Student #:	Student Name:

Grade 11 Physics

Unit 2: Two-Dimensional Motion

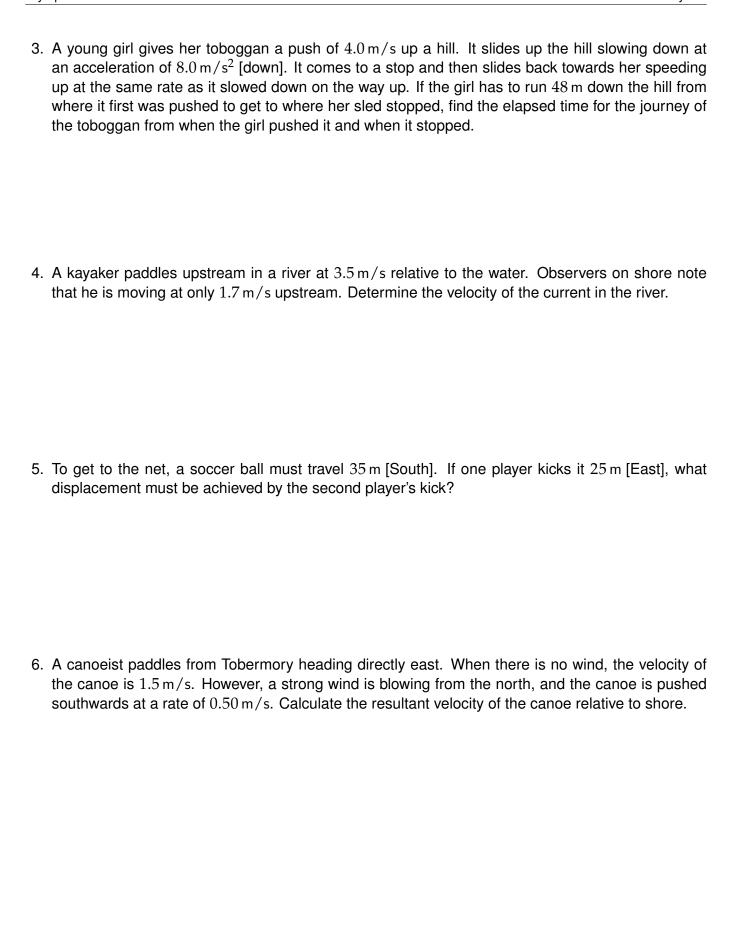
HINT: For questions that ask for *vector* quantities (i.e. position, displacement, velocity and acceleration), you must include both a *magnitude* and a *direction*. Be accurate with directions in two dimensions, e.g. [down] is not the same as [south]; and [N 11° E] is not [NE].

1. Fill in the following table. The first answer has been filled in for your reference.

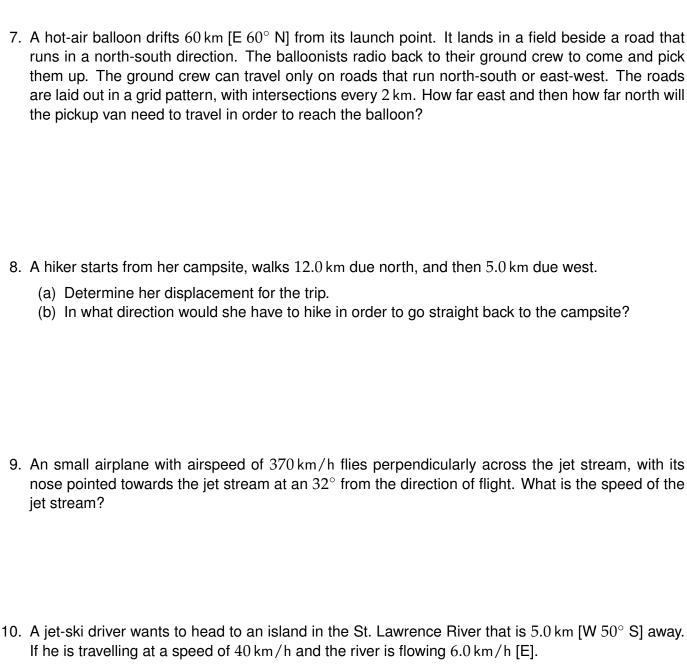
	Position-Time Graph	Velocity-Time Graph
Read Directly from Graph	Position	
Rise (from one point to another)		
Slope of tangent (of a curved line)		
Slope of secant		
Area between line and time axis	n.a.	
area/time	n.a.	

- 2. Ahmad is driving North on Highway 69 at $90 \, \text{km/h}$ and sees a large moose on the road. He quickly slams on his brakes, but his reaction time is $1.35 \, \text{s}$ (he sees the moose, thinks about his response, and then presses the brake pedal). He presses the brake for $2.65 \, \text{s}$ and comes to a stop just in time (average stopping time for a mid-size sedan).
 - (a) Find the distance travelled *after* seeing the moose and *before* pressing the brake.
 - (b) Find the total distance he travelled before coming to a stop.
 - (c) Find the average acceleration once he presses the brake.

Unit 2 Homework Page 1 of 7



Unit 2 Homework Page 2 of 7



- (a) In what direction should he head the jet-ski?
- (b) How long will it take him to reach the island?

