## Arizona's Instrument to Measure Standards (AIMS HS)

## **Mathematics**

### **Released Items**

November 15, 2006

As part of Superintendent Tom Horne's ongoing efforts to improve the communication of academic expectations, the Arizona Department of Education is releasing High School reading, writing, and mathematics items to the public. This release is intended to provide students, parents, teachers, and the community with specific examples of the types of skills being assessed on the AIMS tests. The release is divided into a reading/writing form and a mathematics form, similar to the AIMS test.

This release is from the 2004 AIMS administration which includes three reading passages, directions, and the items associated with each passage in the form of a mini-test. The reading section is followed by the writing section that includes the prompt and directions used in the AIMS assessments. The final section will contain the individual items with the correct answers and statistical information about each item.

The mathematics section consists of a mini-test with fourteen items from the 2002, 2003, 2004, and 2005 AIMS administrations, followed by the individual items and their statistics.

The statistical information provided includes:

1) Item identification number;

2) Correct answer;

3) Response probability (P-Value), which represents the percentage of students who answered the question correctly;

4) Rasch difficulty, which measures the difficulty of the item on a scale in which -3 indicates a very easy item and +3 indicates an extremely difficult item;

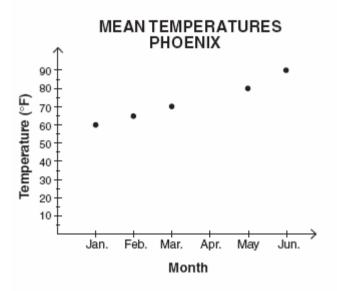
5) The performance objective as the item aligns to the 2003 standards.

The items are reproductions of the actual items as they appeared on the AIMS tests. If you have any questions, please contact Frank Brashear, Director of Test Item Development, at (602) 542-5031.

# MATHEMATICS

#### Mathematics -

- DIRECTIONS: Read each question and choose the best answer.
  - 1. The graph below shows some monthly mean temperatures for Phoenix.



Which of these is the most likely mean temperature for the month of April in Phoenix?

- A 80°F
- B 75°F
- C 60°F
- D 55°F

#### 2.

Which equation represents "the sum of three x and four y equals ten"?

- A 3x + 4y = 10B 3 + x + 4 + y = 10C 7xy = 10
- **D** 3(x + 4y) = 10

**3.** The figure below represents the top view of an area taken up by a fountain at a shopping mall. The figure consists of a rectangle with a semi circle at its end as shown.

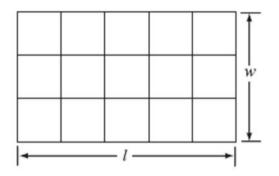


Which is closest to the total area taken up by the fountain?

- A 257 sq ft
- B 757 sq ft
- C 914 sq ft
- D 1228 sq ft

- 4. John has 3 different flags to fly on his flagpole: red (R), yellow (Y), and blue (B). If all 3 flags are to be flown together, what is the outcome set of how they can be displayed?
  - A  $\{R, Y, B\}$
  - B {RY, RB, YB}
  - C {RYB, BRY, YBR}
  - D {RYB, RBY, BRY, BYR, YRB, YBR}

5. Four students each used a different method to find the area of the rectangle below.



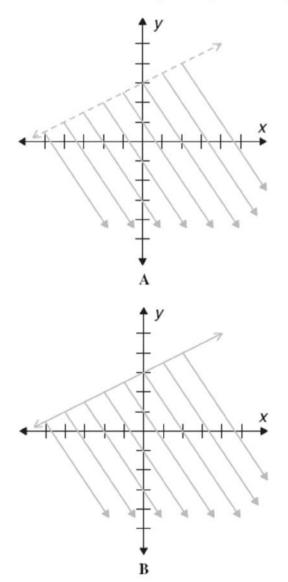
Which of the following students used an INCORRECT method to find the area?

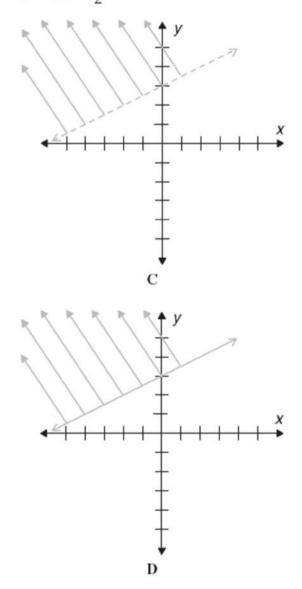
- A Student 1 counted the number of unit squares.
- B Student 2 used  $l \cdot w$ .
- C Student 3 multiplied the number of rows times the number of columns.
- **D** Student 4 used  $2l \cdot 2w$ .
- 6. Which of the following real-world situations could best be modeled by the graph below?



