# Physics Mid-Topic Test – Revision

Name:

***Answer on file paper and show full working out.  
Use the “Physics Formulae and Data” page in your Booklet.***

1. What are scalar and vector quantities?
2. Explain the difference between distance and displacement. Define each term, identify each as either scalar or vector, and give one clear example to illustrate the differences between these concepts.
3. Find the distance and displacement (include a vector diagram) of:
   1. a tennis ball which rolls 4 m to the left and then bounces back 6 m towards the right.
   2. a student who walks 3 km south and then a further 2 km south.
4. Explain the difference between speed and velocity.
5. A runner completes 3 laps of a 200 m circular track in 104 s. Calculate:
   1. the average speed.
   2. the average velocity.
6. A puppy runs 16.5 m south in 2.0 s then 18.9 m north in 3.1 s.
   1. What is the distance travelled?
   2. What is the displacement?
   3. What is the average speed?
   4. What is the average velocity?
7. A soccer ball was kicked towards the goals 18 m away. If the ball reached the goalie in 1.2 s, what was the average speed of the ball?
8. A snail travelled in a straight line for 15 minutes. If the snail could maintain an average velocity of 0.01 m/s, how far did it travel?
9. A jet plane travels at a constant velocity of 580 m/s for 2 km. How long does this take?
10. Velocity is measured in ‘metres per second’ and acceleration is measured in ‘metres per second per second’. These units are written as m/s and m/s2 respectively. Use an example to illustrate the difference between these units.
11. A family car can reach a velocity of 60 km/h in 1 minute from a standing start. What is the car’s acceleration?
12. A jet fighter is travelling horizontally at 31.0 m/s when it engages its after burners for 3.51 s. At the end of this time, its velocity is 273 m/s. Calculate the acceleration.
13. How long would it take a car to change its velocity from 10 m/s to 20 m/s if it could accelerate at a rate of 2.5 m/s2?
14. What is deceleration? How would a deceleration be recognised in a calculation?
15. What is the deceleration of a cyclist who slows down from 8 m/s and stops in 10 s?
16. An object decelerates at a rate of 8 m/s2 over 5 s. If its initial velocity is 60 m/s, what is its final velocity?
17. The Apollo spacecraft missions in 1969 took astronauts to the Moon in a journey that took about 70 hours. A penny is dropped from the Empire State Building. Ignoring the effects of air resistance:
    1. How fast would it be travelling after 3 s?
    2. Sketch a labelled diagram showing the penny’s velocity after 0, 1, 2, and 3 s.
18. Convert:
    1. 16 m/s to km/h
    2. 110 km/h to m/s; and
    3. 340 ms to seconds.
19. In relation to vehicles, define the terms: reaction time, reaction distance, braking distance, and stopping distance.
20. A distracted P-plate driver takes 0.7 seconds to respond to a hazard on the road. If the car’s velocity before braking was 75 km/h, calculate the reaction distance travelled before braking and express your answer in car lengths (1 car length = 4.5 m).
21. Calculate the stopping distance of a car initially travelling at 120 km/h where the sleepy driver takes 1.8 s to react and needs 5.1 s of braking time to stop the vehicle.

***Answer the following questions on this handout.***

1. The following displacement-time graph represents David’s training run on the weekend.

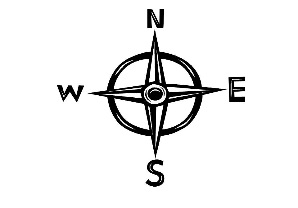
Chart, line chart

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David ran fastest:

* 1. in the first 30 minutes.
  2. between 30 and 60 minutes.
  3. between 60 and 90 minutes.
  4. between 90 and 120 minutes. (1 mark)

1. The diagram below shows the journey taken by Wanesa on her way to work at Macca’s.



650 m

Start

Maccas

1200 m

800 m

1000 m

1. Determine the distance she travelled.

(1 mark)

1. If Wanesa completed this journey in 1 h 30 min, calculate her average speed.

(2 marks)

1. Calculate Wanesa’s displacement.

(2 marks)

1. Calculate her average velocity.

(2 marks)

1. With reference to the “2-second rule”, explain why tailgaiting is so dangerous and what motorists can do to prevent rear-end accidents.

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(2 marks)

1. The graph below plots the motion of a toddler riding a tricycle up and down her driveway.
2. Describe the toddler’s motion for each section of the graph. (4 marks)

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1. What was the distance? \_\_\_\_\_\_\_\_; and final displacement? \_\_\_\_\_\_\_\_ (2 marks)
2. This graph shows the motion of a man riding on a Segway along straight pathway.

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Which option correctly describes the motion during each stage? (1 mark)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | AB | BC | CD | DE |
| P | Decelerating | Constant speed | Accelerating | Stationary |
| Q | Accelerating | Stationary | Constant speed | Decelerating |
| R | Accelerating | Constant speed | Decelerating | Stationary |
| S | Decelerating | Stationary | Constant speed | Accelerating |