Question 1

Choose the correct answer.

What is one key advantage of using SysML parametrics versus traditional derived properties?

Options:

A- A derived property requires an additional constraint expression, whereas SysML parametrics does not.

B- OCL-based constraint expressions can be used with SysML parametrics but not with derived properties

C- it takes many more steps to specify derived properties in the typical tool compared to specifying constraint blocks.

D- SysML parametrics supports non causal expressions, whereas a derived property involves an expression with a fixed output direction
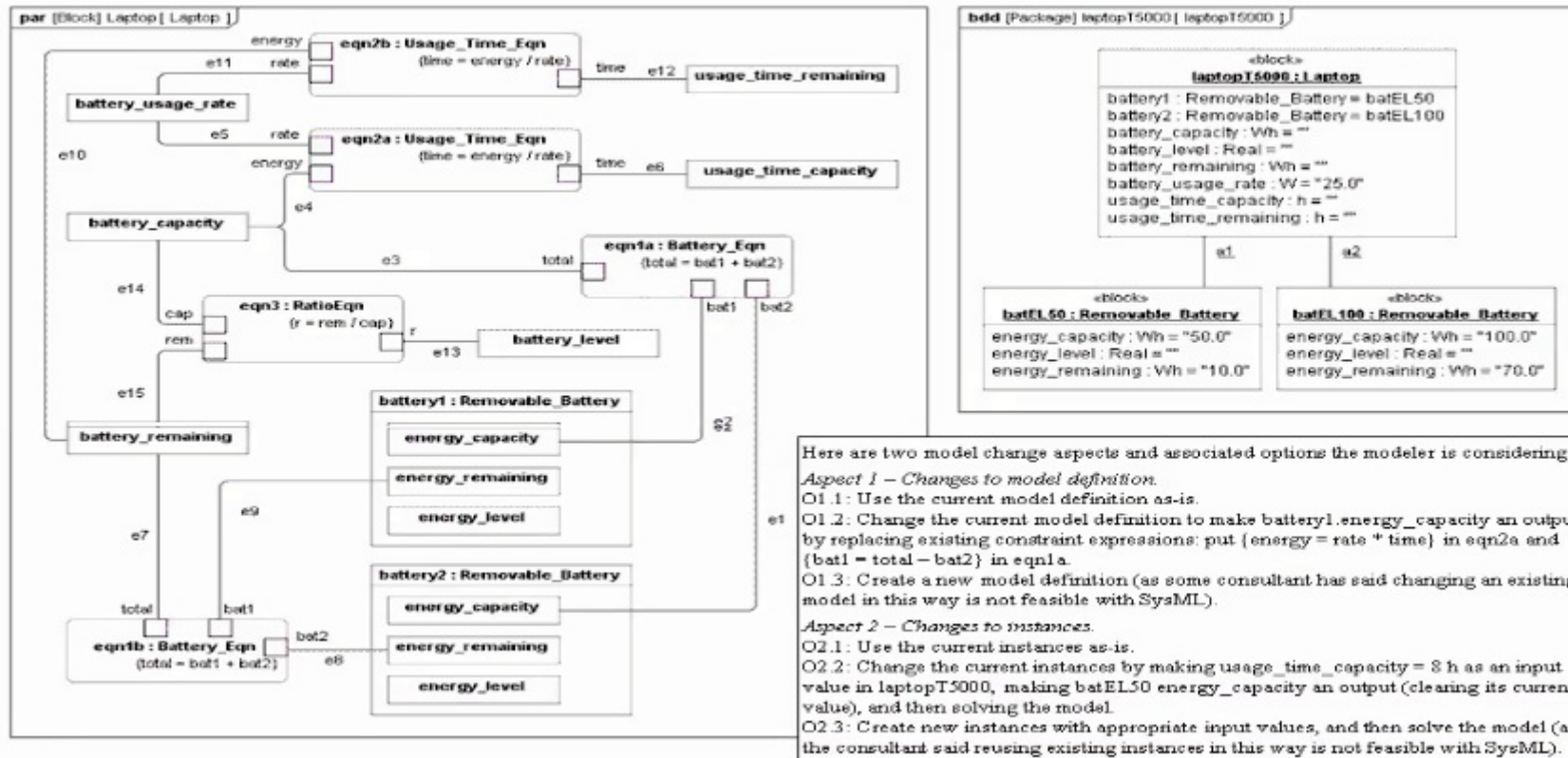
Answer:
C

Question 2

Choose the correct answer.

