

## ELECTRIC HOIST PROBLEM

### Performance Standard 7A.J

Relate the winding motion of an electric hoist with the circumference of the drum to calculate distance lifted:

- *Mathematical knowledge:* Determine the angle through which the drum must rotate in degrees, minutes, seconds, and in radians;
- *Strategic knowledge:* Relate arc length to radius and central angle and convert radians to degrees, minutes and seconds;
- *Explanation:* Explain completely what was done and why it was done.

### Procedures

1. Provide students with sufficient learning opportunities to develop the following in order to measure and compare quantities using appropriate units, instruments and methods.
  - Convert angle measures between degrees and radians.
2. Students are given a copy of the task sheet with a graphic to help describe the situation. It is assumed students have studied the angle and arc relationship in a circle related to the length of the radius as well as the method for converting between radians and degrees.
3. A 4 in mathematical knowledge would require a correct answer of 8 radians and  $458^{\circ} 21' 58.45''$ . A 4 in strategy would require any strategy that appropriately relates arc length to radius and central angle and converts radians to degrees, minutes and seconds. A 4 in explanation would require a complete description of the method used for both answers and why each step was done (i.e. the formula for converting radians to degrees or the other direction).

### Examples of Student Work not available

### Time Requirements

- One class period

### Resources

- Copies of the “Electric Hoist Problem” task sheet
- Access to a calculator
- Mathematics Rubric

NAME \_\_\_\_\_ DATE \_\_\_\_\_

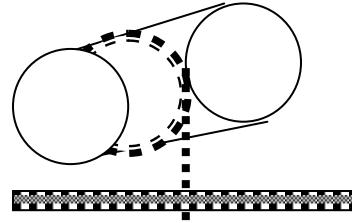
### ELECTRIC HOIST PROBLEM

#### Student Task Sheet

An electric hoist works by rotating on a horizontal axis winding a rope around the drum of the hoist.

If the diameter of the drum is 25 cm and the beam must be raised 1 meter, determine the angle through which the drum must rotate

- a) in degrees, minutes, seconds
- b) in radians.



Write in words what you did to solve the problem, any formulas you used, if applicable, and why you did each step.