

## KS2 Project 1

These resources are based on real-life challenges faced daily by HM Coastguard. Each problem has been assigned a coastguard rank according to its challenge level to enable easy differentiation.



## Maritime Operations Officer



## Senior Maritime Operations Officer



## Commander



## Chief Coastguard

The four levels vary in terms of scaffolding and challenge, but are all based on the same scenario.

### Differentiation

Level	Scale	Area Calculations	Speed/ Distance	Lumens
<b>Watch Officer</b>	1cm:1km	N/A	Metric	N/A
<b>Watch Manager</b>	1cm:5km	Multiples of 10	Metric	Yes
<b>Inspector</b>	Need ruler	Multiples of 5	Imperial	Yes
<b>Chief Coastguard</b>	Need ruler	Multiples of 4	Mix	Yes

## KS2 Project 1

**Support / guidance**Task 1

Students should draw lines South from B, and South East from A. Where the lines meet should be their target location for the rescue.

Task 2

Students should draw a line from helipad to their target location. They should measure this with a ruler and use the scale to find out how far it is. They should use the calculations below:

- Watch Officer:  $\times 1$
- Watch Manager:  $\times 5$
- Inspector & Chief Coastguard: divide by their measurement of 1NM scale on map (e.g.  $7\text{cm} \div 0.8 = 8.75\text{NM}$ )

Task 3

To find the time taken to get from ship to base they should divide their distances by:

- Watch Officer and Manager:  $\div 4$
- Inspector and Chief Coastguard:  $\div 2.5$

Ensure students include the time to winch and unload 4 people in each journey.

Task 4

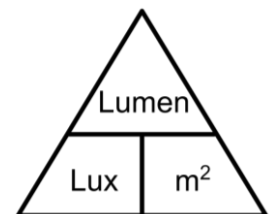
Students should use their answer from task 3 and convert it to hours, then multiply by 400 to find out the amount of fuel consumed. To convert minutes to hours, they should divide by 60. This might be a good teaching point (is 1.5 hours the same as 1 hour 50 minutes?).

Task 5

Students might need help using the lux/lumens calculation triangle on the slide. To find the area, they need to calculate the lumens divided by the lux. In this case, they should get an answer of  $100\text{m}^2$ .

You might like to extend students here. This could be done in a variety of ways, e.g.:

- The light is only working at 80% brightness, what area could they do now?
- Conditions are so bad, the pilot suggests 15,000 lux
- In task 6, students find the area of the ship - they could work out what lux they would need to illuminate the whole ship

Task 6

Students need to find the area of the ship. In the Watch Manager scenario, this could be done by drawing the ship, breaking it up into  $10\text{m}^2$  strips, and counting them. In this case they would get 160 lots of 3 = 480 seconds.

For more able students, prompt them to calculate the area of the ship and divide by the given  $\text{m}^2/\text{s}$  value (10, 5 or 4 depending on challenge level). This would be a good opportunity to practice long division.

## KS2 Project 1

### Scenario

A cargo ship is sinking off the south coast of England. Your job is to ensure that everyone is successfully rescued.

Here's the call that came into the Search and Rescue base:

The 'FS Atlantis' has capsized at 02:14 am in extremely stormy conditions. We don't have exact coordinates of their location. The waters are unsuitable for the lifeboats to go out.

The ship is due South from Lifeboat base B.  
The ship is due South East from Lifeboat base A.

The captain says that there are 26 crew on board - all adult males.

