



PHYSICAL SCIENCE EXPLORED

Quiz & Exam Solutions

Within this resource you'll find the solutions for all of the quiz and exam questions that require students to complete math equations or balancing chemical formulas.

Quiz 2

6. How many millimeters are in a meter?

$$1 \text{ m} \times 1000 \text{ mm/m} = 1000 \text{ mm}$$

7. How many seconds are in a hectosecond?

$$1 \text{ hs} \times 100 \text{ s} / 1 \text{ hs} = 100 \text{ s}$$

8. How many deciliters are in a liter?

$$1 \text{ L} \times 10 \text{ dL/1L} = 10 \text{ dL}$$

9. Convert 9.73 grams to kilograms.

$$9.73 \text{ g} \times 1\text{g}/1000 \text{ kg} = 0.00973$$

10. Convert 12,376 meters to centimeters.

$$12,376 \text{ m} \times 100 \text{ cm/m} = 1237.6 \text{ cm}$$

Quiz 5

1. Calculate the density of an object with a mass of 25 grams and a volume of 32 mL.

$$D = ?$$

$$m = 25 \text{ g}$$

$$V = 32 \text{ mL}$$

$$D = m/v$$

$$D = 25 \text{ g}/32 \text{ mL}$$

$$D = .78 \text{ g/mL}$$

2. What is the mass of an object with a density of 1.25 g/cm³ and a volume of 15 cm³?

$$m = ?$$

$$D = 1.25 \text{ g/cm}^3$$

$$V = 15 \text{ cm}^3$$

$$m = D \times V$$

$$m = 1.25 \times 15$$

$$m = 18.75 \text{ g}$$

3. What is the volume of an object with a mass of 8.71 g and a density of 10.42 g/mL?

$$v = ?$$

$$m = 8.71 \text{ g}$$

$$D = 10.42 \text{ g/mL}$$

$$V = m/D$$

$$V = 8.71/10.42$$

$$V = 0.84 \text{ mL}$$

Exam 1

9. Convert 79.12 liters into hectoliters.

$$79.12 \text{ L} \times 1 \text{ hL} / 100 \text{ L} = 0.7912 \text{ hL}$$

10. Convert 1.43 grams into milligrams.

$$1.43 \text{ g} \times 1000 \text{ mg} / 1 \text{ g} = 1430 \text{ mg}$$

30. What is the density of a substance with a mass of 5.92 g and a volume of 22.41 mL?

$$d = m/v \qquad d = 5.92 / 22.41 = .26$$

31. What is the mass of a substance with a density of 1.77 g/cm^3 and a volume of 32.95 cm^3 ?

$$m = dv \qquad m = (1.77)(32.95) = 58.32$$

32. What is the volume of a substance with a density of 4.38 g/mL and a mass of 70.25 g ?

$$v = m/d \qquad v = 70.25 / 4.38 = 16.04$$

Quiz 15

8. What is the molarity of a solution that has 2.42 moles of solute dissolved in 10.35 L of water?

$$\text{mol} = 2.42 \text{ moles} \quad L = 10.35 \text{ L} \quad M = ?$$

$$M = \text{mol}/L \quad M = 2.42 \text{ mol}/10.35 \text{ L}$$

$$M = 0.23 \text{ M}$$

9. How many liters of water need to be used to make a 0.83 M solution with 3.91 moles of solute?

$$M = 0.83 \text{ M} \quad \text{mol} = 3.91 \text{ moles} \quad L = ?$$

$$L = \text{mol}/M \quad L = 3.91 \text{ mol}/0.83 \text{ M}$$

$$L = 4.71 \text{ L}$$

10. How many moles of solute are dissolved in 876 mL of water to make a 0.98 M solution?

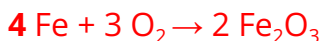
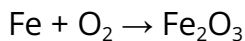
$$L = 876 \text{ mL} = 0.876 \text{ L} \quad M = 0.98 \text{ M} \quad \text{mol} = ?$$

$$\text{mol} = M \times L \quad \text{mol} = 0.98 \text{ M} \times 0.876 \text{ L}$$

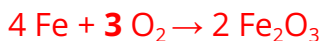
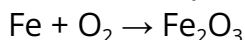
$$\text{mol} = 0.86 \text{ mol}$$

Exam 2

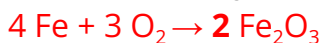
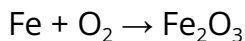
23. When the equation below is balanced, what is the coefficient in front of Fe?



