King Edward VI Camp Hill School for Girls

Maths Department Newsletter

9th May 2016

$16 = 2^4 = 4^2$

News

The end of year exams are almost here, even though it's only May, but we'll start with some good news. Naiya Patel from 9W was awarded a merit in the Intermediate Maths Olympiad. Amrit Phull and Spardha Raut also achieved a merit in the Intermediate Kangaroo. As well as this, a group of girls from year 9 (Eleanor, Kujani, Susannah, Anna and Anshu) have made it through to round 2 of the Edge Hill University Maths Competition.

Maths Quote

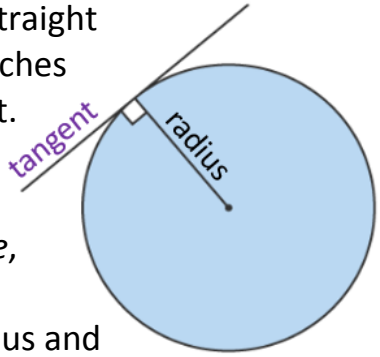
"If you have a tough question that you can't answer, first tackle a simpler question that you can't answer."
Max Tegmark

If, however, you're finding that you can't even tackle the simpler questions, perhaps you should come along to maths workshop. Come and get help, or just sit and revise, any Friday lunchtime in room 13 ☺

Joke

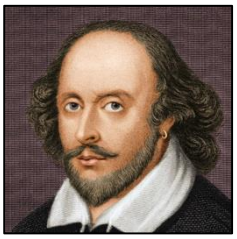
Maths Word

A 'tangent' is a straight line that just touches a circle at a point. The word comes from the Latin *tangere*, which means 'to touch'. A radius and a tangent always meet at a right angle.



Shakespeare's Puzzle

To celebrate the 400th anniversary of the death of Shakespeare, here's a puzzle based on his play *The Merchant of Venice*.[1]



Portia has placed a portrait of herself inside one of three caskets made of gold, silver and lead. Her suitor must choose one of the caskets, and if he chooses the one containing her portrait, he will be allowed to marry her.

Portia has had the following inscriptions engraved on the caskets.

Gold: The portrait is in this casket.
Silver: The portrait is not in this casket.
Lead: The portrait is not in the gold casket.

She tells her suitor that at most one of the three statements is true.

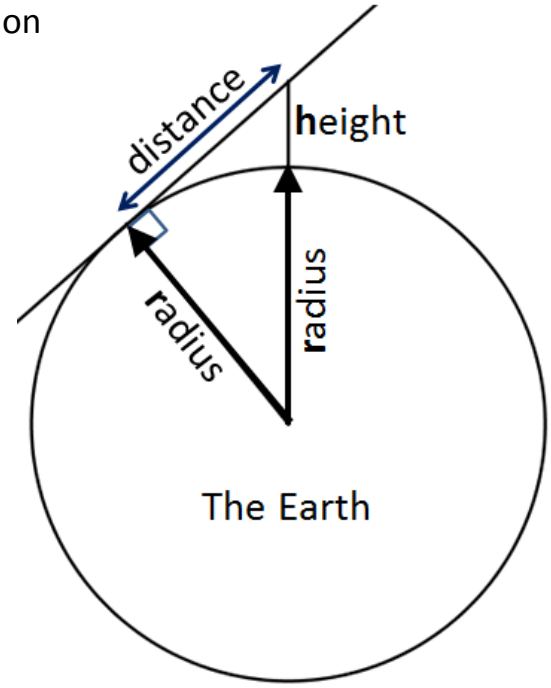
Which casket should he choose?

1. There is a puzzle about three caskets in *The Merchant of Venice*, Act 2 Scene 7, but it's not quite like this one. The golden casket contains a scroll, on which is written the now familiar phrase "All that glisters is not gold".

How far can you see from the top of the London Eye?

