

# Physics movie project

[Science](#), [Physics](#)



James Cameron is one of the best directors in the world. His famous Titanic, which was first showed in 1997, was made into 3D movie this year-----the 100 anniversary of Titanic being sunk. The movie Titanic is close to the real accident happened on April 14th, 1912 and there's a lot of physics involved in the movie. We have to admit that James Cameron really spent plenty of time on the causation of the accident. â' physics side note: Pressure (â^š) At the beginning of the movie, there is a group of people who want to find the invaluable " Heart of the Ocean". They used submarine to get 3821 meters under the sea level. The absolute pressure on the submarine equals to the atmosphere pressure plus the pressure given by water. But the pressure given by water is so big that we can even ignore the  $P_0$   $P_a = \rho_{\text{sea water}} * g * h = 1025 * 9.8 * 3821 = 3.9 * 10^7 \text{Pa}$  And the force on the window of submarine is  $F = P * A$ . So the force is  $3.9 * 10^7 \text{N}$ . The answer is almost the same as what the " boss" said in the movie when they were about to get into Titanic. â'; physics side note: internal energy and work (â^š) In the film, Mr. Eames suggested Captain Smith letting Titanic go with the full speed. And what they did in the film is asking the workers to add more coals to run the machines, which I believe are diesel engine or steam engine. According to the first law of Thermodynamics we learned in Chapter 15, we knew that internal energy equals heat minus work done by the engine. (â' U= Q-Wby) The work done by the engines made Titanic go forward. This is an energy transfer from heat to mechanic energy. And because the efficiency (e) of the certain engines won't change and  $e = W/Q$ , so add more heat into the engine can produce more work. So the workers opened more engines and put more coals into them to run the engines with more heat. â' physics side note:

heat + wave (^^) In the movie, the night of April 13th, 1912, was extraordinarily cold but the ocean was peaceful. The sailors couldn't even feel any gentle breeze. And soon after that Titanic crushed into a floating iceberg. That situation totally fits physics principles. First of all, when there's an iceberg near you, you will feel it's colder than ever was. That's because the temperature around has to find a new balance with the temperature of iceberg.  $Q = cm\Delta t$  shows us that the bigger the iceberg is, the more heat it need to find another balance. So it will be colder. So when the sailors said that night was extremely freezing, that means they are close to icebergs. And in the film, there was a short conversation between Captain and chief officer about how peaceful the ocean was. The Captain was quite happy with the weather however the chief officer seemed opposite. He said that was probably not a good thing since that made it even harder to discover icebergs. The main reason why it would be harder to discover icebergs is no waves. When there is wind, we can judge if there is something ahead by the motion of waves. The waves will have interference when they hit the iceberg ahead of Titanic and get back. So because there was no wind that night so the sailors could not judge by waves. And the chief officer was right. ^£

physics side note: Newton's Law (^^) When the sailor saw the iceberg ahead of Titanic, the distance in between was only about 400 meters. Although the chief officer asked to turn left and tried to go backwards immediately, Titanic still crushed into the iceberg and broke the left side. I think this is also correct because according to Newton's Law, everything will keep the way they were until there's some other force act on it. Titanic was so heavy that it couldn't suddenly head back or turned left to not to crush into iceberg. ^x

physics side note: buoyancy force + torque ( $\hat{s}$ ) In the movie, soon after Titanic crushed into the iceberg, the prow sank first and the stern was highly turned up in the air. That's because prow was full of water first, so the gravity was much more than the buoyancy force. But there wasn't any water in the stern at first. So the center mass was no longer in the middle of Titanic. The CM shifted to the prow however the new torque was no longer balanced since there's more force on the prow. So Titanic was turned clockwise and that made the stern rising in the air.