Motivational Maths

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Leeds Metropolitan University

www.leedsmet.ac.uk/teaching/vsite

www.virtualmaths.org

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Virtual maths aims

Make maths interesting, meaningful & understandable, visually attractive & relevant

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Project objectives

- Demonstrate real world applications of maths
- Produce open access web materials
- Support with resources that are not computer dependent
- Create a link between schools, colleges and universities
- Build confidence and aid transition – narrow education gaps
- Link the pure subject to a vocational context
- Capture the interest of widest student groups
- Work towards engaging underachievers, disengaged and hard to reach groups

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Research method

- Iterative research & development
  - Interactive problems created using Flash technology
  - Some examples created to show what we could do – others led by pupils
  - Interactive environments made live allowing input from, pupils, designers and interested parties
  - Allows experimentation with different tools and new environments

Contextualised images: Step-by-step approach

By linking maths with working technology a more stimulating learning environment can be created

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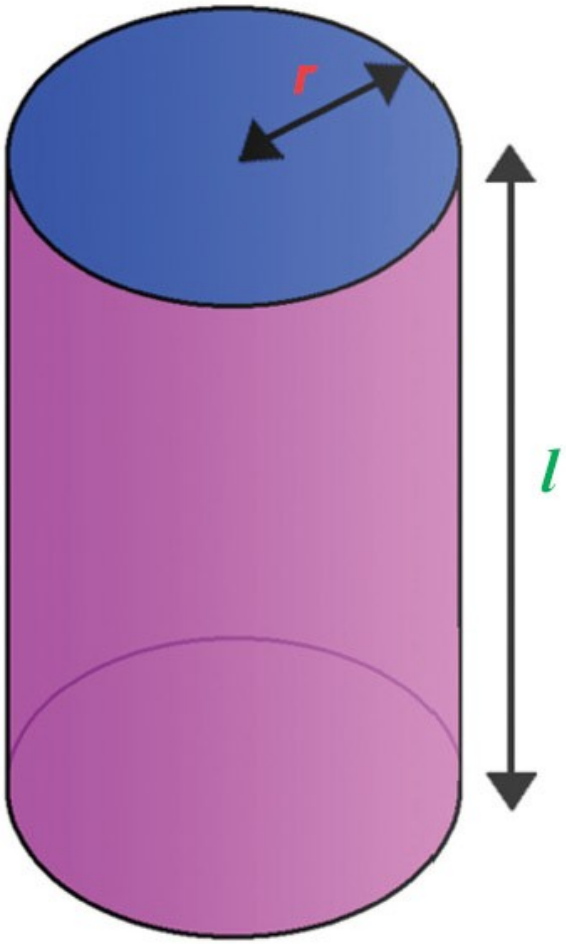
Animation & graphical guidance



Volume of a cylinder = $\pi r^2 l$

r = 0.3m l = 8m

$\therefore$ Volume =

$3.14 \times 0.09m^2 \times 8m$

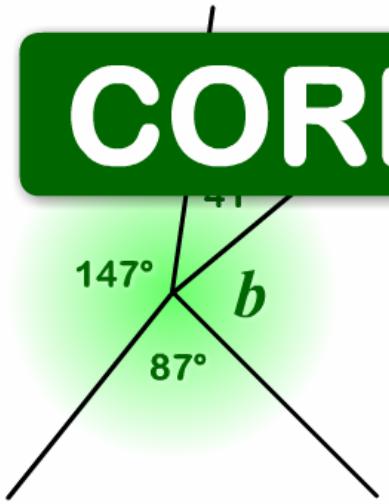
$= 2.26m^3$

Quizzes

Finding Angles

Q2

CORRECT!