24. When the equation below is balanced, what is the coefficient in front of O₂?



25. When the equation below is balanced, what is the coefficient in front of Fe₂O₃?



33. What is the molarity of a solution that has 25 moles of NaCl dissolved in 2.5 liters of water?

$$\text{mol} = 25 \text{ moles}$$

$$\text{L} = 2.5 \text{ L}$$

$$\text{M} = ?$$

$$\text{M} = \text{mol/L}$$

$$\text{M} = 25 \text{ mol} / 2.5 \text{ L}$$

$$\text{M} = 10 \text{ M}$$

34. How many moles of solute are dissolved in 1.5 L of water if the solution has a molarity of 0.80 M?

$$\text{L} = 1.5 \text{ L}$$

$$\text{M} = 0.80 \text{ M}$$

$$\text{mol} = ?$$

$$\text{mol} = \text{M} \times \text{L}$$

$$\text{mol} = 0.80 \text{ M} \times 1.5 \text{ L}$$

$$\text{mol} = 1.2 \text{ moles}$$

Quiz 19

9. How fast does a train travel if it takes 426 seconds to travel 9,758 meters?

$$v = ? \quad t = 426 \text{ s} \quad d = 9,758 \text{ m}$$

$$v = d/t$$

$$v = 9,758 \text{ m}/426 \text{ s} \quad v = 22.91 \text{ s}$$

10. If a shark swims at a rate of 9.09 m/s, how long will it take for it to swim 500 meters?

$$v = 9.09 \text{ m/s} \quad d = 500 \text{ m} \quad t = ?$$

$$v = d/t \quad t = d/v$$

$$t = 500 \text{ m}/9.09 \text{ m/s} \quad t = 55.01 \text{ s}$$

Quiz 20

9. What is the acceleration of an object that goes from 20 m/s to 10 m/s in 2.5 seconds?

$$v_i = 20 \text{ m/s}$$

$$v_f = 10 \text{ m/s}$$

$$t = 2.5 \text{ s}$$

$$a = ?$$

$$a = \frac{v_f - v_i}{t}$$

$$a = \frac{10 \text{ m/s} - 20 \text{ m/s}}{2.5 \text{ s}}$$

$$a = \frac{-10 \text{ m/s}}{2.5 \text{ s}}$$

$$a = -4 \text{ m/s}^2$$

10. How long does it take a person to accelerate from 3 m/s to 9 m/s if they accelerate at a rate of 1 m/s²?

$$v_i = 3 \text{ m/s}$$

$$v_f = 9 \text{ m/s}$$

$$a = 1 \text{ m/s}^2$$

$$t = ?$$

$$t = \frac{v_f - v_i}{a}$$

$$t = \frac{9 \text{ m/s} - 3 \text{ m/s}}{1 \text{ m/s}^2}$$

$$t = 6 \text{ s}$$

Quiz 21

6. What is the net force on an object if it has an applied force of 380 N and a friction force of 320 N?

$$F_A = 380 \text{ N}$$

$$F_f = 320 \text{ N}$$

$$F_{\text{net}} = ?$$

$$F_{\text{net}} = F_A - F_f$$

$$F_{\text{net}} = 380 \text{ N} - 320 \text{ N}$$

$$F_{\text{net}} = 60 \text{ N}$$

10. An object with a mass of 25 kg accelerates at 2.5 m/s^2 . What is the net force on the object?

$$m = 25 \text{ kg}$$

$$a = 2.5 \text{ m/s}^2$$

$$F_{\text{net}} = ?$$

$$F_{\text{net}} = ma$$

$$F_{\text{net}} = (25 \text{ kg})(2.5 \text{ m/s}^2)$$

$$F_{\text{net}} = 62.5 \text{ N}$$

Quiz 22

8. What is the weight of a 750 kg object?

$$m = 750 \text{ kg} \quad g = 10 \text{ m/s}^2 \quad F_g = ?$$

$$F_g = mg$$

$$F_g = (750 \text{ kg})(10 \text{ m/s}^2) = 7,500 \text{ N}$$

Quiz 23

10. What is the momentum of a 40 kg cheetah that is running at a velocity of 29 m/s?

$$p = ? \quad m = 40 \text{ kg} \quad v = 29 \text{ m/s}$$

$$p = mv$$

$$p = (40 \text{ kg})(29 \text{ m/s}) \quad p = 1,160 \text{ kg}\cdot\text{m/s}$$

