Arizona's Instrument to Measure Standards High School Mathematics

Administered Spring, 2004 Released items 11.15.2004

As part of Superintendent 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 includes two Reading passages, directions, and the items associated with them, 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 test administered in the spring of 2004. This is followed by the individual items with the correct answers and statistical information.

The Mathematics section consists of eighteen items in the form of a mini-test, followed by the individual items and 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) Original performance objective (parent PO) that the item was used to measure; and
- 6) The performance objective as the item aligns to the 2003 standards.

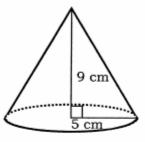
The items are reproductions of the actual items as they appeared on the AIMS tests. If you have any questions, please contact Bryan Doyle at (602) 542-5031.

MATHEMATICS

Mathematics -

DIRECTIONS: Read each question and choose the best answer.

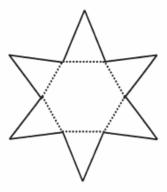
1 What is the volume of the given cone?



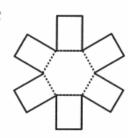
- A 225π cm³
- **B** $75\pi \text{ cm}^3$
- $C 25\pi \text{ cm}^3$
- D 15π cm³

If a hexagonal pyramid were laid flat on a plane, which of the following would represent its net?

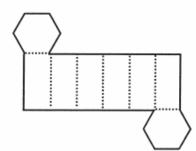
A



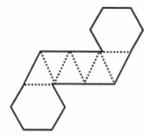
C



В



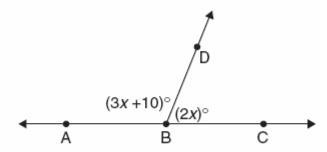
D



- 3 Joan is planning her summer vacation. She can choose to go to one of 7 different countries, using 4 different airlines, and three different departure dates. How many different vacation combinations consisting of one country, one airline and one departure date are possible?
 - A 14
 - B 28
 - C 31
 - D 84
- 4 A model of a house is built to a scale of 1:10. The original house has a height of 15 ft. What is the height of the model?
 - A $1\frac{1}{2}$ feet
 - B $\frac{2}{3}$ feet
 - C 5 feet
 - D 10 feet
- Which of the linear equations below is derived from the following table of values?

- A y = x + 4
- B y = 2x + 7
- v = -x + 4
- D y = 3x + 2

6 In the figure below, \overrightarrow{BD} intersects \overrightarrow{AC} at point B.

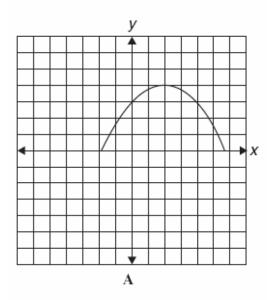


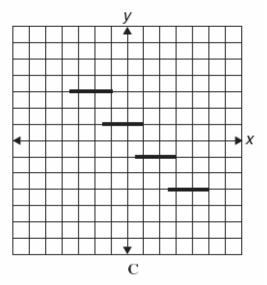
What is the measure of $\angle ABD$?

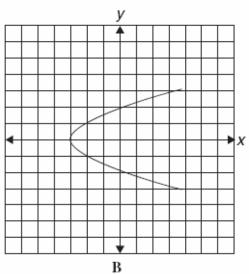
- A 68°
- B 112°
- C 124°
- D 170°

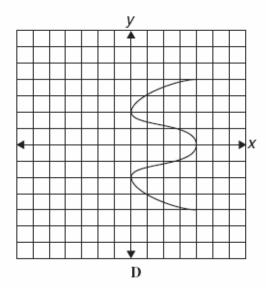


7 In which of the following graphs is y a function of x?









- 8 Lincoln High School is considering adding co-ed soccer to the sports program for the fall season. In order to get an unbiased sample of interest in soccer, the school should survey which group below?
 - A all girls in dance class
 - B the varsity football team
 - C all students who were elected this year to the student council
 - D every third student entering second period classes
- 9 What is the distance between the points (4, -2) and (-5, 3)?

A
$$D = \sqrt{106}$$

B
$$D = \sqrt{28}$$

C
$$D = \sqrt{26}$$

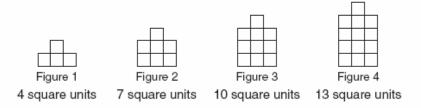
D
$$D = \sqrt{2}$$

10 One night, the low temperature in Flagstaff was -5°F. That same night in Phoenix the low temperature was 40°F. What is the absolute value of the difference between these two temperatures?

