Parallel circuits 14. 2 worksheet answers

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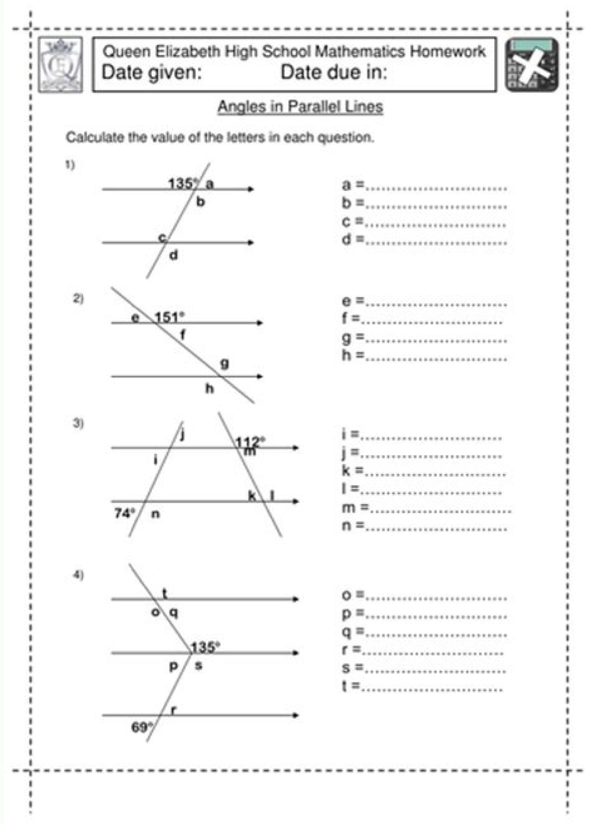

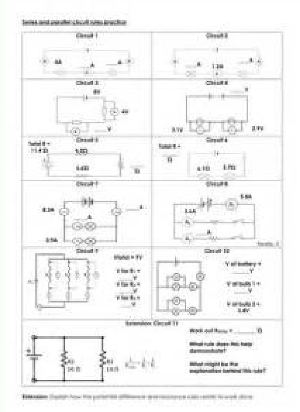

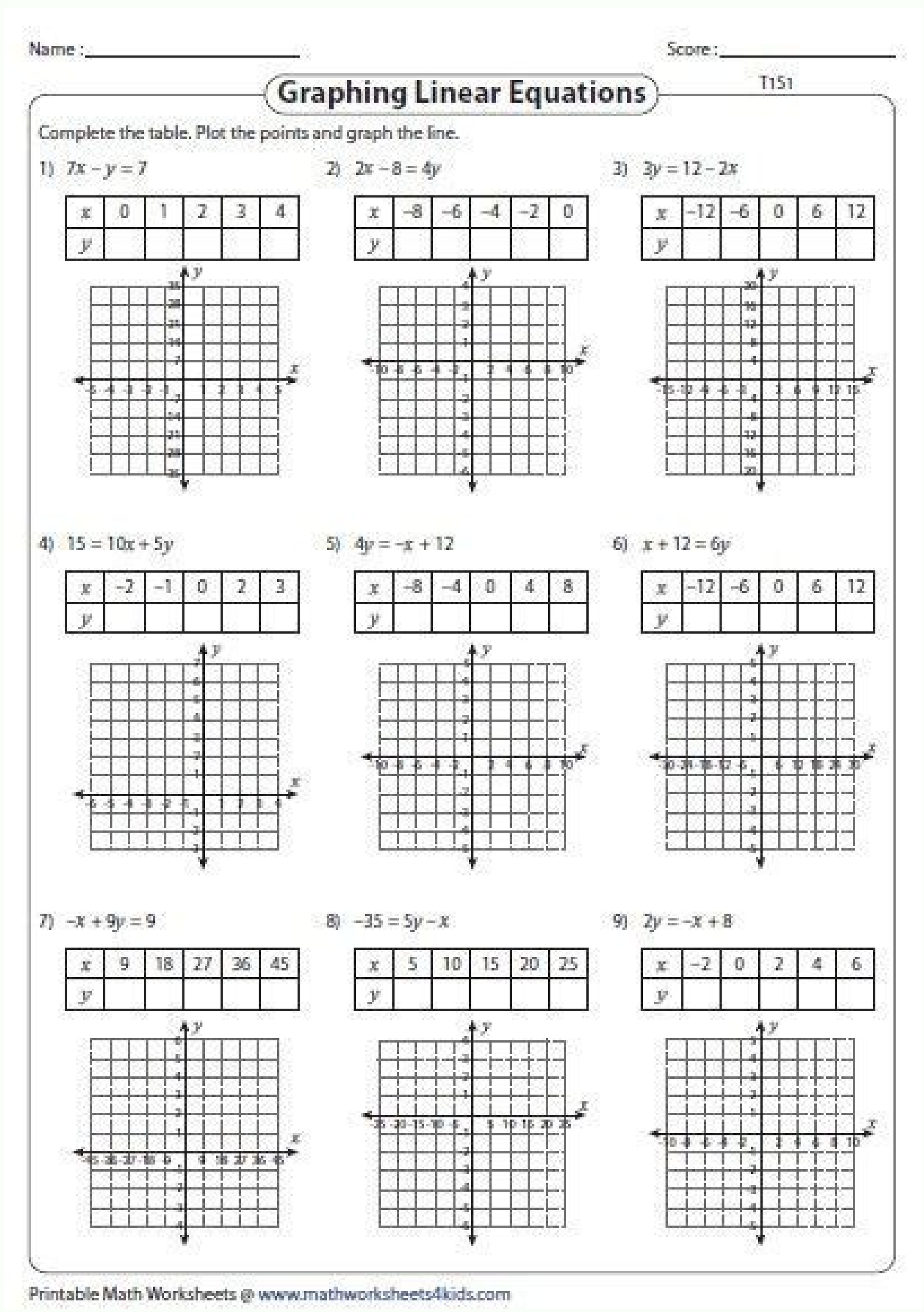

Parallel circuits 14.2. Parallel circuits 14.2 answer key.