Quiz 24

8. A truck pulls a trailer 14 m and exerts a force of 785 N. How much work is done on the trailer?

$$d = 14 \text{ m}$$

$$F = 785 \text{ N}$$

$$W = ?$$

$$W = Fd$$

$$W = (785 \text{ N})(14 \text{ m})$$

$$W = 10,990 \text{ J}$$

9. How much power would be required to lift a 7 N donut from the table to your mouth (a distance of 0.5 m) in 0.25 s?

$$P = ?$$

$$F = 7 \text{ N}$$

$$d = 0.5 \text{ m}$$

$$t = 0.25 \text{ s}$$

$$P = \frac{W}{t}$$

$$W = Fd$$

$$W = (7 \text{ N})(0.5 \text{ m}) \quad W = 3.50 \text{ J}$$

$$P = \frac{3.50 \text{ J}}{0.25 \text{ s}}$$

$$P = 14 \text{ W}$$

10. You pull a sled up a 15 m snow-covered hill. In the process, you do 405 J of work on the sled. How much force did you exert on the sled?

$$d = 15 \text{ m}$$

$$W = 405 \text{ J}$$

$$F = ?$$

$$W = Fd$$

$$F = \frac{W}{d}$$

$$W = \frac{405 \text{ J}}{15 \text{ m}}$$

$$W = 27 \text{ N}$$

Quiz 25

6. How much kinetic energy do you have if you run down the hallway at 7 m/s if you have a mass of 60 kg?

$$K = ? \quad m = 60 \text{ kg} \quad v = 7 \text{ m/s}$$

$$K = \frac{1}{2} mv^2$$

$$K = \frac{1}{2} (60 \text{ kg})(7 \text{ m/s})^2 \quad K = \frac{1}{2} (60 \text{ kg})(49 \text{ m}^2/\text{s}^2)$$

$$K = 1,470 \text{ J}$$

7. A 45 kg rock is placed at the top of a 30 m high cliff. What is the potential energy of the rock at the top of the cliff?

$$U_G = ? \quad m = 45 \text{ kg} \quad h = 30 \text{ m} \quad g = 10 \text{ m/s}^2$$

$$U_G = mgh$$

$$U_G = (45 \text{ kg})(10 \text{ m/s}^2)(30 \text{ m}) \quad U_G = 13,500 \text{ J}$$

Quiz 26

10. What is the mechanical advantage of a steering wheel if you apply a force of 55.0 N to the steering wheel and it applies 132 N of force to the steering column?

Input force = 55 N Output force = 132 N Mechanical advantage = ?

Mechanical advantage = $\frac{\text{output force}}{\text{input force}}$

Mechanical advantage = $\frac{132 \text{ N}}{55 \text{ N}}$ Mechanical Advantage = 2.4

Exam 3

5. What is the velocity of a runner who travels 200 meters in 35 seconds?

$$d = 200 \text{ m} \quad t = 35 \text{ s} \quad v = ?$$

$$v = \frac{d}{t}$$

$$v = \frac{200 \text{ m}}{35 \text{ s}} \quad v = 5.71 \text{ m/s}$$

8. A car entering a freeway accelerates from 14 m/s to 25 m/s in 4 seconds. What is its acceleration?

$$v_i = 14 \text{ m/s} \quad v_f = 25 \text{ m/s} \quad t = 4 \text{ s} \quad a = ?$$

$$a = \frac{v_f - v_i}{t}$$

$$a = \frac{25 \text{ m/s} - 14 \text{ m/s}}{4 \text{ s}} \quad a = \frac{11 \text{ m/s}}{4 \text{ s}} \quad a = 2.75 \text{ m/s}^2$$

9. A cheetah accelerates at a rate of 7 m/s^2 . If its top speed is 36 m/s and it starts at a dead stop, how long will it take for the cheetah to reach its top speed?

$$a = 7 \text{ m/s}^2 \quad v_f = 36 \text{ m/s} \quad v_i = 0 \text{ m/s} \quad t = ?$$

$$t = \frac{v_f - v_i}{a}$$

$$t = \frac{36 \text{ m/s} - 0 \text{ m/s}}{7 \text{ m/s}^2} \quad t = 5.14 \text{ s}$$

14. What is the net force of an object being pulled across the floor with a force of 95 N if the friction force is 35 N?

$$F_{\text{net}} = ? \quad F_A = 95 \text{ N} \quad F_f = 35 \text{ N}$$

$$F_{\text{net}} = F_A - F_f$$

$$F_{\text{net}} = 95 \text{ N} - 35 \text{ N} \quad F_{\text{net}} = 60 \text{ N}$$

