The course web site: www.physics.umanitoba.ca/~birchall/PHYS1020

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PHYS 1020, General Physics I

FALL 2007

Welcome to Physics 1020!

Instructors | Required Materials | Schedule | Policies/Evaluation | Suggested Problems | Formula Sheet

Information on "Mastering Physics"

Marks files

Lecture Notes

www.physics.umanitoba.ca/~birchall/PHYS1020/Instructors_16102.html

Lecture Section & Times:
A01, MWF 8:30 (Room 118 St. John's)

Dr. J. Birchall, 205 Allen Bldg, 474-6205
email: birchall@physics.umanitoba.ca

Consultation Times: Mon/Tue 1:30-2:30

Lecture notes

These lecture notes

Lecture Section & Times:
A02, MWF 11:30 (Room 208 Armes)

Dr. JH Page, 334 Allen Bldg, 474-9852
email: jhpage@cc.umanitoba.ca

Consultation Times: Mon 1:00-2:00, Fri 12:30-2:00

Lecture notes

Lecture Section & Times:
A03, MWF 14:30 (Room 200 Armes)

Dr. M. Gericke, 213 Allen Bldg, 474-6203
email: mgericke@physics.umanitoba.ca

Consultation Times: Mon, Wed, 10:00-11:30

Lecture Notes

Lecture Section & Time:
A04, MTuWThF, 13:30 (Room 315 Machray)

Dr. M.S. Mathur, 221 Allen Bldg, 474-9378
email: mmathur@cc.umanitoba.ca

Consultation Times: Mon/Wed/Fri: 9:30 - 10:30

The famous four formulae

$v = v_0 + at$	No x, x_0	(1)
$x - x_0 = v_0 t + \frac{1}{2}at^2$	No final speed, v	(2)
$x - x_0 = \frac{1}{2}(v + v_0)t$	No acceleration, a	(3)
$v^2 - v_0^2 = 2a(x - x_0)$	No time, t	(4)

You will definitely need to know these!

Example: A car accelerates from rest to a final speed in two stages. Each stage takes the same time T.

In stage 1, the car's acceleration is a = 3.0 m/s^2 and ends at speed v_1.

At the end of stage 2, the car is travelling 2.5 times as fast as at the end of stage 1. The acceleration is a′.

Question: what is the acceleration during stage 2?

Hints:
- What is v_1 in terms of a and T ?
- What is the final speed in terms of v_1, a′ and T ?

Clickers!

Prob. 2.C9: A runner runs half the remaining distance to the finish line every ten seconds. She runs in a straight line and does not ever reverse her direction.

Does her acceleration have a constant magnitude?

Hint

- Suppose she starts at 2L from finish, covers a distance L in the first 10 s. Average speed is $v_1 = L/10$.
- In the second 10 s, she covers a distance L/2. Average speed is $v_2 = L/20$, and so on..

Average acceleration is (change in speed)/time – is it same from v_1 to v_2 as it is from v_2 to v_3 in the next 10 s ?

a) the acceleration is constant
b) the acceleration increases
c) the acceleration decreases

Example: In the 100 m dash a sprinter accelerates from rest to a top speed with an acceleration of 2.68 m/s^2. After achieving top speed, he runs the rest of the race at that speed. If the total race is run in 12.0 s, how far does he run while accelerating?

Put T = duration of acceleration, runs a distance x_1 in this time

The remaining time is 12 – T seconds (total time is 12 s)
The remaining distance is 100 - x_1 metres (total distance 100 m)

Initial speed, $v_0 = 0$, final speed, v = ?

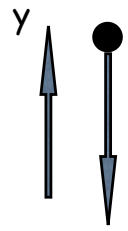
Acceleration, a = 2.68 m/s^2 during time T and zero afterwards

Total distance run = 100 m

Free Fall - negligible air resistance

g = acceleration due to gravity = 9.80 m/s^2

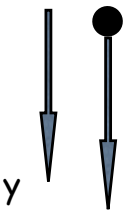
Which way is up? – two choices (equally good)



(1) y-axis is pointing up

Acceleration by gravity is downward, opposite in direction to the y-axis.

a = -g = -9.80 m/s^2



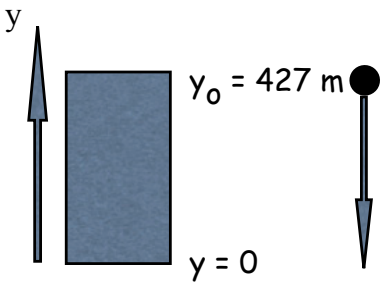
(2) y-axis is pointing down

Acceleration by gravity is downward, in same direction as the y-axis.

a = +g = +9.80 m/s^2

Example: A coin is dropped from the top of a building 427 m high. Ignoring air resistance,

(a) at what speed does the coin hit the ground?
(b) how long does it take to reach the ground?



$$v = v_0 + at$$
$$x - x_0 = v_0 t + \frac{1}{2}at^2$$
$$x - x_0 = \frac{1}{2}(v + v_0)t$$
$$v^2 - v_0^2 = 2a(x - x_0)$$

a) Speed of hitting the ground: find the equation that involves speed and distance, but not time. $v^2 - v_0^2 = 2a(x - x_0)$

b) Time to reach the ground: what is the average speed on way down?