

cell signalling multiple choice questions and answers Latest Edition

Cell Signalling Multiple Choice Questions and Answers

Understanding cell signalling is fundamental to grasping how cells communicate, respond to their environment, and coordinate complex biological processes. For students, researchers, and professionals in biology and medicine, mastering cell signalling concepts through multiple choice questions (MCQs) is an effective way to reinforce knowledge and prepare for exams or assessments. This article provides a comprehensive guide to cell signalling MCQs and answers, covering key topics, common questions, and detailed explanations to enhance learning and retention.

Introduction to Cell Signalling

Cell signalling, also known as cell communication, involves the transmission of signals from the cell's exterior to its interior, orchestrating various physiological responses. It ensures that cells respond appropriately to stimuli such as hormones, growth factors, or environmental changes. Proper functioning of cell signalling pathways is crucial for development, immune response, and maintaining homeostasis.

Types of Cell Signalling

Cell signalling can be broadly classified into several types:

1. Autocrine Signalling

- The cell releases signals that bind to receptors on its own surface.
- Example: Tumor cells producing growth factors that stimulate their own proliferation.

2. Paracrine Signalling

- Signals act locally on nearby cells.
- Example: Neurotransmitters released at synapses.

3. Endocrine Signalling

- Hormones are secreted into the bloodstream and affect distant cells.
- Example: Insulin regulating glucose uptake.

4. Juxtacrine Signalling

- Signals are transmitted through direct contact between cells.
- Example: Notch signalling pathway.

Key Components of Cell Signalling Pathways

Understanding the components involved in cell signalling is essential for answering MCQs effectively. These include:

- Receptors: Proteins on the cell surface or inside the cell that detect signals.
- Ligands: Molecules that bind to receptors to initiate signalling.
- Second Messengers: Intracellular molecules that amplify the signal (e.g., cAMP, Ca²⁺).
- Signal Transduction Proteins: Enzymes and kinases that propagate and modify signals.
- Effector Proteins: Execute the cellular response, such as gene expression.

Common Cell Signalling Pathways and Their MCQs

Below are some of the most important pathways and sample MCQs related to them, along with answers and explanations.

1. The G-protein Coupled Receptor (GPCR) Pathway

Question 1:

Which of the following best describes the primary function of G-protein coupled receptors (GPCRs)?

- A) They directly phosphorylate target proteins.
- B) They activate G-proteins upon ligand binding, initiating intracellular signalling.
- C) They serve as ion channels that open in response to ligands.
- D) They degrade second messengers inside the cell.

Answer: B) They activate G-proteins upon ligand binding, initiating intracellular signalling.

Explanation:

GPCRs are a large family of receptors that, upon ligand binding, undergo conformational changes to activate G-proteins. These G-proteins then modulate downstream effectors like adenylate cyclase or phospholipase C.

Question 2:

Which second messenger is most commonly associated with GPCR activation of adenylate cyclase?

- A) Ca^{2+} ?
- B) cAMP
- C) IP?
- D) DAG

Answer: B) cAMP

Explanation:

When certain GPCRs activate adenylate cyclase via G_s proteins, they increase the production of cyclic AMP (cAMP), which acts as a second messenger to activate protein kinase A (PKA).

2. The Receptor Tyrosine Kinase (RTK) Pathway

Question 3:

Receptor tyrosine kinases (RTKs) are primarily involved in:

- A) Phosphorylating serine residues on target proteins.
- B) Ligand-independent signalling.
- C) Dimerization and autophosphorylation upon ligand binding.
- D) G-protein activation.

Answer: C) Dimerization and autophosphorylation upon ligand binding.

Explanation:

RTKs typically dimerize after ligand binding, leading to autophosphorylation of tyrosine residues, which then serve as docking sites for downstream signalling proteins.

Question 4:

Which pathway is commonly activated downstream of RTKs to promote cell proliferation?

- A) cAMP pathway
- B) MAPK/ERK pathway
- C) Notch pathway
- D) JAK/STAT pathway

Answer: B) MAPK/ERK pathway

Explanation:

RTK activation often leads to the activation of the Ras-MAPK pathway, culminating in ERK phosphorylation, which promotes gene expression related to cell proliferation.

