Surface area & volume

SARAH — Oh no!

ROBBIE — Come on, let's get a shiny new one!

Hey these triangular prism ones are pretty funky.

SARAH — Ooh nice! It's such a different shape though. How can we tell if they'll have the same amount of water to flap about in?

ROBBIE — Don't worry, they'll be fine. Just get this one.

AL GEBRA — When it came to volume these cold kippers were way outta their depth, and this whole pet-shop-palaver was smelling real fishy.

The name's Al. Private Detective.

It's time you two fessed up and told me everything.

SARAH — My old tank is 20 cm wide and 50 cm long. And with the terrapins in, the height of the water is 24 cm...

AL GEBRA — I knew the volume of water with the terrapins in the tank was equal to the area of the rectangular base multiplied by the height... 24,000 cm^3.

SARAH — And Robbie thinks I should get that triangular prism one.

ROBBIE — Sarah!

AL GEBRA — The top and bottom ends of the tank each had 2 equal sides of 40 cm. It was a right-angled isosceles triangle, and the area of that was the base of the triangle multiplied by the height of the triangle multiplied by half... 800 cm^2.

AL GEBRA — Hmm. This whole fish farm was now a crime scene, and somebody was going to have to pay for it, big time.

ROBBIE — Please, I don't want to go to prison!

AL GEBRA — To find the volume of water together with the terrapins, in each triangular prism tank we multiply the area of the end, called cross section, by the height of the water we measure. It's the law...

AL GEBRA So the requirement from the old tank is 24,000 equals the area of the uniform cross-section multiplied by the water level we measure. That is 24,000 equals 40 multiplied by 40 multiplied by ½ multiplied by the height of the water level, including the terrapins.

So 24,000 had to be equal to 800 multiplied by the height, which meant...

SARAH That the height has to be equal to 24,000 divided by 800? So the new tank needs to be at least 30 cm high!

AL GEBRA I had to hand it to her; it wasn't just the tank she'd cracked, it was the case too...

SARAH How about you give us a hand with getting the new tank home?

AL GEBRA How about no.

Case closed.