

REVIEW SHEET – One Dimensional Kinematics

1. Read Chapter 2.
2. Terms to know: magnitude, position, distance, displacement, average speed, instantaneous speed, average velocity, instantaneous velocity, frame of reference, constant (uniform) acceleration, acceleration due to gravity.
3. Define: a) Scalar

b) Vector

c) Velocity

d) Acceleration

4. Identify each of the following quantities as either a **scalar** or a **vector** and state the units for each:

	Displacement	Distance	Speed	Velocity	Acceleration
Scalar/Vector	v	s	s	v	v
Units	m/s	m/s	m/s	m/s	m/s ²

5. How is a vector different from a scalar? State the two general characteristics of a vector.

vector includes direction → magnitude (size)
→ direction

6. If you drive a car on a trip, explain how:

a) your displacement can be zero but your distance traveled not be zero.

made a loop - ended where you started

b) you can drive at a constant speed but not a constant velocity.

turning / changing direction

7. What is the significance of the:

a) slope of a position (or distance or displacement) vs. time graph?

velocity

b) slope of a velocity (or speed) vs. time graph?

acceleration

c) area underneath a velocity (or speed) vs. time graph?

displacement

8. You should be able to draw and analyze distance vs. time and velocity vs. time graphs for a moving object and calculate the slope and area underneath the graph. ✓

9. You should be able to calculate with the kinematics equations of motion ✓

10. What are the three ways to accelerate?

- speed up
- slow down
- change direction

11. Give an example in which an object has:

a) velocity but no acceleration.

car moving at constant speed in straight line

b) acceleration but no velocity.

ball thrown up as it changes direction at peak.

12. If a car is making a turn at a constant speed, is it accelerating?

yes

13. Is negative acceleration the same thing as deceleration? Explain.

No. Deceleration is slowing down ($|V|$ decreasing)

14. Can a car have a positive velocity and a negative acceleration? Is it speeding up or slowing down?

yes, slowing down

15. Can a car have a negative acceleration and a negative velocity? Is it speeding up or slowing down?

yes, speeding up (in negative direction)

16. State the Law of Falling Bodies.

All objects fall with the same downward acceleration.

17. Graph the position (or displacement), distance, speed, velocity, and acceleration for an object that is dropped and one that is thrown up.



18. Is the value of "g" constant? What factors affect it?

no - distance from equator, which planet one is on, elevation, etc.

19. What is meant by a "freely falling" object

object falling with constant acceleration, no air resistance

20. A rock is dropped from a bridge that is 30. m high.

a) How long will it take the rock to hit the ground?

$$d = v_0 t + \frac{1}{2} a t^2 \quad t = \sqrt{2d/a} = \sqrt{\frac{2 \cdot (-30 \text{ m})}{(-9.8 \text{ m/s}^2)}} = 2.5 \text{ s}$$

b) How fast will it be going when it lands?

$$v_f = v_0 + a t = (-9.8 \text{ m/s}^2)(2.5 \text{ s}) = \boxed{24 \text{ m/s}}$$

21. An arrow is shot straight up in the air with a speed of 25 m/s.

a) How long will it be in the air?

Find $\frac{1}{2}$ time ($v_f = 0$)

$$v_f = v_0 + a t \quad t = \frac{-v_0}{a} = \frac{-25 \text{ m/s}}{-9.8 \text{ m/s}^2} = 2.55 \text{ s}$$

b) How high will it go?

$$t_{\text{Total}} = 5.1 \text{ s}$$

$$d = v_0 t + \frac{1}{2} a t^2 = (25 \text{ m/s})(2.55 \text{ s}) + \frac{1}{2} \cdot (-9.8 \text{ m/s}^2)(2.55 \text{ s})^2 = \boxed{32 \text{ m}}$$

Selected Answers:

20. a) 2.5 s b) 24 m/s

21. a) 5.1 s b) 32 m