"Testing Sunglasses"

Subject: Physics

Sensor: Ultraviolet sensor

Overview:
Ultraviolet radiation is electromagnetic waves emitted by the sun and is also produced by white hot objects. They are invisible but can cause damage to the human eye. They carry a lot of energy and can kill living cells also altering them to become cancerous.
As a result, it is a good idea to protect ourselves with either suitable clothing for our bodies or sunglasses for our eyes. This simple experiment is to compare different sunglasses in order to see which provides the best UV protection.

Equipment required: LogIT DataLogger
1 Ultraviolet sensor
1 sensor extension cable (optional)
1 clamp stand (optional)
1 UV source (the sun may be a good choice)

Hazards:
Do not expose pupils or yourself to Ultraviolet sources for any length of time. A good source of UV would be UV-A as this is the least hazardous but it is important that your school and LEA's risk assessment guidelines are followed. A screen around the source should be used to prevent exposure to direct UV rays and if experimenting with sunlight, avoid staring directly at the sun and use suitable protection as directed by your risk assessment and LEA/school guidelines.
Always check your local regulations or the school advisory service such as CLEAPSS or SSERC for guidance on the use of any hazardous material or source.

Setup:

1. Connect the UV sensor to a channel of the LogIT Datalogger.
2. You can use a clamp stand to hold the sensor if required.
3. Set the UV source a set distance from the sensor. (This will depend on the source you are using. We used a readily available key ring type UV light fob.)
4. Set your logging software to record single readings when prompted. (eg. 'Snapshot' mode).

Note: If using the sun as a UV source, make sure that the amount of UV is the same before placing the test sunglasses in front of the sensor for accuracy.

Method:
1. Place the first pair of sunglasses a set distance from the UV sensor.
2. Take a reading for the sunglasses.
3. Repeat the above two steps for all of the sunglasses on test.

Results:
Which pair of sunglasses reduced the UV the most?
How does this amount relate to the cost of the sunglasses?
Are there any results that were a surprise?
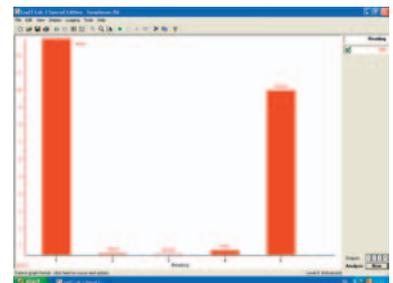
Going further:
Was this an accurate test? If not why not?
What other tests could you perform on the glasses? (Think about the surface area of the glasses)
How would you perform a fair test with this experiment ie. what could you vary?