

3. Use your graph to write an equivalent cosine equation for the deer population.

4. Assuming $t = 0$ is December, at what t -value is the deer population at its minimum? During what month does this occur? Why do you think the minimum population occurs during that month?






5. At what t -value is the deer population at its maximum? During what month does this occur? Why do you think the maximum population occurs during that month?

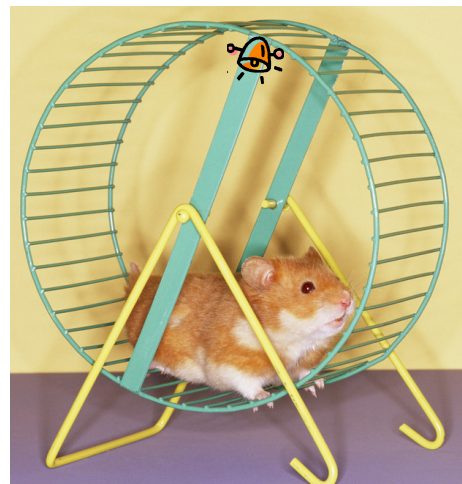
PART II – DUE DECEMBER 7, 2011

6. A photographer visits the forest on a particular day to photograph the wildlife. If 120 deer are present on that day, on which month and day(s) did the photographer visit? Explain how you found your answer and show all work involved.

PART I – DUE NOVEMBER 28, 2011

A bell is attached to the crossbar of a hamster wheel as shown in the picture to the right. As the wheel rotates clockwise, the bell is in motion.

-  The wheel has a diameter of 8 inches.
-  The wheel completes one revolution every 5 seconds.
-  Assume the crossbar of the wheel starts (when time = 0) perpendicular to the floor with the bell on top.
-  The bottom of the hamster wheel is 1 inch off the ground.
-  The height of the bell will be measured relative to the floor.

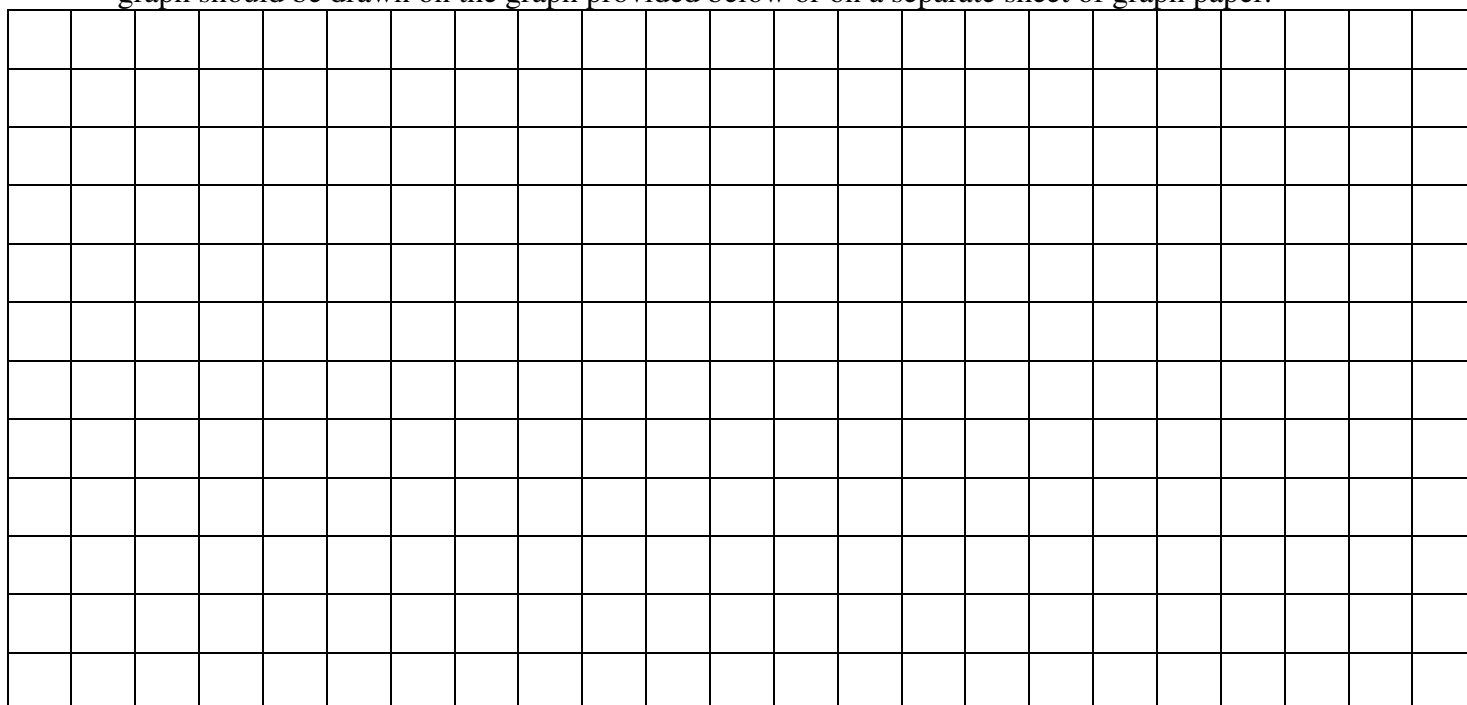


Questions/Components:

- How long does it take for the bell to rotate 90° ? Show how you found your answer.
- Analyze the bell's height at key points in time (every 90°). Complete the table of values to showcase your findings. Show any calculations or reasoning used to complete the table.

