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Which of the following software development models can **best respond to requirements changes**?  
A. The V-model  
B. The Waterfall model  
C. **Agile models**

In which of the following software development models are the software development activities **performed sequentially** rather than in iterations?  
A. Agile models  
B. **The Waterfall model**

Which is the right description about **the requirement specification process**?

A. R***equirement*** specification is a process to design the solution to the problem.  
B. ***Requirement*** specification is a process that identifies and specifies the problem and possible solutions to the problem.  
C. ***Requirement*** specification is a process to **identify and specify** the **problem to solve.**  
D. ***Requirement*** specification is a process of solving the requirements.

C

The following are the requirements and specifications of an online banking service. Which of the following can be categorized as **(user) requirements**? Select two.  
A. **The user** shall be able to check the current balance of the checking accounts **that he/she own.**  
B. Activate a login session when a user logs in, and maintain the session for 60 minutes unless the user who logged in had remained inactive for more than 120 seconds.  
C. **A user** shall be able to use the **online banking system** securely.  
D. At the time a query is made to check the current balance of a checking account, the owner of the checking account shall be logged in.

A C

The following are requirements and specifications of an online banking service. Which of the following can be categorized as **system specifications**? Select two.  
A. A user shall be able to use the online banking system securely.  
B. **Activate** a login session when a user logs in, and maintain the session for 60 minutes unless the user who logged in has been inactive for more than 120 seconds.  
C. **At the time** a query is made to check the current balance of a checking account, the owner of the checking account shall be logged in.  
D. The user shall be able to check the current balance of the checking accounts that he/she own.

B C

Which of the following are non-functional requirements:  
A. Some product requirements, like using a specific encryption protocol, are non-functional requirements.  
B. Organization requirements imposed by the company, like a specific coding style, are non-functional requirements.  
C. External requirements imposed by external organization, like using a specific development style, are non-functional requirements.  
D. **All of the above.**

**WRSPM** stands for:  
A. Wide, Requirement, Software, Planning and Model.  
B. **World,** **Requirement, Specification, Program and Machine.**  
C. None of the above.

B

The purpose of the WRSPM model is to ensure that:  
A. **Specifications meet the requirements.**  
B. Requirements meet specifications.  
C. None of the above.

A

**A subsystem** in an architecture must:+  
A. be created separately and can operate individually.  
B. have business value.  
C. be integrated with one another or with existing subsystems.  
D. All of the above.

D

* **A UNIX program** where the output of one program is the input of another, is an example of which of the software architecture models below:  
  A. **Pipe-and-Filter** Model.  
  B. Event-based Model.  
  C. Layered Model.  
  D. Client-Server Model.  
  E. Blackboard Model.
* A
* An **online banking** system is best modeled by:  
  A. Pipe-and-Filter Model.  
  B. Blackboard Model.  
  C. **Client-Server** Model.  
  D. Event-based Model.
* C
* **A vehicle** identification and tracking system, where each moving **vehicle** is tracked and monitored through a shared program, is best modeled by:  
  A. Pipe-and-Filter Model.  
  B. **Blackboard Model.**  
  C. Layer Model  
  D. Client-Server Model  
  E. Event-based Model

B

The **difference between subsystems and modules** are:  
A. Subsystems can **independently comprise** the business logic by itself while **modules can't.**  
B. Subsystems can communicate with other subsystems while modules cannot communicate with other modules.  
C. All of the above.

A

A B C D E

Which of the following is considered the **most difficult in the software** development process?  
A. **Accurately** identifying **user needs** *Xác định chính xác nhu cầu người dùng*  
B. Developing a Java program to meet the designed solution  
C. Determining the accurate market price for the finished product  
D. Testing the solution with users

A

What is a **Requirements Specification**?  
**A. A process, how the requirements are written (specified)  
B. A product, a written specification of the requirements**  
C. **Both**  
D. Neither

C

Based on the **NASA statistics** on budget and schedule overrun vs. time spent on requirements process, what is the recommended amount of time to spend on the requirements stage?  
A. 0% of the total time spent on the project  
B. **5-10%** of the total time spent on the project  
C. 20% of the total time spent on the project  
D. The same amount as you expect to spend on testing.

B

Which of the following **matches the terms** to the correct definition?  
A. **Requirements - user needs in user language; Specification - solution properties designed to solve problem**  
B. Requirements - solution properties designed to solve problem; Specification - user needs in user language

A

Which of these is a **user requirement**?  
A. Allow an authorized user to post a message of no more than 136 characters to the Facebook POST API  
B. Use the MariaDB database for internal data persistance  
C. Retry posting the message up to 3 times every 5 minutes if the post is rejected by the server  
D. **Allow** the user to post a **message to Facebook**

D

Which of the following is **NOT an example of a non-functional** requirement.  
A. The messages between the client and server shall be in **YAML 1.2 format**.  
B. **The user** **shall be able to select** the **course number.**  
C. Communication between the client and server will be expressed in EBCDIC endoding.  
D. The developing team shall use the spiral model of software development lifecycle.

