Date: Fri, 27 Jan 2006 16:33:42 -0800
To: Diane Shankle <shankle@ee.Stanford.EDU>
From: Olav Solgaard <solgaard@stanford.edu>
Subject: Re: Quals Meeting Time Change Please see below!

Diane:

My questions are appended.

Olav

Qualifying Exam for the Electrical Engineering PhD program, Stanford University, January 2006
Olav Solgaard
Questions:
1) What is this? (Showing a post card with two pictures that appear alternately as the card is viewed from different directions)
2) How does it work?
3) How is the information of the two pictures structured?
4) What type of lens is used? How far away from the lens are the images placed?
5) Why do you see several transitions as you vary the viewing angle?
6) Do the two pictures create the illusion of depth beyond that of a normal picture?
7) How can you create the illusion of depth in pictures that are multiplexed in this way?
8) How would you use this picture-multiplexing effect to create a better computer screen?

At 04:23 PM 1/27/2006, you wrote:

> Quals Meeting
> Tuesday, January 31st.
> 4:30 P.M.
> CIX-X AUD
>
> Coffee, Tea and Cookies will be served before the meeting.
>
> Please send me a copy of your Quals Question either by email or a
> hard copy to the address listed below!
>
> Happy Friday,
> Diane
>
> --
>
> Any other questions feel free to call me!
>
> Diane Joan Shankle
> Tel: (650) 723-3194
> FAX: (650) 723-1882
> shankle@ee.stanford.edu
> Stanford University
> Electrical Engineering
> Student Services
> Packard Building Rm. 177
> Stanford,CA 94305-9505
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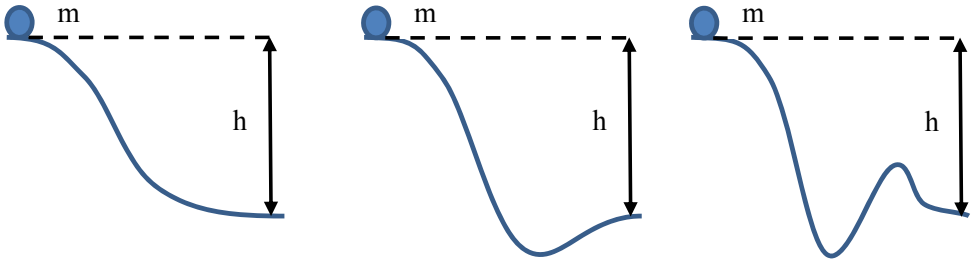
EE Quals Question 2012, Olav Solgaard

1. What is the velocity of the ball after it has rolled down the ramp? Assume negligible friction and that the initial velocity is zero in each example.




$$mgh = \frac{1}{2}mv^2 \rightarrow v = \sqrt{2gh}$$

2. How can you use this to find an expression for the resonance frequency of a mechanical harmonic oscillator (spring-mass system)?

Set the maximum stored kinetic energy equal to the maximum stored potential energy, and assume harmonic motion of the mass to find: $\omega = \sqrt{k}/m$

3. How does the resonance frequency change (up, down, or unchanged) if the spring sets the mass into rotation as it is elongated? Assume that the rotation speed is proportional to the linear speed.

The resonance frequency goes down.

4. How can you use the same thinking to find the shape of a beamed curved by positioning and twisting its ends (positioning the ends and fixing their angles)?

The curve with the minimum stored elastic energy is the correct solution.