

Instructions for students:

Name: _____

- **Show full solutions** for each question using your handwriting. **Do not type out the answers.**
- If you can not print this sheet, ensure the questions are included with your answer so the teacher understands which question you are answering.
- When completed, **submit as a pdf file** to your teacher.
- Plagiarism will result in a mark of zero.

1. A cylinder has a volume of 300 in^3 . The top and bottom parts of the cylinder cost $\$2 / \text{in}^2$ and the sides of they cylinder cost $\$6 / \text{in}^2$. What are the dimensions of the cylinder with the least cost? How much will it cost? Round your answers to 1 decimal place.

2. A train leaves the station at 11:00 am and travels east at 45km/h. A second train heading south at 60 km/h reaches the same station at 12:30 pm. After how many hours will the trains be closest together? Include a diagram in your solution and an interval for your variable. State your answer to two decimal places.

3. A store plans to build a large rectangular sign on the interior wall at one end of their building. For x and y , in metres, the curved roof of the store is described by the function $f(x) = 6 - \frac{6}{25}x^2$, $-5 \leq x \leq 5$.

- Determine the width and height to maximize the area. Round to 2 decimal places.
- Using the second derivative test, find the maximum area. Round to 2 decimal places.

