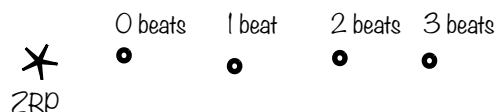


- 1) The following picture shows washers that were placed at evenly-spaced time points as a dune buggy traveled along the floor. Time point values are labeled.



- a) **If the position values can be ranked** based only on the picture, then rank the washers from least position value to greatest position value.

Least Value I _____ II _____ III _____ IV _____ Greatest Value

- b) **If the position values cannot be ranked**, please check one of the following:

- ☐ The position value is *zero* for all of the washers.
- ☐ The position values are equal (but not *zero*) for all of the washers.
- ☐ It is not possible to determine the position values for any of the washers.

- c) Please carefully explain your reasoning.

- d) How sure are you of your ranking? (circle one)

1 2 3 4 5 6 7 8 9 10

basically guessed

fairly sure

very confident

- 1) The following picture shows washers that were placed at evenly-spaced time points as a dune buggy traveled along the floor. Time point values are labeled.



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- c) Please carefully explain your reasoning.

- d) How sure are you of your ranking? (circle one)

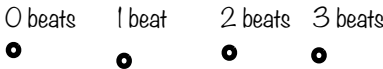
1 2 3 4 5 6 7 8 9 10

basically guessed

fairly sure

very confident

2) The following picture shows washers that were placed at evenly-spaced time points as a dune buggy traveled along the floor. Time point values are labeled, but the reference point is not known.



a) **If the position values can be ranked** based only on the picture, then rank the washers from least position value to greatest position value.

Least Value

I _____ II _____ III _____ IV _____

Greatest Value

- b) **If the position values cannot be ranked**, please check one of the following:
- ☐ The position value is *zero* for all of the washers.
- ☐ The position values are equal (but not *zero*) for all of the washers.
- ☐ It is not possible to determine the position values for any of the washers.

c) Please carefully explain your reasoning.

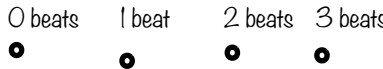
d) How sure are you of your ranking? (circle one)

12345678910

basically guessedfairly surevery confident

¹ O’Kuma, T., Maloney, D., Hieggelke, C. Ranking Task Exercises in Physics. Prentice Hall, Upper Saddle River, New Jersey USA. 2000 (*I wrote the tasks in this lesson myself.*)

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a) **If the position values can be ranked** based only on the picture, then rank the washers from least position value to greatest position value.

Least Value

I _____ II _____ III _____ IV _____

Greatest Value

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c) Please carefully explain your reasoning.

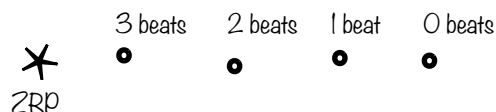
d) How sure are you of your ranking? (circle one)

12345678910

basically guessedfairly surevery confident

¹ O’Kuma, T., Maloney, D., Hieggelke, C. Ranking Task Exercises in Physics. Prentice Hall, Upper Saddle River, New Jersey USA. 2000 (*I wrote the tasks in this lesson myself.*)

- 3) The following picture shows washers that were placed at evenly-spaced time points as a dune buggy traveled along the floor. Time point values are labeled.



- a) **If the position values can be ranked** based only on the picture, then rank the washers from least position value to greatest position value.

Least Value I _____ II _____ III _____ IV _____ Greatest Value

- b) **If the position values cannot be ranked**, please check one of the following:

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- ☐ The position values are equal (but not *zero*) for all of the washers.
- ☐ It is not possible to determine the position values for any of the washers.

- c) Please carefully explain your reasoning.

- d) How sure are you of your ranking? (circle one)

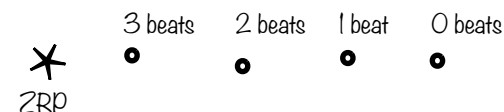
1 2 3 4 5 6 7 8 9 10

basically guessed

fairly sure

very confident

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- c) Please carefully explain your reasoning.

- d) How sure are you of your ranking? (circle one)

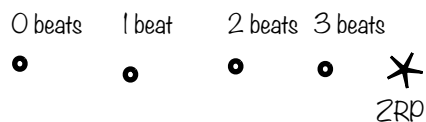
1 2 3 4 5 6 7 8 9 10

basically guessed

fairly sure

very confident

- 4) The following picture shows washers that were placed at evenly-spaced time points as a dune buggy traveled along the floor. Time point values are labeled.