11 What is the solution to the equation below?

$$6x + 4 = 2x - 12$$

- A x = -4
- **B** x = 4
- C x = 2
- D x = -2
- 12 Look at the figures below.



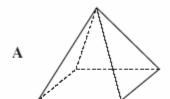
If the number of square units in the pattern of figures continues to increase arithmetically as shown, how many square units will be in the 9th figure?

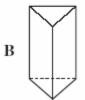
- A 9
- B $3^9 + 1$
- C 9(3+1)
- D $1 + (3 \cdot 9)$
- 13 What value of x would make the following proportion true?

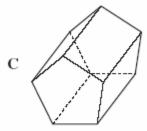
$$\frac{6}{x-4} = \frac{3}{4}$$

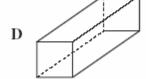
- A 12
- **B** $\frac{28}{3}$
- C 4
- $D \frac{1}{8}$

14 Which figure below has bases that are triangles and lateral faces that are rectangles?









15 Which of the following quadratic equations is solved correctly?

A
$$x^2 - 2x - 35 = 0$$

 $(x - 7)(x + 5) = 0$
 $x = 7, x = -5$

$$B x^2 + 7x + 6 = 0$$

(x + 1)(x + 6) = 0
x = 1, x = 6

$$C x^2 - 9x - 18 = 0$$

(x - 6)(x - 3) = 0
x = -6, x = -3

$$D x^2 - 9x + 20 = 0 (x + 4) (x + 5) = 0 x = -4, x = -5$$

16 What is the y-value of the solution to the following system of linear equations?

$$y = x + 8$$
$$x + 2y = 1$$

- **A** −7
- B -5
- C 3
- D 13

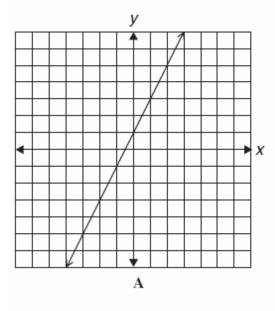
- 17 On June 1, Mary had a balance of \$50 in her bank account. During June she made the four transactions below.
 - · deposited \$25
 - · withdrew \$30
 - · wrote a check for \$60
 - · paid a bank fee of \$25

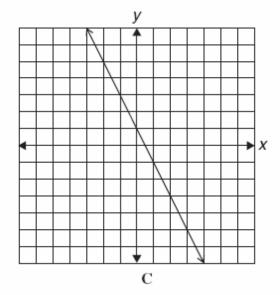
If there were no other transactions, what was the balance in Mary's bank account on July 1?

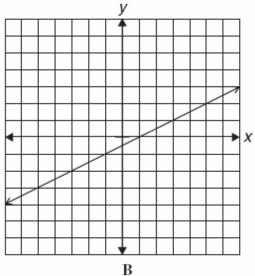
- A -\$90
- B -\$40
- C +\$10
- D +\$190

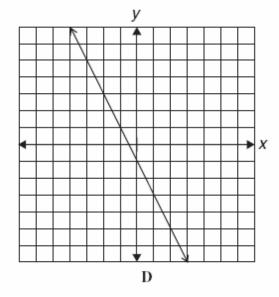
18 Which line graph appears to contain the points on the table below?

