

## Moving About Topic Test

Preliminary Physics, Assessment Task 1

Total Possible Marks: 43

1. A motorbike can travel 0-100 m in 6.6 s. Answer these questions:
  - a. What is its average velocity [1]
  - b. How far would it travel in 72 min if it remained at this velocity [1]
2. Explain the difference between distance and displacement [1]
3. Explain the difference between speed and velocity [1]
4. The force of gravity on the Moon is  $\frac{1}{6}$  that experienced on Earth. If a box has a mass of 10 kg on earth what is its mass and its weight on the Moon. [1]
5. Sketch small velocity-time AND displacement-time graphs of the following scenarios: [4]
  - a. Accelerating motion
  - b. Decelerating motion
  - c. Constant velocity motion
  - d. Stationary object
6. Write Newtons 3 Laws in your own words and a real-world example where of each of the laws apply [6]
7. Explain how are work and energy are related [2]
8. Describe the relationship between momentum and impulse [2]
9. Write an explanation for instantaneous velocity [1]
10. Write an explanation for average velocity [1]
11. Describe the energy transformations that occur in the following scenarios [2]
  - a. A solar cell running a light

- b. Car crashing into a barrier
  - c. A battery operating an ipod
  - d. A jug boiling water
12. Draw a vector diagram, including the resultant vector, of the following scenario using SI units. [2]
- A boat is attempting to cross a river. The boat is travelling at its maximum speed of 30 km/h. The river is flowing to the left at 10 km/h.
13. F1 cars must pass a “Frontal Impact Test”. When hit by a mass of 780 kg travelling at 10 m/s. The damage must not extend beyond the first 0.82 m of the cars bonnet. [2]
- a. What is the kinetic energy of the mass which hits the car during the test
  - b. At the end of the Frontal Impact Test, when nothing is moving, all this kinetic energy has been “lost”. Where did it go?
14. A moving truck travelling at 15 m/s north has a mass of 2000 kg. It collides with a stationary 1500 kg car. If the car and truck stick together, what type of collision is this and what would be the velocity of the wreck after the collision? [4]
15. If a car exerts a force on a caravan. Which of the following forces is the reaction force? [1]
- a. The pull of the caravan on the car
  - b. The force of gravity on the car
  - c. The force developed at the axels of the caravan
  - d. The force of friction between the wheels of the caravan and the road
16. A 1500 kg car moves from a set of traffic lights along a straight road until it reaches a speed of 28 m/s. This occurs over 4 seconds. Determine: [3]
- a. The acceleration of the car
  - b. The force needed to achieve this acceleration

c. The momentum of the car at the end of this acceleration

17. A car engine exerts a force of 500 N in moving the car 1000 m in 200 s. What is the work done by the engine? [2]
18. Draw a displacement versus time graph of the following journey. Draw the cat and the dog and the graph. And answer this question: Who won the race? [4]

A dog and a cat are having a race. The track is 15 m long. The cat gets a head start of 2 m. The cat runs north at 2 m/s for 13 m. The dog runs the 15 m after it but at 3 m/s, then stops and thinks for 2 s about which way to run now. The cat runs south back towards the finish line at 2 m/s, the dog quickly follows at 4 m/s.

19. Explain how either a seatbelt OR an airbag protects the occupants of a car. Use at least one physics concept in your explanation. [3]