

Forum:[Hack Forums](#)

Thread: [Math/Physics Help Desk](#)

Feynman - April 14, 2013, 2:10 pm

I receive a lot of PMs regarding math/physics questions, so I've decided to open up a help desk to further assist the community. [/align]

My qualifications:I have a BSc.Hons. in Physics

I run undergraduate help sessions in school

I have hundreds of hours in lab experience

I have been a TA for three semesters in a row

What I can help with:Algebra and trigonometry

Linear Algebra

Precalculus

Multivariable differential and integral calculus

Vector calculus

Ordinary and partial differential equations

Kinematics

Classical mechanics

Electromagnetic theory

Quantum mechanics

Optics

Thermodynamics and statistical mechanics

Fluid dynamics and introductory oceanography

Some basic group theory and Lie algebra(physics-related only)

Some electric circuits

Special and basic general relativity

Basic nuclear physics

Biophysics

Particle physics and cosmology

Lab reports, research papers, and honours theses

Math/physics career/university advice

What I cannot help with: Computer science

Pure math (including writing proofs)

Real/complex analysis

My rules/Conditions:

I'm extremely approachable, and I will assist you until you feel comfortable with what you're doing. I do not offer homework help.

Please be patient. This is a free service, and I'm taking time out of my own day to help.

You can also [PM me](#) questions.

If you choose to help another user, please PM them instead of posting here.

I provide full, written solutions to problems. If you don't like my notation/writing, sucks. Change it how you see fit. If I'm lazy, or don't have paper, I'll type out solutions.

There are many different methods to solve problems. If it requires a certain method, let me know!

Kosmos - April 14, 2013, 2:46 pm

I can vouch for Feynman. He is fantastic at what he does and I can assure you that he will help you with any question you may have.

Re?olution - April 14, 2013, 3:58 pm

This is an awesome service you are providing here. I can vouch for this as Feynman has saved my ass so many times on Physics assignments :P

Neal Caffrey - April 14, 2013, 11:48 pm

Having a bit of trouble regarding connected masses hanging on a pulley.

I'm pretty shit at the whole topic of Motion, so some help would be appreciated.

A 12kg mass is held on a smooth surface and is connected by a string and pulley to a 2.5kg mass which dangles in mid air. If the 12kg mass is 5 m from the end of the surface;

a) maximum speed does it reach before crashing to into the pulley?

b) How much time does it take for it to crash into the pulley?

Feynman - April 15, 2013, 2:46 am

(Apr 14, 2013 11:48 PM)Neal Caffrey Wrote: [\[CITE\]](#) Having a bit of trouble regarding connected masses hanging on a pulley.

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which dangles in mid air. If the 12kg mass is 5 m from the end of the surface;

a) maximum speed does it reach before crashing to into the pulley?

b) How much time does it take for it to crash into the pulley?

Edit: Finished it. I had the wrong time and showed up early for my exam. Here you go:

Infinity. - April 15, 2013, 8:00 am

Could you tell me What's this P Versus NP problem all about? A famous Math Problem.

Feynman - April 15, 2013, 8:01 am

(Apr 15, 2013 08:00 AM)Infinity! Wrote: [\[CITE\]](#) Could you tell me What's this P Versus NP problem all about? A famous Math Problem.

That's computer science, actually. It's not my specialty.

Infinity. - April 15, 2013, 8:07 am

All right so 1 for Probability.

Its a 4 Digit number 0000-9999

And a Lucky number is consider when Sum of first 2 digits equals Sum of last 2 digits

Like 2222 , $2+2=2+2$

Likewise If a 4 digit number is Picked at random then Whats the probability that its a Lucky Number?

Feynman - April 15, 2013, 8:08 am

(Apr 15, 2013 08:07 AM)Infinity! Wrote: [\[CITE\]](#) All right so 1 for Probability.

Its a 4 Digit number 0000-9999

And a Lucky number is consider when Sum of first 2 digits equals Sum of last 2 digits

Like 2222 , $2+2=2+2$

Likewise If a 4 digit number is Picked at random then Whats the probability that its a Lucky Number?

I don't do stats/probability. I should have added that to the list.

Infinity. - April 15, 2013, 8:12 am

Somewhere Further down the question there is Binomial Theorem Used, Which is an Algebra Topic.

Feynman - April 15, 2013, 8:13 am

(Apr 15, 2013 08:12 AM)Infinity! Wrote: [\[CITE\]](#) Somewhere Further down the question there is Binomial Theorem Used, Which is an Algebra Topic.

But still revolves around probability. I've used binomial theorem, but only sparsely, and not enough to help with a problem.

Infinity. - April 15, 2013, 8:15 am

Yeah its lot more complicated and Confusing , anyways Thanks for your time and help.

We'll post here with Further Doubts.

Feynman - April 15, 2013, 8:59 am

(Apr 15, 2013 08:12 AM)Infinity! Wrote: [\[CITE\]](#) Somewhere Further down the question there is Binomial Theorem Used, Which is an Algebra Topic.

I kind of knocked the question away before even looking at it, because I saw it was probability-related. My apologies:

Let x represent the first two digits, and y represent the last two.

$x + y = 0 \rightarrow 1$ case (0000)

$x + y = 1 \rightarrow 4$ cases (1010,1001,0101,0110)

$x + y = 2 \rightarrow 9$ cases (1111,1120,1102,2011,2020,2002,0211,0220,0202)

$x + y = 3 \rightarrow 16$ cases

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.

There appears to be a pattern. Skip to the end and work backwards to see if it continues.

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$x + y = 18 \rightarrow 1$ case (9999)

$x + y = 17 \rightarrow 4$ cases (9898,8989,9889,8998)

$x + y = 16 \rightarrow 9$ cases

So we have the same pattern starting from $x+y=0$ and moving forward, and starting from $x+y=18$ and moving backwards. The only number of cases that doesn't repeat is 100 cases, when $x+y=10$.

If 100 cases repeated, we'd have:

Total cases = Summation of i^2 from $i=1$ to $i=10$ = 770

However, 100 cases only appears once, so we have:

Total cases = (Summation of i^2 from $i=1$ to $i=10$) - 100 = 670

So there are 670 magic numbers between 0000 and 9999.