- A the altitude of a plane during a trip, from take-off to landing
- B the temperature of a pizza after it has been taken out of an oven
- C the height of a person growing from child to adult
- D the amount of gasoline in a car gas tank during a trip

- 7. Which of the following equations of a line has an x-intercept at 4 and a y-intercept at -2?
  - A 2x y = 8
  - $B \quad 2x y = 4$
  - $C \quad x 2y = 4$
  - $\mathbf{D} \quad 2x y = 10$
- 8. Which of the following best represents the graph of the inequality  $y < \frac{1}{2}x + 3$ ?





**9.** The following table represents *C*, an appliance repairman's charges based on *t*, the hours it takes to make a repair.

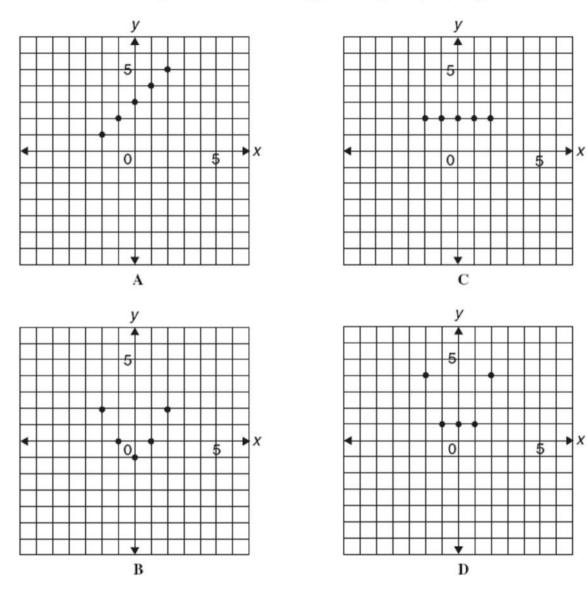
#### APPLIANCE REPAIR TOTAL CHARGES

t (hours)	C (dollars)
1	75
3	145
5	215
7	285

Which of the following equations could be used to determine the repairman's charges for a repair?

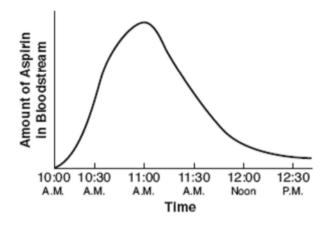
- A C = 35t + 40
- B C = 40t + 35
- $C \quad C = 75t$
- D C = 45t

- 10. Which set of numbers is finite?
  - A {even numbers between 1 and 89}
  - B {real numbers greater than 1}
  - C {rational numbers between 1 and 2}
  - D {whole numbers with tens digits at zero}