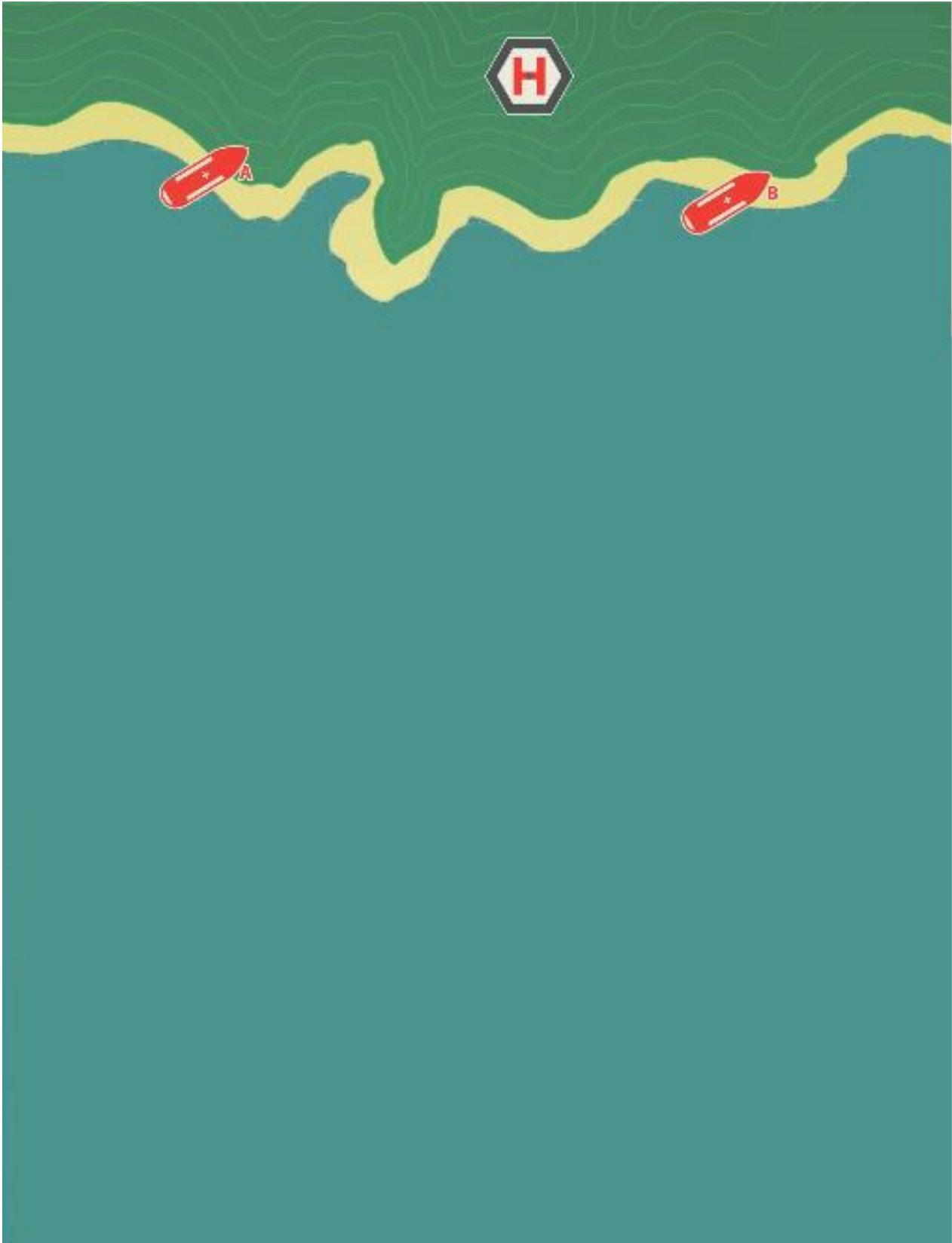
To search in this kind of conditions, we need to cast a light of at least 10,000 lux. The helicopter searchlight has a 1 million candle maximum power bulb.

The helicopter currently has 800kg of fuel.



KS2 Project 1

**Watch Officer**



Scale 1cm:1km

## KS2 Project 1

### Task 1

Mark on a suitable place to search for the ship given the information. (HINT: Draw lines from lifeboat stations A and B).

### Task 2

Draw a line from the helicopter base to the ship and use the scale to work out how far it is.

### Task 3

The helicopter can carry 4 people at a time.

It has a max speed of 240 km per hour which means it can travel 4km every minute.

It takes 2 minutes to winch each person from the ship to the helicopter.

It takes 1 minute per person to get them out of the helicopter at the base.

Calculate how long it would take to successfully rescue all 26 people and get them back to the helicopter base.