I think that's right, but I don't know how to do the probability part.

Infinity. - April 15, 2013, 10:30 am

Actually the probability is coming to 670/10000, And you seem to have cracked it,

Thanks a lot, and also The solution in which Binomial was used was Way too complicated, But your method was bit too easy and understandable.

Feynman - April 15, 2013, 10:41 am

(Apr 15, 2013 10:30 AM)Infinity! Wrote: [\[CITE\]](#) Actually the probability is coming to 670/10000, And you seem to have cracked it,

Thanks a lot, and also The solution in which Binomial was used was Way too complicated, But your method was bit too easy and understandable.

Do you have the other solution? I'd like to see it.

Infinity. - April 15, 2013, 10:57 am

It's in the book of mine that I gave it to my Friend , When he gives me back I will Post it here.

Feynman - April 15, 2013, 3:34 pm

(Apr 15, 2013 10:57 AM)Infinity! Wrote: [\[CITE\]](#) It's in the book of mine that I gave it to my Friend , When he gives me back I will Post it here.

Alright, thanks. It seems like a question you'd find on some form of standardized test. If so, which test was it from?

Infinity - April 15, 2013, 11:23 pm

Its an Exam conducted in India For Admission into IIT's, So the Question was from their Test.

Some of which Includes

Spoiler [\(Click to View\)](#)

And also

Spoiler [\(Click to View\)](#)

Its very tough exam conducted in India.

Milky Gum Shot - April 16, 2013, 1:04 pm

You say you have hours of lab experience.

Is physics a reliable field to go into research?

What about Quantum Physics? Can you specialize in Quantum Physics in grad school?

If possible, what college did you attend for your BS in Physics?

Was it a relatively easy search for a job?

Feynman - April 16, 2013, 1:29 pm

(Apr 16, 2013 01:04 PM)Virgil Wrote: [\[CITE\]](#) You say you have hours of lab experience.

Is physics a reliable field to go into research?

What about Quantum Physics? Can you specialize in Quantum Physics in grad school?

If possible, what college did you attend for your BS in Physics?

Was it a relatively easy search for a job?

Physics is one of the most employable undergraduate degrees. It is highly regarded by research companies, but is also sought after by companies outside of the physics field. Many engineering firms regard a physics degree as equal to an engineering degree. A lot of physicists are hired as financial analysts as well, because they're generally proficient in critical thinking and mathematics.

You can specialize in quantum physics, but it's not recommended unless you're looking to spend your life in academia. It is generally a narrow field, and doesn't have many applications outside of further research. Most research related to it is also applied QM, such as condensed matter or solid state physics.

My university is of no concern to anybody.

I don't work, aside from research positions with professors as summer/semester-long jobs. I'm still in university for the time being, as I am completing a writing diploma. After that, I am spending another two semesters studying anatomy and physiology to help me get into a certain graduate program and/or medical school.

Feynman - April 16, 2013, 5:07 pm

(Apr 15, 2013 11:23 PM)Infinity! Wrote: [\[CITE\]](#) -snip-

At what age is it offered? That stuff is basic intro physics here. You cover it in a first year physics course.

J?c? - May 6, 2013, 5:57 am

Vouch. His maths knowledge is fantastic and easy to follow!

Tando - May 6, 2013, 10:33 am

I bookmarked this thread.

I have knowledge of stat + prob and computer science, the things you claim not to have haha. :o

Trapcode - May 7, 2013, 11:06 pm

Today IIT mains results announced. Thoughst and the most prestigious exam in the world.

Anyways, Vouch for this guy, He helped me also with the binomial theorem.

Just messed with the calculus.

Odin the Wanderer - May 8, 2013, 4:34 am

Vouch for Feynman, I am sure that he can help you in these topics.

i like soccer - May 8, 2013, 3:50 pm

I PMed you with some questions yesterday. Can you please help?

Feynman - May 8, 2013, 4:03 pm

(May 8, 2013 03:50 PM)i like soccer Wrote: [\[CITE\]](#) I PMed you with some questions yesterday. Can you please help?

I'm very busy today. I'm trying my best to help as many people as I can, but I have some other things that I have to get done before I go away on Saturday.

i like soccer - May 8, 2013, 4:22 pm

(May 8, 2013 04:03 PM)Feynman Wrote: [\[CITE\]](#) I'm very busy today. I'm trying my best to help as many people as I can, but I have some other things that I have to get done before I go away on Saturday.

Sure thing. Get to me when you can, then.

Feynman - May 8, 2013, 6:58 pm

Just a reminder: I am a teacher, not a homework service. Do not PM me asking to do your homework, not even if there's money involved. I help people with the intentions of making sure they need understand the material, not to ensure they keep coming back to me with money.

Area 51 - May 8, 2013, 8:44 pm

what is the difference between ac generator and dc generator?

Feynman - May 8, 2013, 9:03 pm

(May 8, 2013 08:44 PM)Area 51 Wrote: [\[CITE\]](#) what is the difference between ac generator and dc generator?

DC Generators produce a direct current, one that travels in one direction through the circuit, kind of like a race car on a track.

AC Generators produce an alternating current, which changes its direction many times per second. It's a bit harder to picture, but you can almost thing of it as a person going back and forth on a swing.

Area 51 - May 8, 2013, 9:41 pm

(May 8, 2013 09:03 PM)Feynman Wrote: [\[CITE\]](#) DC Generators produce a direct current, one that travels in one direction through the circuit, kind of like a race car on a track.

AC Generators produce an alternating current, which changes its direction many times per second. It's a bit harder to picture, but you can almost think of it as a person going back and forth on a swing.

Oh wow, and yea it is pretty difficult to picture. :S

Feynman - May 8, 2013, 10:00 pm

(May 8, 2013 09:41 PM)Area 51 Wrote: [\[CITE\]](#) Oh wow, and yea it is pretty difficult to picture. :S
Here's a better analogy I found:

Imagine you have a series of pipes, connected together into a loop. The pipes are filled with water, which is being pumped through the pipes in one direction. After a certain amount of time, the pump reverses, pushing the water in the opposite direction. Here's a diagram I made to help you:

Area 51 - May 8, 2013, 11:18 pm

(May 8, 2013 10:00 PM)Feynman Wrote: [\[CITE\]](#) Here's a better analogy I found:

Imagine you have a series of pipes, connected together into a loop. The pipes are filled with water, which is being pumped through the pipes in one direction. After a certain amount of time, the pump reverses, pushing the water in the opposite direction. Here's a diagram I made to help you:

Thank you so much sir . Appreciate your help :)?