**11.** Which of the following functions of *x* has an apparent range of  $\{-1, 0, 2\}$ ?

12. Chris took an aspirin at 10:00 A.M. The graph shows the concentration of aspirin in his bloodstream over time.

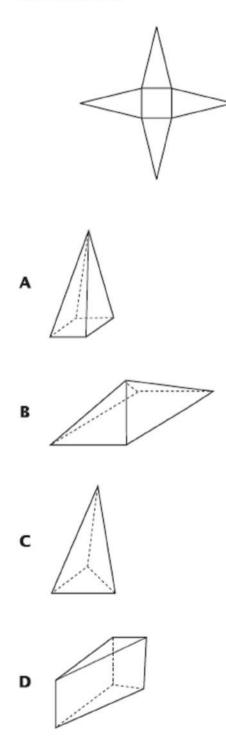


### What appears to be the time the concentration was highest?

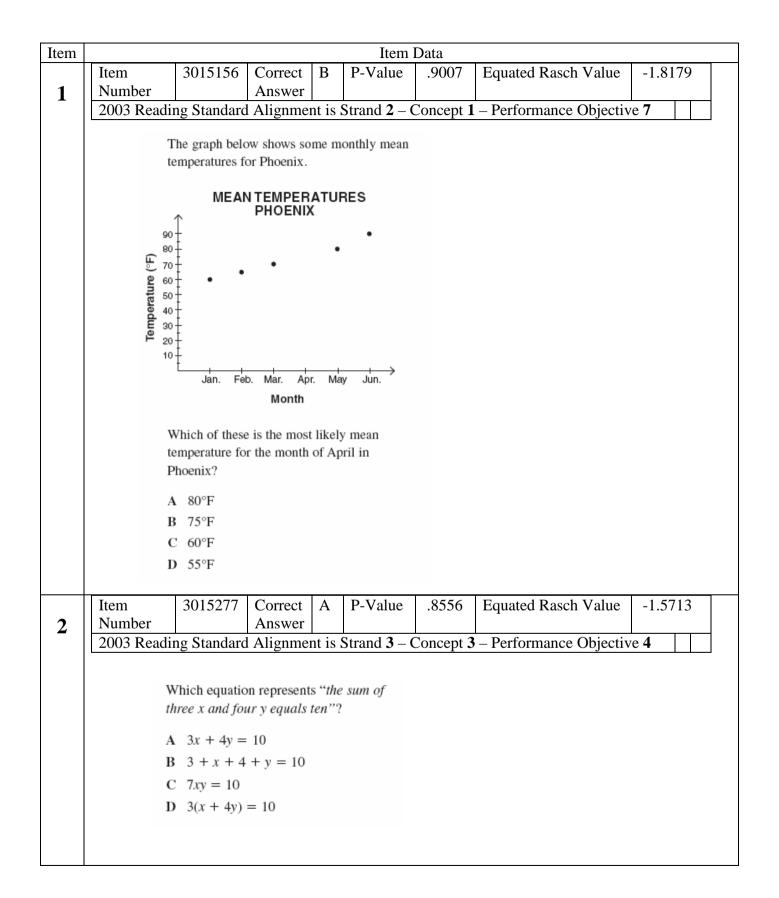
- А 10:00 А.М.
- В 11:00 А.М.
- С 11:30 А.М.
- **D** 12:30 а.м.
- 13. The set of real numbers shown below is a subset of which of the following?

- A rationals
- B irrationals
- C integers
- D whole numbers

14. Which object is represented by the following net?







	Item	3015011	Correct	В	P-Value	.584	Equated Rasch Value	0.3920
3	Number	5015011	Answer	D	I - Value	.504	Equated Rasen Value	0.3720
3		ng Standard		nt is	<u> </u> Strand <b>4</b> – (	Concept 4	– Performance Objectiv	/e <b>1</b>
		0	<u> </u>			1	J	
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	-		-	-	h a semi circ	-		man.
	The lig	are consists	or a reetaing		in a benn ene	ie at no en		
				2	Oft			
					30f1	t		
	Which	is closest to	the total are	o tok	en up by the f	Countain?		
	which	is closest to	the total are	a take	in up by the i	ountain		
	A 25	57 sq ft						
	B 75	57 sq ft						
	C 91	4 sq ft						
		28 sq ft						
		1-1						
		-						
	Item	2019641	Correct	D	P-Value	.720	Equated Rasch Value	-0.7801
4	Number	C 1	Answer					
	2003 Readin	ng Standard	1 Alignme	nt 1s	Strand $Z = 0$	Concept 3	B – Performance Objectiv	/e I
	John	has 3 differe	nt flags to f	ly on	his flagpole:	red (R), yel	llow (Y), and blue (B). If all	3 flags are to
	be flo	own together,	, what is the	outco	ome set of ho	w they can	be displayed?	
	A {	R, Y, B}						
		RY, RB, YB)						
	-	S 10.1 10.1 10.1						
	0.7	RYB, BRY, Y	1.72	UDD	VDD			
	D {	RYB, RBY, I	BRI, BIR,	ΥKB,	IBK}			

AIMS Mathematics Released Items for 2006

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	Item	3015170	Correct	D	P-Value	.785	Equated Rasch Value	-0.72	64		
5	Number		Answer								
C	2003 Readi	ng Standard	Alignme	nt is S	Strand $5 -$	Concept 1	I – Performance Objectiv	/e <b>4</b>			
	Four students each used a different method to find the area of the rectangle below.										
6	Item Number 2003 Readi	3015138 ng Standard	Correct Answer Alignmer	A nt is S	P-Value Strand <b>3</b> –	.883 Concept 2	Equated Rasch Value 2 – Performance Objectiv	-1.55 ve <b>2</b>	75		
	A I B I C I	the altitude of a the height of a the amount of the temperature of the height of a the amount of the height of a the height of	a plane durir e of a pizza a person grow	ng a tri after it ring fro	ip, from take- t has been tak om child to ac	off to landin en out of an dult					

