

The logo for Next Step Test Prep is centered in a blue square. It features the words "Next" and "Step" in a large, white, sans-serif font, stacked vertically. Below them, the words "TEST PREP" are written in a smaller, white, all-caps, sans-serif font.

Next
Step
TEST PREP

MCAT Math

Today's Info Session

- ▶ Welcome to this Info Session!
- ▶ Introduction
- ▶ Math Tips
- ▶ Data interpretation
 - ▶ Practice
 - ▶ Passage
- ▶ How Can Next Step Help?
- ▶ Questions?

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MCAT
Medical College
Admission Test

WHAT IS YOUR NEXT STEP?

Introduction

Hi, I'm Phil!

- ▶ **MCAT Content writer**
 - ▶ **Tutored and taught for 9+ years**
 - ▶ **Attended University of Nebraska Medical Center as an MD/PhD student.**
- ✓ **Next Step is a team of test prep and educational experts committed to excellence.**



Who Is Next Step?

Next
Step
TEST PREP

- Began in 2009 as a tutoring company
- Focus on graduate admissions tests only
- Team of educational experts
- First company to have materials built from ground up for 2015 MCAT format
- Now the first company to have new 2018 MCAT Interface

✓ **We never stop improving our materials!**



Math on the MCAT

Chemistry and Physics

Bio

Hardy Weinberg
Recombination frequencies
Enzyme rates
IC₅₀
DATA!!!!!!

Electricity and Magnetism

$$F = kQ_1Q_2 / r^2$$

$$F = qVB\sin\theta$$

$$F = iLB\sin\theta$$

$$V = IR$$

$$P = IV$$

$$R = \rho L / A$$

$$V_{rms} = V_{max} / \sqrt{2}$$

$$I_{rms} = I_{max} / \sqrt{2}$$

Resistors in series:

$$R_{tot} = R_1 + R_2 \dots$$

Resistors in parallel:

$$1/R_{tot} = 1/R_1 + 1/R_2 \dots$$

Capacitors in series:

$$1/C_{tot} = 1/C_1 + 1/C_2 \dots$$

Capacitors in parallel:

$$C_{tot} = C_1 + C_2 \dots$$

$$C = Q/V$$

$$\text{Energy} = (1/2)QV$$

$$F = qE$$

$$V = Ed$$

$$\text{Energy} = qEd$$

$$E = kQ/r^2$$

$$\text{Energy} = kQq/r$$

$$V = kQ/r$$

$$\Delta G = -nFE$$

$$E_{cell} = E_{cath} - E_{an}$$

Waves

$$v = f\lambda$$

$$T = 1/f$$

Light

$$n_1\sin\theta_1 = n_2\sin\theta_2$$

$$\sin\theta_c = n_2/n_1$$

$$E = hf$$

$$m = -d_i / d_o$$

$$P = 1/f$$

$$f = (1/2)r$$

$$n = c/v$$

$$1/f = 1/d_i + 1/d_o$$

Sound

$$d\beta = 10 \log(I/I_0)$$

$$L = n\lambda/2 \quad (n=1, 2, \dots)$$

$$L = n\lambda/4 \quad (n=1, 3, \dots)$$

$$f_{beat} = |f_1 - f_2|$$

$$f = f_e [v \pm v_d] / [v \pm v_s]$$

Fluids

$$\rho = m/V$$

$$P = F/A$$

$$P = P_{atm} + \rho g d$$

$$F_b = \rho g V$$

$$Q = Av$$

$$P + \rho g y + (1/2) \rho v^2 =$$

constant

Gases

$$PV = nRT$$

$$\text{Boyle: } PV = k$$

$$\text{Guy-Lussac: } P/T = k$$

$$\text{Charles: } V/T = k$$

$$\text{Avogadro: } n/V = k$$

$$R_1/R_2 = \sqrt{m_2/m_1}$$

$$P_A = X_A \times P_{tot}$$

Solutions

$$pH = pK_a + \log(A^-/HA)$$

$$M = \text{mol} / L$$

$$m = \text{mol} / \text{kg}$$

$$N = M \times \# \text{ of } H^+$$

$$pH = -\log[H^+]$$

$$M_i V_i = M_f V_f$$

$$\Pi = MRT$$

$$\Delta T_f = i k_f m$$

$$\Delta T_b = i k_b m$$

$$X_A = \text{mol}_A / \text{mol}_{tot}$$

Thermo

$$\Delta U = Q - W$$

$$\Delta U = (3/2)nRT$$

$$W = P\Delta V$$

$$Q = mc\Delta T$$

$$Q = mH_L$$

$$\Delta G = \Delta H - T\Delta S$$

$$\Delta H_{rxn} = \Delta H_{prod} - \Delta H_{react}$$

Kinematics

$$v_f = v_o + at$$

$$d = v_o t + (1/2)at^2$$

$$v_f^2 = v_o^2 + 2ad$$

$$a_c = v^2 / r$$

$$F_c = mv^2 / r$$

$$v_x = v_o \cos\theta$$

$$v_y = v_o \sin\theta$$

Mechanics

$$F = ma$$

$$F_{a \text{ on } b} = -F_{b \text{ on } a}$$

$$F_{fric} = \mu F_N$$

$$F_g = GM_1 m_2 / r^2$$

$$F_g = mg$$

$$F = kx$$

$$\tau = rF \sin\theta$$

$$P = W/t$$

$$W = Fd \cos\theta$$

$$E_K = (1/2)mv^2$$

$$U = mgh$$

$$U = -GM_1 m_2 / r$$

Inclined Plane

$$F_{incline} = mg \sin\theta$$

$$F_N = mg \cos\theta$$

$$F_{fric} = \mu mg \cos\theta$$

Warm up

A planet is orbiting a distant sun with a velocity of 200 m/s. If the orbit has a radius of 160 km, after how many seconds will the planet be in the same position in which it started? (feel free to do some rounding)

If the orbit's radius is 160 km, its circumference is 320π , or around 1000 km.

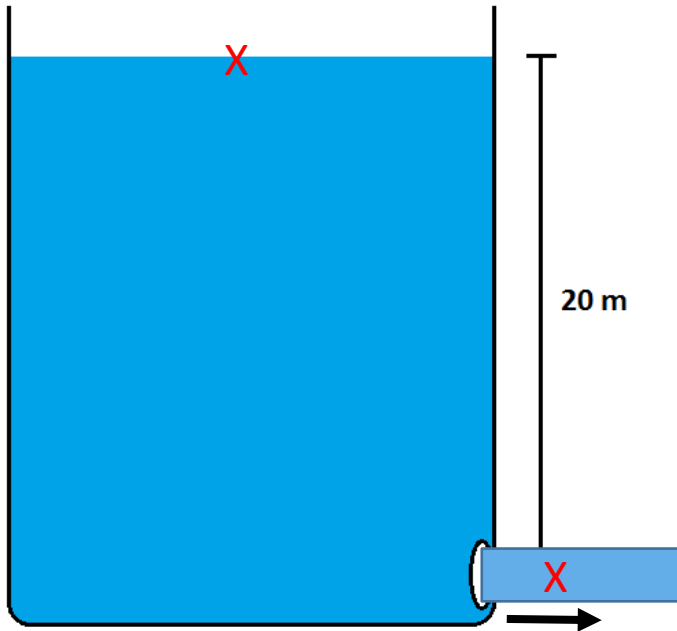
Since the planet's velocity is given in m/s, we'll need to do some conversions. To avoid large numbers, let's convert 200 m/s to 0.2 km/s.

We can thus see that traveling 1000 km will take $1000 \text{ km} \div 0.2 \text{ km/s} = 5000 \text{ s}$.

Tip #1-

Look for stuff to cancel and avoid plugging in numbers and calculating until the very end.

How fast will water spray from this container if a hole is drilled 20 m below the surface level?



$$P_1 + \rho gh_1 + \frac{1}{2}\rho v_1^2 = P_2 + \rho gh_2 + \frac{1}{2}\rho v_2^2$$

$$P_1 + \rho gh_1 + \frac{1}{2}\rho v_1^2 = P_2 + \rho gh_2 + \frac{1}{2}\rho v_2^2$$

$$\rho gh_1 + \frac{1}{2}\rho(0)^2 = \rho gh_2 + \frac{1}{2}\rho v_2^2$$

$$\rho gh_1 = \rho g0 + \frac{1}{2}\rho v_2^2$$

$$\rho gh_1 = \frac{1}{2}\rho v_2^2$$

$$gh_1 = \frac{1}{2}v_2^2$$

$$v_2^2 = 2gh_1$$

$$v_2 = \sqrt{2gh_1}$$

$$v_2 = \sqrt{2(10)(20)}$$

$$v_2 = \sqrt{400}$$

$$v_2 = 20 \frac{m}{s}$$

Tip #2- Let the answer choices help you.