Area 51 - May 21, 2013, 6:50 pm

Why is electricity transmitted using AC currents and not DC currents ??? Please help me out with this

Feynman - May 21, 2013, 6:55 pm

(May 21, 2013 06:50 PM)Area 51 Wrote: [\[CITE\]](#) Why is electricity transmitted using AC currents and not DC currents ??? Please help me out with this

There are a few advantages to AC current versus DC.

1) AC can travel through long circuits for efficiently

2) AC also allows for high voltages to be used more easily. With an AC circuit, you can use a transformer to easily amplify the voltage, but transformers don't work very well with DC.

Area 51 - May 21, 2013, 7:02 pm

(May 21, 2013 06:55 PM)Feynman Wrote: [\[CITE\]](#) There are a few advantages to AC current versus DC.

1) AC can travel through long circuits for efficiently

2) AC also allows for high voltages to be used more easily. With an AC circuit, you can use a transformer to easily amplify the voltage, but transformers don't work with DC. Alright, appreciate your help a lot man, thanks!

Penar - May 29, 2013, 7:46 pm

Vouch for Feynman. He's very skilled in what he does. If you have any issue, he will be more than glad to assist you with it.

Good luck, man.

iLuvHackForums - June 1, 2013, 9:09 pm

Physics help please!

Ross in his Bugatti Veyron Super Sport rolls across a starting line at 25 mph. $\frac{1}{4}$ mile later he is going 248mph. This takes him 9 seconds. What is his average acceleration in Meters per second? There are 1.1 yards in 1 meter and 1769 yards in 1 mile. Show all of your work

Feynman - June 1, 2013, 9:19 pm

First, convert his initial and final speeds into m/s:

25 miles per hour $\frac{1769 \text{ yards/mile}}{1.1 \text{ meters/yard}} \cdot \frac{1 \text{ hour}}{3600 \text{ s}} = 11.2 \text{ m/s}$
248 miles per hour = 111 m/s

Now, use the following equation: $v_{\text{final}} = v_{\text{initial}} + a \cdot t \rightarrow a = (v_{\text{final}} - v_{\text{initial}}) / \text{time} = (111 \text{ m/s} - 11.2 \text{ m/s}) / 9 \text{ s} = (100 \text{ m/s}) / 9 \text{ s} = 11.1 \text{ m/s}^2$

Cryptic™ - June 1, 2013, 9:57 pm

My teacher told me cos60 was wrong.

Maybe I drew the diagram wrong?

Here is my work: <https://i.imgur.com/9a2o3GS.jpg>

Please let me know if I am doing something wrong.

The correct answer is

Spoiler [\(Click to View\)](#)

$$|R| = 100^2 + 500^2 - 2(100)(500) \cos 120$$

But I do not know where the 120 comes from.

Then it's

$$\sin x / 500 = \sin 120 / \sin 576.8$$

Feynman - June 1, 2013, 10:06 pm

(Jun 1, 2013 09:57 PM)Cryptic™ Wrote: [\[CITE\]](#) My teacher told me cos60 was wrong.

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Here is my work: <https://i.imgur.com/9a2o3GS.jpg>

Please let me know if I am doing something wrong.

The correct answer is

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$$|R| = 100^2 + 500^2 - 2(100)(500) \cos 120$$

But I do not know where the 120 comes from.

Then it's

$$\sin x / 500 = \sin 120 / \sin 576.8$$

Usually we measure angles with respect to the x-axis. Given your drawing of 30° CCW from the positive y-axis, plus the 90° from the first quadrant, adding them together we get 120°. I'm not sure if that's the correct way of doing it (I haven't done a question like this in almost 7 years), but that gives you the 120° you were looking for.

Wish. - June 1, 2013, 10:45 pm

Mind integrating this?

$$\text{integrate } 2/(e^{(2x)} + \sqrt{x})$$

there is no limit btw!

$$\text{and integrate } e^x / (6 - e^x)$$

Feynman - June 1, 2013, 10:48 pm

(Jun 1, 2013 10:45 PM)Wish. Wrote: [\[CITE\]](#) Mind integrating this?

$$\text{integrate } 2/(e^{(2x)} + \sqrt{x})$$

there is no limit btw!

Is that or ?

Wish. - June 1, 2013, 10:50 pm

(Jun 1, 2013 10:48 PM)Feynman Wrote: [\[CITE\]](#) Is that or ?
the first one. Yeah.

thanks C: mind explaining too if possible

Feynman - June 1, 2013, 11:03 pm

(Jun 1, 2013 10:50 PM)Wish. Wrote: [\[CITE\]](#) the first one. Yeah.

thanks C: mind explaining too if possible

Done:

Let me know if anything wasn't clear.

Edit: Sorry, made a small error. It's fixed.

Wish. - June 2, 2013, 5:52 am

Thank you, yeah I got it now haha, didn't realize the separation step didn't really have to do the u method but thanks!

Cryptic™ - June 2, 2013, 9:55 pm

Can you explain how to solve this question please. I got stuck on it as we were not given any

angels.

<https://i.imgur.com/wwbwSy7.png>

Feynman - June 2, 2013, 10:06 pm

(Jun 2, 2013 09:55 PM)Cryptic™ Wrote: [\[CITE\]](#) Can you explain how to solve this question please. I got stuck on it as we were not given any angels.

<https://i.imgur.com/wwbwSy7.png>

Find out the angles with the given side lengths.

By inspection, we can see that 2m is the longest length, so it must be the hypotenuse.

Also by inspection, we can see that:

$$1^2 + [\text{Sqrt}(3)]^2 = 2^2$$

And we can conclude that the two strings and the space between the points form a right triangle. Then we can use some simple trig to find the missing angles.