7 Item Number 2019572 Correct Answer C P-Value .544 Equated Rasch Value 0.6522 2003 Reading Standard Alignment is Strand 3 – Concept 4 – Performance Objective 1 Which of the following equations of a line has an x-intercept at 4 and a y-intercept at – 2? A $2x - y = 8$ B $2x - y = 4$ C $x - 2y = 4$ D $2x - y = 10$ 8 Item 3015143 Correct A P-Value .413 Equated Rasch Value 1.3230 Number 2003 Reading Standard Alignment is Strand 4 – Concept 3 – Performance Objective 3 Which of the following best represents the graph of the inequality $y < \frac{1}{2}x + 3?$ Which of the following best represents the graph of the inequality $y < \frac{1}{2}x + 3?$	7 Number Answer Image: Construct the second	7 Number Answer Image: Concept 4 - Performance Objective 1   2003 Reading Standard Alignment is Strand 3 - Concept 4 - Performance Objective 1 Image: Concept 4 - Performance Objective 1   Which of the following equations of a line has an x-intercept at 4 and a y-intercept at -2? A $2x - y = 8$ B $2x - y = 4$ C $x - 2y = 4$ D $2x - y = 10$ 8 Item Number 3015143 Correct Answer A P-Value .413 Equated Rasch Value 1.3230   8 Item Number 3015143 Correct A P-Value .413 Equated Rasch Value 1.3230   8 Item Number 3015143 Correct A P-Value .413 Equated Rasch Value 1.3230   9 Which of the following best represents the graph of the inequality $y < \frac{1}{2}x + 3?$ Image: Correct A P + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 +				AIW		mematics I	vereased I	items for 2006		
7 Number Answer Image: constraint of the second sec	7 Number Answer 2003 Reading Standard Alignment is Strand 3 – Concept 4 – Performance Objective 1 Which of the following equations of a line has an x-intercept at 4 and a y-intercept at – 2? A $2x - y = 8$ B $2x - y = 4$ C $x - 2y = 4$ D $2x - y = 10$ 8 Item <u>3015143 Correct A P-Value .413 Equated Rasch Value 1.3230</u> 2003 Reading Standard Alignment is Strand 4 – Concept 3 – Performance Objective 3 Which of the following best represents the graph of the inequality $y < \frac{1}{2}x + 3?$ Which of the following best represents the graph of the inequality $y < \frac{1}{2}x + 3?$ $f = \frac{1}{2} \int \frac{1}{\sqrt{2}} $	7 Number Answer Answer 2003 Reading Standard Alignment is Strand 3 – Concept 4 – Performance Objective 1 Which of the following equations of a line has an x-intercept at 4 and a y-intercept at $-2?$ A $2x - y = 8$ B $2x - y = 4$ C $x - 2y = 4$ D $2x - y = 10$ 8 Item 3015143 Correct A P-Value 413 Equated Rasch Value 1.3230 2003 Reading Standard Alignment is Strand 4 – Concept 3 – Performance Objective 3 Which of the following best represents the graph of the inequality $y < \frac{1}{2}x + 3?$ Which of the following best represents the graph of the inequality $y < \frac{1}{2}x + 3?$ y $y$ $y$ $y$ $y$ $y$ $y$ $y$ $y$ $y$		Item	2019572	Correct	С	P-Value	.544	Equated Rasch Value	0.652	2
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Which of the following equations of a line has an x-intercept at 4 and a y-intercept at -2?   A $2x - y = 8$ B $2x - y = 4$ C $x - 2y = 4$ D $2x - y = 10$ 8 Item 3015143   Correct A P-Value .413 Equated Rasch Value 1.3230   2003 Reading Standard Alignment is Strand 4 - Concept 3 - Performance Objective 3 Image: Concept 3 - Performance Objective 3 Image: Concept 3 - Performance Objective 3   Which of the following best represents the graph of the inequality $y < \frac{1}{2}x + 3?$ Image: Concept 3 - Performance Objective 3	Which of the following equations of a line has an x-intercept at 4 and a y-intercept at -2? A $2x - y = 8$ B $2x - y = 4$ C $x - 2y = 4$ D $2x - y = 10$ 8 Item <u>3015143 Correct</u> A <u>P-Value .413 Equated Rasch Value 1.3230</u> 2003 Reading Standard Alignment is Strand 4 - Concept 3 - Performance Objective 3 Which of the following best represents the graph of the inequality $y < \frac{1}{2}x + 3?$ $\downarrow \psi$ $\downarrow \psi$	Which of the following equations of a line has an x-intercept at 4 and a y-intercept at $-2$ ? A $2x - y = 8$ B $2x - y = 4$ C $x - 2y = 4$ D $2x - y = 10$ 8 Item <u>3015143</u> Correct <u>A P-Value 413</u> Equated Rasch Value 1.3230 2003 Reading Standard Alignment is Strand 4 – Concept 3 – Performance Objective 3 Which of the following best represents the graph of the inequality $y < \frac{1}{2}x + 3$ ?	'		ng Standard		nt is S	Strand $3 - 0$	Concept 4	– Performance Objectiv	re 1	
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	Item	3015282 C	Correct A	P-Value	.456	Equated Rasch Value	1.1011				
9	Number		Answer								
	2003 Readin	ng Standard A	lignment i	is Strand 3 –	Concept 3	8 – Performance Objectiv	re <b>6</b>				
		e following tab	-								
		pliance repairm	-								
	the hours it takes to make a repair.										
	APP	LIANCE REP	AIR TOTAL	CHARGES							
		t (hours)	C (dolla	ars)							
		1	75								
		3	145	;							
		5	215	;							
		7	285	;							
	W	hich of the follo	owing equati	ons could be							
		ed to determine									
		a repair?	1	0							
		C = 35t + 40									
	<b>B</b> $C = 40t + 35$ <b>C</b> $C = 75t$										
	D	C = 45t									
	Item	3140835	Correct A	P-Value	.2748	Equated Rasch Value	2.0809				
10	Number		Answer		.2740	Equated Rusen Value	2.0007				
10				is Strand 1 –	Concept 1	I – Performance Objectiv	ve <b>3</b>				
	2000 11000	8			<u>concept</u>	<u> </u>					
	W	/hich set of nu	mbers is fir	nite?							
	<ul><li>A {even numbers between 1 and 89}</li><li>B {real numbers greater than 1}</li></ul>										
	c	{rational nur	nbers betwe	en 1 and 2}							
	D	{whole num	bers with ter	ns digits							
		at zero}									
L	1										