B

What element(s) of the WRSPM model belong in the **system** (including the overlap between environment and system)?  
A. S  
B. W,R,S  
C. **S,P,M**  
D. S,P  
E. W  
F. R,S  
G. W,R  
H. R,S,P  
I. P,M  
J. M

C

What element(s) of the WRSPM model belong in the **environment** (including the overlap between environment and system)?  
A. W  
B. W,R  
C. **W,R,S**  
D. R,S  
E. R,S,P  
F. S  
G. S,P  
H. S,P,M  
I. P,M  
J. M

C

Which of these is **proper definition of software architecture**?  
A. integrating small systems with no individual business value into larger ones  
B. **partitioning large systems** into **smaller ones** that can be created seperately, have individual business value, and *can be easily integrated*  
C. planning and pricing the resources involved with developing a large-scale software system, including presenting such plans and budgets to senior level executives for funding  
D. all of the above

B

* Which of the following models is best suited for a system with **significant shared data** that needs to be shared across a variety of components or **sub-systems,** **somewhat like global variables, but with better data integrity**?  
  A. pipe-and-filter  
  B. layered  
  C. **blackboard**  
  D. event-based  
  E. client-server
* C
* Which of the following models is best suited for a system that includes several subsets of **functionality** that are used in **more than one** area of the system?  
  A. client-server  
  B. event-based  
  C. **pipe-and-filter**  
  D. blackboard  
  E. layered
* C
* Which of the following models is best suited for a system that benefits from the separation of complexity and processing between work which can be done locally and that which should be **completed on a shared, remote service?**A. layered  
  B. pipe-and-filter  
  C**. client-server**  
  D. blackboard  
  E. event-based
* C

Which of the following would be considered a **sub-system,** rather than a module?  
A. A set of classes which convert various values based on environment or parameter information  
B. A class which represents the paying customer  
C. **A set of classes** which **generates reports**D. A class which provides a service (e.g. AccountCreationService)

C

Check all that apply: **The four aspects of modularity** are...  
A. **Data Encapsulation**  
B. Sort Functions  
C. Components  
D. **Information Hiding**  
E. Data Hiding  
F. **Cohesion**  
G. **Coupling**

A D F G

* Which of the four aspects of modularity is **defined as: How well modules work together**.  
  A. Information Hiding  
  B. **Coupling**  
  C. Cohesion  
  D. Data Encapsulation
* B
* Which of the four aspects of modularity can be described as: **Abstracting away implementation details.**  
  A. **Information Hiding**  
  B. Data Encapsulation  
  C. Cohesion  
  D. Coupling
* A
* Which of the four aspects of modularity can be described as: How well a module **meets a single well-defined goal.**  
  A. Information Hiding  
  B. **Cohesion**  
  C. Coupling  
  D. Data Encapsulation
* B
* Which of the four aspects of modularity can be described as: **Containment of constructs and concepts within a module.**  
  A. Information Hiding  
  B. **Data Encapsulation**  
  C. Cohesion  
  D. Coupling
* B
* Three goals of \_\_\_\_\_\_ can be described as **(1) Decomposability, (2) Composability, and (3) Ease of Understanding.**  
  A. **Modularity**  
  B. Cohesion  
  C. Coupling
* A
* You have a sort function that provides no **details** on which sorting algorithm is used. This is an example of which aspect of modularity?  
  A. Cohesion  
  B. **Information Hiding**  
  C. Data Encapsulation  
  D. Coupling
* B
* A benefit to using \_\_\_\_\_\_ is that you know if your data is corrupted, then it must have been **corrupted by the module**.  
  A. Cohesion  
  B. **Data Encapsulation**  
  C. Information Hiding  
  D. Coupling
* B

Choose the most accurate answer: **Low coupling aids** in...  
A. abstracting away complex information.  
B. **ensuring** that changes **don't cross boundaries** of modules.  
C. decomposability.  
D. lower corruption rate of data.

B

Which of the following statements about **coupling are true**?  
A. Coupling measures the strength of connections between components.  
B. Loose coupling makes it unlikely that changes will be propogated across components.  
C. Shared variables and control information leads to tight coupling.  
D. Loose coupling is partly achieved through message passing.  
E. All of the above

E

The **three types of tight coupling** are:  
A. **Content**; **Common; External**  
B. Control; Data Structure; Message  
C. There is no such thing as tight coupling  
D. Data; Message; None

A

* Module A relies directly on **local data of module B**. This is an example of what type of coupling?  
  A. **Tight content coupling**  
  B. Tight common coupling  
  C. Tight external coupling
* A
* Modules A and B both rely on **global data or a global variable**. This is an example of what type of coupling?  
  A. Tight content coupling  
  B. Tight **common** coupling  
  C. Tight external coupling
* B
* Modules rely on externally **imposed format (or protocol or interface).** This is an example of what type of coupling?  
  A. Tight common coupling  
  B. **Tight external coupling**  
  C. Tight content coupling
* B

The two types of **medium coupling** are:  
A. Content; Common  
B. Data; Message  
C. **Control; Data Structure**  
D. Message; None

C

**Module A controls the logical flow of module B**. This is an example of what type of coupling?  
A. Medium data structure coupling  
B. **Medium control coupling**

B

Module A and B both rely on the **same composite data structure**. This is an example of what type of coupling?  
A. Medium control coupling  
B. **Medium data structure coupling**

B

**The three types of loose coupling are**:  
A. **Data; Message; None**  
B. Content; Common; External  
C. Data; Message; Data Structure  
D. Control; Data Structure; Loose

A

**Modules only share parameters**. This is an example of what type of coupling?  
A. Loose no coupling  
B. Loose message coupling  
C. **Loose data coupling**

C

The loosest type of coupling; components only communicate **through parameters** or **message passing**. This is an example of what type of coupling?  
A. **Loose message coupling**  
B. Loose data coupling  
C. Loose no coupling

A

Choose the most accurate answer: **Cohesion describes**...  
A. decomposability.  
B. how changes do not cross boundaries of modules.  
C. **how well** everything within a module **fits together.**  
D. loose coupling.