### Task 4

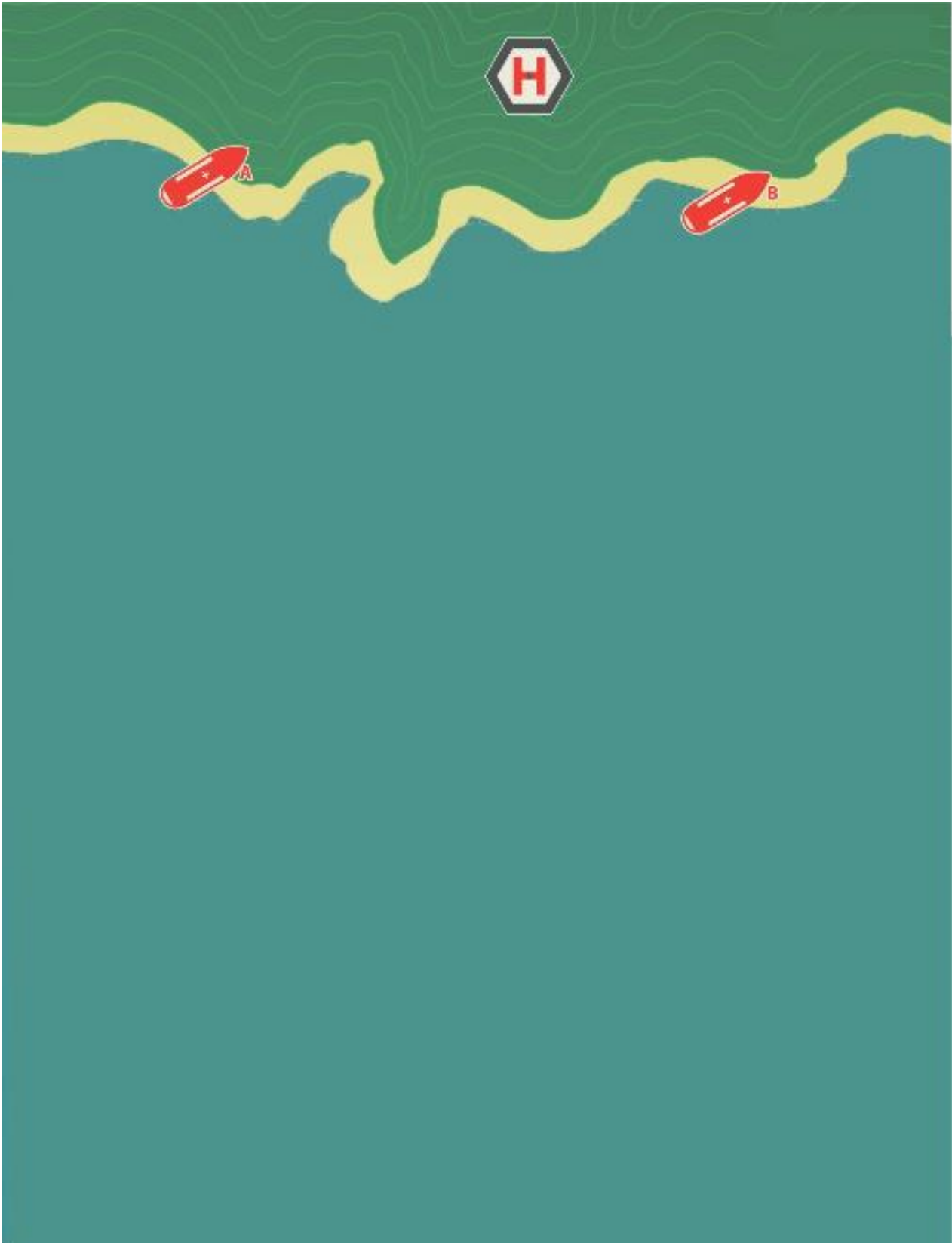
The helicopter uses roughly 400kg of fuel every hour.

Use your answer to task 3 to estimate how much fuel is used. Will the 800kg it already has be enough or will it have to refuel?



KS2 Project 1

Watch Manager



Scale 1cm:5km

## KS2 Project 1

### Task 1

Mark on a suitable place to search for the ship given the information. (HINT: Draw lines from lifeboat stations A and B).

### Task 2

Draw a line from the helicopter base to the ship and use the scale to work out how far it is.

### Task 3

The helicopter can carry 4 people at a time.

It has a max speed of 240 km per hour which means it can travel 4km every minute.

It takes 2 minutes to winch each person from the ship to the helicopter.

It takes 1 minute per person to get them out of the helicopter at the base.

Calculate how long it would take to successfully rescue all 26 people and get them back to the helicopter base.

### Task 4

The helicopter uses roughly 400kg of fuel every hour.

Use your answer to task 3 to estimate how much fuel is used. Will the 800kg it already has be enough or will it have to refuel?

### Task 5

If the searchlight is on full brightness (1,000,000 lumens), what is the focus area needed to create the required 10,000 lux?

### Task 6

It's estimated that a helicopter pilot can accurately search a  $10\text{m}^2$  area every second.

The boat is 30 metres wide and 160 metres long. Estimate how long it would take to perform a search of the ship by the helicopter.



KS2 Project 1

Inspector



Work out the scale using a ruler



## KS2 Project 1

### Task 1

Mark on a suitable place to search for the ship given the information. (HINT: Draw lines from lifeboat stations A and B).

### Task 2

Draw a line from the helicopter base to the ship and use the scale to work out how far it is.

### Task 3

The helicopter can carry 4 people at a time.

It can travel at 150mph.

It takes 2 minutes to winch each person from the ship to the helicopter.

It takes 1 minute per person to get them out of the helicopter at the base.

Calculate how long it would take to successfully rescue all 26 people and get them back to the helicopter base.

### Task 4

The helicopter uses roughly 400kg of fuel every hour.

Use your answer to task 3 to estimate how much fuel is used. Will the 800kg it already has be enough or will it have to refuel?

### Task 5

If the searchlight is on full brightness (1,000,000 lumens), what is the focus area needed create the required 10,000 lux?

