



ANGLE OF ATTACK

This worksheet explores the relationship between fire, wind speed, inclines and declines.

You will be challenged to calculate the effects of slope and wind speed on the spread of bush fires. Measurement data comes from the use of topographical maps of an example area (in this case St Ives Chase), which are available from Google Earth.

The task integrates the mathematical concepts of speed, angles, length, direction, time, working mathematically and mapping.

Set up the mapping

- Open SketchUp and select the Simple Template - Metres.
- Select Geo Location in the drop File menu.
- Select the area north of Toolang Rd. The map will be imported into SketchUp. Repeat and add More Imagery to obtain the entire suburb.
- Select Geo Location / Show Terrain, under the File menu.
- Select Section Plane in the Tool menu and cut through the North / South axis.
- Use the Protractor & Tape Measure under the Tools menu to record data on slopes and distances.
- Repeat the steps above through the East /West axis and record data.

Apply variables

- Wind speed from the North on flat ground = 100 metres per hour
- Wind speed from the East on flat ground = 150 metres per hour
- Distances and slope will vary depending on map imported, section plane location and accuracy of angle and distance measurements taken.
- 10° decline = speed halved. 10° incline = speed doubled.

Calculate and predict fire behaviour

By combining measurements of distance and angle with the variables of wind speed and direction from above, your students can make realistic predictions of fire behaviour around St Ives Chase.



Level 3

LESSON GUIDE



Fire Scenario 1:

A 200m wide fire front is approaching St Ives Chase from the North. The fire starts with a lightning strike approximately 600m from Timbarra Rd. Use the 10° slope rule to calculate the following:

- The maximum fire spread rate from the North.
- The minimum fire spread rate from the North.
- The time taken for the fire to reach Timbarra Rd from the North.

If the wind speed dropped by 30%, what would be the impact on the total time to reach Timbarra Rd? Express your answer in terms of time and percentage increase.

If the wind speed doubled to 200 metres per hour, what would be the impact on the total time to reach Timbarra Rd? Express your answer in terms of time and percentage decrease.

Fire Scenario 2:

A 200m wide fire front is approaching St Ives Chase from the East. The fire starts with an arson attack 500 metres from the most easterly point of Timbarra Rd. Use the 10° slope rule to calculate the time taken for the fire to reach Timbarra Rd from the East.

If the wind speed halved at the floor of the valley, what additional time would this provide to residents to evacuate?

Is there a direct correlation between wind speed doubling and the fire arriving in half the time?

Discuss why this is or is not the case!

Make it your own!

See if you can make another fire scenario for bushland near your school!

This worksheet courtesy of teachers from St Ives North Public School.