Cryptic™ - June 2, 2013, 10:14 pm

(Jun 2, 2013 10:06 PM)Feynman Wrote: [\[CITE\]](#)

"By inspection, we can see that 2m is the longest length, so it must be the hypotenuse."

In your diagram the sqrt3 and 2 need to be switched right?

Or is yours the correct diagram?

Feynman - June 2, 2013, 10:18 pm

(Jun 2, 2013 10:14 PM)Cryptic™ Wrote: [\[CITE\]](#) "By inspection, we can see that 2m is the longest length, so it must be the hypotenuse."

In your diagram the sqrt3 and 2 need to be switched right?

Or is that the correct diagram?

Yeah, I really fucked the diagram up. My apologies. A bit too much rum for the night. Pretend the point on the right is the mass, and the force arrow is pointing towards the top right corner. Also switch around the ?3 and 2.

Cryptic™ - June 2, 2013, 10:21 pm

(Jun 2, 2013 10:18 PM)Feynman Wrote: [\[CITE\]](#) Yeah, I really fucked the diagram up. My apologies. A bit too much rum for the night. Pretend the point on the right is the mass, and the force arrow is pointing towards the top right corner. Also switch around the ?3 and 2.

But why would the force arrow point towards the top right. The question said 'The object exerts a downward force of 200N.'

This is my diagram so far

Spoiler ([Click to View](#))

Feynman - June 2, 2013, 10:23 pm

(Jun 2, 2013 10:21 PM)Cryptic™ Wrote: [\[CITE\]](#) But why would the force arrow point towards the top right. The question said 'The object exerts a downward force of 200N.'

This is my diagram so far

Spoiler [\(Click to View\)](#)

Because I really fucked the diagram up.

The two points should be separated by 2m, so the hypotenuse would be on top. I'd redraw the diagram, but I'm lying in bed.

Cryptic™ - June 2, 2013, 10:28 pm

(Jun 2, 2013 10:23 PM)Feynman Wrote: [\[CITE\]](#) Because I really fucked the diagram up.

The two points should be separated by 2m, so the hypotenuse would be on top. I'd redraw the diagram, but I'm lying in bed.

This is my new diagram according to what you described

Spoiler [\(Click to View\)](#)

Feynman - June 2, 2013, 10:31 pm

(Jun 2, 2013 10:28 PM)Cryptic™ Wrote: [\[CITE\]](#) This is my new diagram according to what you described

Spoiler [\(Click to View\)](#)

Much better. Now find the angles and use Newton's laws to find the force components on the strings.

Hint: $\sum F_x = 0$ for the x-component, so the x component of one string cancels out the x-component of the other.

Cryptic™ - June 2, 2013, 10:41 pm

(Jun 2, 2013 10:31 PM)Feynman Wrote: [\[CITE\]](#) Much better. Now find the angles and use Newton's laws to find the force components on the strings.

Hint: $\sum F_x = 0$ for the x-component, so the x component of one string cancels out the x-component of the other.

Did I find the components right for the F_{y1} and F_{x1} ?

<https://i.imgur.com/DkhjsWl.png>

Diagram <https://i.imgur.com/ULaU2Fz.png>

iLuvHackForums - June 2, 2013, 10:57 pm

I don't understand any of these problems. Can someone help me out?

1. If the designer has 12 outfits to choose from, how many ways are there to arrange the order in which he will show ten of them?

2. The community 10K run/walk event awards ribbons to the top four finishers in each age category. If 20 people in the 15-19 age range register for the race, how many ways are there to arrange the top four finishers?

3. A new computer store offers a special early-bird prize give-away for its grand opening. The

first 12 customers to enter the store between 7 a.m. and 8 a.m. will receive gift certificates worth various dollar amounts. If 18 customers gather to enter the store between those hours, how many ways are there to arrange the twelve prize winners?

4. A state university issues five-digit student identification numbers to all of its students. None of the identification numbers contain the digit 0 and the digits cannot be repeated. How many ways are there to arrange five digits if only the numerals 1 through 9 are used?

Feynman - June 3, 2013, 5:49 am

(Jun 2, 2013 10:57 PM)iLuvHackForums Wrote: [\[CITE\]](#) I don't understand any of these problems. Can someone help me out?

1. If the designer has 12 outfits to choose from, how many ways are there to arrange the order in which he will show ten of them?

2. The community 10K run/walk event awards ribbons to the top four finishers in each age category. If 20 people in the 15-19 age range register for the race, how many ways are there to arrange the top four finishers?

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4. A state university issues five-digit student identification numbers to all of its students. None of the identification numbers contain the digit 0 and the digits cannot be repeated. How many ways are there to arrange five digits if only the numerals 1 through 9 are used?

These are all probability/statistics, which I do not help with. I advise you post your own topic.

Elfen Lied - June 3, 2013, 11:35 am

I have my physics A level exam on Wednesday so I might throw quite a few questions at you if that's alright. Am I right in saying that EMF (Electromotive force) is the voltage across a whole circuit and PD (potential difference) is the voltage across a component.

Feynman - June 3, 2013, 11:59 am

(Jun 3, 2013 11:35 AM)Elfen Lied Wrote: [\[CITE\]](#) I have my physics A level exam on Wednesday so I might throw quite a few questions at you if that's alright. Am I right in saying that EMF (Electromotive force) is the voltage across a whole circuit and PD (potential difference) is the voltage across a component.

Electromotive force is either the voltage generated by a source in a circuit, or the voltage equivalent to the induced current generated by the Maxwell-Faraday equation. Potential difference is simply a change in potential when measurements are taken at two different points. PD can be a source of an emf, as with the case of a battery.

Cryptic™ - June 5, 2013, 9:41 pm

A 300 N mountain goat is standing on a mountain side inclined at 70 degrees. What is the frictional force that is keeping the mountain goat at rest.

Can you show me the diagram for this question please. I can do the rest.

360 - June 10, 2013, 11:29 pm

A force $F = (6i - 2j)$ acts on a particle that undergoes a displacement of $r = (3 + j)$ metres. Find (a) the work done by the force on the particle and (b) the angle between F and r .

I've already done part (a) and found the work done to be 16J, just need to know how to find the angle between the vectors.