The essentials of a laptop battery capacity model are shown In the following diagrams (where the value types W, h and Wh stand for watl, hour, and watt-hour respectively). Assume that the instance values shown are inputs, and that nothing relevant has been omitted.

par [Block] Laptop [Laptop]

- energy
- e11 rate — **eqn2b : Usage_Time_Eqn** (time = energy / rate) — time e12 — **usage_time_remaining**
- **battery_usage_rate**
- e5 rate — **eqn2a : Usage_Time_Eqn** (time = energy / rate) — time e6 — **usage_time_capacity**
- e10 energy
- e4
- **battery_capacity**
- e3 total — **eqn1a : Battery_Eqn** (total = bat1 + bat2) — bat1 bat2
- e14
- cap — **eqn3 : RatioEqn** (r = rem / cap) — r
- rem — e13 — **battery_level**
- e15
- **battery_remaining**
- **battery1 : Removable_Battery**
  - energy_capacity
  - energy_remaining
  - energy_level
- e9
- e7
- **battery2 : Removable_Battery**
  - energy_capacity
  - energy_remaining
  - energy_level
- total bat1 — **eqn1b : Battery_Eqn** (total = bat1 + bat2) — bat2 e8

bdd [Package] laptopT5000 [laptopT5000]

«block»
laptopT5000 : Laptop
- battery1 : Removable_Battery = batEL50
- battery2 : Removable_Battery = batEL100
- battery_capacity : Wh = ""
- battery_level : Real = ""
- battery_remaining : Wh = ""
- battery_usage_rate : W = "25.0"
- usage_time_capacity : h = ""
- usage_time_remaining : h = ""

a1 a2

«block»
batEL50 : Removable_Battery
- energy_capacity : Wh = "50.0"
- energy_level : Real = ""
- energy_remaining : Wh = "10.0"

«block»
batEL100 : Removable_Battery
- energy_capacity : Wh = "100.0"
- energy_level : Real = ""
- energy_remaining : Wh = "70.0"

Here are two model change aspects and associated options the modeler is considering:

Aspect 1 – Changes to model definition.
O1.1: Use the current model definition as-is.
O1.2: Change the current model definition to make battery1.energy_capacity an output by replacing existing constraint expressions: put {energy = rate * time} in eqn2a and {bat1 = total − bat2} in eqn1a.
O1.3: Create a new model definition (as some consultant has said changing an existing model in this way is not feasible with SysML).

Aspect 2 – Changes to instances.
O2.1: Use the current instances as-is.
O2.2: Change the current instances by making usage_time_capacity = 8 h as an input value in laptopT5000, making batEL50 energy_capacity an output (clearing its current value), and then solving the model.
O2.3: Create new instances with appropriate input values, and then solve the model (as the consultant said reusing existing instances in this way is not feasible with SysML).

The designer needs to determine what the energy_capacity of battery 1 should be to enable a laptop usage_time_capacity time of 8 hours. Which combination of the options listed in the text box in the figure will achieve this Intent with minimal changes (including minimal new aspects)?