angle *b* is 85 °

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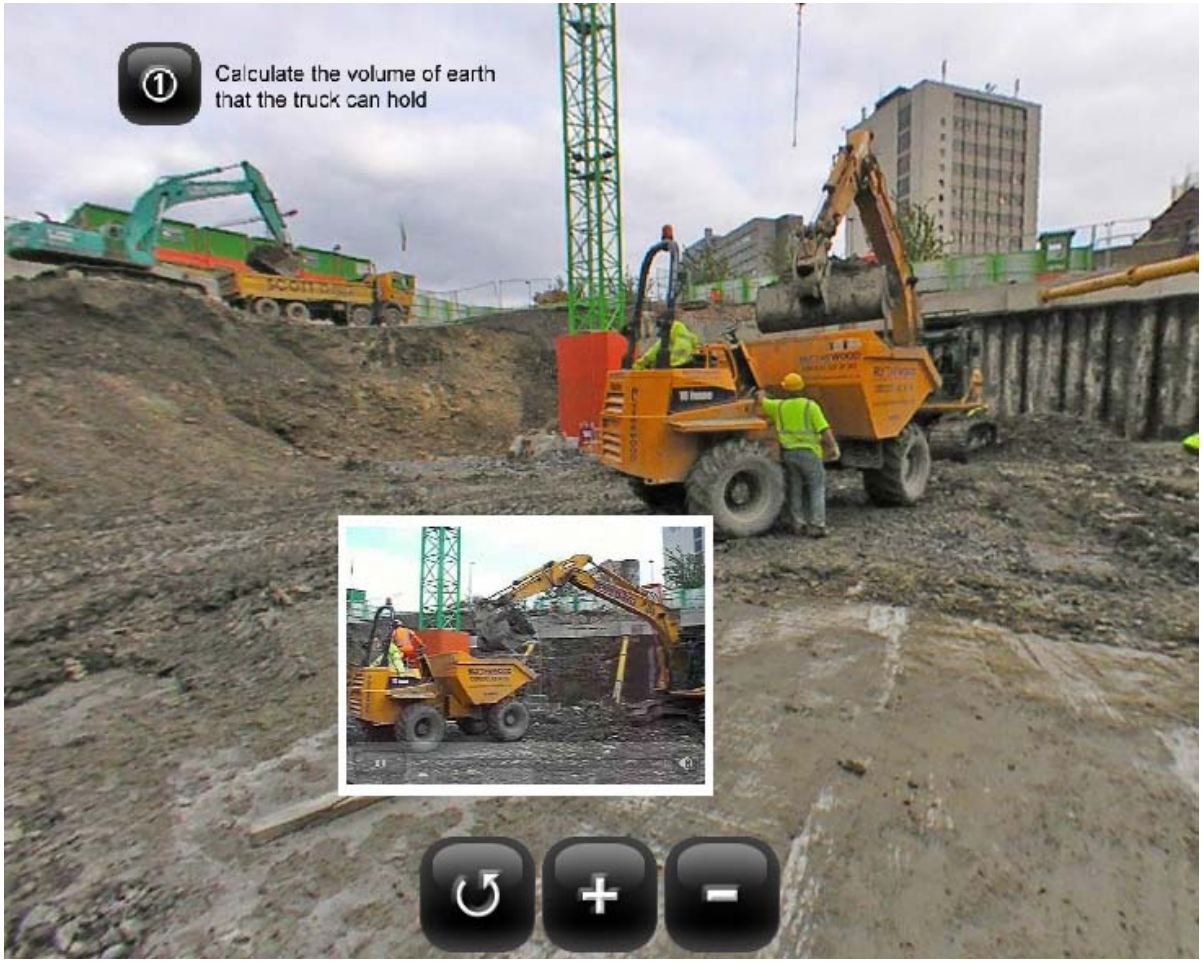
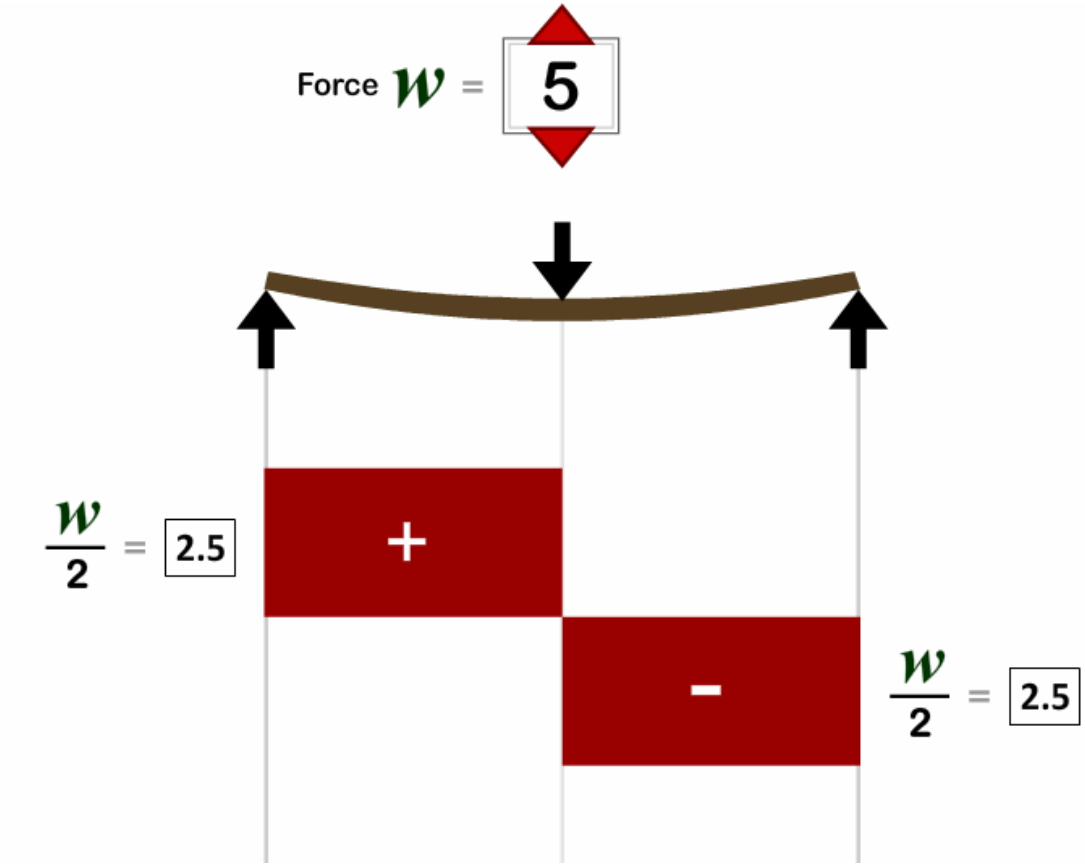
Video & audio