The London Eye is 135 m tall and the owners claim that, from the top of it, you can see for 25 miles. Did you know that you can check whether this is correct using only Pythagoras' Theorem? You can also work out how far you can see from the tops of other famous tall buildings. Given that the average radius of the earth is 6371 km, we can use a right-angled triangle to form the equation

$$6371^2 + d^2 = (6371 + h)^2$$



where h is the height of the building **<u>in kilometres</u>** and d is the distance you can see.
We can re-arrange this equation to get

$$d = \sqrt{h(h + 12742)}$$

In the case of the London Eye,
if we let h = 0.135 km, this gives us

$$d = \sqrt{0.135(0.135 + 12742)}$$

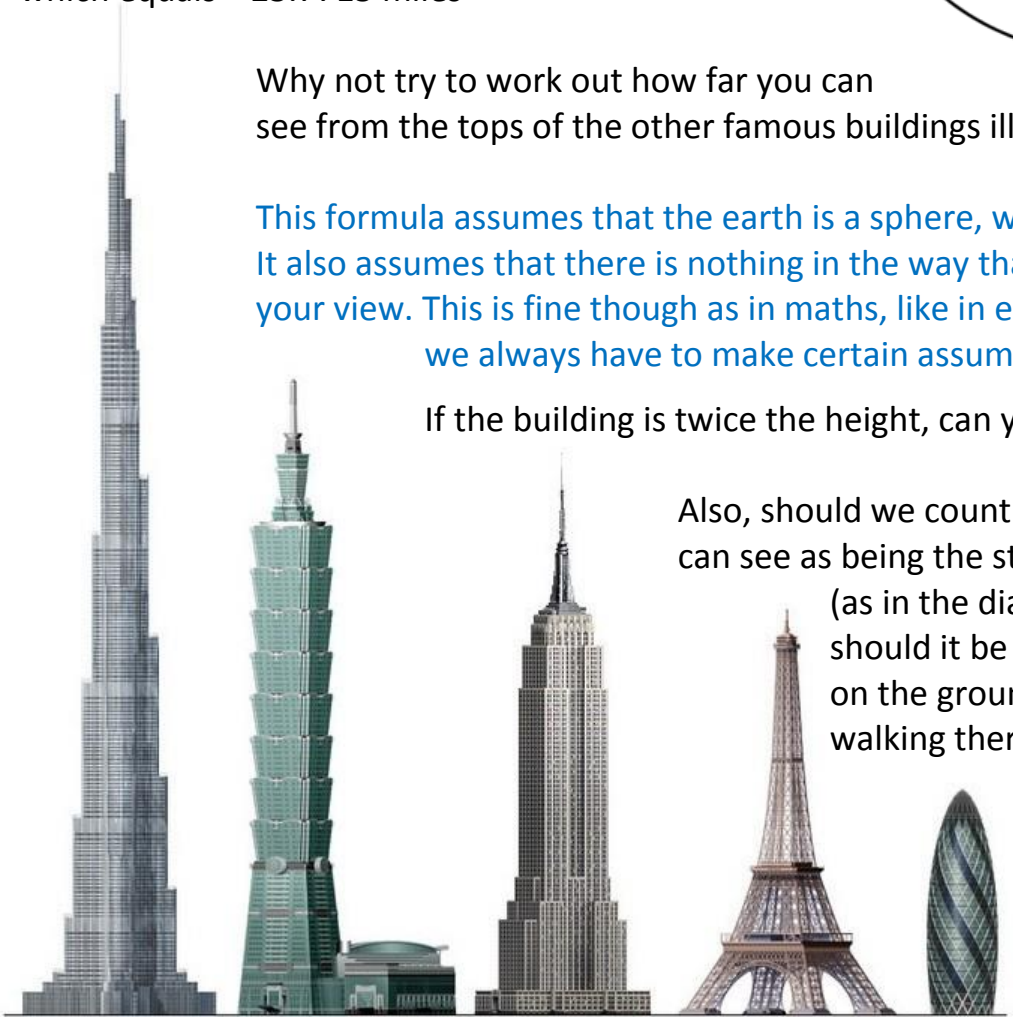
which means d = 41.4752 km
which equals 25.7715 miles

Why not try to work out how far you can see from the tops of the other famous buildings illustrated below?[2]

This formula assumes that the earth is a sphere, which it almost is. It also assumes that there is nothing in the way that would block your view. This is fine though as in maths, like in everything else, we always have to make certain assumptions.

If the building is twice the height, can you see twice as far?

Also, should we count the distance we can see as being the straight line distance (as in the diagram above) or should it be the curved distance on the ground, as if you were walking there? Does it actually make much of a difference? How would you calculate the curved distance?



Burj Khalifa 830 metres | Taipei 101 508 metres | Empire State Building 443 metres | Eiffel Tower 300 metres | The Gherkin 180 metres

2. This formula also works for buildings that aren't famous.