Time in seconds (t)	Height of the Bell (H)

- Construct a neatly drawn and labeled graph of one period using the data from the table above. The graph should be drawn on the graph provided below or on a separate sheet of graph paper.



4. What is the period of the graph? What must the B-value in the equation be to obtain this period?
5. Use the graph to construct an equation to model the scenario. The equation should model the height of the bell (H) as the wheel turns clockwise relative to time (t) in seconds.
6. Write as many equivalent equations as possible. (extra credit for each equation, with a maximum of 3 extra credit points).
7. How far has the bell traveled in inches in one revolution? Show how you found your answer.
8. Calculate the height of the bell after 4 seconds. Show your calculations below.
9. At what other time (in seconds) during the first revolution is the height of the bell the same as the height at 4 seconds? Explain how you know this.

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10. The picture above was taken when the bell was approximately 8 inches above the ground, at what measure(s) of time (in seconds) was the picture taken? Explain how you found your answer and show all work involved.

Scoring Guide:

Problem I – Part I (15 points total)



1. The period was accurately calculated. (1 pt) _____
Work for calculating the period was shown (1 pt) _____
A comprehensible explanation of the work done was provided (1 pt) _____

Comments:

2. Graph was done on graph paper and accurately depicts the equation provided. (3 pts) _____
Both axes are correctly labeled (1 pt) _____
Key points on the graph are marked and easily seen (1 pt) _____

Comments:

3. Equation provided is a cosine equation with correct amplitude, period, phase shift, and vertical shift.
Equation provided matches graph drawn. (3 pts) _____

Comments:

4. Month with minimum was correctly found and matches the minimum shown on the graph (1 pt) _____
Justification is provided for why the minimum may have occurred during that month (1 pt) _____

Comments:

5. Month with maximum was correctly found and matches the maximum shown on the graph (1 pt) _____
Justification is provided for why the maximum may have occurred during that month (1 pt) _____

Comments:

Problem I - Part I total points _____
15

Scoring Guide:

Problem II – Part I (23 points total)



1. Time for the bell to rotate 90° was accurately calculated. (1 pt) _____
Work for calculating time was shown (1 pt) _____

Comments:

2. Table provided was completed correctly. Calculations and/or reasoning for table values was provided (2pts) _____

Comments:

3. Graph was done on graph paper and accurately depicts the equation provided. (3 pts) _____
Both axes are correctly labeled (1 pt) _____
Key points on the graph are marked and easily seen (1 pt) _____

Comments:

4. The period provided was correct. (1 pt) _____
The B-value given can be used to correctly calculate the period provided using either degrees or radians (2 pts) _____

Comments:

5. Equation provided accurately depicts graph drawn. Correct amplitude, period, phase shift, and vertical shift can be calculated from equation. Variables used in equation match those in directions. (3 pts) _____

Comments:

6. An equivalent equation is provided using an alternate function, A-value, and/or phase shift (1 pt) _____
Additional equivalent equations are also provided. Each varies from previous equations by function, A-value, and/or phase shift (+1 pt extra credit for each equation. +3 pts extra credit maximum) _____

Comments:

7. Distance bell has traveled is provided in inches. (1 pt) _____
 Work showing calculations is provided and accurate. (1 pt) _____

Comments:

8. Height of the bell after 4 seconds is correctly calculated (1 pt). _____
 Work showing calculations is provided and accurate. (1 pt) _____

Comments:

9. Additional time is provided where the height of the bell is equivalent to the height at 4-seconds.
 Explanation is provided to justify reasoning. (3pts) _____

Comments:

Problem II - Part I total points _____
 23

Problems I&II Part I total points _____
 38

Scoring Guide:

Problem I – Part II (6 points total)



1. All work to calculate the photographer’s visitation day(s) is included. Reasoning for work is provided. Month and day(s) of photographer’s visit are accurate within one day (allowance for rounding errors). (6 pts) _____

Comments:

Scoring Guide:

Problem II – Part II (6 points total)



2. All work to calculate the time(s) the picture was taken is included. Reasoning for work is provided. Time(s) is accurate within a tenth of a second (allowance for rounding errors). (6 pts) _____

Comments:

Problems I&II Part II total points _____
 12

Problems I&II Parts I&II total points _____
 50