Tools – teacher & user control



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Professional equipment – integrated learning

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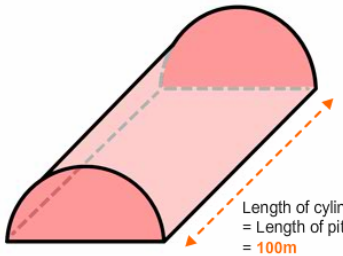
Surface area

We want to calculate the surface area of a cover for an astroturf pitch, including the ends

To answer this question we will calculate the surface area of half a cylinder

The **Length** and **Diameter** of the cylinder are given below



This photo shows a temporary air supported structure that can be used as an astroturf cover

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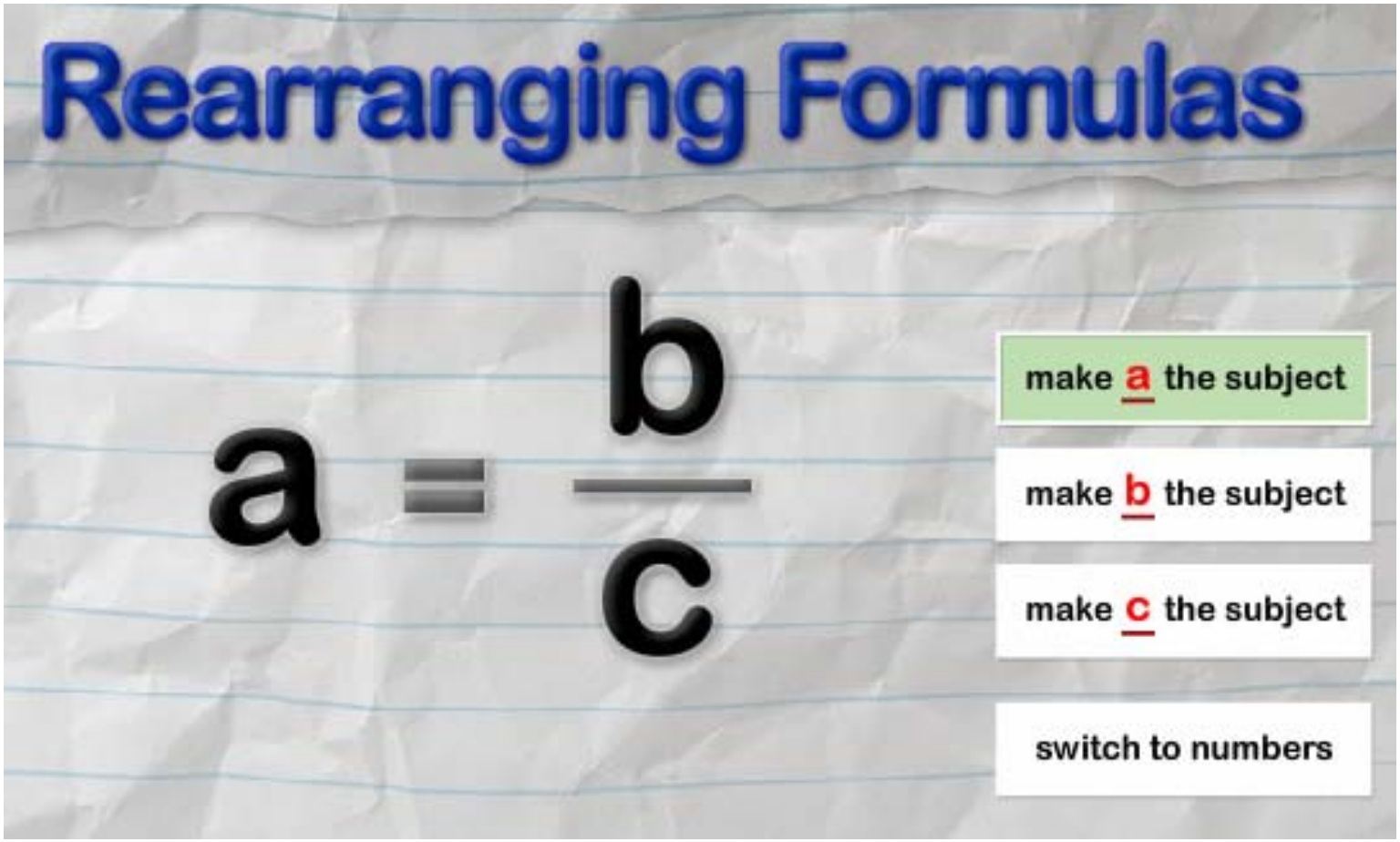
Animated graphics