C

Which of the following statements about **cohesion is true**?  
A. Cohesion measures how well everything within a module fits together.  
B. Describes the implementation of a single logical entity or function.  
C. Represents a desirable design attitude.  
D. High cohesion is the aim in software development.  
E. All of the above

E

The four types of **weak cohesion** are:  
A. There is no such thing as loose cohesion  
B. Communicational, sequential, object, functional  
C. **Coincidental, temporal, procedural, logical association**  
D. Coincidental, temporal, sequential, logical association

C

* Parts of modules are **together in the same file.** This is an example of what type of **cohesion?**  
  A. **Coincidental cohesion**  
  B. Logical association cohesion  
  C. Procedural cohesion  
  D. Temporal cohesion
* A
* **Different pieces of code are activated at the same time**. This is an example of what type of **cohesion**?  
  A. **Temporal cohesion**  
  B. Coincidental cohesion  
  C. Procedural cohesion  
  D. Logical association cohesion
* A
* **One piece of code runs after the othe**r. This is an example of what type of **cohesion**?  
  A. Coincidental cohesion  
  B**. Procedural cohesion**  
  C. Logical association cohesion  
  D. Temporal cohesion

B

**Components do similar but separate things**. This is an example of what type **of cohesion**?  
A. Coincidental **cohesion1wq2**B. Procedural cohesion  
C. Temporal cohesion  
D. **Logical association cohesion**

D

* + The two types of **medium** cohesion are:  
    A. There is no such thing as medium cohesion  
    B. Coincidental, temporal  
    C. **Communicational, sequential**  
    D. Sequential, logical association
* **All elements** of a component operate on the same input or produce the same output. This is an example of what type of cohesion?  
  A. **Communicational Cohesion**  
  B. Sequential Cohesion
* **One component's** output provides the **input to another component**. This is an example of what type of cohesion?  
  A. Communicational Cohesion  
  B. **Sequential Cohesion**
* The two types of **strong cohesion** are:  
  A. **Object, functional**  
  B. Communicational, sequential  
  C. Object, strong  
  D. Coincidental, temporal
* A
* **Each operation** in a module is provided to allow object attributes to be **modified or inspected**. This is an example of what type of cohesion?  
  A. Functional Cohesion  
  B. **Object Cohesion**
* **Every part** of a component is necessary for **a single well-defined behavior**. This is an example of what type of cohesion?  
  A. **Functional Cohesion**  
  B. Object Cohesion

Why should you program when you are alert?  
A. Sleep deprivation leads to mistakes.  
B. Output falls drastically after working 50+ hours per week.  
C. All of the above

C

Fill in the blank. Write \_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ before writing functional code.  
A. Comments; Benchmarks; Tips for Use.  
B. **Comments; Tests; Exception Handling.**  
C. System Specifications; User Guide; Exception Handling.

B

If you write the same code more than once...  
A. It's okay.  
B. You did something wrong.  
C. **Put that code into a method**.

C

Concerns to address in your deployment plan include:  
A. Physical environment requirements  
B. Hardware requirements  
C. Documentation  
D. 3rd party software requirements  
E. Training  
F. Software being deployed  
G. Database-related activities  
H. All of the above

H

What are some reasons why you would **need a rollback plan**? Select two.  
A**. Installation doesn't go as expected**.  
B. It is the end goal in product deployment.  
C. **Fixing the problem ends up taking longer than the window allows**.  
D. Database management in complex systems.

A C

* The three cutover strategies are...  
  A. Warm failover  
  B. **Hot failover**  
  C. Cold failover  
  D. **Warm standby**  
  E. **Cold backup**  
  F. Hot standby
* If you need to have a cutover strategy where the replacement machine is **ready for a full setup and install**, then you would choose which of the following cutover strategies?  
  A. Hot failover  
  B. Warm standby  
  C. **Cold backup**  
  D. Warm failover
* C
* If you need to have a cutover strategy where the replacement services are **ready for the redirection of data with no installation,** then you would choose which of the following cutover strategies?  
  A. Hot backup  
  B. Cold backup  
  C. **Hot failover**  
  D. Warm standby
* C
* If you need to have a cutover strategy where the replacement machine **is running and ready for installation**, then you would choose which of the following cutover strategies?  
  A. Hot failover  
  B. **Warm standby**  
  C. Cold failover  
  D. Cold backup
* B

Test data represents possible inputs that are provided to the \_\_\_\_\_ for the purposes of testing.  
A. system  
B. oracle  
C. both the system and the oracle

C

Test cases are composed of \_\_\_\_\_\_\_  
A. **test data**  
B. system (actual) outputs  
C. **expected outputs**

A C

Choose the correct True-False pair: An error is the manifestation of a failure. A failure is the manifestation of an error.  
A. **False, True**  
B. True, False  
C. False, False  
D. True, True

A

It is possible for errors to remain undiscovered **as long as the erroneous** \_\_\_\_\_\_\_\_ is never used  
A. **component**  
B. test data  
C. test case  
D. output

A

Where does software design fit in the traditional waterfall software development lifecycle?  
A. Between specification and architecture  
B. Between **architecture and implementation**

C. Between implementation and deployment  
D. Before requirements

B

* Which of the following is **NOT an aspect** of software design  
  A. **Polymorphism**  
  B. Modularity  
  C. Cohesion  
  D. Coupling
* A
* The ability to use a **built-in function** of a programming language to generate a **random number** is an example of which of the following?  
  A. Cohesion  
  B. **Information hiding**  
  C. Modularity  
  D. Coupling
* B
* **Analyzing the extent** to which other modules must change when a module is modified is an example of which of the following?  
  A. Information hiding  
  B. **Coupling**  
  C. Cohesion  
  D. Modularity
* B
* When all of the responsibilities of a module are **easily classified as being strongly related**, this is an example of high what?  
  A. **Cohesion**  
  B. Coupling  
  C. Modularity  
  D. Information hiding
* A

**Which of the following is most preferred**?  
A. **Allowing one** module to affect the program flow of another **via** the use of a **state message** (message coupling)  
B. Having more than one module rely on the same version of the RSS standard (external coupling)  
C. **Allowing one** module to affect the program flow of another **via** the use of a flag **(control coupling)**  
D. Having two modules rely on the same global information structure (common coupling)

A

Which of the following is LEAST desirable?  
A. including functionality which relys on the same input  
B. including functionality which entirely encapsulates all the necessary function for a specific task  
C. including functionality which **occurs around** **the same time**  
D. including functionality which modifies an object's own attributes