Options:

A- O1.1 and O2 1

B- O1.1 and O2 2

C- O1 1 and O2 3

D- O1.2 and O2.1

E- O1 7 and O2.2

F- O1.2 and O2.3

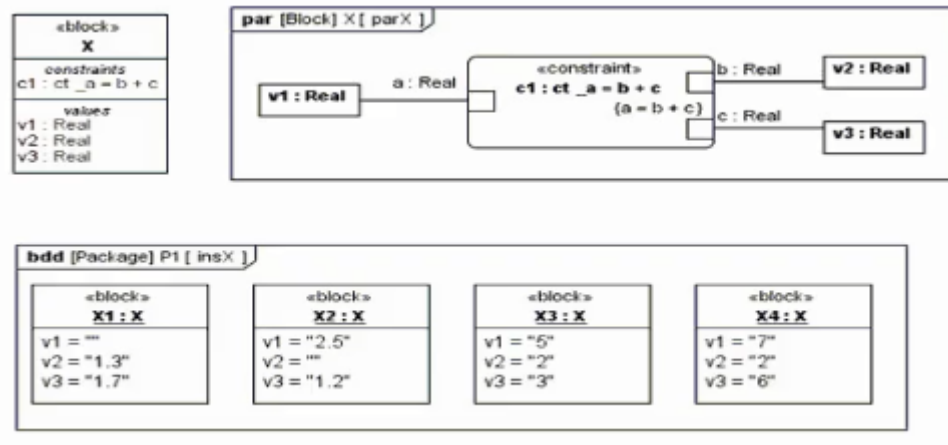**G-** O1 3 and O2 3

Answer:

C

Question 3

Question Type: MultipleChoice

Choose the correct answer.

Given the following model:

Which statement is true?

Options:

A- Only Instances X1 and X? are invalid

B- Only instances X2 and X4 are invalid.

C- Only instance X4 is invalid.

D- All instances (X1, X2, X3, and X4) are valid.

Answer:

C

Question 4

Choose the correct answer.

Given the model composed of the following diagram:
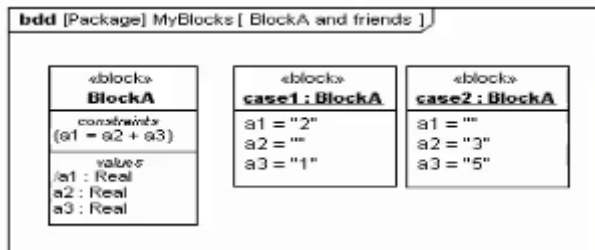
The modeler has set all shown values us inputs and next intends to solve the mode that is, to calculate the outputs. Assume nothing relevant has been left out.

What is wrong with this model?

Options:

A- The modeler set a1 as an input value in case1.

B- Block A cannot be used by both easel and case2.

C- Both easel and case2 should not be underlined.

D- The slash (/) in property a1 of BlockA is an error that paramethes will assume to be a division sign.

Answer:

C

Question 5

Choose the correct answer.

A system engineer has created the following model of a tank system composed of two tanks and a pipe connecting them:

bdd [Package] P11 [Tank System Structure & Content]

«block»
Tank_System
...

«block»
Water
values
flowRate : m³/s

tA
«block»
Tank_A

pipe
«block»
Pipe
values
endA_Area : m²
endB_Area : m²

tB
«block»
Tank_B

ibd [Block] Tank_System [Tank System Connections]