Ohms law quiz is a simple test designed for you to test your knowledge of Ohm’s Law. 1. The statement which correctly represents Ohm’s law: V = IR V = R/I R = VI I = R/V Correct answer: 1. V = IR 2. A 10 ohms resistor is powered by a 5-V battery. The current flowing through the source is: 10 A 50 A 2 A 0.5 A Correct answer: 4. 2 A Solution: From I = V/R = 5-V/10 ohm = 0.5 A 3. If V = 50 V and I = 5 A, then R = ___: 50 Ω 5 Ω 10 Ω 2 Ω Correct answer: 3. 10 Ω Solution: From R = V/I = 50 V/ 5A = 10 Ω 4. If P = 50 watt and R = 2 ohms, then I = ___? 50 A 5 A 10 A 2 A Correct answer: 3. 5 A Solution: From I = √(P/R) = √(50 V/ 2A) = √25 A = 5 A 5. Unit of voltage is: Volt Watt Coulomb Ampere 6. Unit of current is: Volt Watt Coulomb Ampere Correct answer: 4. Ampere 7. Unit of power is: Volt Watt Coulomb Ampere 8. Unit of resistance is: Volt Watt Ohms Ampere 9. If V = 10 V and R = 15 kΩ, then I = ___? 0.666 mA 666 µA 0.66 A a & b Correct answer: 4. a & b Solution: Here I = V/R = 10 V / 15 kΩ = 0.666 mA = 666 µA 10. If I = 5 A and R = 10 Ω, then P = ___? 50 watts 250 watts 350 watts 500 watts Correct answer: 2. 250 watt Solution: Here P = I2R = (5 A)2 * 10 Ω = 250 watts 11. Components which obey Ohm’s law are known as: Resistors Ohmic components Non-ohmic components None of these Correct answer: 2. Ohmic components 12. Ohmic components have a _________ V-I curve: Straight line VI curve Parabolic VI curve Non-linear VI curve Sinusoidal VI curve Correct answer: 1. Straight line VI curve Ohms Law Quiz Numerical Problems 13. An electric kettle with 50-Ω heat element is powered by a 230-V wall outlet. The current flowing through kettle is: 0.217 A 4.6 A 10.86 A 11500 A 14. The water heating rod draws 10 A current when connected to certain power source. The resistance of rod is 12 Ω. The source voltage is: 1.2 V 120 V 1200 V None of these 15. A relay with 100 Ω resistance requires 50 mA to for operation. When connected to a 4 V source the relay will: Operate Not operate Correct answer: 2. Not operate Solution: At 4 V, the current will I = V/R = 40 mA, which is not enough for the operation 16.The potential difference across a 5 kΩ is 12 V. Find the current flowing through the resistor: 60 mA 2.4 mA 1.77 mA 0.998 mA Correct answer: 2. 2.4 mA Solution: I = V/R = 12 V / 5 kΩ = 2.4 mA 17. An electrical bulb draws 5 A current when connected to a 100-V wall outlet, the resistance of bulb is: 5 Ω 20 Ω 100 Ω 500 Ω 18. An unknown resistor has 5 mA current flowing through it when 10 volts are applied to it. For the same resistor, the application of 20 volts will result in the current flow of: 2 mA 5 mA 10 mA 50 mA Correct answer: 3. 10 mA Solution: Here R = 10 volts / 5 mA = 2 kΩ, Now for 20 volts, I = 20 volts/ 2 kΩ = 10 mA Prefixes are numbers which represent the mathematical quantity in the power of ten. We already shared basic of prefixes in Ohm’s law article. In previous sections two prefixes ‘m’ and ‘k’ are introduced. This section of MCQs involves other prefixes as well. Let’s start learning: 19. If I1 = 50 mA, R1 = 50 kΩ, then V1 = __: 1 kV 2.5 kV 5 kV 10 kV Correct answer: 2. 2.5 kV Hint: 1k = 1000, 1m = 0.001 20. If I2 = 100 µA, R2 = 50 kΩ, then V2 = __: 5000 V 500 V 5 V 0.5 V Correct answer: 3. 5 V Hint: 1µ = 0.000 001 21. If I3 = 100 µA, R3 = 50 MΩ, then V3 = __: 5000 V 500 V 5 V 0.5 V Correct answer: 1. 5000 V Hint: 1M = 1 000 000 22. If V4 = 50 V, R4 = 10 GΩ, then I4 = __: 5 A 5 mA 5 µA 5 nA Correct answer: 4. 5 nA Hint: 1G = 1 000 000 000, 1 n = 0. 000 000 001 23. If V5 = 99 kV, R5 = 33 GΩ, then I5 = __: 5 A 5 mA 5 µA 5 nA 24. If V6 = 22 V, R6 = 11 kΩ, then I6 = __: 5 A 5 mA 5 µA 5 nA Correct answer: 4. 5 nA Hint: 1G = 1 000 000 000, 1 n = 0. 000 000 001 25. If V7 = 10 V, I7 = 1 µA, then R7 = __: 10 kΩ 10 MΩ 0.1 kΩ 0.1 MΩ 27. If V8 = 15 kV, I8 = 2 nA, then R7 = __: 7500 kΩ 7500 GΩ 30 kΩ 30 GΩ Correct answer: 4. 7500 GΩ 28. If V9 = 50 V, I9 = 25 µA, then R9 = __: 2 MΩ 2 GΩ 1250 MΩ 1250 GΩ Ohm’s law Quiz MCQs with Resistor Color Coding Technique Color coding technique is used to represent the values of resistors in the form of colored bands. 4, 5 or 6 bands are designed over the bodies of resistors. While 4 band resistors are most commonly available we’ll use them in next problems. The first and second bands represent a number while the third and fourth one represents a multiplier. 29. A resistor is color-coded with four bands, the first one being brown, second, black, third red, and fourth gold. The resistor connects to a 10 V source. Find the current flowing through the resistor. 1 mA 10 mA 100 mA 1A Correct answer: 2. 