х	-1	0	1	2
у	-1	1	3	5







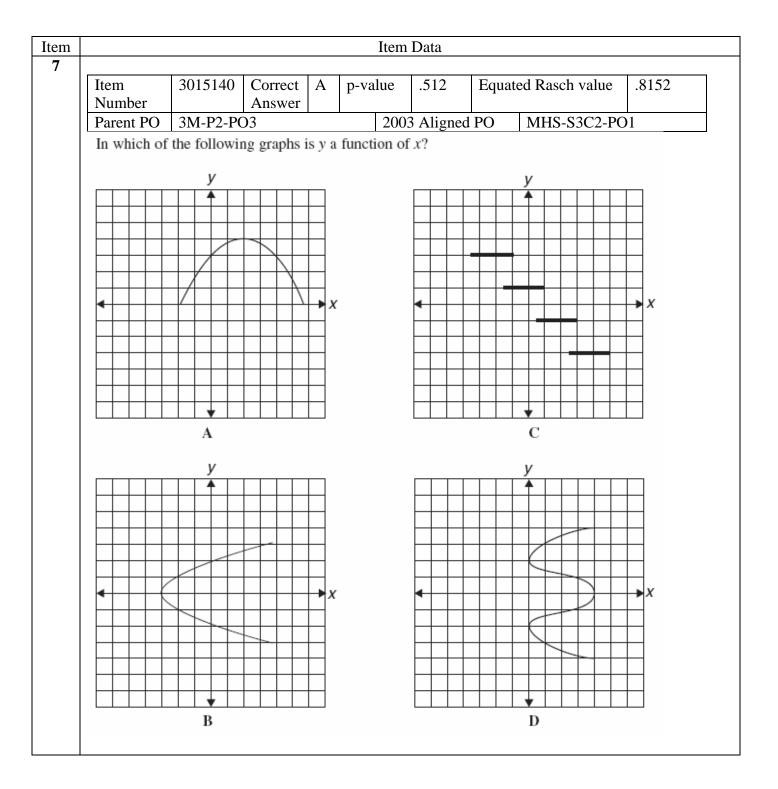


Item					Ite	n Data						
1												
	Item		Correct	В	p-value	.563	Equa	ted Rasch value	.5915			
	Number	2019623	Answer		1		1					
	Parent PO	4M-P2-P0) 1		20	03 Aligne	d PO	MHS-S4C4-PC	02			
	What is the	What is the volume of the given cone?										
	9 cm 5 cm											
	A 225π cr	m^3										
	B 75π cm	3										
	C 25π cm	3										
	D 15π cm	3										

Item					Item	Data			
2									
	Item		Correct	Α	p-value	.712	Equat	ed Rasch value	2577
	Number	2019627	Answer				1		
	Parent PO	4M-P1-P0		•	2003	3 Aligned	PO	MHS-S4C1-PC	03
					•				
	If a hexagona	al pyramid w	ere laid fla	t on a	plane, which	n of the fol	lowing v	would represent its	net?
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Item						Item	Data			
3		ı	ı	ı	Т			ı		
	Item	2019626	Correct	D	p-va	lue	.68	Equat	ted Rasch value	0686
	Number	5M D4 D6	Answer			2002) A 1' J	DO	MHC C2C2 DO	1
	Parent PO	5M-P4-P0)4			2003	8 Aligned	PO	MHS-S2C3-PC)1
	Joan is plan can choose countries, us three different vac of one coun date are pos	to go to one sing 4 diffe ent departur cation comb try, one airl	e of 7 diffe rent airline e dates. H pinations c	erent es, an ow n	nd nany sting	re				
	A 14 B 28 C 31 D 84									
4										
	Item	2019605	Correct	A	p-va	lue	.562	Equat	ted Rasch value	.4239
	Number	4) (D2 D(Answer			2000) A 1' 1	DO	Mile ever bo	
	Parent PO	4M-P2-P0				2003	8 Aligned	PO	MHS-S4C4-PC	9
	A model of of 1:10. The of 15 ft. WI	e original h	ouse has a	heig	ght					
	A $1\frac{1}{2}$ feet B $\frac{2}{3}$ feet									
	B $\frac{2}{3}$ feet C 5 feet									
	D 10 feet									

Item					Item	Data						
5												
	Item	2019583	Correct	A	p-value	.535	Equa	ted Rasch value	.6991			
	Number		Answer									
	Parent PO	3M-P7-P0				3 Aligned		MHS-S3C3-PC				
	Which of the	ne linear eq	uations be	low	is derived f	rom the f	ollowii	ng table of values	?			
	<i>x y</i>	$ \begin{array}{c c c c} -3 & -1 & \\ \hline 1 & 3 & \\ \end{array} $	1 3 5 7									
	$\mathbf{A} y = x + 4$											
	$\mathbf{B} y = 2x$	+ 7										
	C y = -x	+ 4										
	$\mathbf{D} y = 3x$	+ 2										
6												
	Item	3014987	Correct	В	p-value	.676	Equa	ted Rasch value	0466			
	Number		Answer									
	Parent PO	Parent PO 4M-P2-PO8 2003 Aligned PO MHS-S3C3-P08										
	In th	ne figure be	low, \overrightarrow{BD} is	nters	ects \overrightarrow{AC} at							
	poir											
			<i>,</i>	*								
			/									
		(3 <i>x</i> +	10)°/									
	← •		/(2X)°)	•	•						
	Α		В		С							
	Wha	at is the me	asure of ∠	ABI	D?							
	A 68°											
	В	112°										
	C	124°										
		170°										
	_											



