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Physics 7B - Winter 07 - Quiz 1

first two letters of last name

Name _____ Student ID _____

DL section number _____

I certify by my signature that I will abide by the code of academic conduct of the University of California

Signature _____

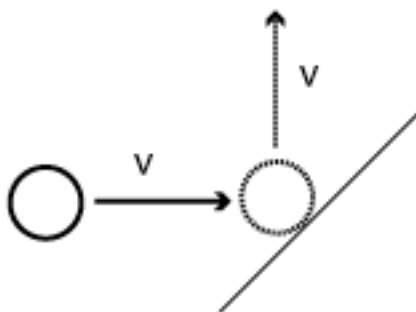
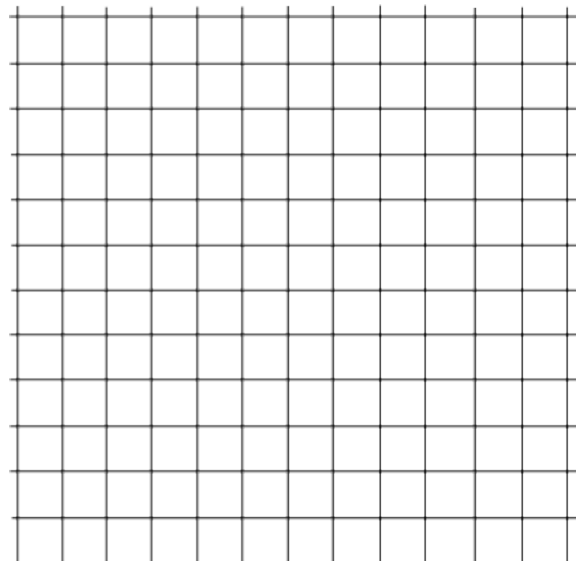
No books or notes. Calculators OK. Show all of your work below - answers alone do not receive credit!

1. (3.0 pts) Let us use a vector notation of the form (x,y) , where x is the x -component of the vector and y is the y component. Draw accurately and label on the grid at right these vectors:

$$\mathbf{A} = (-3,5)$$

$$\mathbf{B} = (4,-1)$$

$$\mathbf{A}-\mathbf{B}$$



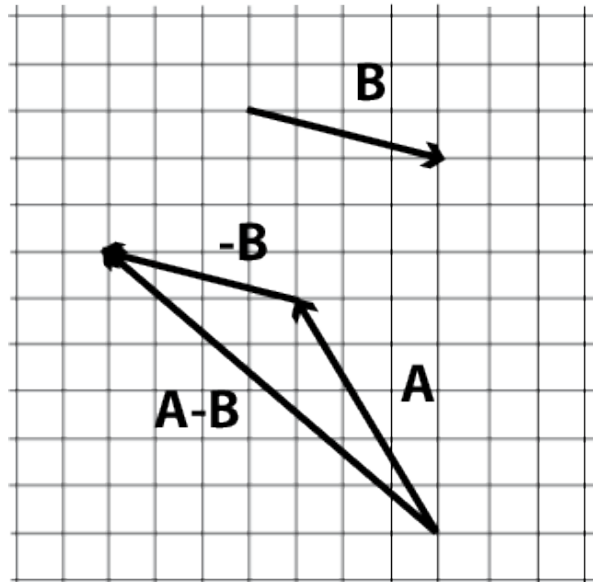
2. a. (1.0 pts) A ball hits a wall at a 45° angle and bounces off such that its new direction is 90° to the original direction, as shown in the drawing at left. Indicate the direction of the impulse vector on the ball on the figure.

b. (0.5 pts) If the ball's mass is 2 kg and it initially travels at 1 m/s, what is the magnitude of the impulse? Show your work below.

1. (3.0 pts) The question asked you to plot all three vectors (**A**, **B**, **A-B**). You could calculate the vector **A-B** either graphically, by adding **A** and **-B** with the head-to-tail method, or else you could calculate the components of **A-B** numerically and plot it directly.

For the case $\mathbf{A} = (-3,5)$, $\mathbf{B} = (4,-1)$, the results would look as below.

Note $\mathbf{A} - \mathbf{B} = (-3,5) - (4,-1) = (-3-4, 5-(-1)) = (-7,6)$



Grade	Points	
Q	4.5	Perfect answer, with work shown either by adding the vectors graphically or by showing the sum of vector components. Labels are clear and unambiguous.
S	3.8	Drawing mistakes (vectors drawn without arrows indicating direction, ambiguous labelling, etc.) Missing work.
T	2.8	Neglected drawing B (only drew -B). Gross inaccuracies, but had the right idea and method.
U	1.8	Labelled -B as B , or other major error, but showed understanding.
W	1.0	Several type-U errors, or showed little understanding.

2a. (1.0 pts) Impulse = $D\mathbf{p} = m(\mathbf{v}_f - \mathbf{v}_i)$. The proper vector should have been pointed perpendicular to the wall, “northwest”.

Q	4.5	Correct, labelled vector, with supporting diagram or equivalent explanation of direction from vector subtraction
S	3.8	Correct answer, some incomplete work shown
T	2.8	Correct answer, no supporting work shown
U	2.2	Incorrect answer (such as showing $\mathbf{v}_f + \mathbf{v}_i$ direction) but work shows understanding of impulse as $\mathbf{p}_f - \mathbf{p}_i$
W	1.0	Incorrect answer with wrong or no explanation
Z	0.0	Blank

2b. (0.5 pts) The magnitude of the impulse vector is simply its length. The x- and y-components of $D\mathbf{p}$ are $(-mv, mv)$ respectively. The magnitude may be calculated from the Pythagorean theorem, or appropriate trigonometric functions of the 45 degree angles: $|D\mathbf{p}| \sin(45^\circ) = mv$. For $m=1$ kg and $v=1$ m/s, the magnitude of the impulse is $\sqrt{2}$ kg m/s.

Q	4.5	Correct magnitude calculated, with work clearly shown.
R	4.0	Wrong impulse vector from 2a, but correct method otherwise. Or minor trig/calculation error, or work somewhat unclear/incomplete.
S	3.0	Correct method but includes incorrect statements (such as initial impulse = final impulse). Or, missing work, or work disagrees with vector from 2a.
U	2.0	Added or subtracted magnitudes rather than vectors (said $ \mathbf{A}-\mathbf{B} = \mathbf{A} - \mathbf{B} $ or equivalent).
W	1.0	$D\mathbf{p} = \mathbf{p}_i$ or other error showing little understanding.
Z	0.0	Blank