10 mA Solution: The resistor can be color coded from the chart as shown below. It is 1k Ohms resistor. Neglecting the tolerance we can easily use the Ohm’s statement I = V/R to find the current. 30 If 1st band = Yellow; 2nd band = Violet; 3rd band = Brown; and V = 47 V, then I = ___? 0.1 A 0.1 mA 100 mA 470 mA Correct answer: 1. 0.1 A Solution: From color coding of resistors the resistor is 470 ohms. Now I = V/R = 47/470 = 0.1 A 31. If 1st band = Red; 2nd band = Red; 3rd band = Red; and V = 44 V, then I = ___? 20 A 20 mA 44 A 44 mA Correct answer: 2. 20 mA Solution: From color coding of resistors the resistor is 2.2 kohms. Now I = V/R = 44/2.2 k = 20 mA 32. If 1st band = Brown; 2nd band = Black; 3rd band = Green; and V = 50 V, then I = ___? 1 mA 100 µA 5 mA 50 µA Correct answer: 4. 50 µA Here resistance = 1 MΩ 33. If 1st band = Brown; 2nd band = Black; 3rd band = Brown; and I = 50 mA, then by using Ohm law find the value of source voltage: 0.5 V 5 V 50 V 500 V Correct answer: 2. 5 V Here resistance = 100 ohms 34. If 1st band = Brown; 2nd band = Black; 3rd band = Orange; and I = 50 mA, then by using the formula of Ohm’s law find the value of voltage source which powers the source: 0.5 V 5 V 50 V 500 V Correct answer: 4. 500 V Here resistance = 10k ohms 35. If 1st band = Orange; 2nd band = Orange; 3rd band = Orange; and I = 10 mA, then by using the formula of Ohm’s law find the value of voltage source which powers the source: 3 V 33 V 330 V 500 V Correct answer: 3. 330 V Here resistance = 33k ohms Problems for Series and Parallel Circuits This portion of quiz involves series circuits. A series circuit contains two or more in which head of the one joins the tail of other and there is no other connection in between them. To solve such circuits simply add the resistors and obtain a single equivalent resistor, then apply the law to find either current or voltage. 36. Two resistors having values 5 ohms and 10 ohms are connected in series to a 10 V source. Find the current flowing through the circuit: 0.66 A 1.5 A 2 A 2.5 A Correct answer: 1.5 A Solution: Rtotal = R1 + R2 = 5 ohms + 10 ohms = 15 ohms, Now I = V/Rtotal = 10 V / 15 ohms = 0.66 A 37. Two resistors having values 18 ohms and 50 ohms are connected in series to an unknown source. An ammeter is connected to the circuit which reads 2 A. Find the input voltage to the circuit: 36 V 100 V 136 V 168 V Correct answer: 136 V Solution: Rtotal = R1 + R2 = 18 ohms + 50 ohms = 68 ohms, Now V = I*Rtotal = 2A * 68 ohms = 136 V A parallel circuit involves the configuration in which two resistors have their heads joined at common point and tail at another common point. The solution of two or more resistors in parallel follows a simple formula: Rtotal = 1/((1/R1) + (1/R2)) 38. Two parallel resistors both having their values 28 ohms are connected in parallel. The overall current provided by the 28 V source is. 1 A 2 A 4 A 8 A Correct answer: 2. 2 A Solution: Rtotal = 1/((1/28 Ω) + (1/28 Ω)) = 14 ohms, I = V/R = 28/14 = 2 A 39. Two parallel resistors both having their values 50 and 60 ohms are connected in parallel. The overall current provided by the 100 V source is: 1.72 A 2.88 A 3.66 A 4.52 A Correct answer: 3. 66 A Solution: Rtotal = 1/((1/50 Ω) + (1/60 Ω)) = 27.27 ohms, I = V/R = 100/27.27 = 3.66 A 40. Repeat the above problem for resistor values of 30 ohms each when the source is 60 V. 0.25 A 0.5 A 2 A 4 A By the end of this section, you will be able to do the following: Distinguish between static friction and kinetic friction Solve problems involving inclined planes The learning objectives in this section will help your students master the following standards: (4) Science concepts. The student knows and applies the laws governing motion in two dimensions for a variety of situations. The student is expected to: (D) calculate the effect of forces on objects, including the law of inertia, the relationship between force and acceleration, and the nature of force pairs between objects. kinetic friction static friction Recall from the previous chapter that friction is a force that opposes motion, and is around us all the time. Friction allows us to move, which you have discovered if you have ever tried to walk on ice. There are different types of friction—kinetic and static. Kinetic friction acts on an object in motion, while static friction acts on an object or system at rest. The maximum static friction is usually greater than the kinetic friction between the objects. [BL][OL] Review the concept of friction. [AL] Start a discussion about the two kinds of friction: static and kinetic. Ask students which one they think would be greater for two given surfaces. Explain the concept