \pi/2$ d) $\pi/2 < \gamma < \pi$ 4. If *A*(-2; 5; -2), *B*(4; -3; 2), *C*(-4; 5; 2), then the median of the ABC triangle equals: _____. 5. Square of the length of vector $\bar{a} = -5\bar{i} + 3\bar{k}$ equals: _____. 6. Slope ratio of the 3x+2y+5=0 line is a) $\frac{3}{2}$ +b) $-\frac{3}{2}$ c) 3 d) -3 7. Area of the triangle bounded by the line 5x-2y+20=0, X-axis, and Y-axis is a) 40 +b) 20 c) 10 d) 5 8. Equation of line that passes through M (2,-1) point and has a *y*-intercept of b=5 is a) 2*x*-*y*+5=0 b) *x*-3*y*-5=0 +c) 3*x*+*y*-5=0 d) 3*x*-*y*+5=0 9. Among the lines 1) 3*x*-*y*-1=0, 2) *x*-3*y*+5=0, 3) 5*x*+*y*-2=0, 4) 6*x*+2*y*-1=0, _____ are parallel a) 1) and 2) +b) 1) and 3) c) 2) and 4) d) 3) and 4) 10. Among the lines 1) 3*x*-*y*-1=0, 2) *x*-3*y*+5=0, 3) 5*x*+*y*-2=0, 4) 6*x*+2*y*-1=0, _____ are perpendicular a) 1) and 2) b) 2) and 3) c) 1) and 4) +d) 2) and 4)

Assessment criteria

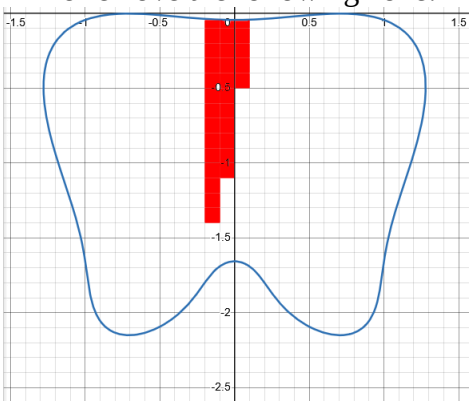
"Pass" – over 75% correct answers

"Fail" – 74 and less % correct answers

Standardized practice problems and checklists for the **Б1.О.05 Mathematics in dentistry** course

Practice problem No.1

	Code	**Competence description / name of labor function / name of work activity / text**
S	31.05.03	Dentistry for international students (in English)
C	GPC-8	Is able to use basic concepts and methods of physics, chemistry, mathematics and natural sciences when working to achieve objectives of professional activities
C	GPC-13	Is able to achieve objectives of professional activity using information and bibliographic resources, biomedical terminology, as well as information and communication technologies, while observing basic information security procedures
F	A/06.7	Management, administrative work
I		1. Given vectors $\vec{a} = (-3; 4; -1)$, $\vec{b} = (-1; 2; 3)$, $\vec{c} = (-4; -2; 1)$, find $4\vec{a} + 3\vec{b} - 2\vec{c}$, $-5\vec{a} + 4\vec{b} + \vec{c}$. 2. Find the scalar multiplication for vectors a and b if $a = (2, -2, 4)$, $\|b\| = 3$ and the angle between them is $\alpha = \pi/4$ 3. Are the following three vectors coplanar? a = {1; 2; 3}, b = {1; 1; 1}, c = {1; 2; 1}. 4. Given vectors a = {3 ,4}, b = {-1, 2}, c = {5, -2}, find and draw vector d = 2a + 3b – 5c. 5. Find the directional cosines of the following vectors $\vec{a}(-1; 3)$, $\vec{b} = 2\vec{\imath} - 3\vec{k}$, 6. From the given points $M_1(3, 2, -1)$, $M_2(-1, -3, 2)$ and vector $\vec{a}\{2, 2, 5\}$ find the projection of $\vec{a}$ into $\overrightarrow{M_1M_2}$: ($\text{Prj}_a \overrightarrow{M_1M_2}$) 7. Find the value $\boldsymbol{\alpha}$, for which vector: $\vec{v} = \begin{pmatrix} 2 \\ 3 \\ \boldsymbol{\alpha} \end{pmatrix}$ has half the length of vector $\vec{b} = \begin{pmatrix} 5 \\ 0 \\ -3 \end{pmatrix}$ ($\|\vec{v}\| = \frac{1}{2}\|\vec{b}\|$): 8. Find the module (length) of the following vectors: $\vec{a} = 2\vec{\imath} - \vec{\jmath} + 3\vec{k} + \frac{\vec{\imath} - 2\vec{\jmath} + 4\vec{k}}{2}$ $\vec{b} = 3\vec{\imath} + 4\vec{\jmath} - 2\vec{k} + \frac{3\vec{\imath} - 6\vec{\jmath} + 9\vec{k}}{3}$ $\vec{c} = 8\vec{\imath} + \overrightarrow{2\jmath} + 7\vec{k} + \frac{3\vec{\imath} + 8\vec{\jmath} - 6\vec{k}}{2}$ 9. An automatic drill starting at position (x, y) = (0, 0), can receive one of the following commands each time frame (tick): **Move(x,y)**: moves the drill relative from the current position to the vector **(x,y)** final coordinates (if not

		obstructed); **Rest()**: it rests for one time frame; **Drill(x,y)**: will move and drill-out material from current position to the vector**, it can remove 6 squares of material either vertically or horizontally (if not obstructed) after which the command cannot be used for a time frame needing a Rest()**; Define a list of commands to remove the affected zone of the tooth with the minimum number of rests possible To remove the following zone: 

4. Assessment criteria for learning outcomes

"Pass" is given to a student who has shown a sufficiently strong knowledge of the basic concepts of the subject; is able to complete specific practical tasks outlined in the program with no outside help, use recommended reference material, and correctly evaluate the results.

"Fail" is given to a student who has significant gaps in knowledge of the basic concepts of the subject, is not able reach the correct solution to a specific practical task outlined in the curriculum even with outside help.

Appendix 1

Practical Skills Assessment Checklist

Practical Skill Name: Determination of the type of equation of a line at given vertices of a triangle

C	GPC-8	Is able to use basic concepts and methods of physics, chemistry, mathematics and natural sciences when working to achieve objectives of professional activities		
C	GPC-13	Is able to achieve objectives of professional activity using information and bibliographic resources, biomedical terminology, as well as information and communication technologies, while observing basic information security procedures		
F	A/06.7	Management, administrative work		
WA	Work activities as part of the function: medical aid quality control (assessment)			
	Action		Performed	Not Performed
1.	Finding the equation of a triangle's median		2 points	-2 points
2.	Finding the equation of the height of a triangle		2 points	-2 points
3.	Finding the distance between the point and the line		1 point	-1 point
	Total		5 points	

Final grade:

"Pass" - at least 75% of required actions performed
"Fail" - 74% of required actions or less performed