

**Recalling the model based on the color criterion.**

Recalling each object color correctly had 0.2 point.

[illegible]

**Recalling the model based on the shape criterion.**

Shapes of two pieces of mechanical equipment (Shape 1 being the large piece and Shape 2 being the small piece) were asked in the Model A questionnaire.

Shapes of the tank (Shape 1) and feeder (Shape 2) were asked in the Model B questionnaire.

Recalling each object shape correctly had 0.5 point. If the 3D equipment shape was not specified but the shape was drawn correctly in the 2D plan, 0.25 point was given.

Name	Model A Shape		Model B Shape	
	Shape 1	Shape 2	Shape 1	Shape 2
BV1	0.25	0.5	0	0
BV2	0	0	0	0
BV3	0.5	0.5	0.5	0.5
BV4	0.5	0.5	0.25	0
BV5	0	0	0.5	0.5
BV6	0.25	0	0	0
BV7	0.5	0.5	0.5	0.5
BV8	0	0	0.5	0.5
BV9	0.5	0	0.5	0.5
BV10	0.5	0	0	0
BV11	0	0	0	0
BV12	0.25	0	0	0
VB1	0.5	0.5	0	0
VB2	0.5	0.5	0.5	0
VB3	0.5	0.5	0	0.5
VB4	0.5	0.5	0	0
VB5	0.5	0.5	0.5	0.5
VB6	0.5	0.5	0	0
VB7	0.5	0	0	0
VB8	0.5	0.5	0	0
VB9	0	0	0	0
VB10	0.5	0.5	0.5	0.5
VB11	0.5	0	0	0.5
VB12	0.5	0.5	0	0

### Recalling the model based on the dimension criterion.

Mechanical equipment parts in Model A and tank and feeder in Model B were considered for this analysis. Recalling the width, length, and height of each part of equipment correctly was worth 0.5 point. 0.25 point for each part of equipment was given to the dimension in relevance to the other equipment part, and 0.25 was given to the dimension in relevance to the surrounding objects.

	Model A Dimension			Model B Dimension		
Name	Width	Length	Height	Width	Length	Height
BV1	0	0	0	0	0	0
BV2	0.5	0.5	0	0.5	0.5	0
BV3	1	1	1	0.5	0.5	0.5
BV4	0	0	0.5	0	0	0.5
BV5	0	0	0	1	1	0.5
BV6	0.5	0.5	0	0	0	0
BV7	1	1	0.5	1	1	1
BV8	0.5	0.5	0	1	1	0.75
BV9	0.5	0.5	0	1	1	0.5
BV10	0.5	0.5	0	0	0	0
BV11	0	0	0	0	0	0
BV12	0	0	0	0	0	0
VB1	1	1	1	0	0	0
VB2	0.5	0.5	1	1	1	0
VB3	1	0.5	0.5	1	1	0.75
VB4	1	1	0.5	0	0	0
VB5	1	1	1	0.5	0.5	0.5
VB6	1	1	1	0	0	0
VB7	0.5	0.5	0	0	0	0
VB8	1	1	1	0	0	0
VB9	0	0	0	0	0	0
VB10	1	1	1	1	1	0.5
VB11	0.5	0.5	0.5	0	0.5	0
VB12	0.5	0.5	0	0	0	0

### Recalling the model based on the pipeline route criterion.

Four pipes in each model were connected to piping equipment. 0.25 point was given for recalling the connection of each pipe correctly. 0.25 point was considered for recalling each of the four criteria of position in elevation and plan, and location in elevation and plan for each pipe.