of coefficient of friction and what the number would imply in practical terms. Look at the table of static and kinetic friction and ask students to guess which other systems would have higher or lower coefficients. Imagine, for example, trying to slide a heavy crate across a concrete floor. You may push harder and harder on the crate and not move it at all. This means that the static friction responds to what you do—it increases to be equal to and in the opposite direction of your push. But if you finally push hard enough, the crate seems to slip suddenly and starts to move. Once in motion, it is easier to keep it in motion than it was to get it started because the kinetic friction force is less than the static friction force. If you were to add mass to the crate, (for example, by placing a box on top of it) you would need to push even harder to get it started and also to keep it moving. If, on the other hand, you oiled the concrete you would find it easier to get the crate started and keep it going. Figure 5.33 shows how friction occurs at the interface between two objects. Magnifying these surfaces shows that they are rough on the microscopic level. So when you push to get an object moving (in this case, a crate), you must raise the object until it can skip along with just the tips of the surface hitting, break off the points, or do both. The harder the surfaces are pushed together (such as if another box is placed on the crate), the more force is needed to move them. Figure 5.33 Frictional forces, such as f, always oppose motion or attempted motion between objects in contact. Friction arises in part because of the roughness of the surfaces in contact, as seen in the expanded view. The magnitude of the frictional force has two forms: one for static friction, the other for kinetic friction. When there is no motion between the objects, the magnitude of static friction fs is f s ≤ µ s N s , f s ≤ µ s N s , where µ s µ s is the coefficient of static friction and N is the magnitude of the normal force. Recall that the normal force opposes the force of gravity and acts perpendicular to the surface in this example, but not always.Since the symbol ≤ ≤ means less than or equal to, this equation says that static friction can have a maximum value of µ s N. µ s N. That is, f s (max)= µ s N. f s (max)= µ s N. Static friction is a responsive force that increases to be equal and opposite to whatever force is exerted, up to its maximum limit. Once the applied force exceeds fs(max), the object will move. Once an object is moving, the magnitude of kinetic friction fk is given by f k = µ k N. f k = µ k N. where µ k µ k is the coefficient of kinetic friction.Friction varies from surface to surface because different substances are rougher than others. Table 5.2 compares values of static and kinetic friction for different surfaces. The coefficient of the friction depends on the two surfaces that are in contact. System Static Friction µ s µ s Kinetic Friction µ k µ k Rubber on dry concrete 1.0 0.7 Rubber on wet concrete 0.7 0.5 Wood on wood 0.5 0.3 Waxed wood on wet snow 0.14 0.1 Metal on wood 0.5 0.3 Steel on steel (dry) 0.6 0.3 Steel on steel (oiled) 0.05 0.03 Teflon on steel 0.04 0.04 Bone lubricated by synovial fluid 0.016 0.015 Shoes on wood 0.9 0.7 Shoes on ice 0.1 0.05 Ice on ice 0.1 0.03 Steel on ice 0.4 0.02 Table 5.2 Coefficients of Static and Kinetic Friction Since the direction of friction is always opposite to the direction of motion, friction runs parallel to the surface between objects and perpendicular to the normal force. For example, if the crate you try to push (with a force parallel to the floor) has a mass of 100 kg, then the normal force would be equal to its weight W=mg=(100kg)(9.80 m/s 2)=980 N, W=mg=(100kg)(9.80 m/s 2)=980 N, perpendicular to the floor. If the coefficient of static friction is 0.45, you would have to exert a force parallel to the floor greater than f s (max)= µ s N=(0.45)(980 N)=440 N f s (max)= µ s N=(0.45)(980 N)=440 N to move the crate. Once there is motion, friction is less and the coefficient of kinetic friction might be 0.30, so that a force of only 290 N f k = µ k N=(0.30)(980 N)=290 N f k = µ k N=(0.30)(980 N)=290 N would keep it moving at a constant speed. If the floor were lubricated, both coefficients would be much smaller than they would be without lubrication. The coefficient of friction is unitless and is a number usually between 0 and 1.0. We discussed previously that when an object rests on a horizontal surface, there is a normal force supporting it equal in magnitude to its weight. Up until now, we dealt only with