

# Unit 7: Python Functions and Function Calls

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**Department of Curriculum and Instruction**

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**Belleville Public Schools**

**Curriculum Guide**

Introduction to Computer Science through Game  
Design and Development

Unit 7 Python Functions and Function Calls, Grades 9-  
12

**Belleville Board of Education**

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Board Approved:

## **Unit Overview**

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- In this unit, students will construct functions, and call them with the proper arguments.
- Students must make sure that functions have "def" more their name.
- Indentation is key when building functions, because it determines which statements are part of the function.
- They must make sure that the beginning of each statement has the same horizontal coordinate.
- Students will see the functions work by making function calls.
- Function calls consist of the function name and necessary arguments.
- Sometimes, students will need to make function calls inside of other functions.

## **Enduring Understanding**

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- Functions are blocks of code that can be reused, and the word "def" precedes the function name in its definition.
- For a function to work properly, it must be called with the same number of arguments as its definition.
- All of the statements inside of a function must be indented, relative to the "def".
- The statements inside of a function must all begin with the horizontal coordinate, given that there are no loops or conditionals.

- In order to execute a function, it must be called with the proper arguments within the program.
- It is possible to make function calls inside of other functions.
- After the called function is executed, the remaining code from the original function executes.
- Functions end with the word "return" and they usually return a value, often a value based on operations in the function.

## Essential Questions

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- How do I define a function?
- Will the function run once it is defined?
- A function was just added to the program; Why is there an error message about indentation?
- How do you get a function to run after defining it?
- Will an error occur if a function is called inside of another function?
- After a function is called inside of another function, will the code after the function call run?
- What word do functions end with? What happens if it is omitted?

## Exit Skills

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After Unit 7, the student should be able to:

- Write a definition of a function, including necessary parameters.
- Each line of code inside of the function must be indented to the same horizontal coordinate.
- Write function calls, including the appropriate arguments.
- Determine the output of a small program if one function is placed inside of another.

## New Jersey Student Learning Standards (NJSLS-S)

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CS.9-12.8.1.12.AP.1	Design algorithms to solve computational problems using a combination of original and existing algorithms.
CS.9-12.8.1.12.AP.4	Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue.
CS.9-12.8.1.12.AP.5	Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.
CS.9-12.8.1.12.CS.4	Develop guidelines that convey systematic troubleshooting strategies that others can use

to identify and fix errors.

- CS.9-12.8.1.12.DA.1 Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
- CS.9-12.8.2.12.EC.3 Synthesize data, analyze trends, and draw conclusions regarding the effect of a technology on the individual, culture, society, and environment and share this information with the appropriate audience.
- CS.9-12.8.2.12.ED.1 Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.
- CS.9-12.8.2.12.ED.4 Design a product or system that addresses a global problem and document decisions made based on research, constraints, trade-offs, and aesthetic and ethical considerations and share this information with an appropriate audience.

