1. c (the bullet fired downward has a non-zero vertical velocity whereas the bullet fired horizontally has a zero vertical velocity)

2. d (the horizontal velocity is the same as what it was on the table)

3. d (since there is no horizontal acceleration during free fall, there is no change in the horizontal velocity)

4. a (the vertical velocity is the same as what it was on the table, where it wasn't moving vertically)

5. Northward component is -33.184 N and the eastward component is -3.584 N. There is no upward component.

   To find the net force, it is helpful to first draw a diagram, just so you can keep track of which components you are calculating. In this case, the upward force will exactly balance the downward force of gravity (isn't that convenient?).

   The first force has a larger eastward component than northward component, since it is closer to east than north. Using the sine and cosine of 20°, one finds that the northward component is 3.420 N and the eastward component is 9.397 N.

   The second force has a larger southward component than eastward component. Using the sine and cosine of 60°, one finds the southward component is 17.320 N and the eastward component is 10.000 N.

   The third force has a larger westward component than southward component. Using the sine and cosine of 40°, one finds the southward component is 19.284 N and the westward component is 22.981 N.

   Adding them all up, I get the values above (using negative for south and west values).

6. d (it ends 10 m south of the initial position)

7. b (vertically, it falls 1 meter)

8. a (with no horizontal forces the ball will not accelerate horizontally)

9. a (northward component is greater because the direction is closer to north than to east)

10. 17.5 m/s

    The physics says that both the water and the stone will fall in the same way, since the vertical motion is independent of the horizontal motion. Thus, it must also take the water 0.4 s to hit the wall. Since the horizontal motion is independent, the velocity of the water coming out the nozzle, being horizontal, must equal the horizontal displacement (7 m) divided by the time (0.4 s).