

# Physics 11 Practice (PART 1 of 2)

## Trigonometry Practice

1. The angle of elevation of a summit from the bottom of the ski lift at Snow Bowl is  $33^\circ$ . If a skier rides 1000 m on this lift to the summit, what is the vertical distance between the bottom of the lift and the summit?
2. Jordan's kite has a string 40 m long and is flying 27 m above the spool of string. Find the angle of elevation of the kite.
3. A pendulum 40 cm long is moved  $30^\circ$  from the vertical. How high is the lower end of the pendulum lifted from its starting point?

## Distance, Displacement, Vectors

4. A polar bear meanders 275 m east and then turns around and ambles 425 m west.
  - a. What was the distance travelled by the bear?
  - b. What was the bear's displacement?
5. Add each of the following vectors and find the resultant vector.
  - a. 15 m east and 25 m north
  - b. 220 m north and 80 m west
  - c. 22 m south and 18 m north

## 1-D Kinematics

6. How long does it take a car travelling 45 km/h to travel 100 m?
7. How far does a skateboarder travel in 22 seconds if her average velocity is 12 m/s?
8. A shopping cart moves from a point 3 m west of a light post and ends up 18 m east of the light post in 2.5 seconds. Find its average speed.
9. A rally car sets out on a 100 km race. At the halfway point (50 km), her pit crew radios that she has averaged only 80 km/h. How fast must she drive over the remaining distance in order to average 100 km/h for the entire race?

10. A supersonic jet travels once around the earth at an average speed of  $1.6 \times 10^3$  km/h. Its orbital radius is  $6.5 \times 10^3$  km. How many hours does the trip take?
11. A sprinter starts from a complete stop and reaches a speed of 12 m/s in 4.25 seconds. What is their acceleration?
12. A car starts from a complete stop and accelerates at 15 m/s for 3 seconds. What is its top speed?
13. If a snowboarder is moving at 8 m/s how long will it take them to reach 36 m/s if their rate of acceleration is 3.5 m/s?
14. Create a displacement vs. time graph for some real or fictional data.
  - a. What is the slope of the best fit line? (slope = rise/run)
  - b. What is this slope measuring?
15. A ball is thrown vertically upward. The ball is 3 m above the ground and travelling at 15 m/s the moment it is released. It reaches some maximum height and then falls to the ground.
  - a. What is the maximum height above the ground that the ball reaches?
  - b. What is the impact velocity of the ball when it hits the ground?
  - c. At what time (s) does the ball have a speed of 13 m/s?
16. A bike first accelerates from 0 m/s to 5 m/s in 4.5 seconds, then continues at this constant speed for another 4.5 seconds. What is the total distance travelled by the bike?

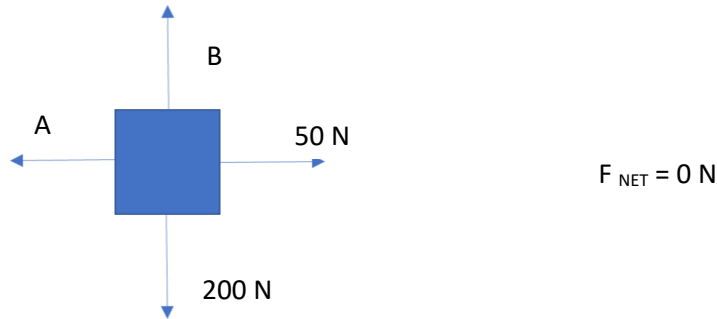
## 2-D Kinematics

17. You can throw a pie at 32 m/s. If you are standing in a car on the Skytrain travelling 32 m/s east and throw a pie toward the front of the train car, what is its resultant velocity?
18. Train A leaves Vancouver at 9:00 a.m. travelling east at 90 km/h. At the same time, train B leaves Montreal travelling west at 110 km/h. if the two stations are 4800 km apart, ...
  - a. At what time do they meet?
  - b. Where are they when they meet?

19. After escaping from a maximum security prison, the A-Team is trying to travel north across a river that is 350 m wide. The boat they are in can travel 25 m/s in still water, and the river is flowing to the east at 11 m/s.
- What is their total (resultant) velocity?
  - How long does it take them to cross the river?
20. A Tesla Model 3 with an “L” sticker on the back drives straight out of a parkade (accidentally) at 8 m/s and hits the street below 3.4 seconds later.
- How far did the car fall?
  - What was the car’s impact velocity as it hits the ground?
21. A quarterback throws the ball into the waiting hands of the wide receiver at 12 m/s and at an angle of  $35^\circ$  relative to the ground.
- How far down the field is the wide receiver?
  - How high does the ball go?
22. A cannon is perched on a 48 m high cliff. It aims  $30^\circ$  above the horizontal and fires a shell at 52 m/s.
- How long does it take for the shell to hit the ground?
  - How far from the base of the cliff does it land?

### Newton’s Laws

23. What is your mass (kg)?
- What is your weight on Earth ( $F=ma$ )
  - What is your weight on the Moon?
  - What is your weight on Jupiter?
24. A free-body diagram is shown below. The net force is known. However, the magnitudes of two of the forces are not known. Analyze the situation and determine the magnitude of the missing forces.



25. The Batmobile exerts a force of  $8.5 \times 10^3 \text{ N}$  east, while friction pulls back on it with a force of 1500 N. If it has a mass of 1250 kg, what is its acceleration?

### Other Forces

26. Two PSII learners sit side by side in the collaborative space. One has a mass of 55 kg and the other a mass of 65 kg. If they sit 50 cm apart, what is the force of gravitational attraction between them?
27. What gravitational force does the moon produce on the Earth if their centres are  $3.88 \times 10^8 \text{ m}$  apart and the moon has a mass of  $7.34 \times 10^{22} \text{ kg}$ ?
28. A PSII learner stretches an elastic band with a spring constant of 50.0 N/m by 15 cm. How much force are they applying? (Hooke's Law)