The Certification of 3D CAD Engineer Examination (sample)

Caution of sample examination

① Question is based on ISO (First angle projection method).
② The side view from the right.
Make the solid model shown in the following figures. Choose the most appropriate answer for Q1 to Q4 and circle them on your answer sheet.

Modeling target time: Difficulty level: Medium: 30 mins/ Hard: 15 mins

«Construction instructions»

● Make a solid model based on the following origin (point O) and its directions.
【Coordinate direction and origin (point O)】

point O

point O

point O
Question 1
Calculate the surface area shown by shaded portions in figure Q1
(If you can choose several dimensions at once, the answer should be
the sum of all surface areas) and circle the closest answer on your answer sheet.

Figure Q1


Question 2
Calculate the surface area shown by shaded portions in figure Q2
(If you can choose several dimensions at once, the answer should be
the sum of all surface areas) and circle the closest answer on your answer sheet.

Figure Q2

Question 3
Measure the distance between point A (the midpoint of line C) and point B (the midpoint of line D) in figure Q3, and circle the closest answer on your answer sheet.

Figure Q3


Question 4
Calculate the volume and find the coordinate value of the completed model's center of gravity, and circle the closest answer on your answer sheet. The center of gravity should be calculated based on the origin.

Answers (the volume and the coordinate of the center of gravity)

Make the five solid models shown in the following figures for q-5, q-6, q-7, q-8 and q-9, and make another solid model based on its assembly function.
Also choose the most appropriate answer for Q5 to Q10 and circle each on your answer sheet.

Modeling target time: 45 min / Difficulty level: Hard

<Construction instructions >
● Make a solid model based on the following origin (point O) and its directions.

Q5 Calculate the volume and find the coordinate value of the completed model's center of gravity, and circle the closest answer on your answer sheet. The center of gravity should be calculated based on the origin for q-5.

(q-5)
[Coordinate direction and origin (point O)]

Answers (the volume and the coordinate of the center of gravity)

[1] $9.122\times10^4$  X: $3.417\times10^1$  Y: $1.302\times10^1$  Z: $5.170\times10^1$

[2] $9.124\times10^4$  X: $3.417\times10^1$  Y: $1.302\times10^1$  Z: $5.170\times10^1$

[3] $9.124\times10^4$  X: $3.419\times10^1$  Y: $1.304\times10^1$  Z: $5.173\times10^1$

[4] $9.126\times10^4$  X: $3.419\times10^1$  Y: $1.304\times10^1$  Z: $5.173\times10^1$

[5] $9.126\times10^4$  X: $3.421\times10^1$  Y: $1.306\times10^1$  Z: $5.175\times10^1$
Q6 Calculate the volume and find the coordinate value of the completed model's center of gravity, and circle the closest answer on your answer sheet. The center of gravity should be calculated based on the origin for q-6.

(q-6)
【Coordinate direction and origin (point O)】

Answers (the volume and the coordinate of the center of gravity)

[1] $2.411 \times 10^5$  X:4.158x10  Y:5.402x10  Z:2.158x10
[2] $2.413 \times 10^5$  X:4.158x10  Y:5.402x10  Z:2.158x10
[3] $2.413 \times 10^5$  X:4.161x10  Y:5.403x10  Z:2.160x10
[4] $2.415 \times 10^5$  X:4.161x10  Y:5.403x10  Z:2.160x10
[5] $2.415 \times 10^5$  X:4.163x10  Y:5.404x10  Z:2.162x10
Q7 Calculate the volume and find the coordinate value of the completed model's center of gravity, and circle the closest answer on your answer sheet. The center of gravity should be calculated based on the origin for q-7.

(q-7)
[Coordinate direction and origin (point O)]

Answers (the volume and the coordinate of the center of gravity)

[1] $2.567 \times 10^5$  X: $2.534 \times 10$  Y: $4.594 \times 10$  Z: $4.033 \times 10$

[2] $2.567 \times 10^5$  X: $2.536 \times 10$  Y: $4.596 \times 10$  Z: $4.034 \times 10$

[3] $2.569 \times 10^5$  X: $2.536 \times 10$  Y: $4.596 \times 10$  Z: $4.034 \times 10$


Q8 Calculate the volume and find the coordinate value of the completed model's center of gravity, and circle the closest answer on your answer sheet. The center of gravity should be calculated based on the origin for q-8.

(q-8)
【Coordinate direction and origin (point O)】

Answers (the volume and the coordinate of the center of gravity)

[1] $1.720 \times 10^5$  
    X: 2.854 x 10  
    Y: 2.942 x 10  
    Z: 1.993 x 10

[2] $1.720 \times 10^5$  
    X: 2.857 x 10  
    Y: 2.944 x 10  
    Z: 1.995 x 10

[3] $1.721 \times 10^5$  
    X: 2.857 x 10  
    Y: 2.944 x 10  
    Z: 1.995 x 10

[4] $1.721 \times 10^5$  
    X: 2.859 x 10  
    Y: 2.946 x 10  
    Z: 1.997 x 10

    X: 2.859 x 10  
    Y: 2.946 x 10  
    Z: 1.997 x 10
Q9 Calculate the volume and find the coordinate value of the completed model's center of gravity, and circle the closest answer on your answer sheet. The center of gravity should be calculated based on the origin for q-9.

