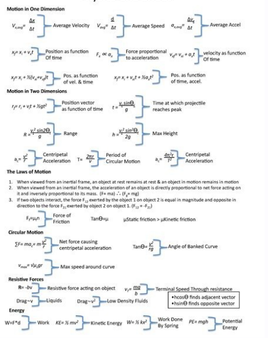
18. 1 electromagnetic waves workbook answers

Physics Crib Sheet



Comprehension Type Questions :

Passage-I :

A light beam travelling in the X-direction is described by the electric field $E_y = 300 \sin\left(\omega t - \frac{x}{c}\right) Vm^{-1}$. An electron is allowed to move along the Y-direction with a speed of $2 \times 10^{-7}\ ms^{-1}$.

27 The maximum magnetic field is _____.

(A) 9×10^{10} T $-Z$ direction (B) 9×10^{10} T $+Z$ direction

(C) 10^{-6} T $+Z$ direction (D) 10^{-6} T $-Z$ direction

28 The maximum electric force on the electron is _____ N.

(A) 4.8×10^{-17} (B) 3.6×10^{-17} (C) 2.4×10^{-17} (D) 1.2×10^{-17}

Name _____ Date _____ Class _____

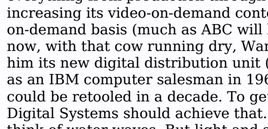
The Electromagnetic Spectrum • *Guided Reading and Study*

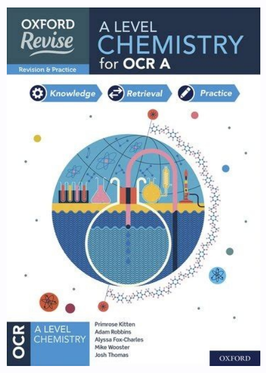
The Nature of Electromagnetic Waves *(continued)*

5. The energy that is transferred by electromagnetic waves is called electromagnetic radiation.
6. Circle the letter of each sentence that is true about electric and magnetic fields.
   a. An electromagnetic wave occurs when electric and magnetic fields vibrate at right angles to each other.
   b. A magnetic field is surrounded by an electric current.
   c. When an electric field vibrates, so does the magnetic field.
   d. Every charged particle is surrounded by a magnetic field.
7. Is the following sentence true or false? All electromagnetic waves travel at the same speed in a vacuum. TRUE 300,000 Km/Sec

Models of Electromagnetic Waves

8. Light has many of the properties of waves. But light can also act as though it is a stream of particles.
9. What happens when light enters a polarizing filter?
   Only some light waves pass through the filter.
10. The light that passes through a polarizing filter is called polarized light.
11. When light passes through a polarizing filter, does it have the properties of a wave or a particle?
    Of a wave.
12. Is the following sentence true or false? If two polarizing filters are placed so that one is rotated 90° from the other, all light can come through.
    False
13. The movement of electrons in a substance when light is shined on it is called the photoelectric effect.
14. The photoelectric effect can be explained by thinking of light as a stream of tiny packets of energy.
15. What are particles of light energy called? photons.





