

The Twelve Tasks of Asterix - The Race against Merinos from Marathon

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Movie / Year:

The Twelve Tasks of Asterix / 1975

Scientific subject and topic:

Gases

Movie producer:

Studio Idefix

Director:

René Goscinny, Albert Uderzo

Cast:

Asterix (voice): Roger Carel, Obelix (voice): Pierre Tornade, Cesar (voice): Jean Martinelli

Website of movie:

Filmography links and data courtesy of The Internet Movie Database

<http://www.imdb.com/title/tt0072901/>

Description of movie:

The Gaul villagers withstand Cesar's troops for years. The idea arises in Rome that they could be demigods. Cesar creates 12 tasks in order to prove this idea. If they really succeed the Gaul villagers should become the rulers of Rome.

Link to Trailer Site:

Filmography links and data courtesy of The Internet Movie Database

<http://www.imdb.com/title/tt097291/trailers>

DVD: The Twelve Tasks of Asterix, U.K.

http://www.amazon.co.uk/Asterix-12-Tasks-DVD/dp/B0009S4VXU/sr=1-10/qid=1170167665/ref=sr_1_10/203-2505246-8430336?ie=UTF8&s=dvd

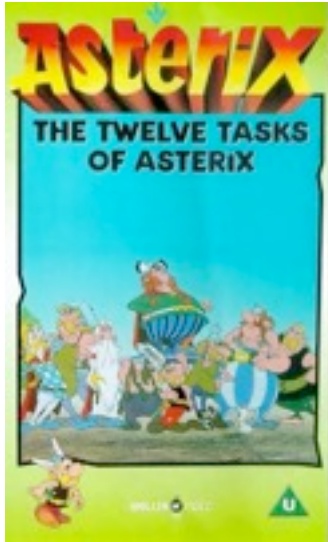
DVD: The Twelve Tasks of Asterix, U.S.A.

http://www.amazon.com/s/ref=nb_ss_gw/102-7439071-9976907?url=search-alias%3Ddvd&field-keywords=The+Twelve+tasks+of+Asterix

Title of scene:

The Race against Merinos from Marathon

Still:



DVD cover scan from the movie "Twelve Tasks of Asterix", claimed as fair use

Time interval:

00:13:50-00:16:45

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Scientific keywords:

Speed of Sound, Air Resistance, Drag, Drag Coefficient

Description of scene:

Asterix races against Merinos from Marathon who is the undefeated Olympic winner. He races faster than the wind and even faster than sound propagates air. Asterix dopes himself with the magic drink in order to be competitive with Merinos. Finally Merinos crashes into a tree, and Asterix wins the race.

EXPLANATION						
Basic	Advanced	Scientific	Movie	Movie Clip	Director	Film Studio

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Movie: The Twelve Tasks of Asterix
Movie Scene: Race against Merinos from Marathon
Director: René Goscinny, Albert Uderzo
Film Studio: Studio Idefix

Basic Level:

In this movie scene Asterix competes against Merinos from Marathon. He is known to run faster than the speed of sound. It is correct from the physics point of view that during the race one hears a bang as Merinos breaks through the sound barrier.

To keep running it is necessary to fight against the air resistance. Both athletes must be very strong in order to do so, since the faster they are running the stronger becomes the force needed to overcome the air resistance.

As seen in the movie scene the Greek athlete lowers his body in order to avoid further air resistance. Asterix carrying mushrooms and flowers while he runs worsens his situation with respect to the air resistance. However, but he does not seem to care as the magic drink dopes him.

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Movie: The Twelve Tasks of Asterix
Movie Scene: Race against Merinos from Marathon
Director: René Goscinny, Albert Uderzo
Film Studio: Studio Idefix

Advanced level:

Sound propagates as a longitudinal wave through material. The speed of sound depends on the stiffness and the density of the material. In air the speed of sound mainly depends on air pressure and is about 1200 km/h.

When Merinos exceeds the speed of sound it can be heard as a bang in the scene. The bang that occurs when an object exceeds the speed of sound happens when the source that emits waves travels at the same speed as the wave propagates. This creates a wave with very high amplitude, which can be heard as the bang when an object breaks through the sound barrier.

Running fast creates an enormous amount of air resistance. The air resistance that a moving object is known to be proportional to the square of velocity of the object and thus increases by tremendous amounts as one travels faster. In order to keep himself running while fighting against the air resistance Merinos would have to keep up a constant force of about 16 kN (16.000 Newton). This means that a weight of about 1.6 tons would act on his body.

In order to continuously generate the force needed, Merinos would have to be equivalent to a very powerful machine. He needs a power of approximately 5.3 Megawatts. This would correspond to about the power of a railroad locomotive.

EXPLANATION						
Basic	Advanced	Scientific	Movie Clip	Director	Film Studio	

Author: Thomas Haschka
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Movie: The Twelve Tasks of Asterix
Movie Scene: Race against Merinos from Marathon
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Scientific level:

Sound propagates as a longitudinal wave through the air. As the air is the carrier medium the speed of sound depends on the air's properties, like density and temperature. Close to the surface of the Earth under normal conditions the speed of sound is typically given by about 1200 km/h or about 330 m/s.

A sound wave source traveling through a medium causes the waves to be deformed causing different frequencies and amplitudes. One can easily notice that the sound is shifted to higher frequencies when an object approaches an observer, whereas it is shifted to lower frequencies when an object moves away from him. This is known as the Doppler effect. In the extreme case that the source travels as fast as the speed of sound extreme amplitudes are created, which can be heard as a bang when an object is breaking through the sound barrier.

Running at high speeds creates a lot of air resistance to the object. The formula for air resistance is given by

$$F_w = c_w \frac{\rho}{2} u^2 A,$$

where c_w denotes the drag coefficient of the object. The symbol ρ denotes the air density, u is the speed and A the surface of the foreside of the body traveling through air. As shown the air resistance is proportional to u^2 and thus traveling at high speeds requires a lot of power.

We estimate that the force onto a body moving through air with a front surface of 0.65 square meters and a drag coefficient of 0.4, which we took approximately for the human body is given by about 16 kN. This is about the same force as gravity acting on a 1.6 ton object. The power needed to unleash this force traveling at a velocity as the speed of sound can be easily calculated by

$$P = Fv$$

and is found to be about 5.3 MWatt (5.3 Million Watt). This would correspond to about the power of a railroad locomotive.

Websites about film:

http://en.wikipedia.org/wiki/The_Twelve_Tasks_of_Asterix
<http://www.imdb.com/title/tt0072901/>

Websites about speed of sound, air resistance (drag), drag coefficient:

http://en.wikipedia.org/wiki/Speed_of_sound
http://en.wikipedia.org/wiki/Air_resistance
http://en.wikipedia.org/wiki/Drag_coefficient