Unit 2 Homework Page 3 of 7

11. A newspaper delivery boy throws a newspaper towards a porch which is 1.25 m below the height of his hand and 12 m in front of him when he releases the paper. Given that he throws the paper with a velocity of 12.5 m/s [horizontal], find:

- (a) the maximum height of the paper's trajectory
- (b) the time it takes for the paper to reach the ground
- (c) the acceleration when the paper is only 1.0 m from the ground
- (d) the horizontal range of the paper. Does it make it to the porch?
- (e) the speed at impact

12. In a boisterous game of "Monkey in the Middle", Kathleen and Shannon are tossing a pencil case back and forth over Kevin's head. The girls were $5.0 \, \mathrm{m}$ apart, and Kevin was *exactly* in the middle. If Kevin was able to reach a height of $3.2 \, \mathrm{m}$ with a jump, calculate how far above his reach Kathleen's throw of $8.7 \, \mathrm{m/s}$ [65° above horizontal] would be if it left her hand $10 \, \mathrm{m}$ above the ground. If Shannon, jumping, can reach $3.0 \, \mathrm{m}$, would she be able to catch the pencil case?

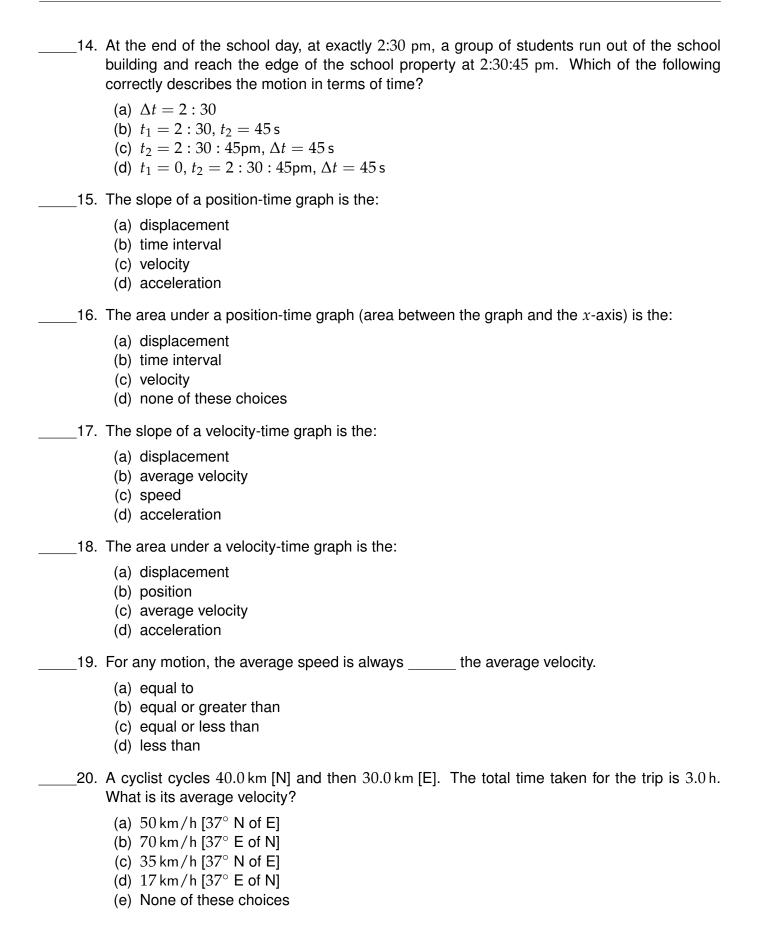
Unit 2 Homework Page 4 of 7

13. In each of the following, draw a vector diagram, then **find the net displacement**. Identify the most appropriate method of solution from the following and explain why it is appropriate. The methods that you may consider include:

- I. Scale diagram (using a ruler and a protractor)
- II. Pythagorean theorem
- III. Cosine and sine law
- IV. Component method
 - (a) A pool ball on a table travels $1.20\,\mathrm{m}$ [N], then $0.85\,\mathrm{m}$ [E], then $1.30\,\mathrm{m}$ [S], and then $0.95\,\mathrm{m}$ [W].
- (b) A student in a classroom walks $3.0\,\mathrm{m}$ forward, then turns right 90° and walks $4.0\,\mathrm{m}.$

- (c) An airplane travels $300\,\mathrm{km}\,[\mathrm{S}]$ and then $200\,\mathrm{km}\,[\mathrm{S}\,31^\circ\,\mathrm{E}]$
- (d) A whale on a migration route swims $1250\,\mathrm{km}$ [N 30° W] and then heads North for $890\,\mathrm{km}$.

Unit 2 Homework Page 5 of 7



Unit 2 Homework Page 6 of 7

- _____21. A baseball player is trying to determine her maximum throwing distance. She must release the ball:
 - (a) at an angle that lets the ball reach the highest possible height
 - (b) horizontally
 - (c) at an angle of 45°
 - (d) so that it has maximum possible speed, regardless of angle
 - (e) at an angle between 45° and 90°
- 22. A projectile is launched with an unknown velocity at an angle of 30° from the horizontal of level ground. Which of the following statements is true?
 - (a) The horizontal component of velocity is less than the vertical component of velocity.
 - (b) The horizontal component of velocity is greater than the vertical component of velocity.
 - (c) Both the horizontal and vertical components of velocity are equal.
 - (d) The horizontal component of velocity is used to calculate the time that the projectile is in the air.
- 23. An object free-falls for Δt from rest a height h. How far will the object fall from rest in twice the elapsed time, i.e. $2\Delta t$?
 - (a) $\sqrt{2}h$
 - (b) 2h
 - (c) 3h
 - (d) 4h

Unit 2 Homework Page 7 of 7