C

Which of the following are necessary **before proper testing?**  
A. inputs which cause issues  
B. inputs, expected output, an oracle, and the actual output  
C. inputs and expected output  
D. **inputs, expected output, and an oracle**

* D
* Which of the following is an **mistake in** code which is **found in code review**?  
  A. Fault  
  B. **Effective error**  
  C. Latent error  
  D. Failure
* B
* Which of the following is an **mistake** in code which **has not yet been activated**?  
  A. Fault  
  B. Effective error  
  C. **Latent error**  
  D. Failure
* C
* Which of the following is a **mistake made by the developer**?  
  A. Effective error  
  B. **Fault**  
  C. Latent error  
  D. Failure
* B
* Which of the following is when the **operation of a system differs from what the aa**?  
  A. Fault  
  B. Effective error  
  C. Latent error  
  D. **Failure**

D

Which of the following is an example **of validation**?  
A. software recognizes incorrect inputs  
B. use of the software provides the correct results as documented  
C. software is **well-received by the user**  
D. ensuring the system locks out an account after three failed log-in attempts

C

In your current project, you have access to some intern development resources, which are not currently operating at full capacity. You also know that the testing timeline will be truncated, due to delays in critical-path module development. **Which strategy should you employ?**  
  
A. **Utilize the intern resources** to design and develop drivers and **stubs**, while work continues on critical-path module development  
B. Make no changes to the current project testing or development allocations, utilizing intern resources to create documentation.  
C. Allow the testing team to work without (or with quick-to-develop) drivers and stubs, and utilize the intern resources to aid testing once all critical-path development is complete  
D. Allow the testing team to work without (or with quick-to-develop) drivers and stubs, while using intern resources to aid critical-path development

A

When is **testing complete**?  
A. When you find the last bug  
B. When you have completed all the tests in the test plan  
C. When you **run out of time**  
D. When you have tested every input

C

Which of the following is an example of **black-box testing**?  
A. Developing additional tests when every if statement does not evaluate both true and false once given the current test suite  
B. Developing additional test cases to force a division by zero  
C. Developing test cases to exercise error-prone constructs  
D. Developing **test cases** **based on *typical user behavior***

D

**Sashimi model** may help decrease the time duration of the project by  
A. Adding more skilled resources of the project  
B. **Overlapping the phases**

B

In which model might you **end up building something** different than **what you originally planned?**  
A. **Adaptive models**  
B. V-Model  
C. Waterfall models

A

Which model is **the best model to use in all situations**?  
A. Adaptive since it has most advantages  
B. **None**  
C. Waterfall

B

Which of the following activities happen in **Step 2 of the Spiral Model**? Select two.  
A. Make a decision whether to continue with the next cycle  
B. **Resolve risks**  
C. **Identify risks**  
D. Decide objectives and constraints

B C

Which of the following are **true for the Unified Processes** and its variants? Select two.  
A. UML Unified Process is the Ultimate Unified Process with a superset of all practices and processes.  
B. Rational Unified Process is a lighter version of the Unified Process.  
C. **Enterprise** Unified Process adds additional practices on top of the Unified Process and Rational Unified Process.  
D. **Agile** Unified Process and Open Unified Process are lighter versions of the "Unified Process".

C D

A team divided the application they were **building into 4 parts and planning to build one part at a time**. To build each part, they are planning to go through the steps of requirements, design, implementation, test, and deployment. Also, they are planning to complete each part fully with high fidelity. By fidelity we mean the completeness of the features implemented in each part. Based on this information, what type of model do you suggest they use for their software development process?  
A. Iterative and Incremental  
B. Iterative  
C. **Incremental**

C

A team is working on a problem where the requirements are well known but they are short on time. They prefer to start the design phase when some of the requirements have been defined. Similarly, they want to start coding when the design for part of the system is ready. What model will **best fit their needs**?  
A. **Sashimi**  
B. V-model  
C. Waterfall  
D. Spiral

A

In the incremental model variation where you do requirements and design for all of the application once and then just increment on **implementation, testing, and deployment**, are you making the process more suitable for a **predictive or adaptive situation**?  
A. **Predictive**  
B. Adaptive

A

Which of following is NOT true about incremental and iterative models?  
A. Iterative approaches release every feature with low fidelity and then improve fidelity over time. By fidelity we mean the completeness of the feature.  
B. Incremental approaches release features as they are finished with high fidelity.  
C. **An incremental model** is one where you can build each part of the **system individually** but you release all at once.  
D. In a model which is both iterative and incremental, we release features when they are usable. Over time the development team improves existing features and adds new ones

C

Which of the following is **NOT true for the Waterfall model, V-model and Sashimi model**?  
A. In these models, the team is expected to know the solution really well.  
B. These models will be a good model to be used by a **startup implement** a new idea that is **new to market**  
C. In these models, the cost of change depends on how late we find out about the change. If problem requiring a change is found during the implementation phase, it will be more expensive to fix than one found during the design phase.  
D. In these models, we assume that we know requirements really well.

B

In the Unified Process, what does the milestone of **"Lifecycle Architecture"** mean?  
A. **Agreement among** stakeholders about the objectives of the project and to proceed with the project.  
B. **Agreement among** the stakeholders about the **technical approach.**  
C. **Agreement among** the stakeholders about the deployment of the system to actual users.

B

Select situations listed below where you would **NOT use the Unified Process framework**.  
A. Medium-sized project with some risks involved.  
B. **Very small**, simple project where the problem and solution are **well known.**  
C. Situation where the organization wants to deliver part of the application early to capture the market ahead of competition.  
D. All requirements are not known early in the project.

