

## MISSED THE BOAT

### Performance Standard (8B/8C).I

Calculate when a helicopter will catch up with a ship that left the same location 6 hours earlier given a graph that plotted the distance the ship and helicopter traveled for a given time period accordingly:

- *Mathematical knowledge*: know how to interpret the graph and interpolate and extrapolate using a system of numbers,
- *Strategic knowledge*: use appropriate strategies to solve the problem, and
- *Explanation*: explain completely and clearly what was done and why it was done.

### Procedures

1. Provide students with sufficient learning opportunities to develop the following skills in order to (8B) interpret and describe numerical relationships using tables, graphs and symbols and (8C) solve problems using systems of numbers and their properties:
  - Create and connect representations that are tabular, graphical, numeric and algebraic from a set of data,
  - Approximate and interpret rates of change from graphical and numerical data, and
  - Interpolate and extrapolate to solve problems using systems of numbers.
2. Provide each student a copy of the "Missed the Boat" task sheet and the rubric. Have students review and discuss the task to be completed and how the rubric will be used to evaluate it.
3. Ask students to solve the following problem using the graph in a variety of ways, perhaps including determining the equations of the lines pictured.

The Backstreet Boys were leaving on a cruise ship from New York to England. Brian missed the ship and after six hours managed to hire a helicopter to take him to the ship. The ship had a significant head start and was going due east. Use the graph provided to help answer the question: At what time (to the nearest minute) is the helicopter three fourths of the way between the port and the cruise ship. Show all work and write in words what you did and why you did each step.

4. Evaluate each student's work using the rubric and its guide to determine the performance level. The final answer of 8:30 is to be evaluated for correctness for a 4 in math knowledge. If the student finds 7 ½ hours or close to that, score a 3 in math knowledge. Finding only the point of intersection of the graphs (9,160) scores a 2 in math knowledge. There should be a visible and appropriate strategy, and a written description of the solution process. With reasons for each step. Appropriate strategies include using the graph to find the intersections points and then the point on the helicopter graph that is ¾ of the distance (120 miles) from port or writing the equations for the graphs, solving the system for the intersection point and using the distance to the intersection to determine ¾ of the distance and, therefore, the time to get there.

### Examples of Student Work follow

### Resources

- Copies of the "Missed the Boat" task sheet
- Calculators (not needed but may be used)
- Mathematics Rubric

### Time Requirements

- 30 minutes

### ASSESSMENT (8B/8C).I

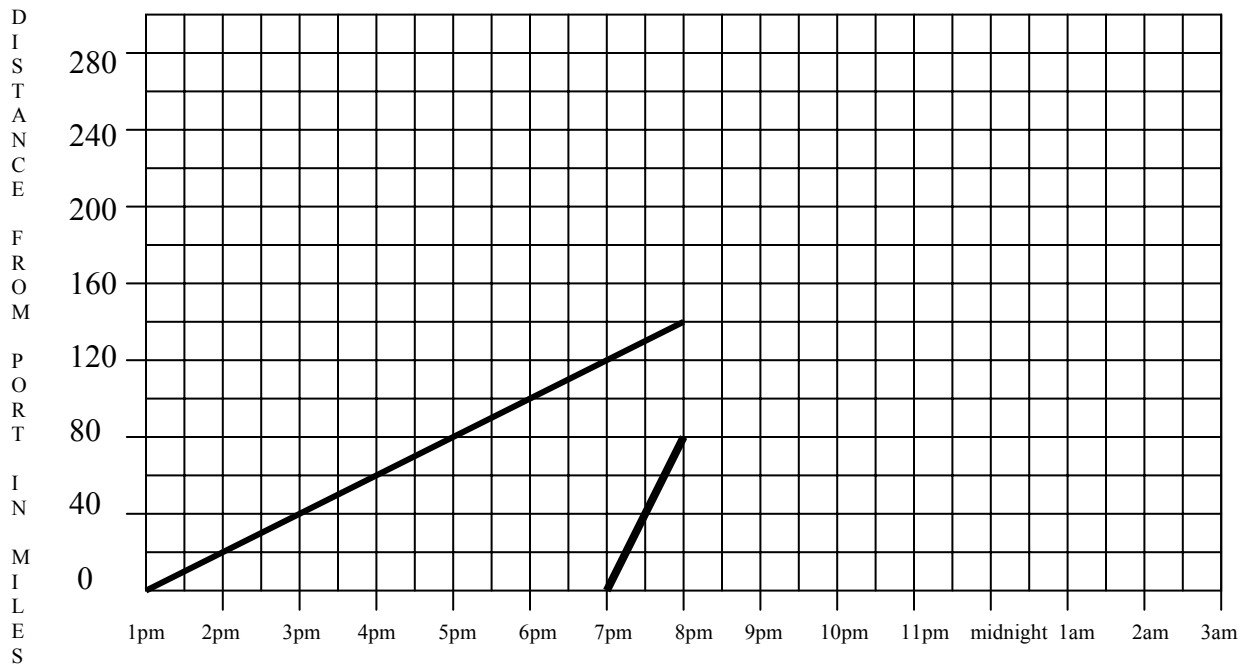
NAME \_\_\_\_\_ DATE \_\_\_\_\_

### MISSED THE BOAT

#### Student Task Sheet

The Backstreet Boys were leaving on a cruise ship from New York to England. Brian missed the ship and after several hours managed to hire a helicopter to take him to the ship. The ship had a significant head start and was going due east.