## Learning Objectives

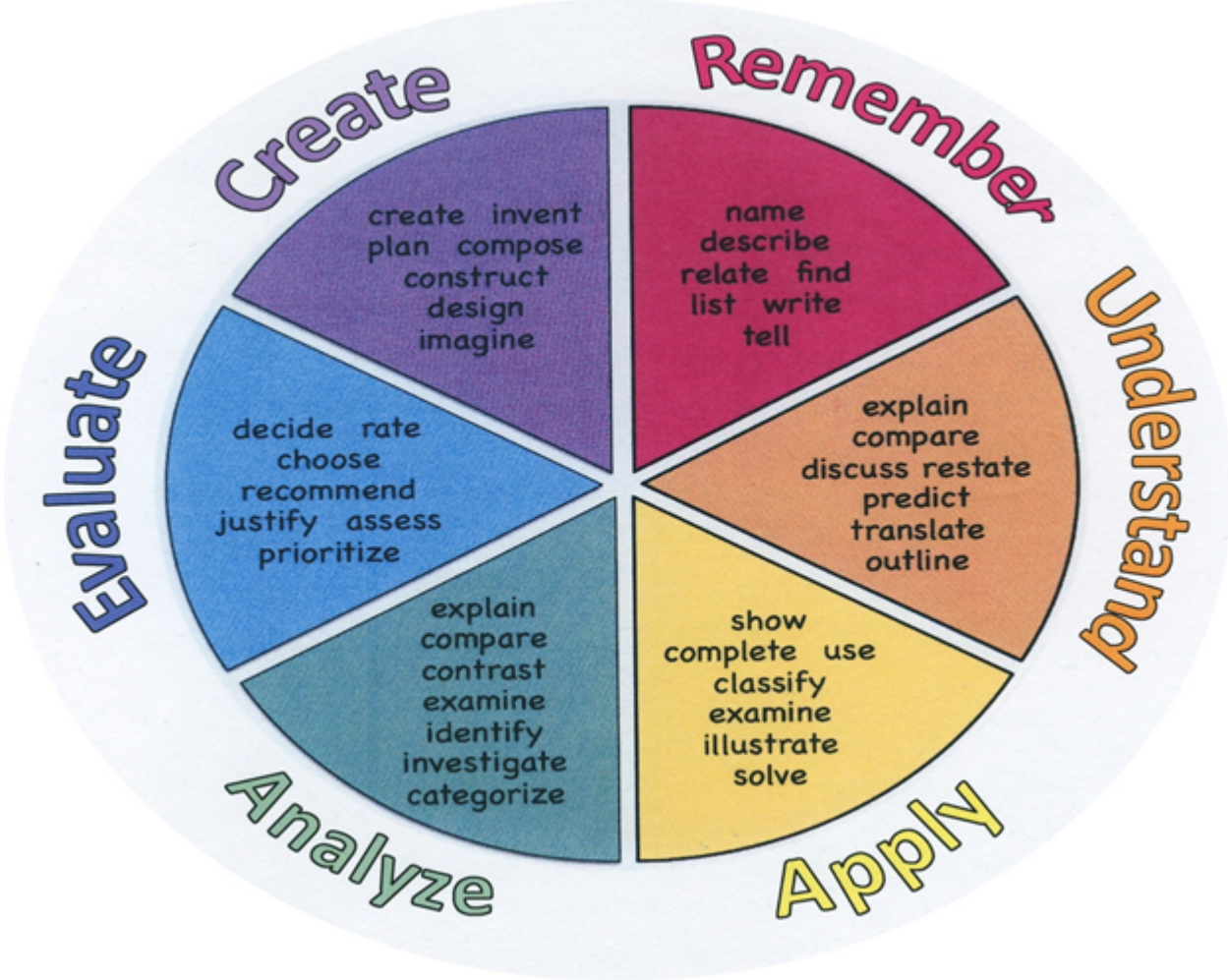
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- Generate a simple function with the appropriate parameters.
- Assess the function to determine the cause of a bug.
- Integrate function calls into animations/games/applications.
- Determine the output of a simple program with function calls.
- Devise a function that will print information about the Asian/Pacific Islander Heritage Month.
- Construct a function that will print what dangerous compound is polluting the air.

**Action Verbs:** Below are examples of action verbs associated with each level of the Revised Bloom's Taxonomy.

Remember	Understand	Apply	Analyze	Evaluate	Create
Choose	Classify	Choose	Categorize	Appraise	Combine
Describe	Defend	Dramatize	Classify	Judge	Compose
Define	Demonstrate	Explain	Compare	Criticize	Construct
Label	Distinguish	Generalize	Differentiate	Defend	Design
List	Explain	Judge	Distinguish	Compare	Develop
Locate	Express	Organize	Identify	Assess	Formulate
Match	Extend	Paint	Infer	Conclude	Hypothesize
Memorize	Give Examples	Prepare	Point out	Contrast	Invent
Name	Illustrate	Produce	Select	Critique	Make
Omit	Indicate	Select	Subdivide	Determine	Originate
Recite	Interrelate	Show	Survey	Grade	Organize
Select	Interpret	Sketch	Arrange	Justify	Plan
State	Infer	Solve	Breakdown	Measure	Produce
Count	Match	Use	Combine	Rank	Role Play
Draw	Paraphrase	Add	Detect	Rate	Drive
Outline	Represent	Calculate	Diagram	Support	Devise
Point	Restate	Change	Discriminate	Test	Generate
Quote	Rewrite	Classify	Illustrate		Integrate
Recall	Select	Complete	Outline		Prescribe
Recognize	Show	Compute	Point out		Propose
Repeat	Summarize	Discover	Separate		Reconstruct
Reproduce	Tell	Divide			Revise
	Translate	Examine			Rewrite
	Associate	Graph			Transform
	Compute	Interpolate			
	Convert	Manipulate			
	Discuss	Modify			
	Estimate	Operate			