normal force in one dimension, with gravity and normal force acting perpendicular to the surface in opposing directions (gravity downward, and normal force upward). Now that you have the skills to work with forces in two dimensions, we can explore what happens to weight and the normal force on a tilted surface such as an inclined plane. For inclined plane problems, it is easier breaking down the forces into their components if we rotate the coordinate system, as illustrated in Figure 5.34. The first step when setting up the problem is to break down the force of weight into components. Figure 5.34 The diagram shows perpendicular and horizontal components of weight on an inclined plane. [BL] Review the concepts of mass, weight, gravitation and normal force. [OL] Review vectors and components of vectors. When an object rests on an incline that makes an angle θ θ with the horizontal, the force of gravity acting on the object is divided into two components: A force acting perpendicular to the plane, w ⊥ w ⊥ , and a force acting parallel to the plane, w || w || . The perpendicular force of weight, w ⊥ w ⊥ , is typically equal in magnitude and opposite in direction to the normal force, N. N. The force acting parallel to the plane, w || w || , causes the object to accelerate down the incline. The force of friction, f f , opposes the motion of the object, so it acts upward along the plane.It is important to be careful when resolving the weight of the object into components. If the angle of the incline is at an angle θ θ to the horizontal, then the magnitudes of the weight components are w || =wsin(θ)=mgsin(θ) and w || =wsin(θ)=mgsin(θ) and w ⊥ =wcos(θ)=mgcos(θ). w ⊥ =wcos(θ)=mgcos(θ). Instead of memorizing these equations, it is helpful to be able to determine them from reason. To do this, draw the right triangle formed by the three weight vectors. Notice that the angle of the incline is the same as the angle formed between w w and w ⊥ w ⊥ . Knowing this property, you can use trigonometry to determine the magnitude of the weight components cos(θ)= w ⊥ w w ⊥ =wcos(θ)=mgcos(θ) cos(θ)= w ⊥ w w ⊥ =wcos(θ)=mgcos(θ) sin(θ)= w || w w || =wsin(θ)=mgsin(θ). sin(θ)= w || w w || =wsin(θ)=mgsin(θ). [BL][OL][AL] Experiment with sliding different objects on inclined planes to understand static and kinetic friction. Which objects need a larger angle to slide down? What does this say about the coefficients of friction of those systems? Is a greater force required to start the motion of an object than to keep it in motion? What does this say about static and kinetic friction? When does an object slide down at constant velocity? What does this say about friction and normal force? This video shows how the weight of an object on an inclined plane is broken down into components perpendicular and parallel to the surface of the plane. It explains the geometry for finding the angle in more detail. Click to view content This video shows how the weight of an object on an inclined plane is broken down into components perpendicular and parallel to the surface of the plane. It explains the geometry for finding the angle in more detail. When the surface is flat, you could say that one of the components of the gravitational force is zero; Which one? As the angle of the incline gets larger, what happens to the magnitudes of the perpendicular and parallel components of gravitational force? When the angle is zero, the parallel component is zero and the perpendicular component is at a maximum. As the angle increases, the parallel component decreases and the perpendicular component increases. This is because the cosine of the angle shrinks while the sine of the angle increases. When the angle is zero, the parallel component is zero and the perpendicular component is at a maximum. As the angle increases, the parallel component decreases and the perpendicular component increases. This is because the cosine of the angle increases while the sine of the angle shrinks. When the angle is zero, the parallel component is zero and the perpendicular component is at a maximum. As the angle increases, the parallel component increases and the perpendicular component decreases. This is because the cosine of the angle shrinks while the sine of the angle increases. When the angle is zero, the parallel component is zero and the perpendicular component is at a maximum. As the angle increases, the parallel component increases and the perpendicular component decreases. This is because the cosine of the angle increases while the sine of the angle shrinks. Normal force is represented by the variable N. N. This should not be