Item					Item	Data					
8											
	Item Number	3015174	Correct Answer	D	p-value	.745	Equa	ted Rasch value	4602		
	Parent PO	2M-P4-P0)2	1	200	3 Aligned	PO	MHS-S2C1-PC	017		
	Lincoln Hig	gh School i	s consider	ing a							
	co-ed socce			_	_						
	fall season.	_	_								
	sample of i		_								
	should survey which group below?										
		, ,									
	A all girls	in dance c	lass								
	B the vars	ity football	team								
	C all students who were elected this year to the student council										
	-	nird student	entering	secor	nd						
	period o	classes									
9											
	Item Number	3015209	Correct Answer	A	p-value	.512	Equa	ted Rasch value	.8144		
	Parent PO	4M-P7-P0	D6	•	200	3 Aligned	PO	MHS-S4C3.PO	7		
	What is the	distance be	tween the	poir	nts						
	(4, -2) and			•							
	$\mathbf{A} D = \mathbf{V}$	106									
	$\mathbf{B} \ D = \mathbf{V}$	28									
	C D =	26									
	$\mathbf{D} \ D = \mathbf{V}$	2									

Item Data										
Item	3015295	Correct	D	p-va	lue	.497	Equat	ed Rasch value	.8925	
Number		Answer								
Parent PO	1M-P2-P0)3			2003	3 Aligned	PO	M07-S1C2-PO	4	
One night, t	t, the low temperature in Flagstaff									
was −5°F. 7	That same i	night in Pl	noeni	x the						
low tempera	ture was 4	0°F. What	is th	e						
these two te	peratares									
A −45°F										
B −35°F										
C 35°F										
D 45°F										
Item	3015210	Correct	Α	p-va	lue	.665	Equat	ed Rasch value	.0127	
								T		
Parent PO	3M-P6-P0)9			2003	3 Aligned	PO	MHS-S3C3-PC	08	
What is the	solution to	the equat	ion b	elow?	•					
6v J	- 4 - 2x -	. 12								
a. i	4 — ZX	12								
A $x = -4$										
B $x = 4$										
C x = 2										
D $x = -2$										
	Number Parent PO One night, to was -5° F. To low temperal absolute values these two temperal absolute values are these two temperal absolute values. A -45° F B -35° F C 35° F D 45° F D 45° F D 45° F D what is the $6x + 4$ A $x = -4$ B $x = 4$ C $x = 2$	Number Parent PO 1M-P2-PC One night, the low term was -5° F. That same is low temperature was 4 absolute value of the dithese two temperatures. A -45° F B -35° F C 35° F D 45° F Item 3015210 Number Parent PO 3M-P6-PC What is the solution to $6x + 4 = 2x - 4$ B $x = 4$	Number Parent PO $1M-P2-PO3$ One night, the low temperature is was $-5^{\circ}F$. That same night in Ph low temperature was $40^{\circ}F$. What absolute value of the difference is these two temperatures? A $-45^{\circ}F$ B $-35^{\circ}F$ C $35^{\circ}F$ D $45^{\circ}F$ Item 3015210 Correct Answer Parent PO $3M-P6-PO9$ What is the solution to the equate $6x + 4 = 2x - 12$ A $x = -4$ B $x = 4$ C $x = 2$	Number Parent PO 1M-P2-PO3 One night, the low temperature in Flawas -5° F. That same night in Phoeni low temperature was 40° F. What is the absolute value of the difference between these two temperatures? A -45° F B -35° F C 35° F D 45° F Item 3015210 Correct Answer Parent PO 3M-P6-PO9 What is the solution to the equation be $6x + 4 = 2x - 12$ A $x = -4$ B $x = 4$ C $x = 2$	Number Parent PO 1M-P2-PO3 One night, the low temperature in Flagstaff was -5° F. That same night in Phoenix the low temperature was 40° F. What is the absolute value of the difference between these two temperatures? A -45° F B -35° F C 35° F D 45° F D 45° F Item 3015210 Correct A p-va Answer Parent PO 3M-P6-PO9 What is the solution to the equation below? $6x + 4 = 2x - 12$ A $x = -4$ B $x = 4$ C $x = 2$	Number Answer Parent PO 1M-P2-PO3 2003 One night, the low temperature in Flagstaff was -5° F. That same night in Phoenix the low temperature was 40° F. What is the absolute value of the difference between these two temperatures? A -45° F B -35° F C 35° F D 45° F D 45° F D 45° F 2003 What is the solution to the equation below? $6x + 4 = 2x - 12$ A $x = -4$ B $x = 4$ C $x = 2$	Number Answer An	Number Answer 2003 Aligned PO One night, the low temperature in Flagstaff was -5° F. That same night in Phoenix the low temperature was 40° F. What is the absolute value of the difference between these two temperatures? A -45° F B -35° F C 35° F D 45° F D 45° F Equation below? Item 3015210 Correct A p-value .665 Equation below? Parent PO 3M-P6-PO9 2003 Aligned PO What is the solution to the equation below? $6x + 4 = 2x - 12$ A $x = -4$ B $x = 4$ C $x = 2$	Number Answer 2003 Aligned PO M07-S1C2-PO One night, the low temperature in Flagstaff was -5° F. That same night in Phoenix the low temperature was 40° F. What is the absolute value of the difference between these two temperatures? A -45° F B -35° F C 35° F D 45° F D 45° F Answer 2003 Aligned PO MHS-S3C3-PO What is the solution to the equation below? $6x + 4 = 2x - 12$ A $x = -4$ B $x = 4$ C $x = 2$	