	Extrapolate Generalize Predict	Subtract			
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## Suggested Activities & Best Practices

### Best Practices:

- Encourage students to test their code and find the bugs.
- Repetition and review of concepts.
- Immediate feedback for assignments.
- Step by step visual instructions to make programs with functions.
- The use of EduBlocks, where blocks appear in one panel, but the Python code appears in the other panel.
- Show model code for students to refer to.
- Provide example output for students to compare their results.
- Google Classroom and Schoology organized around units of study.
- Short slideshow presentations for content, with questioning built into them.

## Exemplars:

- Have examples of Python functions available for students to use as a model.
- Use questioning activities about Python functions where students get feedback after submission (Edulastic, Google Forms, quizizz.com).
- Use slideshow notes for instructions to use Python, with illustrations of the blocks in English and Spanish.
- Have students continue to apply previous Python programming concepts when designing programs with functions.

## Assessment Evidence - Checking for Understanding (CFU)

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- edulastic.com - for practice exercises and assessment (Formative and Summative)
- whiteboard.fi/ - to present notes and questions (Formative)
- Jamboard - for group work (Formative)
- Google Forms - for Do Nows, Exit Tickets and Assessment activities (Formative)
- Coding Rooms - for practice programs and projects (Formative)
- EduBlocks - for block-based python programming on one side and python code on the other (Formative/Summative)

### Performance Task Example (Alternate):

Go through websites on Asian/Pacific Islander Heritage month.

Make a brief program with Python functions with the facts that were found.

You may choose any article or video that was not listed in the suggested articles/websites.

- Google Slides - for Notes and Drag and Drop activities (Formative)
  - Google Classroom - for open-ended questions (Formative)
  - quizizz.com - for content practice in a game format (Alternate)
  - oncourse.com - for benchmarks (if applicable) (Summative/Benchmark)
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- Admit Tickets
  - Common Benchmarks
  - Compare & Contrast
  - Create a Multimedia Poster
  - Define
  - Describe
  - Evaluate
  - Evaluation rubrics
  - Exit Tickets
  - Explaining
  - Illustration
  - Learning Center Activities
  - Outline
  - Quizzes
  - Self- assessments

- Study Guide
- Surveys
- Teacher Observation Checklist
- Think, Pair, Share
- Think, Write, Pair, Share
- Unit review/Test prep
- Unit tests
- Web-Based Assessments
- Written Reports

## Primary Resources & Materials

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- Creative Coding in Python
- Coding for Kids Python
- Coding Games in Python
- <https://edublocks.org/>

## Ancillary Resources

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Climate Change:

- <https://climate.nasa.gov/>
- <https://www.epa.gov/climate-change>
- <https://education.nationalgeographic.org/resource/climate-change>
- <https://www.noaa.gov/stories/ipcc-climate-change-2022-impacts-report-why-it-matters>

Coding:

- <https://www.codingrooms.com/>
- <https://trinket.io/python>
- <https://realpython.com/beginners-guide-python-turtle/>
- <https://blockly.games/>
- <https://www.youtube.com/c/TechWithTim/search?query=turtle> (Tech with Tim Python Turtle Graphics Tutorials)
- <https://hourofpython.com/a-visual-introduction-to-python/index.html>
- <https://studio.code.org/s/csp4-2021/lessons/5/levels/1> (variables, conditionals, and loops)

- <https://little-dot.toxicode.fr/?hour-of-code>

## **Technology Infusion**

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- use of the internet - for Python websites and articles about Asian American/Pacific Islander Heritage Month
- edulastic.com - for practice exercises and assessment
- whiteboard.fi/ - to present notes and questions
- Jamboard - for group work
- Google Forms - for Do Nows, Exit Tickets and Assessment activities
- Google Slides - for Notes and Drag and Drop activities (Formative)
- Google Classroom - for open-ended questions (Formative)
- quizizz.com - for content practice in a game format (Alternate)
- edublocks.org - for programs and games (Formative/Summative)
- trinket.io/python - for programs (Formative)
- <https://www.codingrooms.com/> (Formative)
- oncourse.com - for benchmarks (if applicable) (Summative/Benchmark)



## Alignment to 21st Century Skills & Technology

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- English Language Arts;
- Mathematics;
- Social Studies, including American History, World History, Geography, Government and Civics, and Economics;
- World languages;
- Technology;
- Visual and Performing Arts.