SIM-55606 - June 11, 2013, 12:30 am

(Jun 10, 2013 11:29 PM)360 Wrote: [\[CITE\]](#) A force $F = (6i-2j)$ acts on a particle that undergoes a displacement of $r=(3+j)$ metres. Find (a) the work done by the force on the particle and (b) the angle between F and r .

I've already done part (a) and found the work done to be 16J, just need to know how to find the angle between the vectors. I assume you mean $3i$?

$$\text{Difference} = r - F = (3i+j) - (6i-2j) = (-3i+3j) \text{ or } (-3,+3)$$

$$\tan^{-1}(\text{Rise/Run}) = \text{Angle.}$$

$$\tan^{-1}(-1) = \text{angle} = 45^\circ$$

360 - June 11, 2013, 3:40 am

(Jun 11, 2013 12:30 AM)[Wabbit] Wrote: [\[CITE\]](#) I assume you mean $3i$?

$$\text{Difference} = r - F = (3i+j) - (6i-2j) = (-3i+3j) \text{ or } (-3,+3)$$

$$\tan^{-1}(\text{Rise/Run}) = \text{Angle.}$$

$$\tan^{-1}(-1) = \text{angle} = 45^\circ$$

Cheers for that mate, seems straightforward enough



If I want to find the work done in a graph like this, do I simply create a triangle under the line and find the area?

And if I wanted to find the total work done from $x(\text{initial})$ to $x(\text{final})$, do I add the areas above and under the x axis to find the work done (so I am actually subtracting the area under the x axis)?

Feynman - June 11, 2013, 4:18 am

(Jun 11, 2013 03:40 AM)360 Wrote: [\[CITE\]](#) Cheers for that mate, seems straightforward enough



If I want to find the work done in a graph like this, do I simply create a triangle under the line and find the area?

And if I wanted to find the total work done from $x(\text{initial})$ to $x(\text{final})$, do I add the areas above and under the x axis to find the work done (so I am actually subtracting the area under the x axis)?

Integrate it with respect to x . You could use either numerical integration methods, or just find the areas of the triangles.

360 - June 11, 2013, 7:11 am

No worries, got that. Thanks.

Some more for you guys, if you don't mind;

-Question 1-

A 7.80 g bullet moving at 575 m/s penetrates a tree trunk to a depth of 5.5 cm. a) use work and energy considerations to find the average frictional force that stops the bullet. b) assuming the frictional force is constant, determine how much time elapses between the moment the bullet enters

the tree and the moment it stops moving.

-Question 2-

A 0.600-kg particle has a speed of 2.00m/s at point A and kinetic energy of 7.50 J at point B. What is (a) its kinetic energy at A? (b) Its speed at B? © the total work done on the particle as it moves from A to B? (Part C is the part that is bothering me here, not so much (a) or (b). Do I just take the average force (force at point A and force at point B and divide by 2? So I can use that force in the $W = F \times D$ equation?)

-Question 3-

A 2100 kg pile driver is used to drive a steel I-beam into the ground. The pile driver falls 5 m before coming into contact with the top of the beam. Then it driver the beam 12 cm farther into the ground as it comes to rest. Using energy considerations, calculate the average force the beam exerts on the pile driver while the pile driver is brought to rest.

Oversoul - June 11, 2013, 7:16 am

Thank you for this. I think this is a perfect timing since I have physics class. I'm in my senior high right now. Also I'm very bad at math. I'm really happy about this thread, I hope you can help me soon, but Our class just started 2 days ago, maybe you can help me advance study when I have my books. ^ _ ^

Bookmarked.

Feynman - June 11, 2013, 7:16 am

$$F \cdot d = E \rightarrow F = E/d = mv^2/(2d) = (.00780\text{kg})(575\text{m/s})^2/(\cdot 11\text{m}) = 2.34\text{E}4 \text{ N}$$

$$I = F t \text{ (I = change in momentum = } p = mv, \text{ since final momentum} = 0)$$

$$t = p/F = mv/F = (.0078\text{kg})(575\text{m/s})/2.34\text{E}4\text{N} = 1.91\text{E}-4 \text{ s}$$

I'll work on 2 & 3 in about an hour. I have to run errands.

SIM-55606 - June 11, 2013, 7:27 am

Using the relationship between work and energy that

$$W = (\Delta)K_e - (\Delta)P_e$$

Therefore:

Part 3.

360 - June 12, 2013, 5:51 am

A backyard swimming pool with a circular base of diameter 6.00 m is filled to depth 1.50 m.

A) Find the absolute pressure at the bottom of the pool. (Done, but including it so as to understand the entire scope of the question). Answer is 115.7 kPa

B) Two persons with combined mass 150 kg enter the pool and float quietly there. No water overflows. Find the pressure increase at the bottom of the pool after they enter the pool and float.

No idea where to start with part B, since to use $p = m/v$ I need the volume, but since I need h in the volume (which has changed) I'm not really sure.

Feynman - June 12, 2013, 6:07 am

There's actually a much easier way to do it!

$$P = F/A = mg/A = (150)(9.81)/(9?)$$

Your answer is the increase in pressure, so the new absolute pressure is your answer from (a) + (b).

360 - June 12, 2013, 6:33 am

(Jun 12, 2013 06:07 AM)Feynman Wrote: [\[CITE\]](#) There's actually a much easier way to do it!

$$P = F/A = mg/A = (150)(9.81)/(9?)$$

Your answer is the increase in pressure, so the new absolute pressure is your answer from (a) + (b).

Makes a bit more sense...but where did you get 9pi from?

Feynman - June 12, 2013, 8:02 am

(Jun 12, 2013 07:16 AM)[Wabbit] Wrote: [\[CITE\]](#) $P(0) = 101\text{kPa}$; $(\rho) = 1000\text{kg/m}^3$ $h_1 = 1.5\text{m}$

$$P = P(0) + (\rho)gh_1$$

$$p = 101000 + 1000 \cdot 9.81 \cdot 1.5$$

$$P = 115.7\text{kPa}$$

The next one you need to figure out how much water they displace. and find the change in h due to the displaced water.

To float they must displace the same mass of water as themselves.