### Task 6

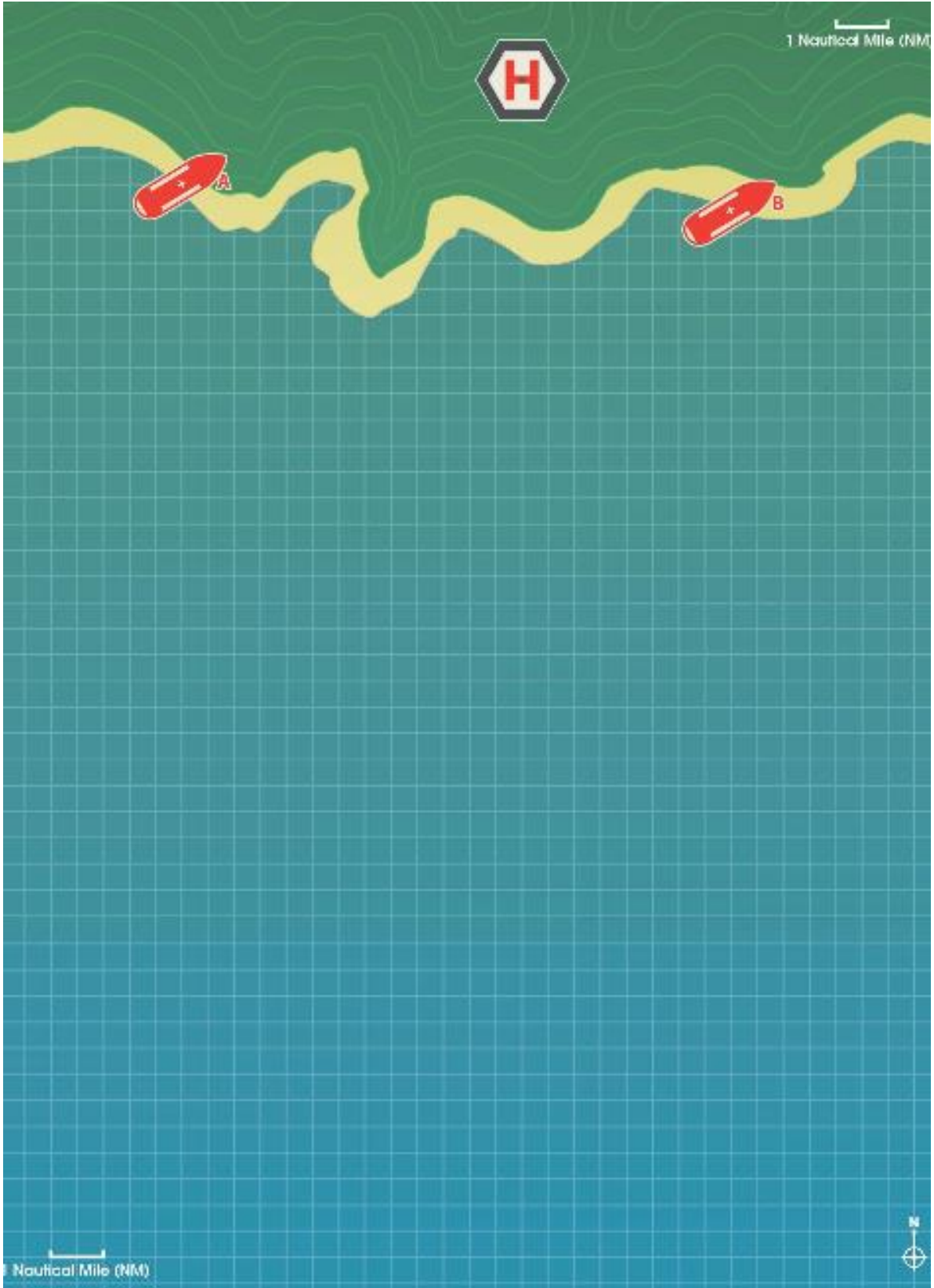
It's estimated that a helicopter pilot can accurately search a  $5\text{m}^2$  area every second.

The boat is 30 metres wide and 160 metres long. Estimate how long it would take to perform a search of the ship by the helicopter.



KS2 Project 1

Chief Coastguard



Work out the scale using a ruler

## KS2 Project 1

### Task

Mark on the ship's location and plan a rescue operation. You may need the information below. You will need to work out key timings so need to be accurate in your calculations. You need to let the helicopter crew know what area to focus the search light when they get to the ship.

- The helicopter can carry 4 people at a time.
- The helicopter can travel at 240 km/hr. (1 mile = 1.6km)
- It takes 2 minutes to winch each person from the ship to the helicopter.
- It takes 1 minute per person to get them out of the helicopter at the base.
- The helicopter uses roughly 400kg of fuel every hour.
- It's estimated that a helicopter pilot can accurately search a  $5\text{m}^2$  area every second.
- The boat is 30 metres wide and 160 metres long.