T. 1						т,	D /			
Item 12						Item	Data			
12	Item Number	3015281	Correct	D	p-va	lue	.629	Equa	ted Rasch value	.2109
	Parent PO	6M D1 D0	Answer			2007	2 Alianad	DO	MHS-S5C2-PC)5
		6M-P1-P0)			2003	3 Aligned	PU	MH3-33C2-PC)3
	If the number how many square A 9 B 39 + 1 C 9 (3 + 1)	Figure 4 square un of square un uare units wil	units 7 so	attern	units of figu	10 s	Figure 3 quare units	13 so	Figure 4 quare units arithmetically as sh	own,
12	D 1 + (3 · 9)								
13	Item	3015247	Correct	Α	p-va	lue	.746	Fana	ted Rasch value	4672
	Number	3013247	Answer	11	p-va	iuc	./+0	Lqua	ica Rascii valuc	4072
	Parent PO	3M-P6-P0		1		2003	3 Aligned	PO	MHS-S3C3-PC	D11
	What value			follo	owing					
		$\frac{3}{4} = \frac{3}{4}$				Prop				
	B $\frac{28}{3}$									
	C 4									
	D $\frac{1}{8}$									

Item	Item Data											
14												
	Item	3015262	Correct	В	p-value	.892	Equat	ted Rasch value	-1.6641			
	Number		Answer									
	Parent PO	4M-P1-P0			2003	3 Aligned	PO	M06-S4C1-PO	3			
	Which figure below has bases that are triangles and lateral faces that are rectangles?											
	A //		>									
	В											
	c											
	D											

Item	Item Data										
15											
	Item Number	3015273	Correct Answer	A	p-valu	ie	.443	Equa	ted Rasch value	1.1667	
	Parent PO	6M-P5-P0				2003	Aligned	PO	MHS-S5C1-PC	02	
	Which of th	_	quadratic	equa	•						
	$\mathbf{A} x^2 - 2x$ $(x - 7)(x - 7) = 0$ $x = 7, x = 0$	(x+5)=0									
	B $x^2 + 7x + 6 = 0$ (x + 1)(x + 6) = 0 x = 1, x = 6										
	$C x^2 - 9x - 18 = 0$ $(x - 6)(x - 3) = 0$ $x = -6, x = -3$										
		+ 20 = 0 (x + 5) = 0 x = -5)								
16											
	Item Number	3015253	Correct Answer	С	p-valu	ie	.515	Equa	ted Rasch value	.7992	
	Parent PO	3M-P6-P0				2003	Aligned	PO	MHS-S3C3-PC	012	
	What is the	v-value of	the solutio	n to	the						
	following sy	-									
	y =	x + 8									
	-	2y = 1									
	A -7										
	B -5										
	C 3										
	D 13										

Item	Item Data										
17											
	Item	3015296	Correct	В	p-valu	ıe	.516	Equat	ed Rasch value	.7927	
	Number		Answer								
	Parent PO	1M-P2-P0	04			2003	8 Aligned	PO	M07-S1C2-PO4	4	
	On June 1, N	Mary had a b	alance of §	550 ir	n her bai	nk ac	count. Du	ıring Ju	ne she made the fo	our	
	transactions	below.									
	• de _I	posited \$25									
	• withdrew \$30										
	• Wr	ote a check t	for \$60								
	• pai	d a bank fee	of \$25								
	If there were	no other tra	ansactions,	what	was the	e bala	ance in M	ary's ba	nk account on July	y 1?	
	A -\$90										
	B −\$40										
	C +\$10										
	D +\$190										