tA : Tank_A

p2 : Water

wFlowin : Water

endA : Water
pipe : Pipe

endB : Water

wFlowOut : Water

p1 : Water
tB : Tank_B
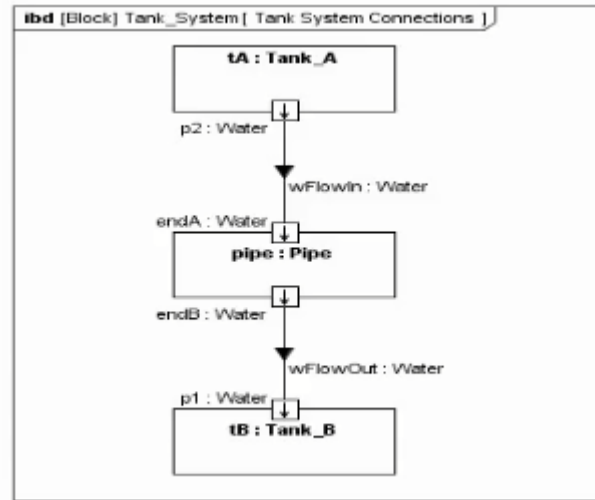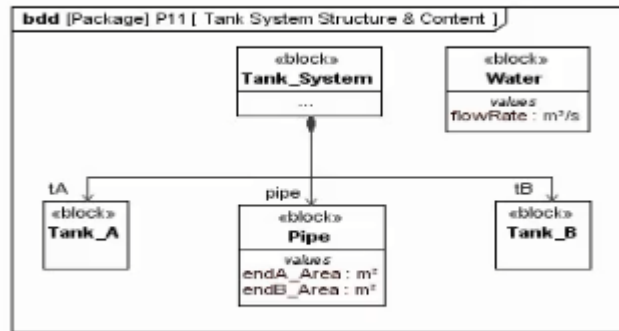
The system engineer wants to mathematically relate the flow of water through the pipe using the following mass conservation equation:

Tank_System wFlowin flowRate * Tank_System pipe endA_Area = Tank_System wFlowOut flowRate * Tank_System pipe endB_Area
How would the system engineer model this in SysML?

Options:

A- Create a block to represent the mass conservation equation, use it in Tank_System. and relate its properties to the properties of wFlowin. wFlowOut. and pipe

B- Create a constraint block to represent the mass conservation equation, use it in Tank_System. and relate its parameters to the properties of wFiowin. wFlowOut. and pipe

C- Create a constraint block to represent each of wFlowin wFlowOut and the mass conservation equation; use these constraint blocks In Tank_System. and relate their parameters to the properties of pipe.

D- Create two flow properties for Tank_System (equivalent to wFlowin and wFlowOut); create a constraint block for the mass conservation equation and use it in Tank_System. and then relate the flow properties to the new constraint property.

E- It is not possible to model this because wFlowin and wFlowOut are item properties and not flow properties

Answer:

C

Question 6

Choose the correct answer.

A system engineer has created a SysML block structure for his system-of-interest. Two of the blocks (M and E) represent system-level abstractions of components that will be designed by a mechanical engineer and an electrical engineer m their respective computer-aided design (CAD) tools.

Given that the CAD models are wrapped as blocks B_mcad and B_ecad, what type of diagram should the system engineer use to quantitatively relate the properties of B_mcad and B_ecad to their system level abstractions M and E respectively?

Options:

A- an activity diagram

B- a parametric diagram

C- an internal block diagram
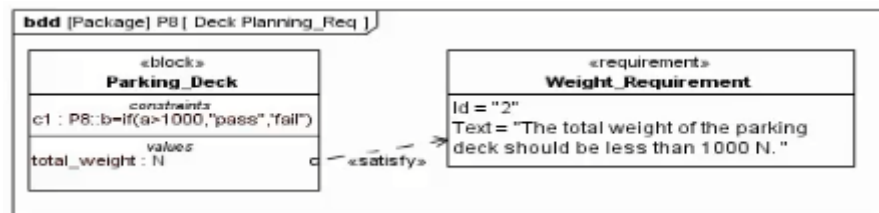
D- a block definition diagram

Answer:

B

Question 7

Question Type: MultipleChoice

Choose the correct answer.

Given the following diagram:

bdd [Package] P8 [Deck Planning_Req]

«block»
Parking_Deck
constraints
c1 : P8::b=if(a>1000,"pass","fail")
values
total_weight : N

«requirement»
Weight_Requirement
Id = "2"
Text = "The total weight of the parking deck should be less than 1000 N."

«satisfy»

Which SysML, relationship should be used to relate c1 to Weight_Requirement for best semantics?

Options:

A- Copy

B- Trace

C- Refine

D- Satisfy

E- Dependency

F- Association

G- composition

Answer:

B