Answer on Question #38356, Physics, Mechanics

Question:

A large open tank has two holes in its wall. One is a square of side at a depth x from the top and the other is a circular hole of radius r at depth 4x from the top. When the tank is completely filled with water, the quantities of water flowing out per second from both holes are the same. Then r is equal to

Answer:

Speed of water in hole equals:

$$v = \sqrt{2gh}$$

where g is acceleration due to gravity, h - depth

Water flow equals:

$$f = \frac{V}{t} = \frac{vtS}{t} = vS = \sqrt{2gh}\,S$$

where S is area of hole.

Therefore:

$$\sqrt{2gx}\,a^2 = \sqrt{2g4x}\,\pi r^2$$

$$r = \frac{a}{2\sqrt{\pi}}$$

Answer: $r = \frac{a}{2\sqrt{\pi}}$