Arizona's Instrument to Measure Standards (AIMS)

Mathematics

Administered Spring, 2005

Released Items

November 15, 2005

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 a Reading passage, directions, and the items associated with the 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 test administered in the spring of 2005. This is followed by the individual items with the correct answers and statistical information.

The Mathematics section consists of twenty-five 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.

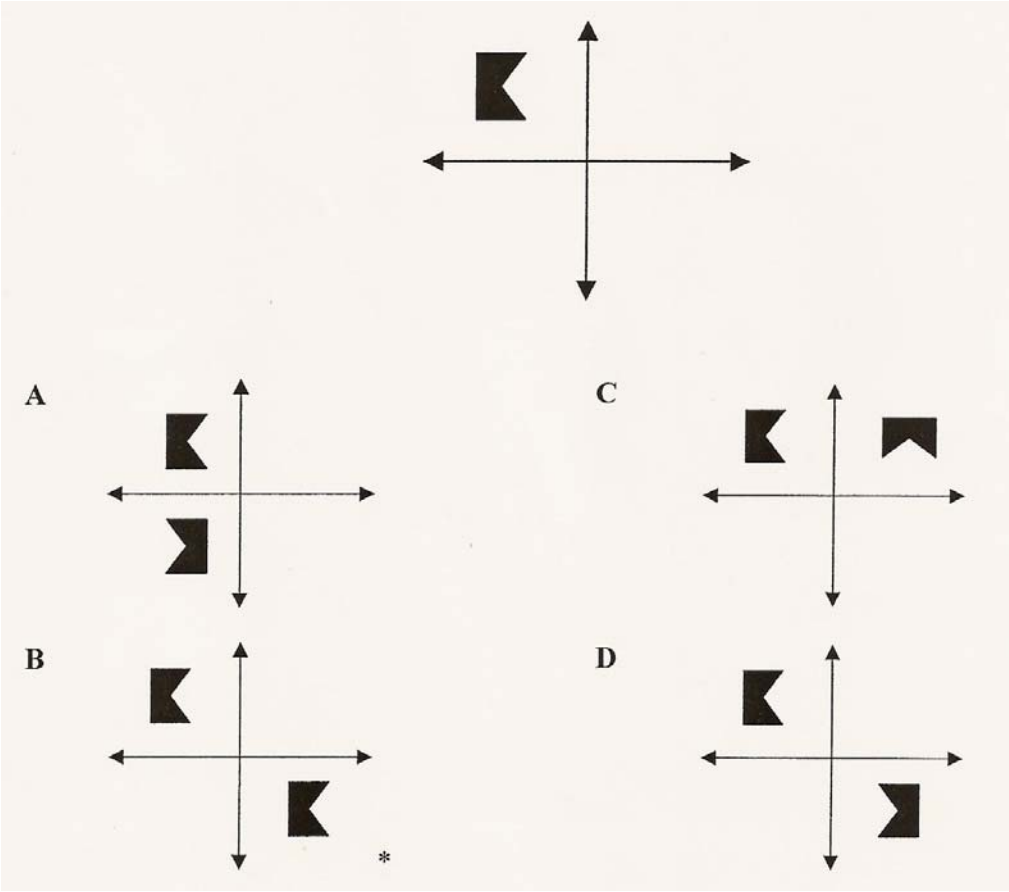
The items are reproductions of the actual items as they appeared on the AIMS tests. If you have any questions, please contact Frank Brashear at (602) 542-5031.

MATHEMATICS

Mathematics

DIRECTIONS: Read each question and choose the best answer.

1. **Which of the following represents a translation of the figure?**



2. **Student council is planning lunchtime activities for Spirit Week. They want to survey students to determine which activities are the most popular. Which of the following is the best group for them to survey?**

A The Freshman, JV, and Varsity football teams.

B The Dance Team and the Band.

C The Speech Club and the Drama Club.

D One English class at each grade level.

Go On

3. **Which of the following expressions is equivalent to $(6xy)^2$?**

A $12x^2y^2$

B $6xy^2$

C $36x^2y^2$

D $6x^2y^2$

4. **Which of the following transformations always preserves the dimensions of a figure?**

I. translation
II. rotation
III. reflection
IV. dilation

A **I, II,** and **III**

B **I, II,** and **IV**

C **I, III,** and **IV**

D **II, III,** and **IV**

5. **Which statement is true about the graphs of these equations?**

$y = 6x + 4$
$y = 5x - 2$

A The lines intersect, but are not perpendicular.