So 150kg, they displace 150kg of water. 150kg of water is roughly $.15\text{m}^3$ (density = 1000kg/m^3)

$$\text{so if } v = A(\text{base}) \cdot h \rightarrow .15 = 9(\pi) \cdot h^2$$

$$h^2 = .15/9(\pi)$$

$$h^2 = 5.3052 \cdot 10^{-3}\text{m}$$

$$\text{So } \Delta P = P(0) + (\rho) \cdot g \cdot (h^2) = 52.04 \text{ Pa}$$

Don't know what Feynman was going on about?

Works out to be the same. You learn a lot of tricks and shortcuts working with it for a while.

Anyway, closed for the time being. If anybody needs help, PM me directly.

Feynman - August 29, 2013, 7:08 pm

Re-opening this. I'm not nearly as flexible with my availability as I used to be.

Again, I ask people to please read my rules and conditions.

Comedic - June 25, 2014, 1:04 pm

Please explain this to me if you can

Spoiler [\(Click to View\)](#)

Thank you so much for your help!

Feynman - June 25, 2014, 1:36 pm

(Jun 25, 2014 01:04 PM)Legend. Wrote: [\[CITE\]](#) Please explain this to me if you can

Spoiler ([Click to View](#))

Thank you so much for your help!

$(g \circ f)(x)$ means plug $f(x)$ into every "x" you see in $g(x)$, as such:

$$f(x) = -2x - 7$$

$$g(x) = -4x + 6$$

$$(g \circ f)(x) = -4(-2x - 7) + 6$$

$$(g \circ f)(x) = 8x + 28 + 6$$

$$(g \circ f)(x) = 8x + 34$$

Next, plug -5 into $(g \circ f)(x)$:

$$(g \circ f)(-5) = 8(-5) + 34$$

$$(g \circ f)(-5) = -40 + 34$$

$$(g \circ f)(-5) = -6$$

fuking problems - June 25, 2014, 2:02 pm

Wow feynman, your a really great guy bro. I remember you helping me out so I just wanted to say your awesome, HF is lucky to have you man.

Dex? - June 27, 2014, 9:13 am

I'm planning on being a CS major but my prerequisites seem pretty challenging.

Freshman year, I should be dropped in Calculus with Analytical Geometry, but I've never even taken pre-calc.

How valuable is pre-calc while learning calculus and is there any way I can get the major parts of pre-calc done in a few months?

Feynman - June 27, 2014, 9:17 am

(Jun 27, 2014 09:13 AM)Dex? Wrote: [\[CITE\]](#) I'm planning on being a CS major but my prerequisites seem pretty challenging.

Freshman year, I should be dropped in Calculus with Analytical Geometry, but I've never even taken pre-calc.

How valuable is pre-calc while learning calculus and is there any way I can get the major parts of pre-calc done in a few months?

Pre-calc is just a fancy way of saying algebra and trigonometry, really. It's just the next level up in algebra/trig, where you focus on higher-order polynomials, hyperbolic trigonometry, and a few other things I can't remember. It's not overly difficult, especially if you did well in algebra before.

Dex? - June 27, 2014, 9:18 am

(Jun 27, 2014 09:17 AM)Feynman Wrote: [\[CITE\]](#) Pre-calc is just a fancy way of saying algebra and trigonometry, really. It's just the next level up in algebra/trig, where you focus on higher-order polynomials, hyperbolic trigonometry, and a few other things I can't remember. It's not overly difficult, especially if you did well in algebra before.

Algebra was a breeze for me.

Never took Trig.

Florida is ranked last in education though ?

Feynman - June 27, 2014, 9:49 am

(Jun 27, 2014 09:18 AM)Dex? Wrote: [\[CITE\]](#) Algebra was a breeze for me.
Never took Trig.

Florida is ranked last in education though ?

Learning trig isn't overly difficult. The only thing that confuses the majority of people is how you start out using degrees and working with triangles, but then relearning everything using radians and working with circles. I'd suggest using resources like KhanAcademy if you want to get a head start at trig.

VYKTOR - June 27, 2014, 11:08 am

First of all thanks for this amazing thread FeynMan

You are just amazing & we all look up to you & your solutions in the Education Nation.?

I was wondering if you could help me in understanding Vector Calculus.

In Vector Calculus I know the theorems but I find it difficult to apply them.

There was this question I had read somewhere on testing the concepts.

Which function would have infinite surface area but finite volume when it would be rotated about the x-axis.???

Feynman - June 27, 2014, 12:40 pm

(Jun 27, 2014 11:08 AM)XEYRUS27 Wrote: [\[CITE\]](#) First of all thanks for this amazing thread FeynMan

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There was this question I had read somewhere on testing the concepts.

Which function would have infinite surface area but finite volume when it would be rotated about the x-axis.???

I think you're talking about Gabriel's wedding cake:

$$f(x): x \rightarrow 1/x$$

Gillte - June 27, 2014, 1:35 pm

Here's one for you:

Feynman - June 27, 2014, 2:13 pm

(Jun 27, 2014 01:35 PM)Gillte Wrote: [\[CITE\]](#) Here's one for you:

That's real analysis. As stated in the OP, I don't help with real analysis.

Ben121 - June 27, 2014, 2:31 pm

(Jun 27, 2014 01:35 PM)Gillte Wrote: [\[CITE\]](#) Here's one for you:

What is n tending towards?

If $n \rightarrow 0$ then the answer is -1

If $n \rightarrow \infty$ then the answer is 0

Gillte - June 27, 2014, 3:11 pm

(Jun 27, 2014 02:31 PM)Ben121 Wrote: [\[CITE\]](#) What is n tending towards?

If $n \rightarrow 0$ then the answer is -1

If $n \rightarrow \infty$ then the answer is 0

Its a lim of a succesion so n is tending towards

Education - June 27, 2014, 6:39 pm

Nice. I have Linear Algebra this fall semester and might need help on it. Posting this here for future reference.

Feynman - June 27, 2014, 9:07 pm

(Jun 27, 2014 06:39 PM)Education Wrote: [\[CITE\]](#) Nice. I have Linear Algebra this fall semester and might need help on it. Posting this here for future reference.

Linear algebra will be one of your easier courses throughout your degree. Best of luck.