3. The Notch Signalling Pathway

Question 5:

The Notch signalling pathway primarily involves:

- A) Ligand-induced cleavage of the Notch receptor releasing a transcription factor.
- B) Second messenger cAMP activation.
- C) G-protein activation.
- D) Phosphorylation of receptor tyrosine kinases.

Answer: A) Ligand-induced cleavage of the Notch receptor releasing a transcription factor.

Explanation:

Notch signaling involves ligand binding to the receptor, leading to proteolytic cleavage and release of the Notch intracellular domain, which translocates to the nucleus to regulate gene expression.

Important Concepts Assessed by Cell Signalling MCQs

When preparing for exams or assessments, understanding the following concepts is crucial:

- Differences between signal transduction pathways (e.g., GPCR vs. RTK).
- The role of second messengers such as cAMP, Ca²⁺, IP₃, and DAG.
- Mechanisms of signal amplification and regulation.
- Cell-specific responses to signalling molecules.
- Pathological implications of signalling pathway disruptions (e.g., cancer, diabetes).

Sample Multiple Choice Questions for Practice

Below are additional MCQs to test your understanding of cell signalling concepts.

Question 6:

Which of the following is NOT a typical second messenger?

- A) cAMP
- B) Ca²⁺
- C) ATP
- D) IP₃

Answer: C) ATP

Explanation:

While ATP is a primary energy currency, it functions as a second messenger in some pathways but is not considered a classic second messenger like cAMP, Ca²⁺, or IP₃.

Question 7:

In the context of cell signalling, desensitization refers to:

- A) Increased receptor sensitivity after ligand binding.
- B) Decreased receptor response upon repeated exposure to the ligand.
- C) Permanent loss of receptor function.
- D) Activation of intracellular signalling pathways.

Answer: B) Decreased receptor response upon repeated exposure to the ligand.

Explanation:

Desensitization involves mechanisms like receptor phosphorylation or internalization that reduce receptor responsiveness to persistent stimuli.

Tips for Answering Cell Signalling MCQs Effectively

- Read each question carefully, noting keywords like "which," "all," or "except."
- Recall fundamental concepts related to the question.
- Use process of elimination to narrow down options.
- Pay attention to specific pathway components and their functions.
- Understand the context and implications of signalling pathway disruptions.

Conclusion

Mastering cell signalling through multiple choice questions and answers is an effective way to deepen your understanding of how cells communicate and respond to their environment. By familiarizing yourself with key pathways such as GPCR, RTK, and Notch, as well as core concepts like second messengers and pathway regulation, you can confidently tackle related exam questions. Regular practice with MCQs, coupled with thorough review of explanations, will enhance your grasp of complex signalling mechanisms and prepare you for advanced studies or professional assessments in biology and medicine.

Remember: Consistent revision and understanding over memorization are key to excelling in cell signalling topics. Keep practicing MCQs, and stay curious about the intricate ways cells communicate!

Cell Signalling Multiple Choice Questions and Answers are essential tools for students and professionals aiming to master the complex pathways that govern cellular communication. These MCQs not only facilitate active recall but also help in identifying gaps in understanding, making them

invaluable in both academic and research settings. As cell signalling is a foundational topic in biology and medicine, mastering the nuances through well-structured questions and answers can significantly enhance comprehension and exam performance.

Understanding the Importance of Cell Signalling MCQs

Cell signalling describes the processes through which cells communicate with each other to coordinate various functions such as growth, immune response, and homeostasis. Given the complexity of these pathways?ranging from receptor activation to intracellular cascades?multiple choice questions serve as an effective pedagogical approach. They enable learners to test their knowledge across a broad spectrum of topics, from basic concepts to detailed molecular mechanisms.

Features of Cell Signalling MCQs:

- Wide coverage: Questions span from simple definitions to complex pathway interactions.
- Rapid assessment: Facilitates quick testing of knowledge.
- Memory reinforcement: Promotes active recall, aiding long-term retention.
- Exam preparation: Mimics question formats encountered in standardized tests and exams.

Pros of Using MCQs:

- Efficient for self-assessment.
- Useful in formative and summative assessments.
- Helps in identifying misconceptions.
- Can be used in group discussions to enhance understanding.

Cons of Using MCQs:

- May encourage rote memorization rather than deep understanding.
- Limited in assessing analytical or descriptive skills.
- Risk of guessing correct answers without true comprehension.
- Can sometimes oversimplify complex pathways.