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Lloyd Braun's colleagues have described him as "creatively reckless"–big on ideas but a little hard on the fine china. Before going to Yahoo, Braun created Grey's Anatomy, Lost, and Desperate Housewives for ABC, until his head-butting with Michael Eisner got him pushed out. Now he's the new honcho at Yahoo's Media Group, charged with inventing, as The New York Times put it, "a medium that unites the showmanship of television with the interactivity of the Internet." That means he'll be pushing tons of original content to the portal's 191 million users, priming the pump for video on demand. Braun has already lured several top network execs and moved his NoCal crew to Santa Monica. This fall, he tapped director Richard Bangs to produce an adventure series, starting with a grueling climb up the Eiger. Not a bad metaphor, actually.Hollywood studios like Robert Rodriguez's math: Take a relatively small production budget (his first film, El Mariachi, cost $7,000; Sin City cost $45 million), run it through a digital camera, and out comes a whole lot of money–nearly $600 million to date. Rodriguez financed Mariachi by being a guinea pig in a drug trial, but those days are long gone. Now the man behind digital films like Desperado and the Spy Kids trilogy shoots under his Troublemaker Studio banner from his home in Austin. Rodriguez records his characters against a blue screen, later creating the entire "set" digitally, which frees him up to focus on the performance. He's already working on a prequel to Sin City (he's not above a little franchise building) and on a black-and-white feature called Grindhouse with Quentin Tarantino. Each director is making an hour-long segment, which will be packaged together and "made to look old," says Rodriguez. The film "will be sold as a double feature, like a night out at the movies, complete with trailers and film reels of movies that don't exist." We're betting that if Rodriguez can convert Tarantino, a longtime celluloid purist, to the digital faith, the rest of Hollywood can't be far behind.Steven Soderbergh, DirectorMore kids should make like Steven Soderbergh and just skip college. The director of sex, lies, and videotape and Traffic is emerging as one of cinema's most conspicuous innovators (see "Maverick Mogul," page 70). His upcoming Bubble, a murder mystery shot on high-definition video cameras along the Ohio-West Virginia border, will show up simultaneously in January in theaters, on DVD, and on TV–a direct slap at industry practice–and uses no actors, only locals. Soderbergh may be philosophically opposed to studio meddling, but he's keeping his options open: He has more than a dozen films in various stages of production within the studio system, including Che, starring Benicio Del Toro. Give that man a diploma.Anne Sweeney, Disney-ABC TVAnne Sweeney is no stranger to magazine power lists. As president of the Disney-ABC Television Group, she's redefining what it means to watch TV. But she wields her influence discreetly. When her boss, Bob Iger, took the credit for the new video-iPod coup (and chummed it up with Steve Jobs at the unveiling), Sweeney, one of the architects of the deal (it'll make ABC hits available to iPod users starting in October), stayed in the background. And when Disney took a shot from the guilds about residuals, Sweeney took the bullet and defended the move–no surprise from a woman who once gave an ad exec a Kevlar vest during a particularly rocky period. Before Disney, Sweeney earned a reputation as a turnaround artist at Nickelodeon and FX. She tends to hire creative people and let them do their thing. And that seems to be paying off just fine: Disney posted a record $998 million profit for the third quarter of 2005. She won't be needing a vest anytime soon.Blair Westlake joined Microsoft in 2004 after the software giant realized it had to lay a little sugar on Hollywood if gizmos such as its Media Center and Xbox 360 were ever going to make it as movie platforms. Who better to sweeten the pot, after all, than the former head of Universal Studios' television division? Now, with the living room overwhelming the theater as the venue of choice for inert Americans–and with Microsoft establishing the PC as a living-room fixture–the forces are aligning (scarily) behind the cattle from Seattle. Media and tech convergence VP Westlake has already greased the works by backing the studios on intellectual-property protection. That should buy the company plenty of goodwill if and when Hollywood builds out its own home-distribution pipeline. Bill Gates must be on the edge of his seat.Morgan Freeman, ClickStarOscar-winning actor Morgan Freeman has gone from Driving Miss Daisy to driving old-school Hollywood insane. In July, Freeman announced that he was teaming up with Intel to launch ClickStar, a startup based in Santa Monica, California, built to distribute movies to computers at the same time they're released in theaters. ClickStar, Freeman announced, is designed "to deliver first-run premium entertainment to film fans around the world–and to make film easier to buy than to pirate." The company won't be building any actual hardware, just tapping its Hollywood connections to deliver movies to platforms built by companies such as Microsoft or TiVo. Theater owners may not like ClickStar's plan, but the company thinks it has found a way around their objections: Pay them. The service is set to launch sometime in 2006.Harvey Weinstein, The Weinstein Co.Harvey Weinstein can't play the underdog for long. After splitting with Disney (and losing the Miramax library, which includes Pulp Fiction, Good Will Hunting, and