Help you figure out how to solve an equation

Guide your rounding

Bill pushes a 2 kg box with a force of 8N. If the box moves 3 meters over the course of 2 seconds, what is Bill's power?

- A. 1.5 Watts*
- B. 8 Watts*
- C. 12 Watts*
- D. 24 Watts*

A 6kg, +3C charge is placed 4 m from another point charge. The spot that is placed in has a potential of 8 volts. What is the magnitude of the force experienced by the charges?

Help you figure out how to solve an equation

Guide your rounding

Tip #2- Let the answer choices help you.

What is the rate of flow for water traveling through a pipe that has a diameter of 4 cm and a length of 310 meters if the pressure change from one end of the pipe to the other is 90 kPa and the viscosity of water is 0.009 Pa s?

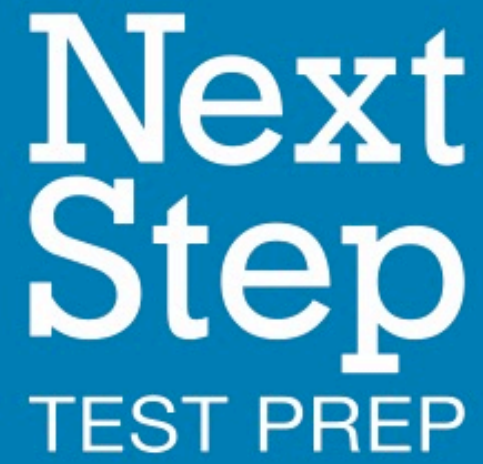
- A. $2.0 \times 10^{-3} \frac{m^3}{s}$
- B. $4.0 \times 10^{-3} \frac{m^3}{s}$
- C. $6.3 \times 10^{-3} \frac{m^3}{s}$
- D. $9.0 \times 10^{-3} \frac{m^3}{s}$

$$Q = \frac{\Delta P \pi r^4}{8 \eta L}$$

$$Q = \frac{(9 \times 10^4 \text{ Pa})(3.14)(0.02 \text{ m})^4}{8(9 \times 10^{-3} \text{ Pa s})(3.1 \times 10^2 \text{ m})}$$

$$Q = \frac{(9)(3.14)(2)^4}{8(9)(3.1)}$$

$$Q = \frac{16}{8} = 2$$

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Q&A

Next Step: Core Values

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Educate Daily



Approachability



Authenticity



Professionalism



Ownership

We are dedicated to providing personalized support, advice and prep options that match each student's individual needs.

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- ✓ **Over 50,000 students have used Next Step Test Prep in their MCAT Prep journey**
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4.7



Personalized Options

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- ✓ No matter your study style, subject expertise, or MCAT goal, Next Step has an option for your personal needs and lifestyle.
- Self-Prep Materials and Planning
- Guided Online Study with Free Extra Help
- Flexibility and Personalization
- One-on-One Tutoring



Next Step: Educate Every Day

- ✓ **Start your prep with high-value FREE practice to build a study plan suited to your goals, needs, and schedule.**

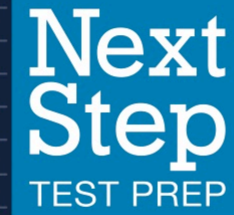
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✓ Supplement your prep with additional support tools

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- MCAT Blog: Content and Admissions
- Next Step MCAT Forum

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Question of the Day

Two people push a box along a frictional surface. One pushes the box at an angle of 30° to horizontal with force F while the other pushes the box horizontally with force $F\cos 30^\circ$. Which person does the most work?

A) Person A
B) Person B
C) Person A and B do equal amounts of work
D) cannot be determined

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New 2018 MCAT Interface

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- New highlighting features
- New strikethrough features
- New keyboard shortcuts
- New Navigation/Review Screens

Next Step is ready. Are you?

Medical College Admission Test - Clara Gillan Time Remaining: 01:21:34 18 of 59

Highlight Strikethrough Flag for Review

Remove Highlight

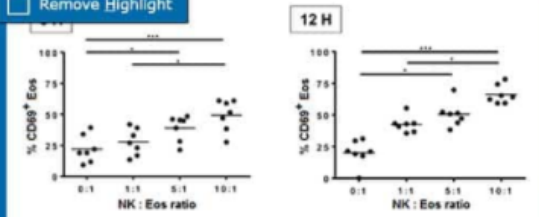


Figure 1 Eosinophil activation as measured by percent of CD69-positive cells after 3 and 12 hours of co-culture (*p < 0.05, **p < 0.01, ***p < 0.001)

Next, researchers aimed to assess the effect of NK co-culture on eosinophil degranulation. After 3 and 12 hours of co-culture, samples were centrifuged at 1500 rpm, and ECP levels were measured in the supernatants (Figure 2). No ECP was detected in supernatant culture of NK cells alone.

