



Oakdale Comprehensive School

Head of Mathematics

Lee Humphreys



Context



- Caerphilly
- English medium
- Approximately 600 pupils
- 11-16
- FSM 18.1%
- L2 inc. E/W & M 52.8%
- Scheduled to merge with another local school

The mathematics department

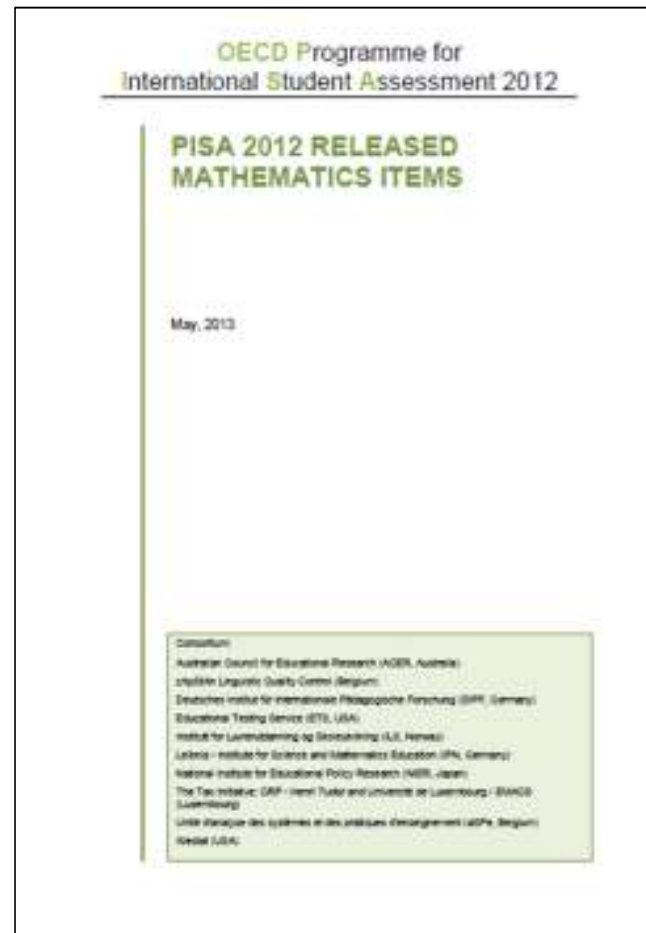
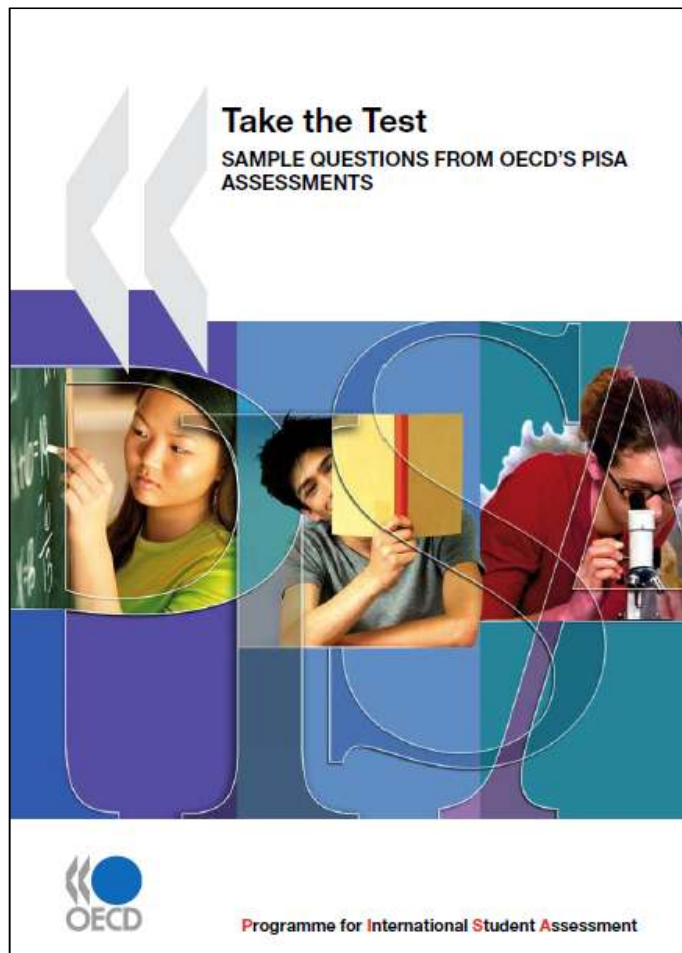