B

Which of the following is **NOT true for Spiral Model**?  
A. It minimizes waste by allowing teams to tailor the effort put into different processes based on the risk involved in each cycle.  
B. Spiral Model is not a model but a process model generator.  
C. **You always** have to perform all the steps mentioned in the **Spiral Model diagram**  
D. It is suitable for very large high risk projects

C

Which of the following is NOT the benefits of the Unified Process?  
A. Supports to incorporate other models in the process for example you can use Agile in the construction phase.  
B. Supports / encourages risk identification and mitigation.  
C. **Easy to understand and implement**.  
D. Supports quality and reuse by putting an emphasis on architecture.  
E. Flexible for handling change.

C

Which of the following statements align with the value "Working software over comprehensive documentation" of the Agile manifesto?  
A. Don't do documentation on an Agile project.  
B**. Create documentation** when it provides value.  
C. Must write documentation to fulfill company policy.

B

Which one of the following statements/situations/conversations align with an Agile mindset?  
A. **Manager**: "The customer is suggesting another change in feature X which is complete as per specification. They agree that it was built as we agreed upon but it lacks some functionality and will result in user frustration. Should we implement the change or not?"  
Developer: "Yes, if it does not fulfill user needs, we should make the change."  
B. **A manager** providing a status update to a customer says: "We are done with requirements and design so we are 50% done."  
C. A software vendor says to a client: "We must define exactly what the user needs and put that in agreement."  
D. **A manager** e-mails her team: "Meeting face to face just for a 15 minute discussion is inefficient, let us all just dial-in from our desk."

A

Which of following is valid on a Kanban Board? (select any 2)  
A. WIP limit for Step X is 3. Step X is divided into "Doing" and "Done." Number of items in "Doing" column is 4, and number of items in "Done" column is 0  
B. WIP limit for Step X **is 3**. Step X is divided into "Doing" and "Done." Number of items in "Doing" column is 2, and number of items in "Done" column is 1  
C. WIP limit for Step X is 3. Step X is divided into "Doing" and "Done." Number of items in "Doing" column is 3, and number of items in "Done" column is 2  
D. WIP limit for Step X is 3. Step X is divided into "Doing" and "Done." Number of items in "Doing" column is 2, and number of items in "Done" column is 1. One of the items in the previous step is done and developer wants to move that item to Step X  
E. WIP limit for Step X **is 5.** Step X is divided into "Doing" and "Done." Number of items in "Doing" column is 3, and number of items in "Done" column is 1. One of the item in previous step is done and developer wants to move that item to Step X

B E

**In Scrum,** when is the **sprint backlog created**?  
A. At the beginning of the project  
B. During the **sprint planning meeting**  
C. During the backlog refinement meeting  
D. Whenever needed

B

In Scrum, how is **Product Backlog Arranged**?  
A. **Most important items at the top**, **least important items at the bottom**.  
B. Large items at the top, small items at the bottom  
C. Into categories, **P1, P2, P3, etc.**  
D. Items are randomly arranged

A

Which Agile Value does the following principle align with:  
"Build projects around motivated individuals, give them the environment and support they need and trust them to get the job done."  
A. **Individuals and Interaction Over Process and Tools**  
B. Respond to Change Over Following a plan  
C. Customer collaboration over contract negotiation  
D. Working software over comprehensive documentation

A

Which of the following align with the agile principle:  
"Business people and developers work together daily throughout the project."  
A. **Since agile methodologies** *do not recommend writing all detailed requirements upfront, it is really important to support greater collaboration between business people and developers so that they can build a shared understanding of what needs to be built.*  
B. Business people and developers MUST meet face-to-face daily to clarify confusions, questions etc.  
C. Business people also need to code together with developers to make faster progress.

A

If a developer says "we don't to do any discussion or upfront design" because we are agile", is he/she truely representing what agile means  
A. Yes, because in agile, we start coding right away  
B. **No, agile does not mean start coding right away**.

B

Which of the following are true about Agile Manifesto? (select any 2)  
A. The Agile Manifesto specifies exact practices and processes that agile teams are expected to follow  
B. Agile Manifesto was primarily based on theoretical knowledge  
C. **The Agile Manifesto** consists of **4 values and 12 principles.**  
D. **The Agile Manifesto** is work in progress and **we are continuing to learn**.

C D

Which one of the following statements/situations/conversations align with an agile mindset?  
A. A manager e-mails her team: "Meeting face to face just for a 15 minute discussion is inefficient, let us all just dial-in from our desk."  
B*.* ***Manager:*** *"The customer is suggesting another change in feature X which is complete according to the specification. They agree that it was built as we agreed upon but it lacks some functionality and will result in user frustration. Should we implement the change or not?"****Developer:*** *"Yes, if it does not fulfill user needs, we should make the change."*  
C. A manager providing a status update to a customer says: "We are done with requirements and design so we are 50% done."  
D. A software vendor says to a client: "We must define exactly what the user needs and put that in the agreement."

B

Why is it difficult to **predict user needs and requirements**? (select any 3)  
A. **Sometime t**he **market shifts** from time when the requirements were originally defined.  
B. **Difficult** to **understand user needs**.  
C. There is not enough time spent on requirements. If we spend more time early, we can define requirements very accurately.  
D. **Translation** issues. Requirements are **misinterpreted.**

A B D

Which of the following statements align with following Agile Principle:  
"Deliver working software frequently, from a couple of weeks to a couple of months, with a preference for the shorter timescale"  
A. We **MUST release** software to actual users every couple weeks.  
B. We should **frequently** deliver software in some environment (not necessarily to production always) to gather **user/client feedback**  
C. We should NOT release software to a production environment on a shorter timeframe. We should ONLY release it in lower environment (e.g., a test environment).