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Resources to be created

- Interactive 360º environments supported by video and audio explanation
- Worksheets to support each interactive environment – (self study and group tasks)
- Formulae posters and support aids for each topic
- Games and role play exercises
- Teacher notes

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Future

- Tools ebedded effectively into curriculum
- Provide reusable learning objects that can be adapted, changed and updated

- All resources will be open access on the web

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Morley High School pupils recently completed AS Maths and worked with us as part of their Maths in a Real World Project

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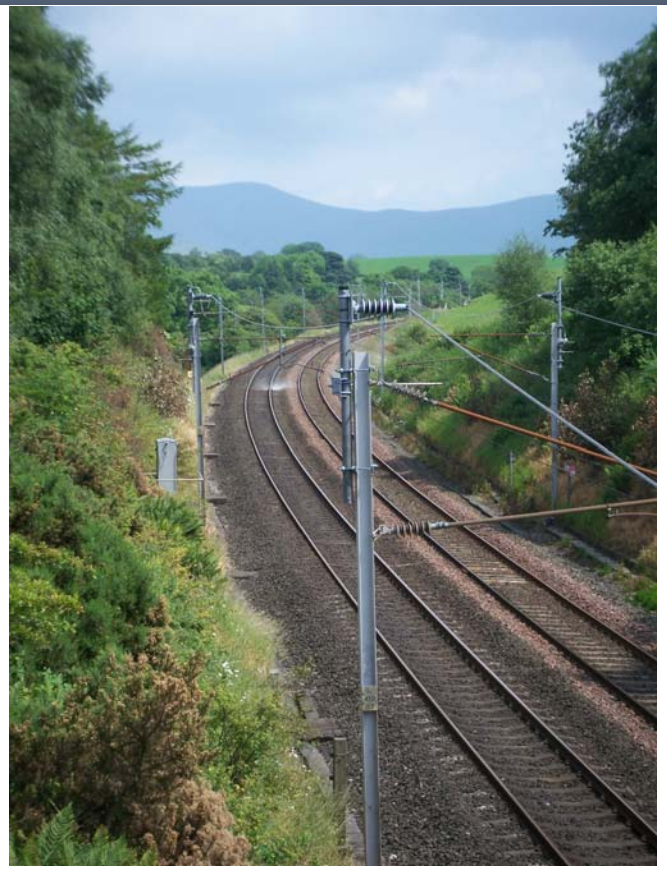
Curves for transport



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Setting out & understanding application