MoonSun - June 28, 2014, 1:32 am

So nice that you help people for free :)

Dime Bag - June 28, 2014, 10:08 am

i dont understand the Electromagnetic spectrum, and the calculations to work out their wavelengths.

:)

Feynman - June 28, 2014, 4:18 pm

(Jun 28, 2014 10:08 AM)Dime Bag Wrote: [\[CITE\]](#) i dont understand the Electromagnetic spectrum, and the calculations to work out their wavelengths.

:)

Be a bit more specific. Which level of physics are you dealing with? High school optics or a higher-year uni course? What specifically don't you understand?

Gillte - June 28, 2014, 5:43 pm

I don't know if you can solve these but there you go.

EDIT: I saw you can't solve this, anyway if anyone wants to help me feel free to do so :D

Ben121 - June 28, 2014, 6:06 pm

(Jun 28, 2014 05:43 PM)Gillte Wrote: [\[CITE\]](#) I don't know if you can solve these but there you go.

EDIT: I saw you can't solve this, anyway if anyone wants to help me feel free to do so :D

I don't have any paper to hand and Q1 looks a bit fiddly but this is what I got for Q2 using notepad:

$$|1 + z|^2 + |1 - z|^2 \leq 10$$

$$z = a + bi$$

$$1 + z = (a+1) + bi$$

$$1 - z = (1-a) - bi$$

$$|1 + z|^2 = (a+1)^2 + b^2$$

$$|1 - z|^2 = (1-a)^2 + b^2$$

$$|1+z|^2 + |1-z|^2 = (a+1)^2 + b^2 + (1-a)^2 + b^2 = a^2 + 2a + 1 + b^2 + 1 - 2a + a^2 + b^2 = 2a^2 + 2 + 2b^2 = 2(a^2 + b^2 + 1) \leq 10$$

$$|z|^2 = a^2 + b^2$$

$$2(|z|^2 + 1) \leq 10$$

$$|z|^2 + 1 \leq 5$$

$$|z| \leq 2$$

Feynman - June 28, 2014, 6:07 pm

1.1 A pure imaginary number is one where $\text{Re}\{z\} = 0$.

$$z = \text{Cis}(a) = e^{ia}$$

$$z^2 = e^{i(a+2)}$$

Expand out $z^*(z^2)$ and solve for a .

1.2

$$|1+z|^2 = (1+z)(1+z^*) \text{ (denotes complex conjugate)}$$

$$|1-z|^2 = (1-z)(1-z^*)$$

Expand out, solve for z .

Gillte - June 28, 2014, 6:24 pm

(Jun 28, 2014 06:07 PM)Feynman Wrote: [\[CITE\]](#) 1.1 A pure imaginary number is one where $\text{Re}\{z\} = 0$.

$$z = \text{Cis}(a) = e^{ia}$$

$$z^2 = e^{i(a+2)}$$

Expand out $z^*(z^2)$ and solve for a .

1.2

$$|1+z|^2 = (1+z)(1+z^*) \text{ (denotes complex conjugate)}$$

$$|1-z|^2 = (1-z)(1-z^*)$$

Expand out, solve for z .

I know that on the first question you need to use arguments.

Dime Bag - July 2, 2014, 2:58 pm

(Jun 28, 2014 04:18 PM)Feynman Wrote: [\[CITE\]](#) Be a bit more specific. Which level of physics are you dealing with? High school optics or a higher-year uni course? What specifically don't you understand?

im doing GCSE, I guess that is known as Sophomore year in high school? Im not sure about the american system though.

My Physics teacher didnt explain this very well at all and im confused.

I understand that there is different wavelengths and frequencies for each part of the EM Spectrum, but he showed us how to calculate them? I would just like a rough explanation of everything about the EM Spectrum please.

(also can you explain Cosmic Background Radiation or CMBR please:))

Thanks

Feynman - July 3, 2014, 5:47 am

(Jul 2, 2014 02:58 PM)Dime Bag Wrote: [\[CITE\]](#) im doing GCSE, I guess that is known as Sophomore year in high school? Im not sure about the american system though.

My Physics teacher didnt explain this very well at all and im confused.

I understand that there is different wavelengths and frequencies for each part of the EM Spectrum, but he showed us how to calculate them? I would just like a rough explanation of everything about the EM Spectrum please.

(also can you explain Cosmic Background Radiation or CMBR please:))

Thanks

Alright, I'll do my best.

Electromagnetic radiation is a fundamental property of extremely tiny massless particles known as photons. Photons are emitted from a source and propagate in a straight line in an oscillatory fashion.

Here's what the motion of a single photon moving from point 1 to point 2 looks like:

It will travel straight to the right by moving up and down. As you can see, it follows a sinusoidal or cosinusoidal pattern, so it's periodic in nature. The time it takes the photon to travel from point A to point B (in the diagram) is known as the period, T . The distance between point A and B is known as the wavelength, λ . The frequency of the photon can be found using:

Photons have a special property as opposed to most other particles: they have zero rest mass (the concept of rest mass is a bit complicated for your level, so just assume their mass is zero). This allows them to travel at the speed of light in a vacuum, c . This makes sense because light is just photons travelling in a way in which we can see them.

The relationship between frequency and wavelength is as follows:

The EM spectrum is divided into different categories based on wavelength. I've ripped this image from Wikipedia to show the different categories:

Cosmic microwave background radiation is low-intensity electromagnetic radiation on the microwave scale. It is attributed to being leftover radiation from the Big Bang. You can also have other cosmic background radiation on the x-ray and gamma ray scales, which can be traced to electron clouds, supernovas, stars, etc.

Hopefully this helps a bit.

Dime Bag - July 10, 2014, 6:05 am

(Jul 3, 2014 05:47 AM)Feynman Wrote: [\[CITE\]](#) Hopefully this helps a bit.

Absolutely excellent, thank you very much sir. I now understand it, ive printed this out for when i have to revise this time next year.

Thanks for doing this service and if i have any more questions im sure I know who to ask?

clark.dll - July 10, 2014, 2:22 pm

I have a very general question. How does one get better with math? Of course you need to practice, however I'm not sure where to begin and what I'd like to even do with it. I just want to be better in general.

Any suggestions?

