

This print-out should have 7 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

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### Playing Catchup Short

**001** 10.0 points

A man jogs at a speed of 1.2 m/s. His dog waits 2 s and then takes off running at a speed of 4.1 m/s to catch the man.

How far will they have each traveled when the dog catches up with the man?

Correct answer: 3.3931 m.

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### Softball Thrown Up

**002** (part 1 of 3) 10.0 points

The position of a softball tossed vertically upward is described by the equation

$$y = c_1 t - c_2 t^2,$$

where  $y$  is in meters,  $t$  in seconds,  $c_1 = 3.66$  m/s, and  $c_2 = 4.46$  m/s<sup>2</sup>.

Find the ball's initial speed  $v_0$  at  $t_0 = 0$  s.

Correct answer: 3.66 m/s.

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**003** (part 2 of 3) 10.0 points

Find its velocity at  $t = 0.981$  s.

Correct answer:  $-5.09052$  m/s.

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**004** (part 3 of 3) 10.0 points

Find its acceleration at  $t = 0.981$  s.

Correct answer:  $-8.92$  m/s<sup>2</sup>.

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### Quadratic Relationship

**005** (part 1 of 2) 10.0 points

The velocity of a particle moving along the  $x$  axis varies in time according to the expression

$$v(t) = \alpha - \beta t^2$$

where  $\alpha = 44.2$  m/s,  $\beta = 3.08$  m/s<sup>3</sup>, and  $t$  is in seconds.

Find the average acceleration in the time interval from  $t = 0$  to 1.63 s.

Correct answer:  $-5.0204$  m/s<sup>2</sup>.

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**006** (part 2 of 2) 10.0 points

Determine the acceleration of the particle at  $t_f = 1.63$  s.

Correct answer:  $-10.0408$  m/s<sup>2</sup>.

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### Rocket Sled

**007** 10.0 points

A rocket sled for testing equipment under large accelerations starts at rest and accelerates according to the expression

$$a = (2.8 \text{ m/s}^3)t + (3.9 \text{ m/s}^2).$$

How far does the sled move in the time interval  $t = 0$  to  $t = 0.81$  s?

Correct answer: 1.5274 m.