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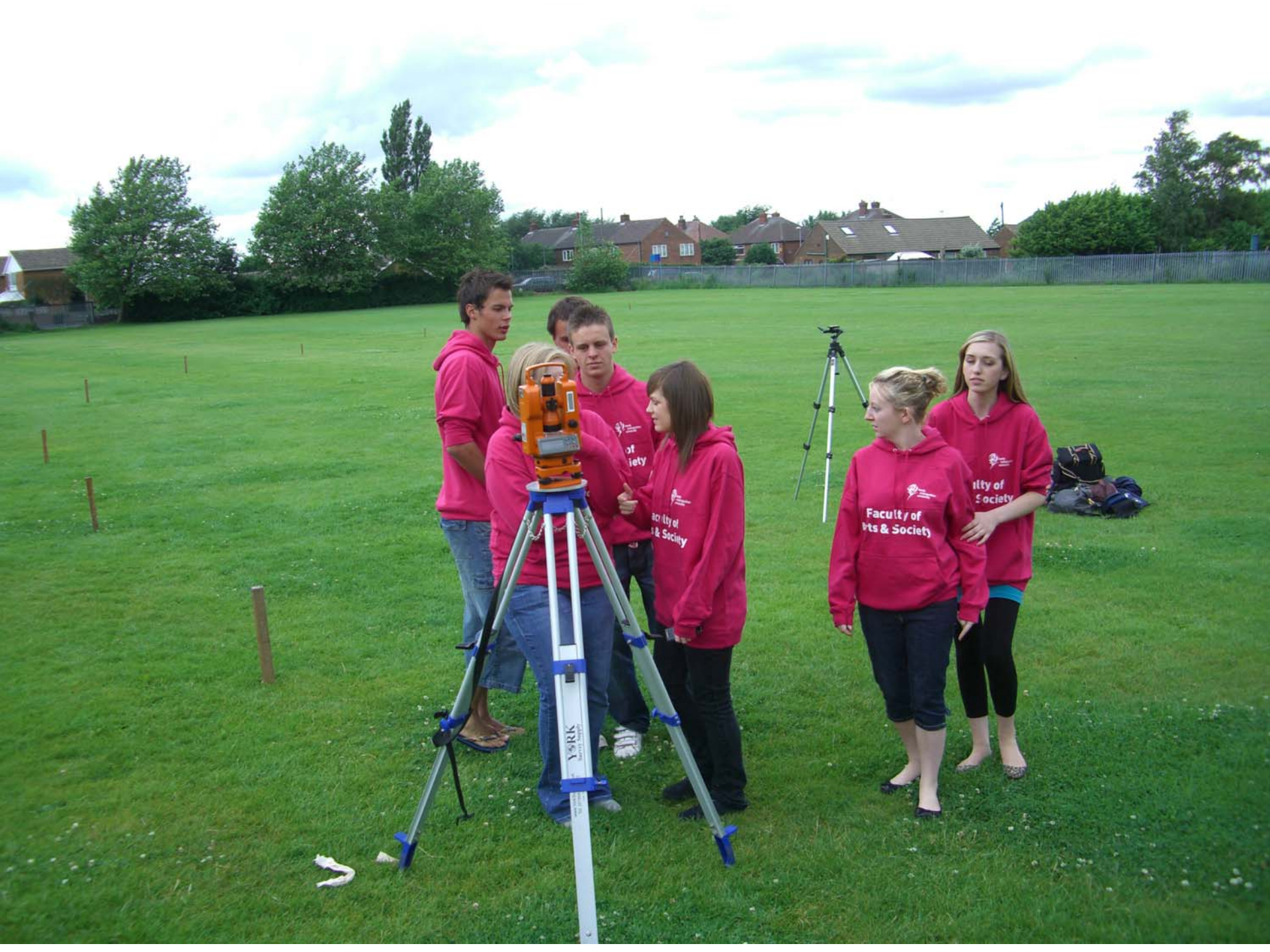
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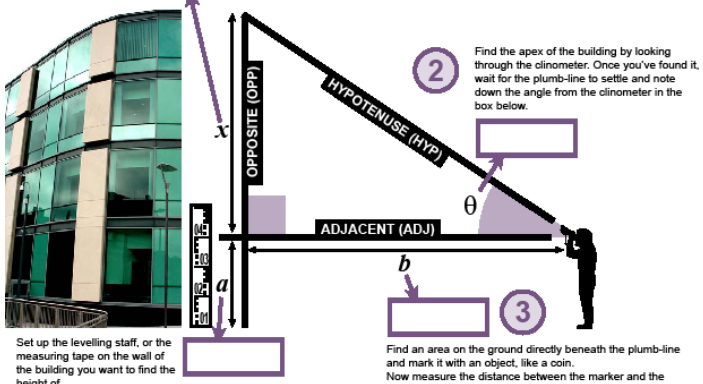
Worksheets