Shakespeare in Love, not to mention the company that made $4.5 billion at the box office and collected 53 Oscars in 10 years), Harvey and brother Bob did what any heavyweight entrepreneurs would do: They started over. And now, with a little help from Goldman Sachs, the Weinstein Co. is on track to build a new $1 billion machine with interests in film, Broadway musicals, music, publishing, and video games. Harvey has already inked deals with directors such as Robert Rodriguez and Quentin Tarantino. And a strategic Cablevision pact should allow him to control everything from production through multiplatform distribution."Scary" isn't a word people often use to describe Comcast CEO Brian Roberts. But as head of the country's largest cable operator, he certainly has the bandwidth to strike terror in the L.A. establishment. In late October, Roberts upped the fear a notch by announcing that Comcast was increasing its video-on-demand content by 250 titles, to a roster of 800 movies a month. That may be only one small step for Comcast customers, but it's a giant leap toward Roberts's philosophical goal of releasing films simultaneously on cable and at theaters. And with his call for the major networks to feed their programs to cable operators on an on-demand basis (much as ABC will be piping Desperate Housewives to iPods), Roberts isn't going to be soothing many nerves in Old Hollywood.Kevin Tsujihara, Warner Bros.No one would accuse the film studios of being early adopters, but if one studio was ahead of the pack in seeing the huge potential upside of the DVD, it was Warner Bros. And now, with that cow running dry, Warner has given the nod to Kevin Tsujihara, the man it hopes will lead the studio into the next green pasture, video on demand. Tsujihara, an 11-year Warner veteran, was promoted in October to head video, wireless, and online operations, as well as games and antipiracy. As if that weren't enough, Warner also gave him its new digital distribution unit (video on demand, electronic video sales and pay-per-view). That puts the 41-year-old Tsujihara in charge of the most important technological transition the studio has faced in decades (no pressure, Kev!). Meaning he'll be Warner's next superhero–or its next fall guy.Bud Mayo, AccessITBud Mayo began his career as an IBM computer salesman in 1965–and he's still selling. Mayo founded AccessIT in hopes of getting every theater in America converted to digital distribution and projection. He has already committed AccessIT to making 150 screens operational by year's end and some 4,000 by October 2007. He even predicts that all 36,000 American screens could be retooled in a decade. To get people to even listen, though (especially theater owners terrified of the $100,000 cost of conversion), took some smooth talking. "Everyone in Hollywood was waiting for someone to show them the way," Mayo says. His mantra is "No theater left behind," and his recent partnership with projector maker Christie Digital Systems should achieve that. It standardizes format, delivery, and distribution–and even creates a payment plan to keep out-of-pocket costs for theaters on par with analog. In order to continue enjoying our site, we ask that you confirm your identity as a human. Thank you very much for your cooperation. When most people think of waves, they think of water waves. But light and sound also travel as waves. A light wave, like a water wave, is an example of a transverse wave, which causes a disturbance in a medium perpendicular to the direction of the advancing wave. In the diagram below, you can also see how transverse waves form crests and troughs. The distance between any two crests (or any two troughs) is the wavelength, while the height of a crest (or the depth of a trough) is the amplitude. Frequency refers to the number of crests or troughs that pass a fixed point per second. The frequency of a light wave determines its color, with higher frequencies producing colors on the blue and violet end of the spectrum and lower frequencies producing colors on the red end of the spectrum. Sound waves are not transverse waves. They are longitudinal waves, created by some type of mechanical vibration that produces a series of compressions and rarefactions in a medium. Take a woodwind instrument, such as a clarinet. When you blow into a clarinet, a thin reed begins to vibrate. The vibrating reed first pushes against air molecules (the medium), then pulls away. This results in an area where all of the air molecules are pressed together and, right beside it, an area where air molecules are spread far apart. As these compressions and rarefactions propagate from one point to another, they form a longitudinal wave, with the disturbance in the medium moving in the same direction as the wave itself. If you study the diagram of the wave above, you'll see that longitudinal waves have the same basic characteristics as transverse waves. They have wavelength (the distance between two compressions), amplitude (the amount the medium is compressed) and frequency (the number of compressions that pass a fixed point per second). The amplitude of a sound wave determines its intensity, or loudness. The frequency of a sound wave determines its pitch, with higher frequencies producing higher notes. For example, the open sixth string of a guitar vibrates at a frequency of 82.407 hertz (cycles per second) and produces a lower pitch. The open first string vibrates at a frequency of 329.63 hertz and produces a higher pitch. As we'll see in the next section, the Doppler effect is directly related to the frequency of a wave, whether it's made of water, light or sound.

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