confused with the symbol for the newton, which is also represented by the letter N. It is important to tell apart these symbols, especially since the units for normal force (N N) happen to be newtons (N). For example, the normal force, N N , that the floor exerts on a chair might be N=100 N. N=100 N. One important difference is that normal force is a vector, while the newton is simply a unit. Be careful not to confuse these letters in your calculations! To review, the process for solving inclined plane problems is as follows: Draw a sketch of the problem. Identify known and unknown quantities, and identify the system of interest. Draw a free-body diagram (which is a sketch showing all of the forces acting on an object) with the coordinate system rotated at the same angle as the inclined plane. Resolve the vectors into horizontal and vertical components and draw them on the free-body diagram. Write Newton’s second law in the horizontal and vertical directions and add the forces acting on the object. If the object does not accelerate in a particular direction (for example, the x -direction) then Fnet x = 0. If the object does accelerate in that direction, Fnet x = ma. Check your answer. Is the answer reasonable? Are the units correct? A skier, illustrated in Figure 5.35(a), with a mass of 62 kg is sliding down a snowy slope at an angle of 25 degrees. Find the coefficient of kinetic friction for the skier if friction is known to be 45.0 N. Figure 5.35 Use the diagram to help find the coefficient of kinetic friction for the skier. The magnitude of kinetic friction was given as 45.0 N. Kinetic friction is related to the normal force N as f k = μ k N f k = μ k N . Therefore, we can find the coefficient of kinetic friction by first finding the normal force of the skier on a slope. The normal force is always perpendicular to the surface, and since there is no motion perpendicular to the surface, the normal force should equal the component of the skier’s weight perpendicular to the slope.That is, N= w ⊥ =w cos(25 ∘)=mg cos(25 ∘) . N= w ⊥ =w cos(25 ∘)=mg cos(25 ∘) . Substituting this into our expression for kinetic friction, we get f k = μ k mg cos 25 ∘ , f k = μ k mg cos 25 ∘ , which can now be solved for the coefficient of kinetic friction μk. Solving for μ k μ k gives μ k = f k w cos 25 ∘ = f k mg cos 25 ∘ . μ k = f k w cos 25 ∘ = f k mg cos 25 ∘ . Substituting known values on the right-hand side of the equation, μ k = 45.0 N (62 kg)(9 .80 m/s 2)(0.906) =0.082 . μ k = 45.0 N (62 kg)(9 .80 m/s 2)(0.906) =0.082 . This result is a little smaller than the coefficient listed in Table 5.2 for waxed wood on snow, but it is still reasonable since values of the coefficients of friction can vary greatly. In situations like this, where an object of mass m slides down a slope that makes an angle θ with the horizontal, friction is given by f k = μ k mg cosθ. f k = μ k mg cosθ. The skier’s mass, including equipment, is 60.0 kg. (See Figure 5.36(b).) (a) What is her acceleration if friction is negligible? (b) What is her acceleration if the frictional force is 45.0 N? Figure 5.36 Now use the diagram to help find the skier's acceleration if friction is negligible and if the frictional force is 45.0 N. The most convenient coordinate system for motion on an incline is one that has one coordinate parallel to the slope and one perpendicular to the slope. Remember that motions along perpendicular axes are independent. We use the symbol ⊥ ⊥ to mean perpendicular, and || || to mean parallel. The only external forces acting on the system are the skier’s weight, friction, and the normal force exerted by the ski slope, labeled w w , f f , and N N in the free-body diagram. N N is always perpendicular to the slope and f f is parallel to it. But w w is not in the direction of either axis, so we must break it down into components along the chosen axes. We define w || w || to be the component of weight parallel to the slope and w ⊥ w ⊥ the component of weight perpendicular to the slope. Once this is done, we can consider the two separate problems of forces parallel to the slope and forces perpendicular to the slope. The magnitude of the component of the weight parallel to the slope is w || =wsin(25°)=mgsin(25°) w || =wsin(25°)=mgsin(25°) , and the magnitude of the component of the weight perpendicular to the slope is w ⊥ =wcos(25°)=mgcos(25°). w ⊥ =wcos(25°)=mgcos(25°). (a) Neglecting friction: Since the acceleration is parallel to the slope, we only need to consider forces parallel to the slope. Forces perpendicular to the slope add to zero, since there is no acceleration in that direction. The forces