WRK.9.2.12.CAP.2	Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.
WRK.9.2.12.CAP.6	Identify transferable skills in career choices and design alternative career plans based on those skills.
TECH.9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
TECH.9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).

## 21st Century Skills/Interdisciplinary Themes

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Exemplars:

- Students research topics by using videos and articles.
- Students communicate about Asian American/Pacific Islander Heritage Month.

- Communication and Collaboration
- Creativity and Innovation
- Critical thinking and Problem Solving
- ICT (Information, Communications and Technology) Literacy
- Information Literacy
- Life and Career Skills
- Media Literacy

## 21st Century Skills

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Exemplars:

- Students learn about the Asian American/Pacific Islander heritage.

- Students understand the role of a function in making business applications.
- Financial, Economic, Business and Entrepreneurial Literacy
- Global Awareness

## Differentiation

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### Differentiations:

- Small group instruction
- Small group assignments
- Extra time to complete assignments
- Pairing oral instruction with visuals
- Repeat directions
- Use manipulatives
- Center-based instruction
- Study guides
- Teacher reads assessments allowed
- Scheduled breaks
- Rephrase written directions
- Multisensory approaches
- Additional time
- Preview vocabulary
- Preview content & concepts
- Behavior management plan
- Highlight text
- Student(s) work with assigned partner
- Visual presentation
- Assistive technology
- Small group setting

### Hi-Prep Differentiations:

- Alternative formative and summative assessments
- Games and tournaments
- Group investigations
- Guided Reading
- Independent research and projects
- Learning contracts
- Leveled rubrics
- Multiple intelligence options
- Multiple texts
- Personal agendas
- Project-based learning
- Problem-based learning
- Stations/centers
- Tiered activities/assignments
- Tiered products
- Varying organizers for instructions

### Lo-Prep Differentiations

- Choice of books or activities
- Exploration by interest
- Flexible grouping
- Goal setting with students
- Mini workshops to re-teach or extend skills
- Open-ended activities
- Think-Pair-Share
- Reading buddies
- Varied supplemental materials

## **Special Education Learning (IEP's & 504's)**

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### Exemplars:

- Allow multiple-choice assignments, written assignments, and quizzes to be submitted late.
- Convert articles to PDF and highlight important ideas for students.
- Give students handouts with the block code for difficult programs.
- Give students the opportunity to unscramble computer commands instead of generating their own.

- printed copy of board work/notes provided
- additional time for skill mastery
- assistive technology
- behavior management plan
- Center-Based Instruction
- check work frequently for understanding
- computer or electronic device utilizes
- extended time on tests/ quizzes
- have student repeat directions to check for understanding
- highlighted text visual presentation
- modified assignment format
- modified test content
- modified test length
- multi-sensory presentation
- multiple test sessions
- preferential seating
- preview of content, concepts, and vocabulary
- Provide modifications as dictated in the student's IEP/504 plan
- reduced/shortened reading assignments
- Reduced/shortened written assignments
- secure attention before giving instruction/directions
- shortened assignments

- student working with an assigned partner
- teacher initiated weekly assignment sheet
- Use open book, study guides, test prototypes

## **English Language Learning (ELL)**

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Exemplars:

- Have all notes, activity directions, and assessment items translated into Spanish.
  - Place students next to Spanish-speaking peers.
  - Make visual instructions.
  - Have individual interaction with students to make sure that they understand the content and expectations.
  - Allow students to use the drop-down menu to choose their native language on software, when applicable.
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- teaching key aspects of a topic. Eliminate nonessential information
  - using videos, illustrations, pictures, and drawings to explain or clarify
  - allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning;
  - allowing students to correct errors (looking for understanding)
  - allowing the use of note cards or open-book during testing
  - decreasing the amount of work presented or required
  - having peers take notes or providing a copy of the teacher's notes
  - modifying tests to reflect selected objectives
  - providing study guides
  - reducing or omitting lengthy outside reading assignments
  - reducing the number of answer choices on a multiple choice test
  - tutoring by peers
  - using computer word processing spell check and grammar check features
  - using true/false, matching, or fill in the blank tests in lieu of essay tests

## **At Risk**

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Exemplars:

- Minimize the amount of reading that needs to be done.
- Minimize the amount of information that students need to write/type.
- Make visual instructions with the blocks needed for the complex programs.
- When asking questions, give students possible answers to choose from.
- Give students the opportunity to unscramble commands instead of having to generate them by themselves.