Key Topics Covered in Cell Signalling Multiple Choice Questions

Cell signalling MCQs typically address several core topics, which include:

- Types of cell signalling (autocrine, paracrine, endocrine, direct contact)
- Signal transduction pathways (e.g., GPCRs, RTKs, G-proteins)
- Second messengers (cAMP, calcium ions, IP3, DAG)
- Signal amplification mechanisms
- Cellular responses to signals
- Crosstalk between pathways
- Dysregulation and disease associations

Below, we explore these topics in detail, highlighting typical questions, their explanations, and strategic tips for answering.

Types of Cell Signalling

Understanding the different modes of cell communication is fundamental. MCQs in this area often test recognition of each type's characteristics and examples.

Autocrine Signalling

Definition: Cells respond to signals they produce themselves.

Sample MCQ:

Which of the following best describes autocrine signalling?

- A) Cells secrete signals that affect nearby cells.
- B) Cells respond to signals they produce themselves.
- C) Signals are released into the bloodstream to act on distant cells.
- D) Signalling occurs through direct cell-cell contact.

Correct Answer: B

Features to Remember:

- Autocrine signals are self-targeting.
- Common in immune responses and cancer cells.

Paracrine and Endocrine Signalling

- Paracrine: Signal acts on nearby cells; e.g., growth factors.
- Endocrine: Signal (hormone) travels via blood to distant cells.

Sample MCQ:

Which signalling type involves hormones traveling through the bloodstream?

- A) Autocrine
- B) Paracrine
- C) Endocrine
- D) Juxtacrine

Answer: C

Features:

- Endocrine signals are long-range.
- Paracrine and autocrine are short-range.

Signal Transduction Pathways

This is the core of cell signalling MCQs, focusing on the mechanisms by which signals are converted into cellular responses.

G-Protein Coupled Receptors (GPCRs)

Question:

Which of the following is NOT a characteristic of GPCRs?

- A) They span the cell membrane seven times.
- B) They activate heterotrimeric G-proteins.
- C) They directly phosphorylate intracellular proteins.
- D) They are involved in senses like smell and taste.

Answer: C

Explanation: GPCRs activate G-proteins that then trigger downstream effectors; they do not directly phosphorylate proteins.

Features:

- Highly versatile and involved in many physiological processes.
- Targeted by many drugs.

Receptor Tyrosine Kinases (RTKs)

Question:

RTKs are characterized by:

- A) Having seven transmembrane domains.
- B) Ligand-induced dimerization and autophosphorylation.
- C) Activation of G-proteins.
- D) Their role in ion channel functioning.

Answer: B

Features:

- Activation involves ligand binding and dimerization.
- Autophosphorylation creates docking sites for signalling proteins.

Second Messengers in Cell Signalling

Second messengers amplify signals within the cell, and questions often test recognition of their roles and pathways.

Common Second Messengers

- cAMP
- Calcium ions (Ca^{2+})
- Inositol triphosphate (IP3)
- Diacylglycerol (DAG)

Sample MCQ:

Which second messenger is primarily responsible for increasing intracellular calcium levels?

- A) cAMP
- B) IP3
- C) DAG
- D) NO

Answer: B

Features:

- IP3 causes calcium release from the endoplasmic reticulum.
- Calcium acts as a versatile signal affecting many processes.

Signal Amplification and Cellular Responses

MCQs often focus on how initial signals are magnified and how cells respond.

Sample Question:

In a signalling cascade, the initial binding of a ligand to its receptor results in:

- A) Signal attenuation.
- B) Amplification of the signal.
- C) Signal termination.
- D) No change downstream.

Answer: B

Features:

- Enzymatic cascades (e.g., kinase cascades) amplify responses.
- Ensures a strong response from a weak signal.

Pathway Crosstalk and Regulation

Understanding how pathways interact and are regulated is crucial.

Sample MCQ:

Which of the following is a common mechanism for terminating a GPCR signal?

- A) Phosphorylation of the receptor.
- B) Activation of G-proteins.
- C) Ligand binding.
- D) Dimerization of the receptor.

Answer: A

Explanation: Phosphorylation by G-protein-coupled receptor kinases (GRKs) leads to receptor desensitization.