Re?olution - July 10, 2014, 2:25 pm

(Jul 10, 2014 02:22 PM)Clark Wrote: [\[CITE\]](#) I have a very general question. How does one get better with math? Of course you need to practice, however I'm not sure where to begin and what I'd like to even do with it. I just want to be better in general.

Any suggestions?

Keep doing practice problems and spend a lot of time understanding the underlying theory behind the solutions.

In remedial math courses up to say Calc II you can get away without really having a great understanding of the theory but instead just knowing how to compute the answer.

Usually though in more difficult courses theory becomes more important, and failure to grasp it becomes a major issue.

clark.dll - July 10, 2014, 2:31 pm

(Jul 10, 2014 02:25 PM)Re?olution Wrote: [\[CITE\]](#) Keep doing practice problems and spend a lot of time understanding the underlying theory behind the solutions.

In remedial math courses up to say Calc II you can get away without really having a great understanding of the theory but instead just knowing how to compute the answer.

Usually though in more difficult courses theory becomes more important, and failure to grasp it becomes a major issue.

Thank you for your detailed reply Revolution. I actually have a pretty solid understanding of the theories I've been taught however my basic math skills are what hold me back -- for instance I struggle to manipulate numbers (even the more simpler ones) in my head. I guess I just need to practice more.

Re?olution - July 10, 2014, 2:34 pm

(Jul 10, 2014 02:31 PM)Clark Wrote: [\[CITE\]](#) Thank you for your detailed reply Revolution. I actually have a pretty solid understanding of the theories I've been taught however my basic math skills are what hold me back -- for instance I struggle to manipulate numbers (even the more simpler ones) in my head. I guess I just need to practice more.

Yeah that is another thing I forgot to mention. When I was a TA for Calc II I can't tell you how many people missed questions on exams for failing to know Algebra.

They would know how to solve the integral, but they make some stupid mistake when simplifying or would get stuck since their Algebra skills weren't up to par.

clark.dll - July 10, 2014, 2:36 pm

(Jul 10, 2014 02:34 PM)Re?olution Wrote: [\[CITE\]](#) Yeah that is another thing I forgot to mention. When I was a TA for Calc II I can't tell you how many people missed questions on exams for failing to know Algebra.

They would know how to solve the integral, but they make some stupid mistake when simplifying or would get stuck since their Algebra skills weren't up to par.

Yeah, I guess that's the same reason my math tutor stresses the importance of foundations.

Anakin Skywalker - July 10, 2014, 5:49 pm

I am thinking about studying information science, so if I need help... you are my man :)

Feynman - July 10, 2014, 6:27 pm

(Jul 10, 2014 02:36 PM)Clark Wrote: [\[CITE\]](#) Yeah, I guess that's the same reason my math tutor stresses the importance of foundations.

Foundations are very important. When I started university, I was a neuroscience major. For that pathway, I only needed intro calc. Using RateMyProf, I picked a teacher with good reviews. He taught math using a lot of analogies, so I never really understand what was going on. I did okay in that course, but when I switched to physics and needed to know what a derivative actually was, my poor calc foundations caused a bit of trouble at first. I ended up having to reteach myself most of intro calc to actually understand things.

Feynman - August 19, 2014, 7:20 am

Now that the fall semester has started for some, I'm officially offering math and physics help again. I will be on vacation from Sept. 2nd to 8th, but I will still try to help when I can. Post any questions here, or feel free to PM me. Best of luck with your courses.

Xerif - August 20, 2014, 10:02 am

I have a really simple physics question.

I am told to use the percent error formula where the actual value = 1.0003g and the measured value = 1.01g

I put the numbers in the formula like so:

And I'm wondering what should be done for the very first step. Because if I do $(1.01g - 1.0003g)$, then the answer = 0.0097. But in my book it says "When adding or subtraction numbers, the number of decimal places in the answer should be the same as the smallest number of decimal places in any number used in the calculation". But if I did that, whole thing would just be 0.00.

Ben121 - August 20, 2014, 10:48 am

(Aug 20, 2014 10:02 AM)Xerif Wrote: [\[CITE\]](#) I have a really simple physics question.

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You could use 0.0097 as 0.01 which is 2dp, or perform the entire sum and then round it to 2dp.

Xerif - August 20, 2014, 12:06 pm

(Aug 20, 2014 10:48 AM)Ben121 Wrote: [\[CITE\]](#) You could use 0.0097 as 0.01 which is 2dp, or perform the entire sum and then round it to 2dp.

Oh so I can just do the whole calculation and round the final answer to 2 decimal places?

I see now. Thanks for the help!

Gillte - March 1, 2015, 2:30 pm

I need help with the asymptotes.

<https://hackforums.net/showthread.php?tid=4705691>

Thanks in advance

Raguel - March 1, 2015, 8:00 pm

(Mar 1, 2015 03:30 PM)Gillte Wrote: [\[CITE\]](#) I need help with the asymptotes.

<https://hackforums.net/showthread.php?tid=4705691>

Thanks in advance

You should probably PM him, considering the thread was made 2 years ago, and the last post was nearly 6 months ago.

Gillte - March 2, 2015, 1:42 am

(Mar 1, 2015 09:00 PM)Subsister Wrote: [\[CITE\]](#) You should probably PM him, considering the thread was made 2 years ago, and the last post was nearly 6 months ago.

I already did. He is Bush at the moment.

egggy103 - March 13, 2015, 7:50 am

Can you help me solve this problem?

<http://www.Che-g-g.com/homework-help/pioneer-3-spacecraft-spin-stabilized-spacecraft-launched-dec-chapter-8-problem-2dp-solution-9780077570637-exc>

Feynman - December 8, 2016, 10:37 am

I'm going to reopen this for a few weeks until a few days before Christmas. I can also help with biochemistry and a bit of organic chemistry now. Either post here or PM me.

Starboy123 - January 10, 2017, 12:46 pm

I suck at maths can you teach higher level topics?

Feynman - January 10, 2017, 1:01 pm

(Jan 10, 2017 01:46 PM)Starboy123 Wrote: [\[CITE\]](#) I suck at maths can you teach higher level topics?

I don't teach, sorry. I just help with assignments and projects.