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Answers pg 389 #1-5, 7-9
rearrangements of the acceleration formula
practice questions

Warm-Up

1. If a car increases its speed from 25km/h to 50km/h in 6 s, what was the cars acceleration?

a= ?
v_i = 25km/h
v_f = 50km/h
t = 6s

$$a = \frac{v_f - v_i}{t} = \frac{50km/h - 25km/h}{6s} = \frac{25km/h}{6s} = 4.17km/h/s$$

The cars acceleration was 4.17km/h/s

Answers pg 388 #1-5, 7-9

1. In constant acceleration, the change in speed is the same for each time interval.

2. After the same time interval, your change in speed is twice as great as your friends.

3. Car A

$$a = \frac{v_2 - v_1}{t} = \frac{100.0 - 0km/h}{16.0s} = \frac{100.0km/h}{16.0s} = 6.25km/h/s$$

Car B

$$a = \frac{v_2 - v_1}{t} = \frac{100.0 - 0km/h}{8.0s} = \frac{100.0km/h}{8.0s} = 13km/h/s$$

Car B has two times the average acceleration of Car A

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4. v = 5.0m/s
t= 4.5s
a=?

$$a = \frac{v}{t} = \frac{5.0m/s}{4.5s} = 1.1m/s^2$$

5. 8.0m/s^2 32m/s
4.0s

7. a) v_1 = 2.5m/s
v_2 = 20.0m/s
t = 3.8s

$$a = \frac{v_2 - v_1}{t} = \frac{20.0m/s - 2.5m/s}{3.8s} = \frac{17.5m/s}{3.8s} = 4.6m/s^2$$

b) An acceleration of 4.6m/s^2 means that the speed of the skier is increasing by 4.6m/s for every second he is skiiing

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8.a) v_1 = 0km/h
v_2 = 50km/h
t= 8.20s

$$a = \frac{v_2 - v_1}{t} = \frac{50km/h - 0km/h}{8.20s} = \frac{50km/h}{8.20s} = 6km/h/s$$

b) 6km/h/s there are 20km between 40 and 60
divide 20/6 = 3.3 s

9. v_1 = 6.0m/s
v_2 = 0m/s He is slowing down to stop so v_2 = 0
t= 2.5s

$$a = \frac{v_2 - v_1}{t} = \frac{0m/s - 6.0m/s}{2.5s} = \frac{-6.0m/s}{2.5s} = -2.4m/s^2$$

Rearrangements of the acceleration formula:

$$t = \frac{v}{a} = \frac{v_f - v_i}{a}$$

$$v_{final} = v_i + (a)(t)$$

$$v_{initial} = v_f - (a)(t)$$

Sample Problem:

A skateboarder rolls down a hill and changes his speed from rest to 1.9m/s. If the acceleration was 0.40m/s^2, for how long was the skateboarder on the hill?

v_i = 0m/s
v_f = 1.9m/s
a = 0.40m/s^2

$$t = \frac{v_f - v_i}{a} = \frac{1.9\text{m/s} - 0\text{m/s}}{0.40\text{m/s}^2} = 4.8\text{s}$$

The skateboarder was on the hill for 4.8s

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Sample Problem:

A bus with an initial speed of 12m/s accelerated at 0.62 m/s^2 for 15s. What is the final speed of the bus?

$v_i = 12\text{m/s}$
$a = 0.62\text{m/s}^2$
$t = 15\text{s}$
$v_f = ?$

$v_f = v_i + (a)(t)$
$v_f = 12\text{m/s} + (0.62\text{m/s}^2)(15\text{s})$
$v_f = 12\text{m/s} + 9.3\text{m/s}$
$v_f = 21\text{ m/s}$

The final speed of the bus is 21m/s.

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Sample Problem:
A snowmobile reaches a final speed of 22.5m/s after acclerating at 1.2m/s^2 for 17s. What was the initial speed of the snowmobile?

v_f = 22.5m/s
v_i =?
t = 17s
a = 1.2m/s^2

$vi = v_f - at$
v_i = 22.5 m/s - (1.2m/s^2) (17s)
v_i = 22.5m/s - 20.4m/s
v_i = 2.1m/s

The initial speed of the snowmobile was 2.1m/s

Complete Questions pg 389 #10-14

Mar 23-7:52 PM