Question 18

Which of the statements below is supported by the experimental results, as shown in Figures 1 and 2?

- A. The duration of Eos co-culture with NK cells directly and linearly correlates to the amount of ECP found in the supernatant after centrifugation.
- B. Cells cultured with a 1:1 NK-to-Eos ratio displayed statistically similar levels of activation to cells cultured with a 5:1 NK-to-Eos ratio, as measured by CD69 expression.
- C. NK co-culture stimulates Eos activation while inhibiting degranulation.
- D. Co-culture with NK cells significantly increased Eos degranulation in all groups, as compared to Eos cells cultured alone.

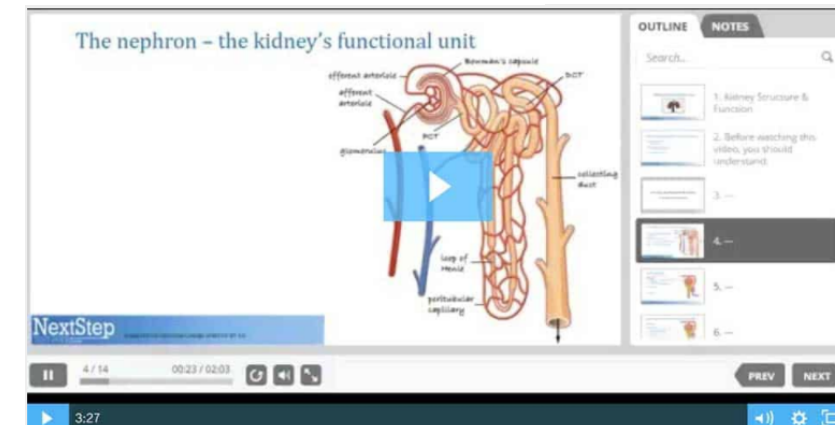
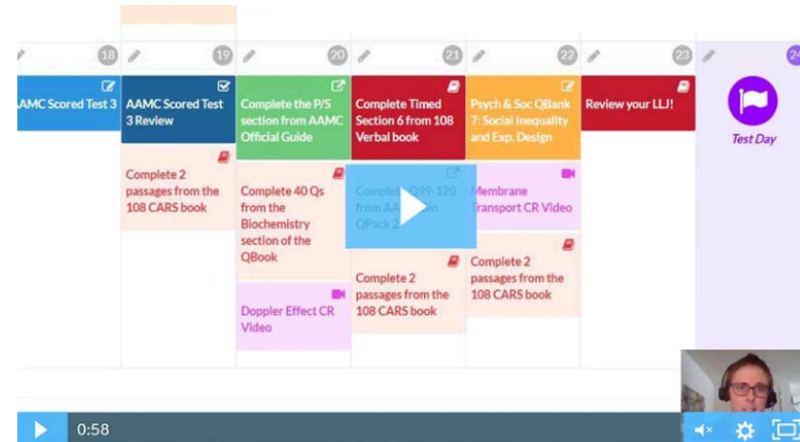
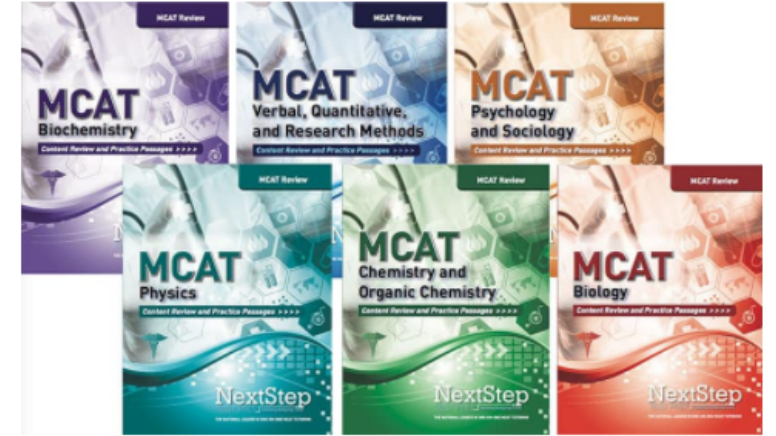
Periodic Table Review Screen Previous Next

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✓ **All aligned to new 2018 interface**

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