The EAS approach

- ▶ The wave 1 schools
- ▶ The profiling method and matching
- ▶ Lesson study



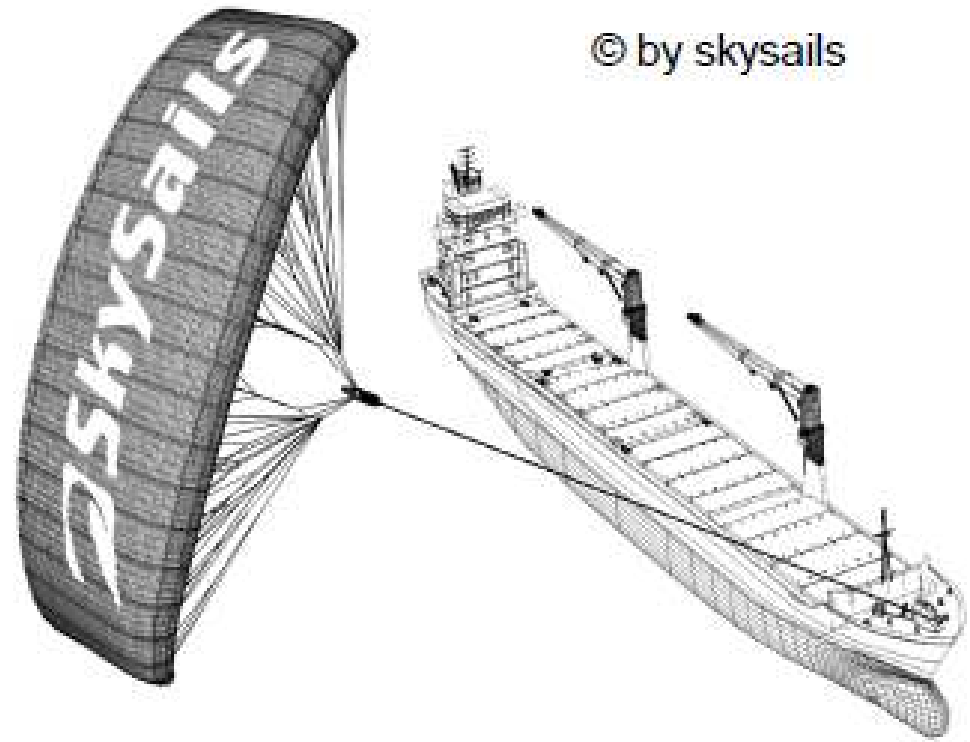
PISA



Sailing Ships

Ninety-five percent of world trade is moved by sea, by roughly 50 000 tankers, bulk carriers and container ships. Most of these ships use diesel fuel.

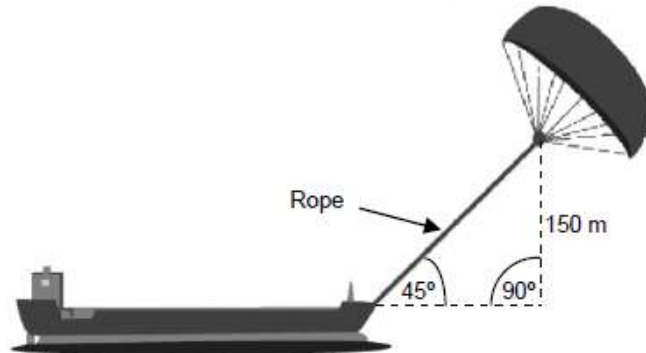
Engineers are planning to develop wind power support for ships. Their proposal is to attach kite sails to ships and use the wind's power to help reduce diesel consumption and the fuel's impact on the environment.



© by skysails

Approximately what is the length of the rope for the kite sail, in order to pull the ship at an angle of 45° and be at a vertical height of 150 m, as shown in the diagram opposite?

- A 173 m
- B 212 m
- C 285 m
- D 300 m



What did we want to achieve?

Objectives:

- ▶ To be able to read the question and extract the relevant information that is needed to answer the problem
- ▶ To be able to identify the question that is being asked
- ▶ To be able to select and use the appropriate mathematics needed to answer the question.