B

Which of the following align with this principle:  
" Working software is the primary measure of progress."  
A. If a team has written the requirements and done the design for 5 out of 10 stories, then the team has made some progress **(they are more than 0% done)**B. On a 10 month project, the team has been working for 5 months. Thus, the project is 50% complete.  
C. If a team has **delivered 5 features out of 10 features** (or stories), team has made progress **(they are more than 0% done)**

C

In which of the following situations, would you **NOT recommend using an agile process**?  
A. For a project where the customer wants to build an e-commerce website but the development team has never done something like this before. Further, the company knows that they want to build an e-commerce website but are not sure about the functionality at this time.  
B. For a project where requirements are well known but the technology and solution are unknown (i.e., changes expected in the solution).  
C. **For a project where change is not expected.** requirements **are well known**, and the solution is **both well known and repeatable.**D. For a project where the customer has an idea of what they want to build but is not sure of his/her exact needs.

C

Which of the following is **true for agile projects**?  
A. **An agile methodology** may help a team to go to market early by delivering **with limited functionality.**B. Agile methods do not require rework because the team knows exactly what they building. No refactoring of code is needed.  
C. Scrum is the best way to implement agile.  
D. If somebody says, they use an agile methodology, they must be doing either Scrum or XP.

A

One of the core principles of agile is **to "Embrace Change".** This makes architecting and designing the system challenging since you don't know all of the requirements upfront. Thus, you have to be prepared to make architecture and design changes. To effectively embrace change, agile teams must learn how to keep the cost of change low.  
From the options below, select the ones that can help mitigate this challenge. (Select 3)  
A. **Automated Regression** testing provides faster feedback which helps you detect defects quickly. This in turn, gives you confidence to make changes.  
B. **Keep the code** clean and continuously improve/refactor the design as needed. Don't delay these changes for later.  
C. **Keep design** simple and just build what is required. It is easier to change a simple design than to update a complicated design.  
D. Try to define as many requirements as you can at the beginning of the project, and spend a good amount of time designing the system.

A B C

Which of the following is true for a typical agile project? (select 2)  
A. No discussion sessions happen around what we want to build. We start with coding.  
B. **The team talks** about the high-level software architecture / design as well as their approach for building software **(the release plan)** before directly **jumping into coding**.  
C. The team does a detailed design before starting to code.  
D. **If required,** the team may need to plan and conduct training, etc. for users before **launching the system**.  
E. Release planning is never required on an agile project. We only plan for a day or for a week at the most.

B D

What issues do you see in following story?  
As a grocery buyer, I want to see different food items in different colors: red for meats, brown for grains, green for vegetables so that i can identify food items by type.  
A. This story **breaks** the **quality of negotiable.**  
B. This story is not testable.  
C. The user "grocery buyer" is not a valid user.  
D. This story has no issues. It has all the info we need in a story.

A

The goal of a story writing workshop is to:  
A. Write as many foundational stories as possible.  
B. Write as many user stories as possible in priority order.  
C. Write as many user stories as possible **under the** **themes identified.**  
D. Write as many themes as possible.

C

Who estimates the effort to complete a product backlog item **(a user story)?**  
A. **The scrum development team** **after clarifying the requirement**.  
B. **The scrum** master with input from the scrum development team.  
C. The most senior people in the organization such as the engineering managers and the chief architect.  
D. The product owner with input from the scrum development team.

A

Calculate the velocity range a team should use to select work for next iteration based on their past velocities (see chart below). The team uses the last 5 iterations to estimate their velocity. Use format "from-to" to specify the answer (e.g., 0-100).  
**Table 1**: The velocity of previous iterations  
"Iteration" - "Story points completed"  
1 - 14  
2 - 18  
3 - 23  
4 - 17  
5 - 15  
6 - 21  
7 - 22  
8 - 20

15-22

A team was doing release planning and they decided that the next release will include all stories from Story 1 to Story 11 (see table 2 below).  
The velocity range to be used for the release planning is 15-22.  
The team works in a 2 week iteration.  
It costs about $50,000 per iteration to fund the entire team.  
Calculate the estimated duration for next release. Additionally, how much will this release cost?  
**Table 2:** Prioritized Product Backlog  
"Story Title" - "Estimate (in ideal days)"  
Story 1 - 5  
Story 2 - 5  
Story 3 - 8  
Story 4 - 3  
Story 5 - 5  
Story 6 - 5  
Story 7 - 3  
Story 8 - 5  
Story 9 - 8  
Story 10 - 8  
Story 11 - 3  
Story 12 - 3  
Story 13 - 3  
Story 14 - 5  
Story 15 - 8  
Story 16 - 3  
Story 17 - 5  
Story 18 - 5  
Story 19 - 8  
Story 20 - 8  
  
A. Duration: **6-8 weeks**, Cost: **150K to 200K**  
B. Duration: 3-4 weeks, Cost: 150K to 200K77  
C. Duration: 10-14 weeks, Cost: 500K to 700K  
D. Duration: 6-8 weeks, Cost: 300K to 400K

A

Due to an unpredictable market event, the Product Owner (PO) asked the team to complete the next release in 6 weeks. Assuming the backlog in Table 2 is up to date and prioritized from highest to lowest, the Product Owner wants you to estimate what can be done in next 6 weeks. Describe 1) what can be done, 2) what might be done, and 3) what will not be done.  
The velocity range to be used for the release planning is 15-22.  
The team works in 2 week iteration.  
  
