Space Relation, Part 1 – HINTS

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I. RELATIVE POSITION VECTORS

A. 1.

HINT 1: "*Due* north (south, east, etc.)" means ***straight*** north (south, etc.), i.e. not at all diagonal.

HINT 2: A typical gas station is only about 0.05 miles long. Compared to the 60- & 30-mile distances given in this problem, this is very small. You can & should draw the gas station as just a single point.

HINT 3: Your answer won't quite be a ***number***. An approximate distance is all you need.

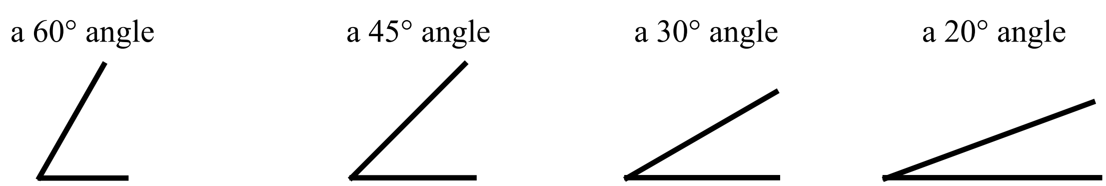
A. 2. & A. 3.

HINT 1: Make sure your diagram is ***to scale***—i.e. 60 miles should look twice as long as 30 miles.

B. 1

HINT 1: For standard compass-point directions (NE, SE, etc.), the angles are measured ***from the x-axis***.

HINT 2: Use a ruler or other straight edge to draw your lines neatly. You don't need a compass, but you should try to estimate angles. Use the guide below, if you're not sure what different angles look like.



HINT 3: Again, make sure that your 60 miles looks twice as long as your 30 miles.

B. 2. & 3.

HINT 1: Remember that, when two parallel lines are cut by a transversal, alternate interior angles, alternate exterior angles, and corresponding angles are all equal.

B. 5.

HINT 1: Notice that the distance you are looking for is actually the tip-to-tail "sum" of two other vectors. See textbook sections 3-1 and 3-2 to understand how to add vectors.

HINT 2: If you are unable to solve this algebraically, try to estimate the length and angle, based on your (SCALE) drawing. (Your drawing better be to scale, though!)

II. RELATIVE VELOCITY VECTORS – An Introduction

C.

HINT 1: Draw a diagram of the scenario from part B.

HINT 2: Now really try to imagine what you would see if you were ***in*** that speedboat. Which way are you facing? Which way would that rowboat seem to be moving?

D.

HINT 1: Try drawing a diagram like the one you drew above, but this time include the location of the speedboat at several moments in time, as it moves past the rowboat. Now add the location of the torpedo at each of these moments in time.

HINT 2: Remember—the torpedo always stays due north of the rowboat.

E (extra credit).

HINT 1: If you drew your diagram for part D carefully, you can use it to figure this out.

HINT 2: How far does the speedboat move relative to the rowboat in each second?

HINT 3: How far does the torpedo move relative to the speedboat in each second?

HINT 4: You'll need to use the Pythagorean Theorem, SohCahToa, & inverse trig functions.