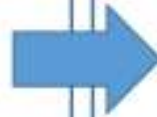
Existing strategies - New ideas

The Thinking Wall



What information have you been given?

What do you need to find out?



What if?

What else could I be asked?

The Problem:

What mathematics do you need to use?



Workings and solution:

City planners need to know the difference in height between a building on one side of a road and a building on the other side of the road.

The buildings are vertical and directly opposite each other.

The horizontal road is 20m wide.

From the centre of the road between the buildings, the angle of elevation of

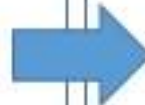
- the top of the building on one side is 72° ,
- the top of the building on the other side is 38° .

Calculate the difference in the heights of the buildings.

Space for diagram.

What information have you been given?

What do you need to find out?



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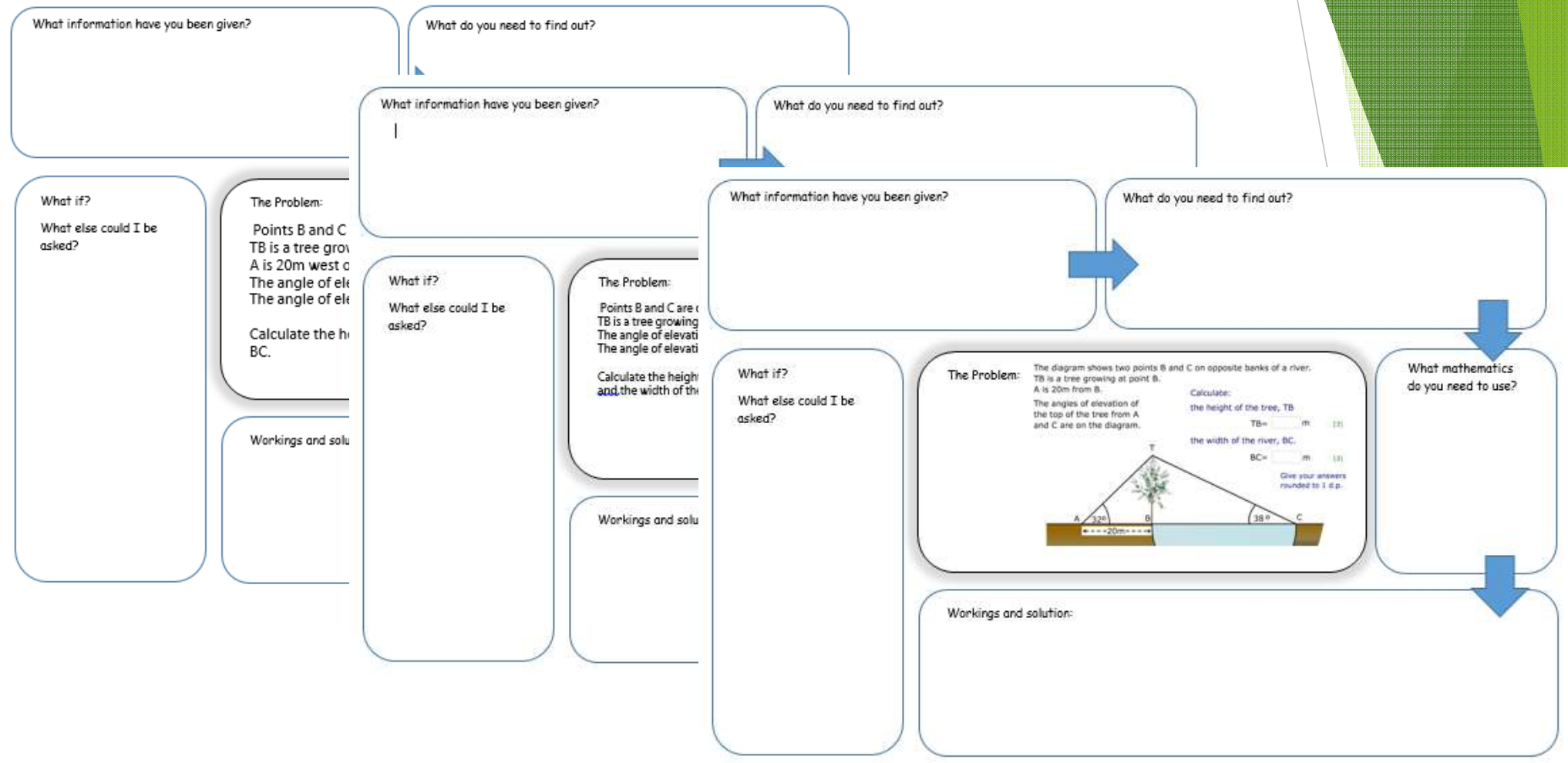
What mathematics do you need to use?