(q-9)
**[Coordinate direction and origin (point O)]**

![Diagram showing coordinate directions and origin point O]

**Answers (the volume and the coordinate of the center of gravity)**

<table>
<thead>
<tr>
<th>No.</th>
<th>Volume</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$1.519 \times 10^5$</td>
<td>3.330</td>
<td>4.781</td>
<td>1.499</td>
</tr>
<tr>
<td>2</td>
<td>$1.519 \times 10^5$</td>
<td>3.331</td>
<td>4.783</td>
<td>1.500</td>
</tr>
<tr>
<td>3</td>
<td>$1.521 \times 10^5$</td>
<td>3.331</td>
<td>4.783</td>
<td>1.500</td>
</tr>
<tr>
<td>4</td>
<td>$1.521 \times 10^5$</td>
<td>3.332</td>
<td>4.785</td>
<td>1.501</td>
</tr>
<tr>
<td>5</td>
<td>$1.523 \times 10^5$</td>
<td>3.332</td>
<td>4.785</td>
<td>1.501</td>
</tr>
</tbody>
</table>

**Q10**

Assemble the five solid models that you created for Q5 to Q9 to make a cube measuring 100mm (W) x 100 (D) mm (H) x 100 mm on the outside. (This cube has space inside but no holes on its surface). Also find the coordinate of the assembled model’s center of gravity, and circle the closest answer on your answer sheet.

The center of gravity should be calculated based on the origin.

<<Assemble instruction>>

Assemble the other solid model based on [q-5] which the coordinate direction and the origin of [q-5] was matched to the assemble coordinate direction and the origin.

**Answer (Value of the center of gravity)**

<table>
<thead>
<tr>
<th>No.</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.540</td>
<td>2.443</td>
<td>3.063</td>
</tr>
<tr>
<td>2</td>
<td>2.541</td>
<td>2.443</td>
<td>3.064</td>
</tr>
<tr>
<td>3</td>
<td>2.542</td>
<td>2.441</td>
<td>3.064</td>
</tr>
<tr>
<td>4</td>
<td>2.550</td>
<td>2.441</td>
<td>3.065</td>
</tr>
<tr>
<td>5</td>
<td>2.551</td>
<td>2.440</td>
<td>3.065</td>
</tr>
</tbody>
</table>
Make a solid model for the following figures, and choose the most appropriate answer for Q11 to Q14.

**Modeling target time: 25 min Difficulty level: Hard**

**Construction instruction**
- Make a solid model based on the following origin (point O) and its directions.

All thickness, unless specifically stated, are always 3 mm.
【Coordinate direction and origin (point O)】
Question 11

Calculate the surface area shown by shaded portion and bold line in figure Q11 (If you can choose several dimensions at once, the answer should be the sum of all these portions), and circle the closest answer on your answer sheet.

Figure Q11

Question 12

Measure the distance between point C and point D in figure Q12, and circle the closest answer on your answer sheet.

Figures Q12

Answers

Question 13
Calculate the surface area shown by shaded portion and bold line in figure Q13
(If you can choose several dimensions at once, the answer should be
the sum of all these portions), and circle the closest answer on your answer sheet.
Figure Q13


Question 14
Calculate the volume and find the coordinate of the completed model's center of gravity of,
and circle the closest answer on your answer sheet.
The center of gravity should be measured based on the origin.

Answers (the volume and the coordinate of the center of gravity)

<table>
<thead>
<tr>
<th></th>
<th>Volume</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
</table>
Q Make the solid models shown in the following figures, and choose the most appropriate answer for Q15 to Q18.

Modeling target time: 20 mins

Construction instruction:
- Make a solid model based on the following origin (point O) and its directions.
【Coordinate direction and origin (point O)】
Question 15

Calculate the surface area shown by shaded portion and bold line in figure Q15 (If you can choose several dimensions at once, the answer should be the sum of all these portions), and circle the closest answer on your answer sheet.

Figure Q15


Question 16

Calculate the surface area shown by shaded portion and bold line in figure Q16 (If you can choose several dimensions at once, the answer should be the sum of all these portions), and circle the closest answer on your answer sheet.

Figure Q16

Question 17
Measure the distance between point A and point B (the midpoint of line C) in figure Q17, and circle the closest answer on your answer sheet.

Figure Q17


Question 18
Calculate the volume and the coordinate of the completed model's center of gravity, and circle the closest answer on your answer sheet.
The center of gravity should be measured based on the origin.

Answers (the volume and the coordinate of the center of gravity)
