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1. Physics

Toss Up: Multiple Choice

Two trucks are 50 kilometers apart and traveling toward each other. One automobile is moving at 60km/h and the other is moving at 40km/h . How long will it take for them meet?

- W) 15 minutes
- X) 20 minutes
- Y) 24 minutes
- Z) 30 minutes

Toss Up Answer: Z

Bonus: Short Answer

The position of a particle in meters is given by $x(t) = 25t - 3t^3$ (READ AS: 16 times t minus 3 times t cubed) , where the time t is in seconds. The particle is momentarily at rest at what time t rounded to the nearest hundredth?

Bonus Answer: 1.67 seconds, accept 1.67

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2. Chemistry

Toss Up: Multiple Choice

Which of the following is an example of a strong nucleophile but a weak base?

- W) CH₃OH
- X) OH⁻
- Y) I⁻
- Z) F⁻

Toss Up Answer: Y

Bonus: Short Answer

By name or number, which of the following are second order reactions?

- 1. Sn1
- 2. Sn2
- 3. E1
- 4. E2

Bonus Answer: Sn2 and E2 only (accept 2, 4 only)

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3. Mathematics

Toss Up: Multiple Choice

Which of the following the derivative with the highest degree?

- W) x^2 (x squared)
- X) 20
- Y) 104
- Z) 3x

Toss Up Answer: W

Bonus: Short Answer

Find $y' = dy/dx$ for $x^3 + y^3 = 4$. (x cubed + y cubed)

Bonus Answer: $-x^2/y^2$ (negative x squared over y squared)

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4. Energy

Toss Up: Multiple Choice

Which of the following is measured by total harmonic distortion, a standard for gauging the quality of power provided to customers?

- W) How distorted the waveform is from a pure sinusoidal waveform
- X) How distorted the waveform is from a triangular waveform
- Y) The difference between a sinusoidal waveform and a triangular waveform
- Z) the maximum value of a sinusoidal wave form with respect to the reference point of the waveform

Toss Up Answer: W

Bonus: Multiple Choice

Which of the following is NOT an accurate representation of a limitation on the production and use of bioplastics?

- W) using crops for plastic diverts plants from the food supply
- X) bioplastics are unlikely to disintegrate in a landfill
- Y) bioplastics produce a variety of pollutants when burned
- Z) Individuals at home would find it more difficult to compost bioplastics

Bonus Answer: Y

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