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Least Value I _____ II _____ III _____ IV _____ Greatest Value

- b) **If the position values cannot be ranked**, please check one of the following:

- ☐ The position value is *zero* for all of the washers.
☐ The position values are equal (but not *zero*) for all of the washers.
☐ It is not possible to determine the position values for any of the washers.

- c) Please carefully explain your reasoning.

- d) How sure are you of your ranking? (circle one)

1 2 3 4 5 6 7 8 9 10

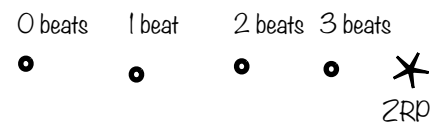
basically guessed

fairly sure

very confident

² O’Kuma, T., Maloney, D., Hieggelke, C. Ranking Task Exercises in Physics. Prentice Hall, Upper Saddle River, New Jersey USA. 2000 (*I wrote the tasks in this lesson myself.*)

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Unit 1. Constant Velocity Particle Model Name: _____

Ranking Tasks³ 1.5c. Position 3 Date: _____ Period: _____

- 5) This time, the students placed brightly-colored plastic shapes at evenly-spaced time points as a dune buggy traveled along the floor, shown in the picture below. Time point values are not labeled.



- a) **If the position values can be ranked** based only on the picture, then rank the shapes from least position value to greatest position value.

Least Value I _____ II _____ III _____ IV _____ Greatest Value

- b) **If the position values cannot be ranked**, please check one of the following:

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☐ The position values are equal (but not *zero*) for all of the shapes.
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- c) Please carefully explain your reasoning.

- d) How sure are you of your ranking? (circle one)

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basically guessed

fairly sure

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Unit 1. Constant Velocity Particle Model Name: _____

Ranking Tasks³ 1.5c. Position 3 Date: _____ Period: _____

- 5) This time, the students placed brightly-colored plastic shapes at evenly-spaced time points as a dune buggy traveled along the floor, shown in the picture below. Time point values are not labeled.



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Least Value I _____ II _____ III _____ IV _____ Greatest Value

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☐ The position values are equal (but not *zero*) for all of the shapes.
☐ It is not possible to determine the position values for any of the shapes.

- c) Please carefully explain your reasoning.

- d) How sure are you of your ranking? (circle one)

1 2 3 4 5 6 7 8 9 10

basically guessed

fairly sure

very confident

6) This time, the students placed brightly-colored plastic shapes at evenly-spaced time points as a dune buggy traveled along the floor, shown in the picture below. Time point values are not labeled.



- a) **If the placement order can be ranked** based only on the picture, then rank the shapes from first placed to last placed.
- First
Placed

I_____

II_____

III_____

IV_____

Last
Placed
- b) **If the placement order cannot be ranked**, please check one of the following:
- ☐ The shapes were all placed simultaneously.
- ☐ It is not possible to determine the placement order for any of the shapes.
- c) Please carefully explain your reasoning.

d) How sure are you of your ranking? (circle one)

1

2

3

4

5

6

7

8

9

10

basically guessed

fairly sure

very confident

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- First
Placed

I_____

II_____

III_____

IV_____

Last
Placed
- b) **If the placement order cannot be ranked**, please check one of the following:
- ☐ The shapes were all placed simultaneously.
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- c) Please carefully explain your reasoning.

d) How sure are you of your ranking? (circle one)

1

2

3

4

5

6

7

8

9

10

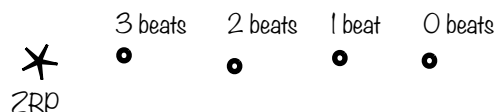
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- 7) The following picture shows washers that were placed at evenly-spaced time points as a dune buggy traveled along the floor. Time point values are labeled.



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- d) How sure are you of your ranking? (circle one)

1 2 3 4 5 6 7 8 9 10

basically guessed

fairly sure

very confident

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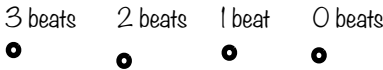
1 2 3 4 5 6 7 8 9 10

basically guessed

fairly sure

very confident

8) The following picture shows washers that were placed at evenly-spaced time points as a dune buggy traveled along the floor. Time point values are labeled, but the reference point is not known.



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Least Value

I _____ II _____ III _____ IV _____

Greatest Value

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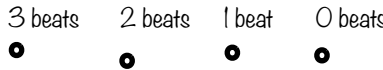
d) How sure are you of your ranking? (circle one)

1 2 3 4 5 6 7 8 9 10

basically guessed fairly sure very confident

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