CONCEPTESTS:
WHAT DO STUDENTS LEARN FROM THEM?

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Outline

- **What are ConcepTests?**

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- **What do students learn from them?**

Background: Peer Instruction

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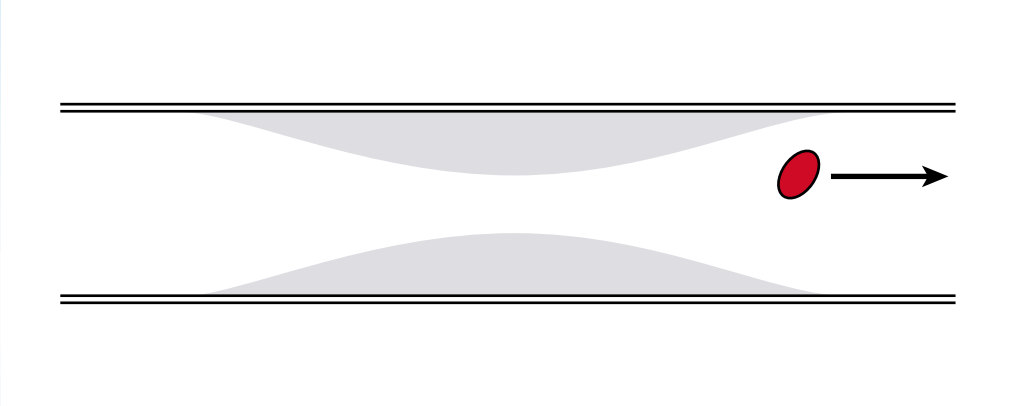
Background: Peer Instruction

- **Students read before class**
- **Lectures interspersed with ConcepTests**
- **Students think about and discuss ConcepTests**

Sample ConcepTest

A blood platelet drifts along with the flow of blood through an artery that is partially blocked by deposits. As the platelet moves from the narrow region to the wider region, it experiences



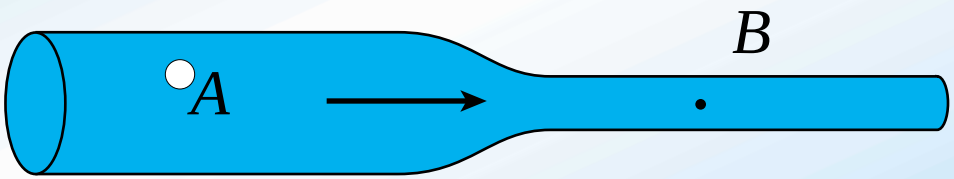
1. an increase in pressure
2. no change in pressure
3. a decrease in pressure.

Study

- ConcepTests asked after mini-lecture on topic
- No further presentation on topic
- Free-response exam questions based on 7 ConcepTests
- Compare exam and ConcepTest results

Exam question

Consider a small bubble of air trapped inside a pipe of non-uniform cross-section as shown in the figure, filled with flowing water. You may ignore the viscosity of the water.



The bubble travels along with the water around it; it expands in regions of low pressure and shrinks in regions of high pressure. As the bubble moves from point *A* to point *B*, how does its size change, if at all? Explain your answer briefly.

Results

TOPIC	CORRECT pre discussion	post discussion	on exam
average velocity			
v(t) graph			
free-body diagram			

Results

TOPIC	CORRECT pre discussion	post discussion	on exam
average velocity	54%		
v(t) graph	34%		
free-body diagram	19%		

Results

TOPIC	CORRECT pre discussion	post discussion	on exam
average velocity	54%	89%	
v(t) graph	34%	56%	
free-body diagram	19%	32%	

Results

TOPIC	CORRECT pre discussion	post discussion	on exam
average velocity	54%	89%	77%
v(t) graph	34%	56%	68%
free-body diagram	19%	32%	46%

Results

TOPIC	CORRECT pre discussion	post discussion	on exam
average velocity	54%	89%	77%
v(t) graph	34%	56%	68%
free-body diagram	19%	32%	46%
bubble	26%	59%	60%
wave on string	63%	95%	83%
seesaw	9%	46%	32%
oscillator	26%	53%	50%

Results

TOPIC	CORRECT pre discussion	post discussion	on exam
average velocity	54%	89%	77%
v(t) graph	34%	56%	68%
free-body diagram	19%	32%	46%
bubble	26%	59%	60%
wave on string	63%	95%	83%
seesaw	9%	46%	32%
oscillator	26%	53%	50%
ALL	34%	63%	61%

Does participation matter?

All CTs but one posted on course web site

	exam results			
	particip.	**nonparticip.**	**diff.**	***p*-value**
bubble CT	**60%**	**46%**	**15%**	**0.97**
posted CTs	**61%**	**56%**	**5%**	**0.92**

Conclusions

Students

- **learn the concepts**
- **can apply them to different physical situations**
- **retain them to the end of the semester**

Funding: National Science Foundation

Discussion: David van Dyk, Emily Oster

For a copy of this talk and additional information:

http://mazur-www.harvard.edu