Table 2: Prioritized Product Backlog  
"Story Title" - "Estimate (in ideal days)"  
Story 1 - 5  
Story 2- 5  
Story 3 - 8  
Story 4 - 3  
Story 5 - 5  
Story 6 - 5  
Story 7 - 3  
Story 8 - 5  
Story 9 - 8  
Story 10 - 8  
Story 11 - 3  
Story 12 - 3  
Story 13 - 3  
Story 14 - 5  
Story 15 - 8  
Story 16 - 3  
Story 17 - 5  
Story 18 - 5  
Story 19 - 8  
Story 20 - 8  
A**. Most likely: Story 1 to Story 8; Might Be Done: Story 9 to Story 13; Not likely: Rest of the stories**  
B. Most likely: Story 1 to Story 9; Might be Done: Story 10; Not likely: Rest of the stories  
C. Most likely: Story 1 to Story 11; Might be Done: Story 12 and 13; Not likely: Rest of the stories

A

What do **we mean by Velocity in agile terms**?  
A. It is calculated at the team level and represents the estimated duration of current iteration.  
B. ***It is calculated at the team level and represents how much work a team can get done in an iteration.***  
C. It represents actual work done in the first iteration of project.  
D. It is a velocity of the individual team members, not the team

B

Who prioritizes the work in Scrum?  
A. **Product Owner**  
B. The Team  
C. Team Manager  
D. Scrum Master

A

In Scrum, when is the sprint backlog created?  
A. At the beginning of the project  
B. During the **sprint planning meeting**  
C. During the backlog refinement meeting  
D. Whenever needed

B

In Scrum, how is the Product Backlog arranged?  
A. Into categories, **P1, P2, P3, etc**.  
B. Items are randomly arranged.  
C. Large items at the top, small items at the bottom.  
D. **Most important items at the top, least important items at the bottom.**

D

In which artifact is the customer requirements stored?  
A. **In the Product Backlog**  
B. In a database  
C. In a Scrum Product Requirement Specification  
D. Nowhere. The Scrum Product Owner knows them

A

What is usually plotted on the x-axis of the Sprint Burndown Chart?  
A. **Days of the sprint**  
B. Tasks  
C. Hours  
D. Team member names

A

What is a **Sprint Burndown Chart?**  
A. A sprint plan which is burned to celebrate successful completion of sprint.  
B. **A chart showing the trend** of work **remaining across** time in a sprint.  
C. **A chart showing the trend** of work accomplished across time in a sprint.  
D. A graph to measure human burnout effect due to fast pace of sprint

B

Your team is planning out the next sprint. You've chosen to fill the sprint by taking stories in priority order from the product backlog and stopping when you reach the first story that won't fit in the sprint.  
Based on following details, which stories should the team commit to for a sprint?  
Table 1: Prioritized story with estimated story points and total estimate in hrs of tasks for that story.  
"Story" - "Story Points" - "Total of Tasks Estimates"  
Story 1 - 5 - 16 hrs  
Story 2 - 8 - 16 hrs  
Story 3 - 5 - 24 hrs  
Story 4 - 3 - 16 hrs  
Story 5 - 13- 32 hrs  
Story 6 - 8 - 26 hrs  
Story 7 - 5- 8 hrs  
Story 8 - 8- 15 hrs  
Story 9 - 5 - 12 hrs  
Table 2: Capacity of Team members for given sprint  
"Name" - "# days available" - "Hours / day" - "Capacity (hrs) You compute this"  
John - 3 - 4-5  
Matt - 5 - 2-3  
Sally - 5 - 4-5  
Ram - 5 - 2-3  
A. **Story 1, Story 2, and Story 3**  
B. Story 1 and Story 2  
C. Story 1, Story 2, Story 3, and Story 4  
D. Story 1, Story 2, Story 3, and Story 7

A

During sprint execution, when are **new tasks added to the sprint**?  
A. When the product owner identifies a new task.  
B. When the scrum master identifies a new task.  
C. Never. Sprint tasks are fixed and decided during sprint planning.  
D. **As soon as possible after they are identified, unless they reflect a scope change in the sprint goals.**  
E. When the scrum master approves them.

D

Who should **attend the sprint retrospective?**  
A**. All team members.**  
B. The scrum master and some of the team members.  
C. Everybody in the team, except for the product owner.  
D. Everybody who is attending the sprint review, to get as much feedback as possible.  
E. The product owner, team members, and their managers.

A

How long should the Daily Standup be?  
A. At least an hour.  
B. As long as you need.  
C. Short fixed duration **(most commonly 15 min).**  
D. Change based on how many people are attending.

C

**The CEO asks** a team member to do some work outside the goals of the current sprint in progress. What should the team member do?  
A. **Add** it to the next sprint.  
B. **Add** it to the current sprint while swapping out committed work of equal size.  
C. ***Inform the product owner so he can work with the CEO and if it is still necessary to get this work done in current sprint, it should be discussed with in the team***.  
D. **Add** it to the current sprint.

C

When is a **sprint complete?**  
A. When all tasks are complete.  
B. When all committed product backlog items meet their definition of done.  
C. It depends.  
D. **When the sprint duration ends. For example, if sprints are 2 weeks long, then the sprint is complete at the end of those 2 weeks.**

**D**

**Which of following is true about Sprint Reviews?**A. Only team members attend the Sprint Review.  
B. The Sprint Review is to show stakeholders the documentation and design. The demo should be given to customer before the sprint review.  
C. **Individual team members** should be encouraged to **demo the work** they did.  
D. The Sprint Review should be done every week even if your sprint duration is 3 weeks or longer.

C

Which of the following is the right sequence when developing software using the XP practice of Test First Programming?  
A. **Write a test  
Make sure the test fails  
Write enough code so the test passes  
Refactor as necessary**B. Write code  
Refactor as necessary  
Write a test  
Make the test pass  
C. Design  
Write code  
Write a test  
D. Write code  
Write a test  
Make the test pass  
Refactor as necessary

A

Which XP practice prescribes that "the code **[always be]** written by two programmers at one machine"?  
A. Buddy Programming  
B. Twin Programming  
C. Peer Programming  
D. **Pair Programming**

D

One of the practices of XP **is "Whole Team".** Which of the following statements align with its meaning?  
A. All the skills **necessary to deliver** the software product should be present on the team.  
B. The whole team should be working together to meet the team's commitment  
C. The whole team should be energized and passionate about the product they are building.  
D. The whole team should always sit together in a room.

A

**If an XP team cannot provide an estimate for a story**, what should they do to gain a better understanding of the story?  
A. **Create a spike story---a new story under which the team will do some research or other work to gain a better understanding of the original story.**  
B. Provide their best guess based on what they know.  
C. No action required; keep the story with no estimates.  
D. Skip that story and exclude that story from the release.

