

# Phys 217 Homework #2

## Physics Homework Instructions

Welcome to the **Canvas Quiz** system for your physics homework submissions. Please read these guidelines carefully to ensure successful completion of your assignments.

### 1. General Guidelines for Submissions

#### 1. Formula Question Format:

- You will receive numerical problems with **randomized values** that change with each attempt
- Each student receives different numbers for the same problem
- Problems require numerical answers calculated from the given values

#### 2. Unlimited Attempts with No Time Limit:

- There is **no time limit** for completing the quiz
- You have **unlimited attempts** until the due date
- **Important:** Each new attempt generates **new numbers** for all problems

#### 3. Answer Format Requirements:

- Enter **only the numerical value** (no units unless specifically requested)
- **Calculate to 3 significant figures** unless otherwise specified in the problem
- Round your final answer to the correct number of significant figures
- Use standard decimal notation or scientific notation as appropriate

### 2. How to Enter Your Answers

#### Scientific Notation Format

- Use the format: number\*10^exponent
- Examples:
  - For  $1.23 \times 10^5$  enter: 1.23\*10^5
  - For  $6.02 \times 10^{23}$  enter: 6.02\*10^23
  - For  $2.34 \times 10^{-3}$  enter: 2.34\*10^-3
- Do NOT use: 1.23e5 or 1.23E5 format

#### Negative Numbers

- Include the negative sign directly: -4.56
- For scientific notation: -4.56\*10^-3

#### Units

- Do NOT include units unless the problem specifically asks for them

- Canvas will mark answers with units as incorrect if only the number is requested

## 3. Significant Figures and Rounding

### Critical Rules for Significant Figures

#### 1. Count Significant Figures Correctly:

- All non-zero digits are significant
- Zeros between non-zero digits are significant
- Leading zeros are NOT significant
- Trailing zeros after a decimal point ARE significant

#### 2. Round **ONLY** Your Final Answer:

- Keep at least 4-5 significant figures in ALL intermediate calculations
- Round to 3 significant figures (or as specified) only for the final answer you enter
- **Example:** If your calculator shows 12.3456789, enter 12.3

#### 3. Rounding Rule - Round Up for 0.5:

- When the digit being rounded is exactly 5, round UP
- **Examples:**
  - $6.225 \rightarrow 6.23$  (the 5 rounds up)
  - $3.145 \rightarrow 3.15$  (the 5 rounds up)
  - $8.995 \rightarrow 9.00$  (the 5 rounds up)

#### 4. Scientific Notation and Sig Figs:

- In scientific notation, only the coefficient determines sig figs
- $1.23 \times 10^5$  has 3 significant figures
- $1.230 \times 10^5$  has 4 significant figures

### Examples of Proper Rounding to 3 Sig Figs:

- $0.0045678 \rightarrow 0.00457$
- $1234.56 \rightarrow 1230$  or  $1.23 \times 10^3$
- $0.99951 \rightarrow 1.00$
- $456789 \rightarrow 4.57 \times 10^5$
- $6.225 \rightarrow 6.23$  (5 rounds up)
- $3.145 \rightarrow 3.15$  (5 rounds up)

## 4. Canvas Formula Questions and Tolerance

### Understanding Canvas's Grading Tolerance

Canvas formula questions with scientific notation do not have a tolerance range. Your answer will be marked incorrect if it isn't equal to the 3 sig fig scientific notation answer in the formula question. This does not account for different rounding approaches in multi-step problems.

- I will manually review the grading after the assignment closes
- If your answer is mathematically correct but was marked wrong due to formatting or rounding issues, I will adjust your grade
- **However**, it is still best to avoid these issues by following the formatting guidelines carefully
- This ensures immediate feedback and avoids any confusion about your score

#### 1. Best Practices to Stay Within Tolerance:

- **Never round intermediate values** - only round the final answer
- Use your calculator's memory function to store intermediate results
- If using constants ( $g = 9.8 \text{ m/s}^2$ ), use the value given in the problem

## 2. Common Rounding Errors to Avoid:

- Rounding too early in calculations (compounds error)
- Using incorrect number of sig figs
- Forgetting to round the final answer

## Troubleshooting Example:

**Problem:** Calculate velocity where intermediate steps give 12.3456789 m/s

- ☒ **Wrong:** Rounding to 12.3 after step 1, then continuing calculations
- ☐ **Correct:** Keep 12.3456789 throughout, enter final answer as 12.3

## 5. Important Notes About Multiple Attempts

### 1. New Numbers Each Attempt:

- When you start a new attempt, **all problem values change**
- Previous calculations will NOT apply to the new numbers
- You must recalculate everything with the new given values

### 2. No Answer Carryover:

- Starting a new attempt clears all previous answers
- Canvas only grades your most recent submitted attempt
- Make sure to complete ALL problems before submitting

### 3. Strategy Recommendation:

- Work through all problems before submitting
- Double-check your calculations and significant figures
- Only start a new attempt if you need to correct errors

## 6. Step-by-Step Answer Entry Process

1. **Calculate** your answer keeping extra digits
2. **Determine** the correct number of significant figures required
3. **Round** your final answer appropriately
4. **Format** your answer:
  - Decimal notation for reasonable numbers
  - Scientific notation ( $1.23 \times 10^5$  format) for very large/small numbers
5. **Enter** only the numerical value (no units unless requested)
6. **Verify** before moving to the next problem

## 7. Common Mistakes and Solutions

Issue	Wrong	Correct
Scientific notation format	1.23e5	$1.23 \times 10^5$
Including units	12.3 m/s	12.3
Wrong sig figs	12.34 (4 sig figs)	12.3 (3 sig figs)
Rounding too early	Round after step 1	Round only final answer
Leading zeros	0.045 (2 sig figs)	0.0450 (3 sig figs)