	Item	3015280	Correct	В	P-Value	.514	Equated Rasch Value	0.800	51	
11	Number	2010200	Answer		I varue		_quited Rubbin Value	0.000	~ 1	
**	2003 Readin	ng Standard		nt is l	Strand $3 - 0$	Concept 2	2 – Performance Objectiv	ve 5		
	Which	h of the following funct	ions of x has an appa	rent range	of {-1, 0, 2}?					
		<i>y</i>			y       ↑					
		5			5					
					****					
	•	0	5 × X	•	0 5	X				
		y y			y y					
		5								
		• •								
	•	0	5 × x	•	0 5	x				
		В			D					
	-		-	•						
	Item	3140659	Correct	В	P-Value	.953	Equated Rasch Value	-2.88	349	
12	Number	na Standard	Answer	ntia	Strand 2 (	Concept 1	Derformance Objectiv	10.6		
	2005 Readil	ng Standard	Angnine	nt is i	Strand $5 - 0$	_oncept 2	2 – Performance Objectiv	veo		
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		aspirin in his b								
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	Amount of Aspirin	ream	$\backslash$							
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		concentration								
		А 10:00 А.М.								
		в 11:00 а.м.								
		с 11:30 а.м.								
		<b>D</b> 12:30 а.м.								
		- 12.30 A.M.								

AIMS Mathematics Released Items for 2006

		-							
13	Item Number	3140724	Correct Answer	В	P-Value	.6097	Equated Rasch Value	.349	00
13		ng Standard		nt is l	Strand $1 - 0$	Concept 1	– Performance Objectiv	ve 1	
	i	The set of real s a subset of A rationals B irrationals C integers D whole nu	al numbers which of t {√8, π}	sho	wn below				
14	Item Number 2003 Readin	3140763 ng Standard	Correct Answer Alignmer	A nt is l	P-Value Strand <b>4</b> – 9	.8967 Concept <b>1</b>	Equated Rasch Value	-1.85 ve <b>4</b>	514
		Which object is re following net?	presented by t	he					
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		8	/						
		-							
	1								

AIMS Mathematics Released Items for 2006