Disease Associations and Pharmacology

MCQs highlight how signalling pathways relate to diseases like cancer, diabetes, and cardiovascular disorders.

Sample Question:

Mutations leading to constitutive activation of RTKs are commonly associated with:

- A) Autoimmune diseases.
- B) Cancer.

C) Infectious diseases.

D) Neurodegeneration.

Answer: B

Features:

- Such mutations promote uncontrolled cell proliferation.
- Targeted therapies include tyrosine kinase inhibitors.

Strategies for Approaching Cell Signalling MCQs

- Read each question carefully, noting keywords.
- Recall pathway diagrams and key features.
- Eliminate obviously wrong options.
- Watch for qualifiers like 'NOT', 'least', 'except'.
- Use logic based on pathway functions and interactions.

Conclusion: The Value of Cell Signalling MCQs in Education

Cell signalling multiple choice questions and answers are indispensable tools for mastering this complex subject. They promote active engagement, reinforce memory, and prepare learners for assessments. While they have limitations such as potential overemphasis on memorization, they remain an efficient method for foundational learning and self-assessment. Combining MCQs with detailed explanations, diagram-based learning, and practical applications can foster a comprehensive understanding of cellular communication. Whether for students preparing for exams or researchers designing experiments, mastering MCQs in cell signalling enhances both knowledge and confidence in the field.

Question Which of the following best describes cell signalling? The process by which cells communicate with each other to coordinate their activities. Which type of cell signalling involves the release of signalling molecules into the extracellular fluid, affecting nearby cells? Paracrine signalling. In signal transduction pathways, what is typically the first molecule activated upon receptor binding? A secondary messenger or an intracellular signaling protein. Which class of receptors is most commonly involved in hormone signalling? G protein-coupled receptors (GPCRs). What is the main role of second messengers in cell signalling? To amplify the signal and propagate it within the cell. Which of the following is NOT a common second messenger? DNA. Which process allows a cell to respond to a signal by altering gene expression? Signal transduction leading to

transcriptional regulation. Which molecule acts as a second messenger to increase intracellular calcium levels? Inositol triphosphate (IP3). Which of the following best describes an autocrine signal? A signal that a cell produces and responds to itself. In the context of cell signalling, what is desensitization? A decrease in cellular response to a signal after prolonged exposure.

Related keywords: cell signaling, multiple choice questions, signal transduction, second messengers, receptor proteins, phosphorylation, kinase enzymes, cellular communication, signal pathways, MCQs on cell signaling

Scipad Biology Answers

scipad biology answers are essential tools for students and educators seeking to excel in biology coursework and assessments. Scipad, a popular digital learning platform, offers a variety of resources, including practice questions, quizzes, and detailed answer explanations that aid in mastering complex biological concepts. This article provides a comprehensive overview of scipad biology answers, their importance, how to utilize them effectively, and tips for maximizing learning outcomes.

Understanding Scipad Biology Answers

What Are Scipad Biology Answers?

Scipad biology answers are the solutions and explanations provided for questions found within the Scipad platform's biology modules. These answers are carefully curated by educators and subject matter experts to ensure accuracy and clarity. They serve as a valuable reference for students to verify their responses, understand the reasoning behind correct answers, and reinforce their learning.

The Role of Scipad Biology Answers in Learning

Using scipad biology answers enhances the learning experience by:

- Providing immediate feedback on practice questions
- Clarifying complex biological processes and terminology
- Helping students identify areas that need improvement
- Facilitating self-paced learning outside the classroom
- Preparing effectively for exams and quizzes

Benefits of Using Scipad Biology Answers

1. Accurate and Reliable Content

One of the primary advantages of scipad biology answers is their accuracy. Developed by qualified educators, these answers are aligned with current biology curricula and standards, ensuring students receive trustworthy information.

2. Enhanced Understanding of Concepts

Detailed explanations accompanying answers help students grasp underlying biological principles, promoting deeper understanding beyond rote memorization.

3. Time-Efficient Study Sessions

Quick access to correct answers allows students to assess their performance swiftly, enabling more efficient review sessions.

4. Support for Different Learning Styles

Whether visual, auditory, or kinesthetic learners, students can benefit from diverse explanations and interactive content available through scipad.

How to Effectively Use Scipad Biology Answers

1. Attempt Questions First

Before consulting the answers, attempt to solve questions independently. This practice encourages critical thinking and problem-solving skills.