Calculating the height of a building

http://www.virtualmaths.org/activities/shapes/theod2

You're going to find height of the building. Lets call this x



2 Find the apex of the building by looking through the clinometer. Once you've found it, wait for the plumb-line to settle and note down the angle from the clinometer in the box below.

Set up the levelling staff, or the measuring tape on the wall of the building you want to find the height of.

1 Stand as far back as you need to, so you can clearly see the apex of the building. Look though the clinometer at the leveling staff or measuring tape, **making sure the the angle on the clinometer reads 0**. Now take the reading and write it in the box above.

3 Find an area on the ground directly beneath the plumb-line and mark it with an object, like a coin. Now measure the distance between the marker and the building, and write the measurement in the box above.

Shapes, Space & Measure — Calculating the height of a building

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We know that...

$$\text{Tan}\ \theta = \frac{\text{OPP}}{\text{ADJ}}$$

We want to work out the height of **OPP**, so we need to make **OPP** the subject of the above equation.

We can do that by multiplying both sides by **ADJ**, which will cancel out the **ADJ** on the right side of the equation.

$$\text{ADJ} \times \text{Tan}\,\theta = \cancel{\text{ADJ}} \left(\frac{\text{OPP}}{\cancel{\text{ADJ}}} \right)$$

Now we have...

$$\text{ADJ} \times \text{Tan}\,\theta = \text{OPP}$$

So...

$$x = \text{ADJ} \times \text{Tan}\,\theta$$

What is x ?

.....

To find the height of the building, add x to height a that you found earlier

x = ...

ng the height of a building

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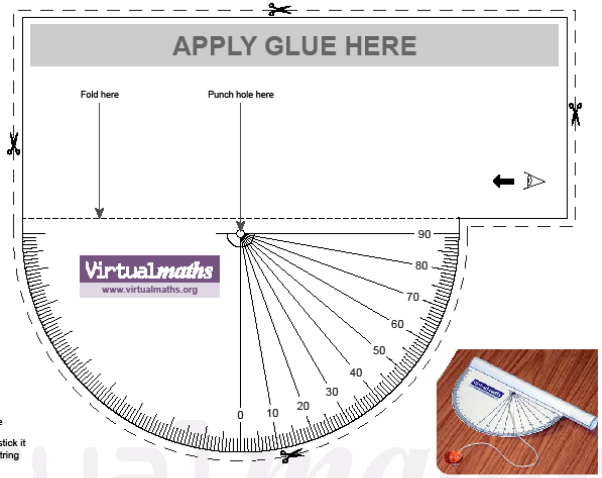
...s.org/activities/shapes/theod2

...R

...ht

...e and ...shape from

...t the center ...lake sure the ...to pass your ...the larger the ...he readings!



3 Now fold along the line that attaches the rectangle shape to the protractor, creating a hinge.

4 Apply some glue to the gray marked area and roll the rectangle to form your scope.

5 Apply some adhesive tape to the scope hinge to add strength

6 Cut off about a foot length of string and thread it through the hole you created earlier. Now take the length you passed through and tie some knots in it so its held in place and cant pass back through the hole

7 Take a coin or another weighted object and stick it with adhesive tape, to the other side of the string creating a plumb-line.

Shapes, Space & Measure — Calculating the height of a building

Evaluation: some points to take forward

- Snapshot of what can be done, but need of further development and more research
- To accommodate advanced and less able students the range of problems needs to be broad
- Some evidence that students can quickly find their way through the problems but don't fully understand the maths theory
- Whole classroom activity needs to be developed

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Observations & feedback

- Students engage quickly with technology
- Interest in the context itself
- Pace & recap, step-by-step progress
- Forward / back pass button useful for teaching & learning
- Consideration should be given to peer pressure & neighbour progression
- Multiple approaches & different perspectives
- Colour coding & audio
- New contexts

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Some spin off benefits

- Career links
- Exposure to real problems
- Parent involvement
- Parents up-skilling
- Leading industrialists concerned about standards in maths
- Industry interested in collaboration

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