The lab of MR.Q

Water you looking at?

TITANIUM DIOXIDE

What you need:

A LARGE PRINTOUT OF THE WORDS TITANIUM DIOXIDE (ALL CAPS)
A SMOOTH, CLEAR CYLINDER (E.G., A WATER BOTTLE FILLED COMPLETELY WITH WATER, LITTLE TO NO AIR BUBBLES)

What to do:

FILL THE WATER BOTTLE COMPLETELY AND SEAL IT TIGHTLY.
HOLD THE BOTTLE HORIZONTALLY IN FRONT OF THE PRINTED WORD TITANIUM DIOXIDE.
SLOWLY ROTATE OR MOVE THE BOTTLE BACK AND FORTH IN FRONT OF THE TEXT AND OBSERVE.

What's going on?

THIS LAB SHOWS HOW A CURVED LENS, LIKE A BOTTLE FILLED WITH WATER, CAN BEND LIGHT AND MAKE IMAGES LOOK FLIPPED. WHEN YOU PLACE THE CYLINDER IN FRONT OF THE WORDS TITANIUM DIOXIDE, BOTH WORDS ARE FLIPPED, BUT ONLY "TITANIUM" LOOKS BACKWARD. THAT'S BECAUSE THE LETTERS IN "DIOXIDE" ARE MOSTLY THE SAME ON BOTH SIDES, SO THEY STILL LOOK NORMAL WHEN REVERSED. THIS EFFECT HAPPENS BECAUSE THE CURVED SURFACE OF THE BOTTLE CHANGES THE PATH OF LIGHT - BENDING IT AS IT MOVES FROM AIR INTO WATER AND THEN BACK INTO AIR. THE ROUNDED SHAPE MAKES THE LIGHT RAYS CROSS, WHICH FLIPS THE IMAGE HORIZONTALLY. THIS WORKS IN A SIMILAR WAY TO HOW A MAGNIFYING LENS CAN MAKE AN IMAGE APPEAR RIGHT-SIDE UP OR UPSIDE-DOWN DEPENDING ON HOW FAR AWAY THE OBJECT IS.