# 27 JAN 11

- HW ✓ & Q ! A
- BALL TOSS LAB
- Homework Assignment

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Ch 2 Questions

4. In drag racing, is it possible for the car with the greatest speed crossing the finish line to lose the race? Explain.

5. If one object has a greater speed than a second object, does the first necessarily have a greater acceleration? Explain, using examples.

6. Compare the acceleration of a motorcycle that accelerates from 80 km/h to 90 km/h with the acceleration of a bicycle that accelerates from rest to 10 km/h in the same time.

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# CHAPTER 2 problems

hw2

**9.** (II) A person jogs eight complete laps around a quarter-mile track in a total time of 12.5 min.

Calculate (*a*) the average speed and (*b*) the average velocity, in m/s.

$t = 12.5\,\text{min} \times \frac{60\,\text{s}}{1\,\text{min}} = 750\,\text{s}$

$\frac{1}{4}\,\text{mile} \times \frac{1609\,\text{m}}{1\,\text{mile}} = 402.25\,\text{m}$

$\text{speed} = \frac{\text{distance}}{\text{time}} = \frac{8 \cdot 402.25\,\text{m}}{750\,\text{s}} = 4.291\,\text{m/s}$

$\text{velocity} = \frac{\text{displacement}}{\text{time}} = \frac{0}{750\,\text{s}} = 0\,\text{m/s}$

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**16.** (I) A sports car accelerates from rest to 95 km/h in 6.2 s. What is its average acceleration in $\text{m/s}^2$?

$v_0 = 0\,\text{m/s}$

$v = 95\frac{\text{km}}{\text{h}} \times \frac{1000\,\text{m}}{1\,\text{km}} \times \frac{1\,\text{h}}{3600\,\text{s}} = 26.389\,\text{m/s}$

$t = 6.2\,\text{s}$

$a = ?$

$a = \frac{v - v_0}{t} = \frac{26.389\,\text{m/s} - 0\,\text{m/s}}{6.2\,\text{s}} = 4.256\,\text{m/s}^2$

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**18.** (II) At highway speeds, a particular automobile is capable of an acceleration of about $1.6\ m/s^2$. At this rate, how long does it take to accelerate from 80 km/h to 110 km/h?

$a = 1.6\ m/s^2$

$V_0 = 80\frac{km}{h} \times \frac{1000m}{1km} \times \frac{1h}{3600s} = 22.222\ m/s$

$V = 110\frac{km}{h} \times \frac{1000m}{1km} \times \frac{1h}{3600s} = 30.556\ m/s$

$t = ?$

$a = \frac{V - V_0}{t} \Rightarrow t = \frac{V - V_0}{a} = \frac{30.556\ m/s - 22.222\ m/s}{1.6\ m/s^2} = \boxed{5.209\ s}$

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**21.** (I) A car accelerates from 13 m/s to 25 m/s in 6.0 s. What was its acceleration? How far did it travel in this time? Assume constant acceleration.

$V_0 = 13\ m/s$
$V = 25\ m/s$
$t = 6\ s$
$a = ?$

$a = \frac{V - V_0}{t} = \frac{25\ m/s - 13\ m/s}{6\ s} = \boxed{+2\ m/s^2}$

$x = \frac{v^2 - v_0^2}{2a} = \frac{(25\ m/s)^2 - (13\ m/s)^2}{2(2\ m/s^2)} = \boxed{114\ m}$

or $x = v_0 t + \frac{1}{2} a t^2 = (13\ m/s)(6\ s) + \frac{1}{2}(2\ m/s^2)(6\ s)^2 = \boxed{114\ m}$

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**22.** (I) A car slows down from 23 m/s to rest in a distance of 85 m. What was its acceleration, assumed constant?

$v_0 = 23\ m/s$

$v = 0\ m/s$

$x = 85\ m$

$a = ?$

$$a = \frac{v^2 - v_0^2}{2x} = \frac{(0\ m/s)^2 - (23\ m/s)^2}{2(85\ m)} = -3.112\ m/s^2$$

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**23.** (I) A light plane must reach a speed of 33 m/s for takeoff. How long a runway is needed if the (constant) acceleration is 3.0 $m/s^2$ ?

$v_0 = 0\ m/s$

$v = 33\ m/s$

$a = +3\ m/s^2$

$x = ?$

$$x = \frac{v^2 - v_0^2}{2a} = \frac{(33\ m/s)^2 - (0\ m/s)^2}{2(3\ m/s^2)} = 181.5\ m$$

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assign hw

# ★Homework Assignment★

- READ 2-6, 2-7, & 2-8 (due Tuesday)

- Chapter 2

  questions: 7, 8, 9

  problems: 24, 25, 26, 27

  (due Monday)

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