2. Review Correct Answers Carefully

After completing questions, compare your responses with the provided answers. Pay attention to explanations to understand why certain options are correct or incorrect.

3. Focus on Explanation Details

Go beyond the correct answer and study the detailed breakdowns. This will deepen your comprehension of biological concepts and processes.

4. Use Answers as Learning Tools

Instead of passively copying answers, use them as learning tools to explore related topics, clarify doubts, and reinforce your knowledge.

5. Incorporate Practice Tests

Regularly use scipad biology practice tests with answers to simulate exam conditions and build confidence.

Tips for Maximizing the Benefits of Scipad Biology Answers

1. Create a Study Schedule

Consistency is key. Dedicate specific times for practicing with scipad resources, ensuring steady progress.

2. Take Notes While Reviewing Answers

Summarize explanations in your own words, which aids retention and understanding.

3. Engage with Interactive Features

Leverage interactive diagrams, videos, and quizzes available on scipad to diversify your learning methods.

4. Clarify Doubts Promptly

If certain answers or explanations are unclear, seek help from teachers or online forums to ensure comprehension.

5. Track Your Progress

Maintain a record of questions answered and concepts mastered to identify strengths and areas needing improvement.

Common Topics Covered by Scipad Biology Answers

Scipad biology answers span a wide range of topics, reflecting the diverse curriculum of biology courses. Some of the most common areas include:

- Cell Structure and Function

- Genetics and Heredity
- Evolution and Natural Selection
- Human Anatomy and Physiology
- Plant Biology and Photosynthesis
- Microorganisms and Diseases
- Ecology and Environment
- Biological Processes and Cycles

Each topic has associated practice questions with detailed answers, enabling comprehensive review and mastery.

Challenges and Considerations When Using Scipad Answers

1. Dependence on Answers

While answers are valuable, over-reliance can hinder the development of problem-solving skills. It's important to attempt questions independently first.

2. Ensuring Up-to-Date Content

Biology is an evolving science. Ensure that the scipad content is current and aligns with the latest curriculum standards.

3. Verifying Correctness

Occasionally, errors might occur. Cross-reference answers with textbooks or trusted online resources for confirmation.

Conclusion

In summary, scipad biology answers are a powerful resource for students aiming to excel in biology. They provide accurate, detailed explanations that foster understanding, support effective revision, and boost exam readiness. By integrating scipad answers into a structured study plan, students can enhance their grasp of biological concepts, develop critical thinking skills, and achieve academic success. Remember to use these answers as a supplement to active learning strategies, ensuring a well-rounded and effective approach to mastering biology.

Scipad Biology Answers: A Comprehensive Guide to Mastering Scipad's Resources

In the realm of biology education, students constantly seek effective tools to enhance their understanding and retention of complex concepts. Among these tools, Scipad Biology Answers

stand out as a vital resource for learners aiming to excel in their studies. Whether you're preparing for exams, revising key topics, or seeking clarification on challenging concepts, accessing accurate and detailed answers from Scipad can make a significant difference. This guide aims to explore the importance of Scipad Biology answers, how to utilize them effectively, and tips for maximizing their benefits to foster a deeper comprehension of biological sciences.

Understanding Scipad and Its Role in Biology Education

What is Scipad?

Scipad is an educational platform designed to offer comprehensive resources for students across various subjects, with a strong focus on biology. It provides a wide range of study materials, including notes, quizzes, and most notably, detailed answers to textbook exercises and questions. These answers are curated to align with curriculum standards, making them reliable tools for learning and revision.

Why Are Scipad Biology Answers Important?

- Clarify Difficult Concepts: They help break down complex biological processes into understandable explanations.
- Aid in Exam Preparation: Well-structured answers serve as excellent revision tools for exams.
- Ensure Accuracy: Reliable answers minimize misunderstandings that could arise from incorrect or incomplete information.
- Enhance Critical Thinking: Comparing your answers with Scipad's encourages analytical thinking and self-assessment.

How to Effectively Use Scipad Biology Answers

Maximizing the benefits of Scipad answers involves more than just reading. It's about strategic engagement to deepen understanding and develop exam skills.

Step 1: Use Answers as a Learning Tool, Not Just a Shortcut

While it might be tempting to copy answers directly, the true value lies in understanding the reasoning behind each response.

