# Taking a risk Paying the price of piracy


## Estimated ransoms paid (2005 – 2008)

### Bulk carriers

- *16 captured*
- $750 000 each, except for one carrying an arms shipment ($2,000,000)

### Oil tankers

- *20 captured*
- $1,500,000 each

### Private sailing vessels

- Two French vessels $50,000 each
- a Swedish ship $20 000
- a US craft $300 000

## Estimated cost of each ransom negotiation

$50 000 for each ship

**What was the annual cost of piracy?**

# Taking a risk

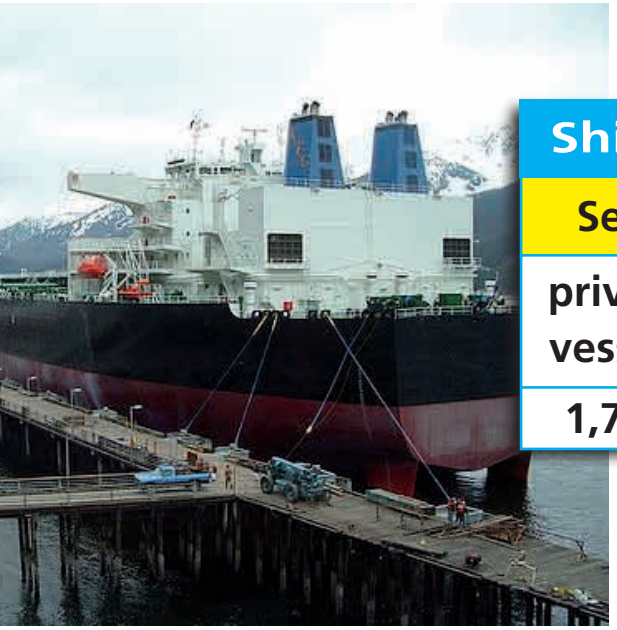
## What's the risk?

Shipping companies **insure against** the risk of piracy.

**Actuaries** are employed to make **risk assessments**.

They investigate how **risky** something is and then calculate what to charge.

The **more risky**, the **higher** the insurance premium.



| Ships through the pirate area | | | |
|---|---|---|---|
| Seven year period* (2003 – 2009) | | | |
| private vessels | oil tankers | bulk carriers | total |
| 1,750 | 8,400 | 24,500 | 34,650 |

| Ships captured | | | |
|---|---|---|---|
| Four years period* (2005 – 2008) | | | |
| private vessels | oil tankers | bulk carriers | total |
| 4 | 20 | 16 | 40 |

How likely is it that a **bulk carrier** will be captured by pirates?

How likely is it that an **oil tanker** will be captured by pirates?

How likely is it that a **private vessel** will be captured by pirates?

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* These are simplified approximations.

# Taking a risk

## Piracy premiums

### How does insurance work?

In your groups prepare **competitive quotes**.

Think about:

- the average expected payout
- the negotiation costs
- the probability of piracy.

*A British family are planning to sail through the area next summer. Most ships take one week to pass through but this family are holidaying and want to take two weeks.*

**Quote?**

*An oil company has a tanker passing through the area once every month. They want to insure their vessels for a year.*

**Quote?**

*A company is going to schedule 40 bulk carriers to pass through the area over the next two years.*

**Quote?**

**What margin of error will you build into your calculations?**

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# Taking a risk Becoming an actuary

Fayezah Sayed is a trainee actuary.

*I wouldn't be where I am without maths.*

Being an actuary means thinking about **probability** and statistics. But it takes more than that.

She liked maths at school.

*I liked the feeling that there could be a right or wrong answer and that it was challenging. I also liked doing a subject with a lot of applications in the real world.*

*I obviously use a lot of mathematical skills however I also need to use a lot of my **social skills**. I need to be able **to explain complicated theories** to a wide range of people. There is also a lot of **team work** involved in my job which makes a nice informal working atmosphere.*

In your groups, prepare a display showing how you worked out one of your insurance quotes. Present this to the rest of the class.

**Find out more about Fayezah and about becoming an actuary at:**

http://www.mathscareers.org.uk/

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# Taking a risk

## Topic

The topic is designed to use and apply the uncertain and difficult nature of probability calculations in the real world through the work of an actuarial trainee. It is assumed that pupils will work in groups or pairs as the data and ideas will need considerable discussion on the best way of proceeding.

## Mathematical activities

Paying the price of piracy

What's the risk?

Piracy premiums

## Careers link-up

Becoming an actuary

## Planning for teaching

Pupils will need some familiarity with the concepts of simple probability and the idea of independent events before beginning these activities. The first two are reasonably straight forward and engage the pupils in working with real world data in order to develop some understanding of the context in which the final, more challenging, problems are set. Links to news items about incidents of piracy are included on the project website.

**Paying the price** asks the pupils to calculate an annual cost for piracy based on the data supplied. They may be interested to research ship piracy and its costs using the internet. This will develop geographical awareness as well as mathematical knowledge. **What's the risk** gives data on piracy and asks pupils to calculate the probability of capture. The data are presented in different formats so care is needed to extract the relevant figures. Encourage the pupils to present their probabilities in the form 1/integer. This will help comparison and will support the thinking required for the third activity.

In order to tackle **Piracy premium** pupils will need to grapple with the idea of how insurance works. They will need to understand that it depends on a large number of people seeking insurance, the vast majority of whom will make no claim. Allow each group to decide on the scenario they want to tackle first – some groups will complete all three of them but some may not. As they work, you may need to offer support for their mathematical thinking including getting them to create some more simple examples to help them spot the line of analysis required. Encourage them to realise that with each scenario the probability of piracy is greater than the individual probabilities they calculated in **What's the risk?** For example, the British family is taking two weeks for their holiday so the risks are doubled; and the oil company needs to insure twelve voyages so, again, the risks overall are increased. You will probably need to explain the idea of a margin of error.

# Taking a risk

Using the random number generator function on a spreadsheet can model, and thus help build an awareness of the unpredictability inherent in probabilistic reasoning. Best used as a plenary activity, each group can test out their quotes and compare how successful they have been. You will probably also want to introduce a random element into the ransom demanded.

**Becoming an actuary** features Fayezah Sayed who is working as an actuarial trainee. Pupils are asked to prepare a display showing how they worked out their quotes – this could be a poster or a PowerPoint sequence – and to share this with the rest of the class. They can also be encouraged to visit the website **http://www.mathscareers.org.uk/** to find out more about how to become an actuary.

## Want to know more?

Contact STEM Subject Choice and Careers

info@careersinstem.co.uk

The Centre for Science Education
Sheffield Hallam University
City Campus, Howard Street
Sheffield S1 1WB

**Tel:** 0114 225 4870

A Department for Children, Schools and Families initiative to promote subject choice and careers in Science, Technology, Engineering and Maths (STEM) delivered by the Centre for Science Education at Sheffield Hallam University and VT Enterprise.



or for more information on careers go to Maths careers at www.mathscareers.org.uk/
or Future Morph at www.futuremorph.org/<http://www.futuremorph.org/

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