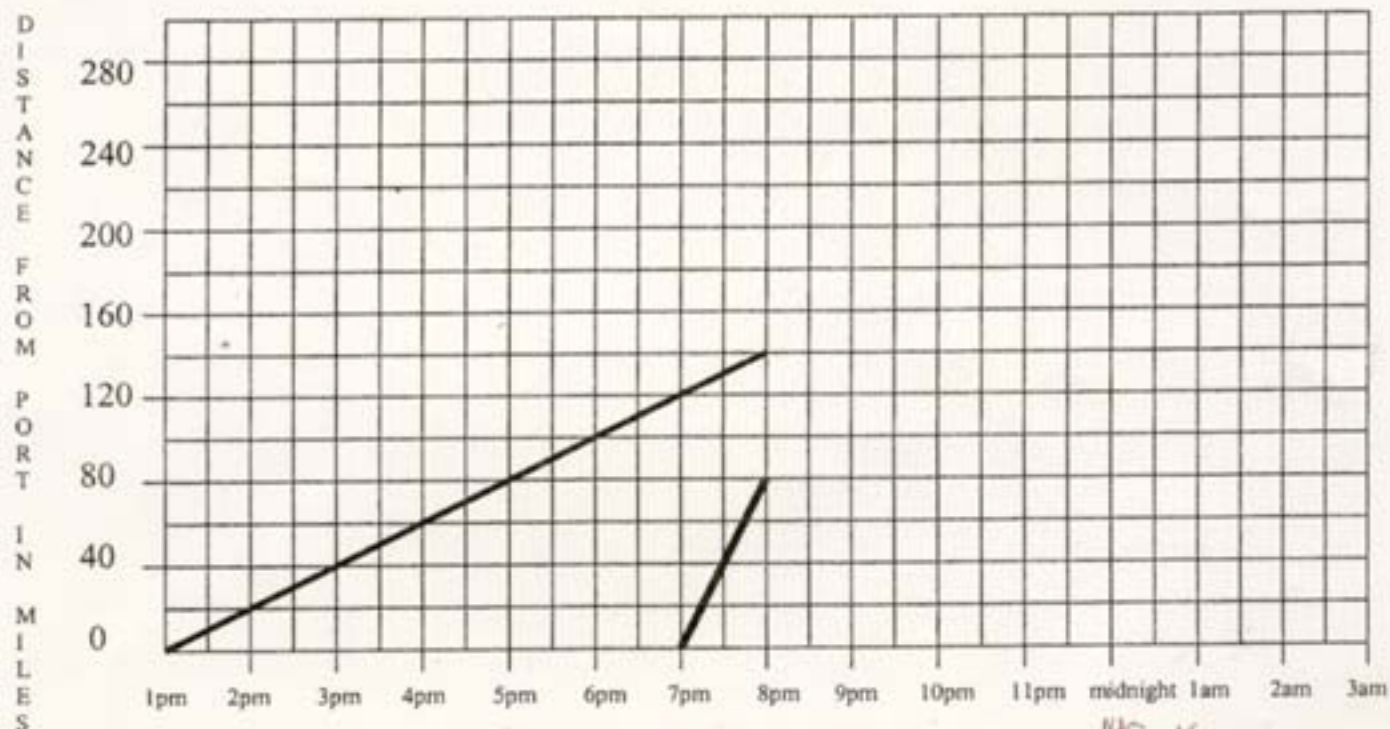
Use the graph below to help answer the question: At what time (to the nearest minute) is the helicopter exactly three fourths of the way between the port and the cruise ship. Show all work and write in words what you did and why you did each step.



Adapted from [NCSM Released High School Tasks](#), H12390c, Balanced Assessment, March 1994.

The Backstreet Boys were leaving on a cruise ship from New York to England. Brian missed the ship and after several hours managed to hire a helicopter to take him to the ship. The ship had a significant head start and was going due east.

Use the graph below to help answer the question: At what time (to the nearest minute) is the helicopter exactly halfway between the port and the cruise ship. Show all work and write in words what you did and why you did each step.



I found the linear equation of the ship =  $y = \frac{140}{8}x$   
 I found the linear equation of the helicopter =  $y = \frac{80}{1}(x-7)$   
 To find the halfway point, I made the helicopter equal to half of the ship =  $\frac{1}{2} \left( \frac{140}{8}x \right) = 40(x-7)$   
 $6.75x = 80x - 560$   
 $-71.25x = -560$   
 $x = 7.86 \text{ hours}$   
 $.89 \times 60 = 53$   
 time = 7:53 pm