- Read Carefully: Analyze the explanations provided.
- Identify Key Points: Highlight essential concepts, definitions, and processes.
- Compare Your Work: Assess where your answers align or differ, and understand why.

Step 2: Practice Active Learning

- Attempt Questions First: Before consulting the answers, try solving questions independently.
- Use Answers to Check and Correct: After attempting, compare with Scipad's solutions to identify gaps in knowledge.
- Rewrite or Summarize: Paraphrase answers to reinforce comprehension.

Step 3: Incorporate into Study Routines

- Regular Revision: Use answers to review topics periodically.
- Focused Study Sessions: Target areas where your answers and Scipad's diverge.
- Create Summaries: Develop concise notes based on detailed answers to aid quick revision.

Navigating Common Challenges with Scipad Biology Answers

While Scipad offers valuable resources, users may encounter some challenges. Here are common issues and strategies to overcome them:

Challenge 1: Over-Reliance on Answers

Solution: Use answers as a guide rather than a crutch. Always aim to understand the why behind each response.

Challenge 2: Outdated or Incomplete Answers

Solution: Cross-reference answers with textbooks, class notes, or reputable online resources to ensure accuracy and completeness.

Challenge 3: Difficulty in Understanding Explanations

Solution: Break down complex explanations into simpler parts, and seek additional resources or videos for clarification.

Best Practices for Using Scipad Biology Answers Effectively

To truly benefit from Scipad, students should adopt best practices, including:

- Active Engagement: Don't passively read answers; interact with them.

- Contextual Learning: Relate answers to real-life examples or practical applications for better retention.
- Question Development: Use answers to generate your own questions for further exploration.
- Group Study: Discuss answers with peers to gain different perspectives and deepen understanding.

Enhancing Learning with Supplementary Resources

While Scipad answers are valuable, supplement your study with other resources:

- Biology Textbooks: For detailed explanations and diagrams.
- Online Tutorials and Videos: Platforms like Khan Academy or YouTube channels specializing in biology.
- Practice Tests: To simulate exam conditions and test your knowledge.
- Flashcards: For memorizing definitions, processes, and terminology.

Ethical Use and Academic Integrity

While leveraging Scipad biology answers can be highly beneficial, it's crucial to uphold academic integrity:

- Avoid Plagiarism: Use answers for learning, not for submitting as your own work.
- Develop Your Own Responses: Use answered questions to guide your understanding and craft original responses.
- Cite Resources: When referencing information from Scipad, give appropriate acknowledgment if required.

Final Thoughts: Mastering Biology with Scipad Answers

Scipad Biology Answers are an invaluable resource for students striving to excel in their biological sciences coursework. They serve as guides, clarifiers, and confidence boosters when used correctly. Remember, the goal is not just to memorize answers but to develop a genuine understanding of biology's fundamental principles. By integrating Scipad answers into a strategic study plan, complemented with other resources, active learning techniques, and ethical practices, you can unlock your full potential and achieve academic success in biology. Embrace these answers as stepping stones towards mastery, and let them inspire curiosity and a lifelong passion for understanding the living world.

QuestionAnswer What is Scipad Biology and how can it help students? Scipad Biology is an

educational resource that provides concise summaries and answers to biology topics, helping students prepare for exams and understand complex concepts more easily. Where can I find accurate Scipad Biology answers for my coursework? You can find accurate Scipad Biology answers on official educational websites, authorized study guides, or through reputable online platforms that offer verified solutions and explanations. How do I effectively use Scipad Biology answers for exam preparation? Use Scipad Biology answers as a supplement to your study materials by reviewing concepts, practicing questions, and ensuring you understand the explanations to reinforce your learning. Are Scipad Biology answers suitable for all grade levels? Yes, Scipad Biology offers content tailored for various grade levels, from secondary education to college, making it a versatile resource for different learners. Can I rely solely on Scipad Biology answers for my exams? While Scipad Biology answers are helpful, it's best to use them alongside textbooks, class notes, and practical exercises to achieve a comprehensive understanding of the subject. What are the common topics covered in Scipad Biology answers? Common topics include cell biology, genetics, ecology, human anatomy, plant biology, and evolution, among others, all explained in a simplified and accessible manner.

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