A

**According to XP's principles**, what should you do when a **story's acceptance test fails**?  
A. Release the software without fixing; a few bugs are ok.  
B. **Create a bug report so it can be fixed.**  
C. Extend the iteration's duration so the bug(s) can be fixed in the same iteration.  
D. As a team, update the acceptance test so the test passes.

B

An XP team is getting feedback more frequently than they can handle. What should they do?  
A. Ignore the extra feedback.  
B. **Slow down** the frequency of feedback.  
C. Further increase the frequency and quantity of feedback.  
D. Work extra hours each day to address all of the feedback.

B

Which of the following statements are true about **the XP value of "Simplicity"?**  
A. No matter what you are building, just choose a simple design even if it only partially solves the problem.  
B. **Select the simplest design that could possibly work.**  
C. Generalize your solution so it can work for unanticipated future requests.  
D. The software design for each component should fit on a single page.

B

In terms of "Lean", what is the best description of Waste?  
A. **Waste is the usage of any resource during the process, which are not recognized by the customer as adding value to the product or service they receive.**  
B. Waste is something you put in the rubbish bin.  
C. Waste is a part of the Process and is always inevitable.

A

**Lean techniques define "Value"** from the perspective of who?  
A. Team Members  
B. The Manager  
C. **The Customer**  
D. All stakeholders

C

In Lean software development, what does the principle of **"defer commitment"** mean?  
A. Decisions are made to delay the product delivery to a later date.  
B. **Decisions are made after having enough information from considering the alternatives.**  
C. Decisions are made to choose the modern alternative.  
D. Decisions are made just before a deadline.

B

Which of the following tools can help you find waste in a process?  
A. **Value Stream Mapping**  
B. 5 Whys  
C. Kaizen  
D. Exploring multiple options

A

How do you **deliver fast (i.e reduce cycle time) without compromising the quality**?  
A. Have people work on multiple things at the same time.  
B. Finish the work and leave quality for later.  
C. **Minimize the number of items in-process.**  
D. Ask people to work overtime.

C

**"The Last Responsible Moment"** is a tool for which Lean Software Principle?  
A. Deliver Fast  
B. See the Whole  
C. Empower People  
D. **Defer Commitment**

D

**Lean helps increase productivity by:**  
A. Adding additional resources to help decrease the burden of the workload.  
B. Increasing inputs to directly increase outputs.  
C**. Reducing the amount of useless activity that our resources (the team members) are currently burdened with.**  
D. Giving staff more work to help create more output.

C

**The 5 "Whys"** to be considered during a Root Cause Analysis are...?  
A. **Why, Why, Why, Why and Why**  
B. Who, Who, Who, Who, and Who  
C. Who, What, When, Where and Why  
D. Who, Why, Why not, When, What

A

What is the **purpose of the Lean tool 'Kaizen'?**  
  
A. To create a map of the physical path taken by the product as it passes through the process.  
B. To analyze the forces supporting or resisting a particular change.  
C. To ensure that the workstation does not make anything until the next work center requests supply.  
D. An improvement activity to **create more value and remove waste.**

D

Which of the following can be used to do 5 Whys analysis?  
A**. A fishbone diagram**  
B. A sin diagram  
C. A node graph  
D. A grid diagram

A

**In Kanban**, a developer pulls the next item to work on from the:  
A. managers who determine which tasks will be performed  
B. **previous column on the board**  
C. clients determining the tasks  
D. product backlog

B

What is the formula to calculate the **Process Cycle Efficiency**?  
A. **Value Added Time / Cycle Time**  
B. Value Added Time / Non Value Added Time  
C. (Value Added Time - Non Value Added Time) / Total Cycle Time  
D. Value Added Time - Non Value Added Time

A

What is the main goal of the Build-Measure-Learn Cycle?  
A. To go through the **build-measure-learn** cycle as **fast as possible.**  
B. To make sure we do quality work through every step of this cycle.  
C. To go through the build-measure-learn cycle as cheaply as possible.  
D. To make sure we get lot of work done effectively in this cycle.

A

What do we mean **by Validated Learning?**  
  
A. Validate what you learned from your product with company leaders.  
B. Launch a product and then decide what we want to measure to validate.  
C**. Validating** the assumptions by conducting an experiment and collecting data.  
D. Listening to what the customer is saying.

C

Why are traditional management principles **ill-suited** to the world of startups?  
A. Because startups can only be built with a **"just do it"** attitude.  
B. Because startups **face chaos and uncertainty.**  
C. Because building a startup is not the same as institution building.

B

When a **startup 'pivots',** what is it doing?  
A. Ignoring its vision.  
B. **Employing** a **revised strategy in an attempt to achieve its vision**.  
C. Optimizing its product.

B

How do Vanity metrics prevent/inhibit pivoting?  
A. **Vanity metrics allow entrepreneurs to draw incorrect conclusions. Based on these metrics, they assume that the product is going in the right direction when it really isn't.**  
B. Vanity metrics are the metrics that matter.  
C. Vanity metrics are designed by leadership so no pivoting is necessary.  
D. Vanity metrics are user-based collection which is always the right metrics to measure.

A

What **are leap-of-faith assumptions**?  
A. Assumptions that, if true, would result in a lot of revenue.  
B. Assumptions that are the **riskiest elements** of a startup plan.  
C. Assumptions that the organization made after getting the blessing of the stakeholders.

B

**Who is an "Intrapreneur" ?**  
A. Entrepreneurs that work with other entrepreneurs.  
B. **A manager** who promotes **innovations within** the company.  
C. The opposite of an entrepreneur: someone who prevents innovation.

B

What is created to **allow a compiler to temporarily stop processing code** that is being executed to allow for the developer to see current state?  
A. D​ebugging break  
B. D​ebugging  
C. P​ause  
D. S​toppoint  
E. **B​reakpoint**

E