15. How much net force is needed to accelerate a 25 kg object 7.3 m/s^2 ?

$$F = ? \quad m = 25 \text{ kg} \quad a = 7.3 \text{ m/s}^2$$

$$F = ma$$

$$F = (25 \text{ kg})(7.3 \text{ m/s}^2) \quad a = 182.5 \text{ N}$$

20. What is the weight of an 89.2 kg object?

$$F = ? \quad m = 89.2 \text{ kg} \quad g = 10 \text{ m/s}^2$$

$$F = mg$$

$$F = (89.2 \text{ kg})(10 \text{ m/s}^2) \quad F = 892 \text{ N}$$

24. A 12 kg bowling ball travels at a rate of 3 m/s. What is the momentum of the bowling ball?

$$m = 12 \text{ kg} \quad v = 3 \text{ m/s} \quad p = ?$$

$$p = mv$$

$$p = (12 \text{ kg})(3 \text{ m/s}) \quad p = 36 \text{ kg}\cdot\text{m/s}$$

27. How much work is done to lift a 64 kg object 5.1 meters off the ground?

$$m = 64 \text{ kg} \quad d = 5.1 \text{ m} \quad W = ?$$

$$W = Fd$$

$$F = mg \quad F = (64 \text{ kg})(10 \text{ m/s}^2) \quad F = 640 \text{ N}$$

$$W = (640 \text{ N})(5.1 \text{ m}) \quad W = 3,264 \text{ J}$$

28. How much power is required to do 855 J of work in 12 seconds?

$$t = 12 \text{ s} \quad W = 855 \text{ J} \quad P = ?$$

$$P = \frac{W}{t}$$

$$P = \frac{855 \text{ J}}{12 \text{ s}} \quad P = 71.25 \text{ W}$$

31. How much potential energy does a 68 kg base jumper have at the top of a 95-meter-high cliff?

$$m = 68 \text{ kg} \quad h = 95 \text{ m} \quad g = 10 \text{ m/s}^2 \quad U_G = ?$$

$$U_G = mgh$$

$$U_G = (68 \text{ kg})(95 \text{ m/s}^2)(10 \text{ m}) \quad U_G = 64,600 \text{ J}$$

32. How much kinetic energy does a 0.5 kg baseball have if it is moving at 40 m/s?

$$K = ? \quad m = 0.5 \text{ kg} \quad v = 40 \text{ m/s}$$

$$K = \frac{1}{2} mv^2$$

$$K = \frac{1}{2} (0.5 \text{ kg})(40 \text{ m/s})^2 \quad K = 400 \text{ J}$$

42. What is the mechanical advantage of a lever if you apply a force of 12 N and it applies 96 N to open a treasure chest?

$$\text{Mechanical advantage} = \frac{\text{output force}}{\text{input force}}$$

$$\text{Mechanical advantage} = \frac{96 \text{ N}}{12 \text{ N}}$$

$$\text{Mechanical advantage} = 8$$

Quiz 33

3. A TV uses a current of 1.5 amperes with a voltage of 120 volts. What is the resistance of the TV?

$$\begin{array}{lll} I = 1.5 \text{ A} & V = 120 \text{ V} & R = ? \\ V = IR & R = \frac{V}{I} & \\ R = \frac{120 \text{ V}}{1.5 \text{ A}} & R = 80 \Omega & \end{array}$$

4. A 2 ohm resistor is hooked up to a 60 volt battery. How much current is running through it?

$$\begin{array}{lll} R = 2 \Omega & V = 60 \text{ V} & I = ? \\ V = IR & I = \frac{V}{R} & \\ I = \frac{60 \text{ V}}{2 \Omega} & I = 30 \text{ A} & \end{array}$$

5. What is the voltage of a battery that pushes a current of 3.2 amperes through a resistor that measures 17 ohms?

$$\begin{array}{lll} V = ? & I = 3.2 \text{ A} & R = 17 \Omega \\ V = IR & V = (3.2 \text{ A})(17 \Omega) & V = 54.4 \text{ V} \end{array}$$

Exam 4

17. If the 6 cm crest of one wave overlaps with the 2 cm trough of another wave, what will the amplitude of the resultant wave be?

$$+ 6 \text{ cm} - 2 \text{ cm} = 4 \text{ cm}$$

38. What is the potential difference across a 2.5-ohm resistor with 3 amps of current running through it?

$$R = 2.5 \, \Omega$$

$$I = 3 \text{ A}$$

$$V = 9 \text{ V}$$

$$V = IR$$

$$V = (3 \text{ A})(2.5 \, \Omega) \quad V = 7.5 \text{ V}$$

39. How much resistance does a curling iron have if it is hooked up to a 120-volt outlet and draws 15 amps of current?

$$V = 120 \text{ V}$$

$$I = 15 \text{ A}$$

$$R = ?$$

$$V = IR$$

$$R = V/I$$

$$I = 120 \text{ V}/15 \text{ A}$$

$$I = 8 \, \Omega$$

