SCIENCE YEAR 10.

RECTILINEAR MOTION.

SET 1.

1. A body travels 360 m in 12 s. Find the average velocity.
2. A car moves 36 m in 8 s. What is the average velocity?
3. What is the average speed of a car which travels 4.2 km in 2 min.
4. Find the average velocity of a body which travels 6.3 m in 9 s?
5. A car travels 110 m in 5 s. Find its average speed.
6. How far does a body move in 3 s at an average velocity of 25 m/s ?
7. Calculate the distance travelled in 2.5 s at a speed of 14 m/s.
8. A body moves with a uniform velocity of 0.15 m/s. What is its displacement after 0.4 min ?
9. Find the time in minutes needed to travel 10.8 m at 0.12 m/s.
10. A car travels for 18 min at 50 km/hr. Find the distance, in km, it moves in this time.

SET 2.

1. A car moves at 6 m/s for 3 min, then at 3 m/s for 6 min. Find the average velocity for the whole journey.
2. A car is to make a 3 km journey. Find (a) the time it would take at 30 m/s.
   b) the time it would take at 25 m/s.
   c) the time saved by travelling at 30 m/s. instead of at 25 m/s.
3. Swimmer A can swim at 1.25 m/s. and swimmer B can swim at 1.6 m/s. If swimmer B starts 8 s. after swimmer A in a 50 metre race, which one wins and by what time margin?
4. Runner A can run at 8 m/s and runner B can run at 7.5 m/s. In a race, runner A starts at the 200 metre mark and runner B starts 20 metres in front of him. Which one wins and by what time margin?
5. A man runs half way round a circular track of radius 210 metres in 100 s. Calculate his average speed.

SET 3.

1. A body increases its velocity from 4m/s. to 25 m/s. in 3 s. Find its acceleration, assumed to be constant.
2. A car moving at 25 m/s. accelerates uniformly for 5 s. If its velocity is then 40 m/s. find the acceleration.
3. A car moves from rest to 28 m/s. in 7 s. What is the average acceleration?
4. Write down the increase in velocity per second for a car accelerating at 40 cm/s².
5. A car accelerates from rest to 30 km/hr. in 8 sec. What is its average acceleration in km/hr/s?
6. A body is moving with a uniform velocity of 3 m/s. If it is given a constant acceleration of 4m/s. in the same direction for 2 s., calculate the final velocity.

SET THREE cont.,

7. A car starts from rest with a uniform acceleration of 8 m/s². Calculate the velocity after 12 s.
8. A body has an initial uniform velocity of 800 cm/s. For 14 s. it is uniformly accelerated at 50 cm/s². Calculate the final velocity in m/s.

SET 4.

1. A body changes its velocity from 30 m/s. to 18 m/s. in 6 s. Calculate the acceleration.
2. A car decreases its velocity from 36 m/s. to rest in 8 s. What is its acceleration?
3. A car moving at 40 m/s. decelerates uniformly for 4 sec. If the final velocity is 8 m/s. in the same direction, find the deceleration.
4. A car takes 6 s. to be retarded uniformly from 33 m/s. to rest. What is the retardation?
5. A body is subjected to an acceleration of -7.0 m/s². Write down the decrease in velocity per second.
6. A car is retarded at 3.0 m/s². Write down the decrease in velocity per second.
7. A car is braked uniformly from 45 m/s. to rest in 6 sec. Find the acceleration.
8. A body is moving with a velocity of 8.6 m/s. For 24 s. it experiences a uniform deceleration of 0.2 m/s². (ie. a uniform acceleration of -0.2 m/s².). Find the new velocity.

SET 5.

1. A body starts moving from rest with an acceleration of 5 m/s². for 4 s. Find:
   a) the final velocity.
   b) the average velocity.
   c) the displacement.
2. A car starts moving from rest and moves with an acceleration of 4 m/s² for 6 s. Calculate:
   a) the final velocity,
   b) the average velocity.
   c) the displacement.
3. Find the displacement of a car which moves at 6 m/s². from rest for 5 sec.
4. A body accelerates from rest at 11 m/s² for 4 s. What is:
   a) the distance travelled.
   b) the final velocity.
5. A car is moving at 20 m/s. If it is then accelerated uniformly at 3 m/s² for 6 s., find:
   a) the final velocity,
   b) the displacement.
6. A car moving with a uniform velocity of 50 m/s. If it is uniformly accelerated at 8 m/s² for 3 s., find the displacement during this

SET 5 cont.,

7. A car travelling at 42 m/s, is brought to rest in 7 s. with a uniform negative acceleration. Find:

a) the acceleration.
b) the average velocity while slowing down.
c) the displacement in m. during this time.

8. A body is moving at 30 m/s. It is then retarded uniformly at 2 m/s.² for 12 s. Find:

a) the final velocity.
b) the average velocity.
c) the displacement.

SET 6.

1. A car reaches a velocity of 50 m/s. after being accelerated uniformly at 5 m/s.² for 7 sec. Find the initial velocity.