## 8. Getting Help

If you encounter issues:

### 1. Answer Marked Wrong?

- Verify you rounded to the correct number of significant figures
- Check scientific notation format (\*10^ not e or E)
- Confirm no units were included
- Ensure you used current attempt's values

### 2. Calculation Problems:

- Review each step keeping extra digits
- Check your final rounding

### 3. Persistent Issues:

- Document your calculation steps
- Contact your instructor with your work shown
- Do this before the due date for assistance

## 9. Final Checklist Before Submission

- ☐ Used the current attempt's given values for all calculations
- ☐ Kept extra digits during ALL intermediate calculations
- ☐ Rounded final answers to exactly 3 significant figures (unless specified otherwise)
- ☐ Used correct scientific notation format: number\*10^exponent
- ☐ Entered only numerical values (no units unless requested)
- ☐ Double-checked significant figures for each answer
- ☐ Completed all problems in the quiz

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*Remember: Proper significant figures and correct formatting are essential for Canvas to recognize your answer as correct. When in doubt, count your sig figs carefully and round only at the very end!*

1

Formula 5 points

You are given a single displacement vector in the plane. Its magnitude is 5.0 meters, and its direction is  $28^\circ$  measured counterclockwise from the +x-axis. Your task is to find the **\*\*x-component\*\*** of this vector. Please enter a number with units of meters (m).

Student tip (Ch. 2): Components are the “shadows” of the vector on the axes. For a vector with magnitude  $A$  at angle  $\theta$ ,  $A_x = A \cos \theta$ . Always convert degrees to radians when using trig:  $\theta \rightarrow \theta \cdot \pi/180$ .

Answer

2

Formula 5 points

Two displacement vectors are described in polar form (magnitude and direction from +x). Vector **A**: 9.4 meters at 151°. Vector **B**: 8.4 meters at 108°. Your task is to find the \*\*magnitude of the sum\*\*  $|\mathbf{A} + \mathbf{B}|$ . Please enter a number with units of meters (m).

Student tip (Ch. 2): Convert each vector to components with **cos** and **sin**. Add the x-components to get  $R_x$ , and add the y-components to get  $R_y$ . The total length is

$|\mathbf{R}| = \sqrt{R_x^2 + R_y^2}$ . Use degrees→radians in the trig functions.

Answer

3

Formula 5 points

A vector in 3D is given by its components (in meters):  $\mathbf{C} = \langle 3.5, 5.3, -3.0 \rangle$ . Your task is to create the \*\*unit vector\*\* that points in the same direction,  $\hat{\mathbf{u}}_C = \mathbf{C}/|\mathbf{C}|$ , and then report \*\*its y-component\*\*. Enter a pure number (no units).

Student tip (Ch. 2): First find the length  $|\mathbf{C}| = \sqrt{C_x^2 + C_y^2 + C_z^2}$ . Then divide each component by this length. Because you divide meters by meters, unit-vector components have no units.

Answer

4

Formula 5 points

Two 2D vectors are given by their components (in meters):  $\mathbf{A} = \langle 1.3, -1.4 \rangle$  and  $\mathbf{B} = \langle -2.4, 5.5 \rangle$ . Your task is to form the difference  $\mathbf{A} - \mathbf{B}$  and report \*\*its magnitude\*\*  $|\mathbf{A} - \mathbf{B}|$ . Enter a number with units of meters (m).

Student tip (Ch. 2): Subtract x-components and y-components separately. Then use the Pythagorean theorem on those differences to get the magnitude of the resulting vector.

Answer

5

Formula 5 points

You are given the rectangular components of a 2D vector:  $R_x = 5.6$  meters and  $R_y = 7.0$  meters. Your task is to report the vector's **direction angle** in degrees, measured counterclockwise from the +x-axis. Enter a number in degrees.

Student tip (Ch. 2): Use the two-argument inverse tangent to get the correct quadrant:

$\theta = \text{atan2}(R_y, R_x) \cdot \frac{180}{\pi}$ . This returns angles in  $(-180^\circ, +180^\circ]$ . If your course prefers  $0^\circ - 360^\circ$ , add  $360^\circ$  if the angle is negative.

Answer

6

Formula 5 points

Two displacement vectors form a parallelogram when placed tail-to-tail. The first has magnitude 7.1 meters, and the second has magnitude 8.9 meters. The smaller angle between them is  $158^\circ$ . Your task is to find the **area** of that parallelogram, which equals the **magnitude** of  $|\mathbf{A} \times \mathbf{B}|$ . Enter a number in square meters ( $\text{m}^2$ ).

Student tip (Ch. 2): The geometric result is  $|\mathbf{A} \times \mathbf{B}| = AB \sin \theta$ . Convert degrees to radians inside the sine.

Answer

7

Formula 5 points

Two vectors in 3D are given by their components (each component is in meters):

$\mathbf{A} = \langle 1.4, -3.8, 0.4 \rangle$  and  $\mathbf{B} = \langle -0.4, 2.5, -1.9 \rangle$ . Your task is to find the **scalar projection** of  $\mathbf{B}$  onto  $\mathbf{A}$ . This is the signed length of  $\mathbf{B}$ 's "shadow" along the direction of  $\mathbf{A}$ . Enter a number in meters (m).

Student tip (Ch. 2): Compute the dot product  $\mathbf{A} \cdot \mathbf{B}$ , then divide by  $|\mathbf{A}|$ :  $\text{comp}_A \mathbf{B} = \frac{\mathbf{A} \cdot \mathbf{B}}{|\mathbf{A}|}$ .

If the result is negative,  $\mathbf{B}$  points partly opposite  $\mathbf{A}$ .

Answer