- allowing students to correct errors (looking for understanding)
- teaching key aspects of a topic. Eliminate nonessential information
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning
- allowing students to select from given choices
- allowing the use of note cards or open-book during testing
- collaborating (general education teacher and specialist) to modify vocabulary, omit or modify items to reflect objectives for the student, eliminate sections of the test, and determine how the grade will be determined prior to giving the test.
- decreasing the amount of work presented or required
- having peers take notes or providing a copy of the teacher's notes
- marking students' correct and acceptable work, not the mistakes
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using authentic assessments with real-life problem-solving
- using true/false, matching, or fill in the blank tests in lieu of essay tests
- using videos, illustrations, pictures, and drawings to explain or clarify

## **Talented and Gifted Learning (T&G)**

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### Exemplars:

- Have students do further research on Asian American/Pacific Heritage Month.
  - Allow students to make their own applications beyond the classroom assignments.
  - Let students see their Python program with blocks converted to actual Python code.
  - Encourage students to try typing their own Python code.
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- Above grade level placement option for qualified students
  - Advanced problem-solving
  - Allow students to work at a faster pace
  - Cluster grouping
  - Complete activities aligned with above grade level text using Benchmark results
  - Create a plan to solve an issue presented in the class or in a text
  - Debate issues with research to support arguments
  - Flexible skill grouping within a class or across grade level for rigor
  - Higher order, critical & creative thinking skills, and discovery
  - Multi-disciplinary unit and/or project

- Teacher-selected instructional strategies that are focused to provide challenge, engagement, and growth opportunities
- Utilize exploratory connections to higher-grade concepts
- Utilize project-based learning for greater depth of knowledge

## Sample Lesson

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**Unit Name:** Asian American/Pacific Islander Heritage Month and Functions

**NJSLS:**

**Interdisciplinary Connection:** Social Studies Connection - Students learn about Asian American/Pacific Islander heritages.

**Statement of Objective:** The student should be able to:

- Learn what countries Pacific Islander encompasses.
- State facts about Asian Americans/Pacific Islander Heritage Month.
- Incorporate the facts into a program that uses functions.

**Anticipatory Set/Do Now:** Ask students if they know what countries are considered Pacific Islander.

**Learning Activity:** Do Now.

Have students read articles/watch videos about Asian American/Pacific Islander Heritage Month.

Students participate in a whole-class discussion.

Students design a program about Asian Americans/Pacific Islanders that uses functions.

**Student Assessment/CFU's:** questioning, observation

**Materials:** computer/Chromebook, articles about Asian American/Pacific Islander Heritage Month

**21st Century Themes and Skills:** communication, critical thinking, information literacy

**Differentiation/Modifications:** peer tutoring, provide additional code for students who need it, have articles/code blocks translated into Spanish

**Integration of Technology:** use of computer/Chromebook, use of internet for articles and EduBlocks

LA.SL.11-12.4	Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
CS.9-12.8.1.12.AP.1	Design algorithms to solve computational problems using a combination of original and existing algorithms.
CS.9-12.8.1.12.DA.1	Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
CS.9-12.8.2.12.EC.3	Synthesize data, analyze trends, and draw conclusions regarding the effect of a technology on the individual, culture, society, and environment and share this information with the appropriate audience.

CS.9-12.8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.
CS.9-12.8.2.12.ED.4	Design a product or system that addresses a global problem and document decisions made based on research, constraints, trade-offs, and aesthetic and ethical considerations and share this information with an appropriate audience.
SOC.6.2.12.D.6.a	Assess the role of increased personal and business electronic communications in creating a “global” culture, and evaluate the impact on traditional cultures and values.
TECH.9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
TECH.9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).