2. A car is retarded at 3 m/s.² for 9 s. If the velocity is then 23 m/s. find the initial velocity.

3. A moving car is retarded at 7 km/hr/s. for 4 s. If its final velocity is 12 km/hr. what is the initial velocity?

4. A car starts from rest and travels 72 metres in the first 6s. at a uniform acceleration. Find the acceleration. (Hint: use formula (2) or find the average velocity and final velocity first).

5. A car starts from rest and moves 250 m. in a straight line in the first 10 s. Find the acceleration, assuming this to be uniform.

6. A car accelerates at 5 m/s.² for 4 s. If the displacement during this time interval is 64 metres, find the initial velocity.

7. A car undergoes a displacement of 60 m. while it is retarded at 4 m/s.² for 5 s. Find the initial velocity.

SET 7 (note: g = 10 m/s.²)

1. By how much does the velocity of a freely falling body increase each second?

2. A stone is dropped from rest. Calculate its velocity and displacement after 5 s.

3. A body is allowed to fall freely from rest for 2 s. Find its velocity and displacement.

4. A stone is allowed to fall from rest. Calculate the increase in displacement during the 3rd second.

5. If a stone is dropped from rest, how far does it fall in the 5th second of the motion?

6. A stone is dropped from rest into a well. If it takes 1.5 s. to reach the water, find the depth of the well.

SET 8.

1. A stone is given an initial downward velocity of 12 m/s. After 3 s., what is

a) its velocity.
b) its displacement.

2. A stone is thrown vertically down at 8.0 m/s. After 3 s., what is:

a) its velocity.
b) its displacement?

3. A body is thrown vertically down at 2 m/s. After 2 s. what is:

a) its velocity.
b) its displacement.

4. A stone is dropped from rest. Find the time taken to reach a speed of 200 m/s.

5. A pile driver falls 20 m. from rest. Find the time taken.

6. A stone is dropped from rest. Find the time taken to reach a speed of 40 m/s.

7. Find the time taken for a stone to fall 0.2 metre, if it is dropped from rest.

8. A stone falls a distance of 500 m. from rest. Find the final velocity.

SET 9.

1. A car moving with uniform velocity from rest goes 60 m. in 5 s. or 120 m. in 10 s. Use these results to construct a displacement-time graph. From the graph write down:

a) the displacement after 6.2 s.
b) the displacement after 3.7 s.
c) the time taken to move 37 m.
d) the time taken to move 103 m.

2. A car has a uniform velocity of 8 m/s. Construct a displacement-timegraph, and from the graph write down:

a) the displacement after 3.6 s.
b) the time taken to reach 19.3 m.
c) the displacement after 1.9 s.
d) the time taken to move 11.8m.

3. A car accelerates at a uniform rate of 4 m/s.² starting from rest. Construct a velocity-time graph, and hence find:

a) the velocity after 4.7 s.
b) the time taken to reach 14.3 m/s.
c) the velocity after 2.9 s.
d) the time taken to reach 9.3 m/s.

4. A body falls freely from rest for 5 s. Construct a velocity time graph. From the graph write down the velocity after:

a) 1.3 s.
b) 3.7 sec.

SET 9   cont.,

5. A body falls freely from rest for 3 s. Construct a graph of displacement against (time)^2. From the graph write down the distance fallen after:

   a) 1.7 s.
   b) 2.6 sec.

SET 10.

1. A body travels at a uniform velocity of 150 cm/s. for 0.2 hour. Calculate the displacement in metres.

2. A car moves 132 m. in 6 s. Find its speed.

3. How many m. does a body travel in 25 s. at 30 km per hour?

4. Find the time needed to travel 3.2 m. at 40 cm/s.

5. How much further can you travel in 0.2 hr. at a velocity of 11 m/s. than at a velocity of 10 m/s?

6. A body moves from rest for 5 s. with a horizontal acceleration of 4 m/s.^{2} find:

   a) the final velocity.
   b) the average velocity.
   c) the displacement.

7. A car is slowed from 30 m/s. to 10 m/s. in 5 s. Find:

   a) the acceleration.
   b) the displacement.

8. A stone is allowed to fall from rest. Find the velocity and displacement after 3 s.

9. A body falls freely from rest. Write down the increase in velocity during any second of its fall.

10. How far does a stone falling from rest, move during the 4th second of its motion.

FORCE: SET 1.

1. What force accelerates a 16 kg. body at 2 m/s.^{2}?

2. Find the force to accelerate a 3.5 kg. body at 6 m/s.^{2}

3. Find the mass of a body if a 63 newton force accelerates it at 1.5 m/s.^{2}.

4. A 6 newton force acts on a 4 kg. body. What is the acceleration?

5. Find the mass of a body if a 10.8 newton force accelerates it at 0.2 m/s.^{2}

6. What is the acceleration when a 42 newton force acts on a 12kg.body?

7. A 25kg. body is retarded at 2.6 m/s.^{2}. Find the force needed.

8. What acceleration is given to a 24 kg. mass by a 21.6 newton retarding force?