Workings and solution:



Differentiation by levels of support in the question.....



... or by adapting the frame

What information have you been given?
Can you highlight/underline the key facts?

What do you need to find out?
What has the questions asked for? Has it given all the information that you need or do you need to work something else out first?

What if?
What else could I be asked?

The Problem: The diagram shows two points B and C on opposite banks of a river. TB is a tree growing at point B. A is 20m from B. The angles of elevation of the top of the tree from A and C are on the diagram.

Calculate:

the height of the tree, TB

TB = m [3]

the width of the river, BC

BC = m [3]

Give your answers rounded to 1 d.p.



What mathematics do you need to use?

When you are finding the missing sides of triangles what do you use? Does this change if you are given angles or sides?

Workings and solution:
Can you find an example in your book to help you?

Further ideas

Billy Mistake

What information have you been given?

- Angle of elevation = 56°
- The man is standing 19m from the tree
- There is a right angled triangle 1.8m

What do you need to find out?

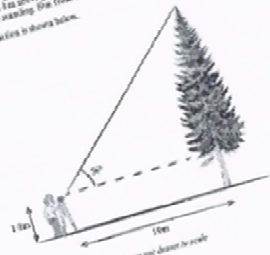
The height of the tree, which is one of the sides of the triangle.
Then add 19m.

What mathematics do you need to use?

Trigonometry
SOH-CAH-TOA
To find the missing side of the triangle

The Problem:

A tree is seen from a distance of 19m. The angle of elevation of the top of the tree from the observer is 56° . A sketch of the situation is shown below.



Calculate the full height of the tree.

Workings and solution:

SOH (CAH) TOA
We use $\cos \theta = \frac{\text{adj}}{\text{hyp}}$

$\cos 56 = \frac{19}{\text{hyp}}$

$\text{hyp} \times \cos(56) = 19$

$\text{hyp} = \frac{19}{\cos 56}$

$\text{hyp} = 33.98\text{m}$
Height of tree
 $= 34 + 19$
 $= 53\text{cm}$

What if?
What else could I be asked?

Another strategy

You will be assessed on the quality of your written communication in this part of the question.

A committee organised an end of Year 11 party in a local hotel.

The costs for the party were:

- A room hired for 5 hours at a cost of £24 per hour.
- A band hired at a cost of £165 for the evening.
- Balloons and decorations for the room at a cost of £356.
- A meal at a cost of £27 per person.

The tickets for the party were sold at £35 each.

154 tickets were sold.

After the committee had paid all of the costs for the party, the money left over was given to a charity.

How much money was given to the charity?

Show all your working. [10]



R Read it

U Underline it

D Decode it

E Estimate it

M Method

A Answer

N Nonsense?



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R
U
D
E

M
A
N

Read it because you wouldn't understand it.

Underline it because then words stand out more.

Decode it because key points and find out what topic we are on about.

Estimate it because you can have a rough idea what it's about.

Method. Follow through the method to get the final answer.

Answer

ity.

Not S

Read it - it is important to read it so it tells you what you have to do.

Underline it - so you can highlight keywords.

D

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$$5 \times 24 = 120$$

room hire = £120

band hire = £165

decorations = £356

food = £4158

total cost = £4808

$$27 \times 154 = 4158$$

$$\begin{array}{r} 154 \\ \times 27 \\ \hline 1078 \\ 3080 \\ \hline 4158 \end{array}$$

Charity gets £5390 - £4808

$$35 \times 154 = 5390$$

$$\begin{array}{r} 154 \\ \times 35 \\ \hline 770 \\ 4620 \\ \hline 5390 \end{array}$$

$$\begin{array}{r} 5390 \\ - 4808 \\ \hline 582 \end{array}$$

Charity gets £582

Read it. - You

Underline it. - D

Decode it. - To k

Estimate it. - To r

Method. - You have

Answer. - the correct

Not a

What we have learned



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