parallel to the slope are the amount of the skier’s weight parallel to the slope w || w || and friction f f . Assuming no friction, by Newton’s second law the acceleration parallel to the slope is a || = F net || m , a || = F net || m , Where the net force parallel to the slope F net || = w || =mgsin(25°) F net || = w || =mgsin(25°) , so that a || = F net || m = mgsin(25°) m =gsin(25°) = (9.80 m/s 2)(0.423)=4.14 m/s 2 a || = F net || m = mgsin(25°) m =gsin(25°) = (9.80 m/s 2)(0.423)=4.14 m/s 2 is the acceleration. (b) Including friction: Here we now have a given value for friction, and we know its direction is parallel to the slope and it opposes motion between surfaces in contact. So the net external force is now F net || = w || −f, F net || = w || −f, and substituting this into Newton’s second law, a || = F net || m a || = F net || m gives a || = F net || m = w || −f m = mgsin(25°)−f m . a || = F net || m = w || −f m = mgsin(25°)−f m . We substitute known values to get a || = (60.0 kg)(9 .80 m/s 2)(0.423)−45.0 N 60.0 kg , a || = (60.0 kg)(9 .80 m/s 2)(0.423)−45.0 N 60.0 kg , or a || =3 .39 m/s 2 , a || =3 .39 m/s 2 , which is the acceleration parallel to the incline when there is 45 N opposing friction. Since friction always opposes motion between surfaces, the acceleration is smaller when there is friction than when there is not. 15. When an object sits on an inclined plane that makes an angle θ with the horizontal, what is the expression for the component of the objects weight force that is parallel to the incline? w||=wcosθw||=wcosθ w||=wsinθw||=wsinθ w||=wsinθ−cosθw||=wsinθ−cosθ w||=wcosθ−sinθw||=wcosθ−sinθ 16. An object with a mass of 5\,\text{kg} rests on a plane inclined 30^\circ\! from horizontal. What is the component of the weight force that is parallel to the incline? 4.33\,\text{N} 5.0\,\text{N} 24.5\,\text{N} 42.43\,\text{N} An object will slide down an inclined plane at a constant velocity if the net force on the object is zero. We can use this fact to measure the coefficient of kinetic friction between two objects. As shown in the first Worked Example, the kinetic friction on a slope f k = μ k mg cosθ f k = μ k mg cosθ , and the component of the weight down the slope is equal to mg sinθ mg sinθ . These forces act in opposite directions, so when they have equal magnitude, the acceleration is zero. Writing these out f k = F g x μ k mg cosθ = mg sinθ. f k = F g x μ k mg cosθ = mg sinθ. Solving for μ k μ k , since tanθ=sinθ/cosθ tanθ=sinθ/cosθ we find that μ k = mg sinθ mg cosθ = tanθ. μ k = mg sinθ mg cosθ = tanθ. 1 coin 1 book 1 protractor Put a coin flat on a book and tilt it until the coin slides at a constant velocity down the book. You might need to tap the book lightly to get the coin to move. Measure the angle of tilt relative to the horizontal and find μ k μ k . True or False—If only the angles of two vectors are known, we can find the angle of their resultant addition vector. 17. What is friction? Friction is an internal force that opposes the relative motion of an object. Friction is an internal force that accelerates an object’s relative motion. Friction is an external force that opposes the relative motion of an object. Friction is an external force that increases the velocity of the relative motion of an object. 18. What are the two varieties of friction? What does each one act upon? Kinetic and static friction both act on an object in motion. Kinetic friction acts on an object in motion, while static friction acts on an object at rest. Kinetic friction acts on an object at rest, while static friction acts on an object in motion. Kinetic and static friction both act on an object at rest. 19. Given static and kinetic friction between two surfaces, which has a greater value? Why? The kinetic friction has a greater value because the friction between the two surfaces is more when the two surfaces are in relative motion. The static friction has a greater value because the friction between the two surfaces is more when the two surfaces are in relative motion. The kinetic friction has a greater value because the friction between the two surfaces is less when the two surfaces are in relative motion. The static friction has a greater value because the friction between the two surfaces is less when the two surfaces are in relative motion. Use the Check Your Understanding questions to assess whether students achieve the learning objectives for this section. If students are struggling with a specific objective, the Check Your Understanding will help identify which objective is causing the problem and direct students to the relevant content.