Name	Model A Pipeline					Model B Pipeline				
	Pipe Connection	Elevation		Plan		Pipe Connection	Elevation		Plan	
		Pos	Loc	Pos	Loc		Pos	Loc	Pos	Loc
BV1	0	1	0.5	1	1	0	1	0.5	1	1
BV2	0	0	0	0	0	1	0	0	1	0.5
BV3	0	0	0	1	0	0.5	0.5	0.5	0	0
BV4	0	0	0	0	0	0	0	0	0.5	0
BV5	1	1	1	0.5	0.5	1	1	1	1	1
BV6	1	1	0.75	0	0	0.5	0.5	0.5	0.5	0.25
BV7	1	1	0.75	0	0	1	1	1	1	1
BV8	0	0	0	0	0.5	1	1	1	1	0.5
BV9	0.5	1	0.75	1	1	0.5	1	1	1	0.5
BV10	0.5	1	0.5	0	0	0	0	0	0	0
BV11	0.5	0	0	0	0	0	0	0	0	0
BV12	0	0	0	0	0	0.5	0.5	0.5	0	0
VB1	1	0.5	0.25	1	1	0.5	1	0.75	0.5	0.5
VB2	0.75	1	0.5	1	0.5	1	1	1	1	1
VB3	1	1	1	0.5	0.5	1	1	0.75	0.5	0.25
VB4	1	1	0.5	1	1	0	0.5	0	1	0.5
VB5	0	1	0.25	1	0.75	1	0	0	0.5	0.5
VB6	0.5	1	0.5	0	0	0	0.5	0	0	0
VB7	0	0	0	0	0	0	0	0	0	0
VB8	1	1	1	1	1	1	1	1	1	1
VB9	1	1	1	1	1	0.5	0.5	0	0	0
VB10	1	1	1	1	0.5	1	1	1	1	1
VB11	1	1	0.75	0	0	0.5	0.5	0	0.25	0
VB12	0	0	0	0	0.25	0	0	0	0	0.25

Pos=Position & Loc=Location

### Recalling user location in the model with viewpoint criterion.

User's location was evaluated based on the area in the model it was specified. Viewpoint 1 was close to chillers next to the southern wall, and Viewpoint 2 was close to mechanical equipment next to the Northern wall. Recalling the location of each viewpoint was worth 0.5 point. 0.25 point was awarded when the area was close to the correct wall but not to the equipment. The relative distance of the viewpoint from the wall and equipment was then evaluated by assigning 0.25 point for each distance.

Name	Model A				Model B			
	Viewpoint 1		Viewpoint 2		Viewpoint 1		Viewpoint 2	
	Location	Distance	Location	Distance	Location	Distance	Location	Distance
BV1	0	0	0	0	0.5	0.5	0.25	0.5
BV2	0	0	0	0	0	0	0.5	0.5
BV3	0.25	0.5	0.5	0.5	0.5	0.5	0.5	0.5
BV4	0	0	0	0	0	0	0	0
BV5	0.25	0	0	0	0.25	0.5	0.5	0.5
BV6	0.25	0.5	0.5	0.5	0	0	0	0
BV7	0	0	0	0	0.5	0.25	0.5	0.5
BV8	0.25	0.25	0.5	0	0.25	0.5	0	0
BV9	0.25	0	0.5	0.5	0	0	0.5	0.5
BV10	0	0	0	0	0	0	0	0
BV11	0	0	0	0	0	0	0	0
BV12	0	0	0	0	0	0	0	0
VB1	0.5	0.25	0.5	0.25	0.5	0.25	0.5	0.25
VB2	0	0	0	0	0	0	0	0
VB3	0	0	0	0	0.5	0.25	0	0
VB4	0.25	0.5	0	0	0.25	0.5	0	0
VB5	0.5	0.5	0.5	0.25	0.5	0	0.5	0
VB6	0.5	0	0.5	0	0.5	0	0.5	0
VB7	0.5	0	0	0	0.5	0	0	0
VB8	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
VB9	0	0	0	0	0	0	0	0
VB10	0.5	0.5	0.5	0.25	0.5	0.5	0.5	0.5
VB11	0	0	0	0	0.25	0	0.25	0
VB12	0	0	0.25	0.5	0	0	0	0