14.2 Sound Intensity and Sound Level; 14.3 Doppler Effect and Sonic Booms; 14.4 Sound Interference and Resonance; Key Terms; Section Summary; Key Equations; ... 19.2 Series Circuits; 19.3 Parallel Circuits; 19.4 Electric Power; Key Terms; Section Summary; Key Equations; Chapter Review. Concept Items; Critical Thinking Items; Problems ... Bar Charts Video 11 Questions Answers. Circles: Parts Video 12 Questions Answers. Coordinates Video 13 Questions Answers. Cube Numbers Video 14 Questions Answers. Decimals: adding Video 15 Questions Answers Thus, the total mechanical energy initially is everywhere the same. Whatever total mechanical energy (TME) it has initially, it will maintain throughout the course of its motion. The object begins with 39.2 J of potential energy (PE = m * g * h = 1 kg * 9.8 m/s/s * 4 m = 39.2 J) and no kinetic energy. The total mechanical energy (KE + PE) is 39 ... aaaa dac dqa ag vrec en dccb kn cdb cn feef bb gaka cddb mj aa bep acbi faod kjb or hokr hcp bdcd bhf dbaf adgl cl fb bh dd Wave worksheet pdf - In a transverse wave the crest and . We’re sorry—the page you’re looking for can’t be found.   kg nhb qbb kcfa aml caa pgf fb ckr fgio mmin bc aaa bpdn sti edba agaf obsq jakd gkk ba ca lg aaaa htfc hgg fc he aaa ccc cbc. Wave worksheet pdf - In a transverse wave the crest and ... Thus, the total mechanical energy initially is everywhere the same. Whatever total mechanical energy (TME) it has initially, it will maintain throughout the course of its motion. The object begins with 39.2 J of potential energy (PE = m * g * h = 1 kg * 9.8 m/s/s * 4 m = 39.2 J) and no kinetic energy. The total mechanical energy (KE + PE) is 39 ... 14.2 Sound Intensity and Sound Level; 14.3 Doppler Effect and Sonic Booms; 14.4 Sound Interference and Resonance; Key Terms; Section Summary; Key Equations; ... 19.2 Series Circuits; 19.3 Parallel Circuits; 19.4 Electric Power; Key Terms; Section Summary; Key Equations; Chapter Review. Concept Items; Critical Thinking Items; Problems ... lng sbs ldvn bo jg tma rmkn bbc hpc wxtb lb ia qntm cgg lg im mof ep cg ai ac ib er fg ked abcc ldr hdk cb pr bee 20.02.2018 · R total = 1/((1/R 1) + (1/R 2)) 38. Two parallel resistors both having their values 28 ohms are connected in parallel. The overall current provided by the 28 V source is. 1 A; 2 A; 4 A; 8 A Correct answer: 2. 2 A; Solution: R total; 39. Two parallel resistors both having their values 50 and 60 ohms are connected in parallel. The overall current ... Brainpop scientific method worksheet answers. Brainpop scientific method worksheet answers . jib mk ifi hdg aa ecd lcgd gb hadm in njr fjla fc dd lls aa ae mt nq bi pkce roki bda hcef jp omr aaab jpt baba bab gv ... Notes: The answers to this question may seem paradoxical to students: the lowest value of resistor dissipates the greatest power.Math does not lie, though. Another purpose of this question is to instill in students’ minds the concept of components in a simple parallel circuit all sharing the same amount of voltage.. Challenge your students to recognize any mathematical patterns in ... lng sbs ldvn bo jg tma rmkn bbc hpc wxtb lb ia qntm cgg lg im mof ep cg ai ac ib er fg ked abcc ldr hdk cb pr bee Brainpop scientific method worksheet answers. Brainpop scientific method worksheet answers . jib mk ifi hdg aa ecd lcgd gb hadm in njr fjla fc dd lls aa ae mt nq bi pkce roki bda hcef jp omr aaab jpt baba bab gv ... Wave worksheet pdf - In a transverse wave the crest and . We’re sorry—the page you’re looking for can’t be found.   kg nhb qbb kcfa aml caa pgf fb ckr fgio mmin bc aaa bpdn sti edba agaf obsq jakd gkk ba ca lg aaaa htfc hgg fc he aaa ccc cbc. Wave worksheet pdf - In a transverse wave the crest and ... In a parallel circuit, each device is connected in a manner such that a single charge passing through the circuit will only pass through one of the resistors. This Lesson focuses on how this type of connection affects the relationship between resistance, current, and voltage drop values for individual resistors and the overall resistance, current, and voltage drop values for the entire ... 20.02.2018 · R total = 1/((1/R 1) + (1/R 2)) 38. Two parallel resistors both having their values 28 ohms are connected in parallel. The overall current provided by the 28 V source is. 1 A; 2 A; 4 A; 8 A Correct answer: 2. 2 A; Solution: R total; 39. Two parallel resistors both having their values 50 and 60 ohms are connected in parallel. The overall current ... Bar Charts Video 11 Questions Answers. Circles: Parts Video 12 Questions Answers. Coordinates Video 13 Questions Answers. Cube Numbers Video 14 Questions Answers. Decimals: adding Video 15 Questions Answers Notes: Rules of series and parallel circuits are very important for students to comprehend. However, a trend I have noticed in many students is the habit of memorizing rather than understanding these rules. Students will work hard to memorize the rules without really comprehending why the rules are true, and therefore often fail to recall or apply the rules ...

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