B The lines are parallel.

C The lines are perpendicular.

D The lines coincide (same line).

Go On

6. **Evaluate the expression $2(x - 3) + 3y$ when $x = 5$ and $y = 3$. Mark the correct answer.**

A 13

B 15

C 16

D 25

7. **Steps 1 and 2 describe an algorithm.**

Step 1: Isolate the variable.
Step 2: Take the square root of both sides of the equation. You now have your answer.

Which of these equations can be solved by the algorithm above?

I. $x^2 - 2x - 3 = 0$
II. $x + 5 = 0$
III. $x^2 - 9 = 0$
IV. $x^3 + 2x + 6 = 0$

A **I**

B **II**

C **III**

D **IV**

8. **Which is the solution to the following inequality?**

$$2x - 7 \geq 9$$

A $x \geq 8$

B $x \geq 1$

C $x \leq 8$

D $\boldsymbol{x \geq -1}$

Go On

9. **Which of these is equivalent to the equation below?**

$$A = \frac{1}{2}bh$$

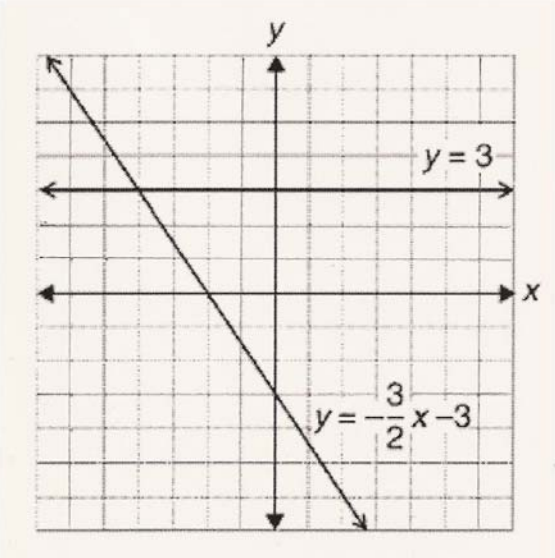
A $b = \frac{2A}{h}$

B $b = \frac{A}{2h}$

C $b = \frac{Ah}{2}$

D $b = 2A - h$

10. **Which point best represents the solution to the system of linear equations shown in the graph below?**



A (–4, 3)

B (3, –4)

C (4, –3)

D (–3, 4)

Go On

11. **Which of the following addition properties justifies the statement below?**

$2 + 0 = 2$

A Commutative

B Identity

C Inverse

D Closure

12. **A car made a trip of 352 miles on 16.8 gallons of gasoline. Which is closest to the number of miles per gallon the car got on that trip?**

A 10 mpg

B 20 mpg

C 30 mpg

D 40 mpg

13. **The table represents how the air temperature combines with the humidity to form the heat index.**

HEAT INDEX TABLE

Relative Humidity	Air Temperature (°F)				
	85	90	95	100	105
60	90	100	114	132	149
55	89	98	110	126	142
50	88	96	107	120	135
45	87	95	104	115	129
40	86	93	101	110	123
35	85	91	98	107	118
30	84	90	96	104	113

Which statement is correct?

A As the humidity and temperature decrease, the heat index increases.

B As the humidity and temperature increase, the heat index decreases.

C As the humidity increases and the temperature decreases, the heat index increases.

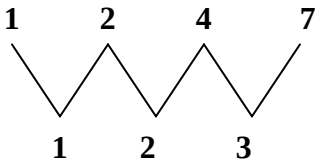
D As the humidity and temperature increase, the heat index increases.

Go On

14. **Sally wrote the number pattern shown below.**

1, 2, 4, 7, . . .

She noticed another pattern when she found that the difference between consecutive numbers increased by 1 as shown below.



If the difference continues to increase by 1, what will be the next two terms of the original pattern?

A 10, 13

B 10, 14

C 11, 15

D 11, 16

15. **Which linear equation best represents the data in the table shown below?**

x	***y***
2	1
3	3
4	5

A $y = \frac{1}{2}x$

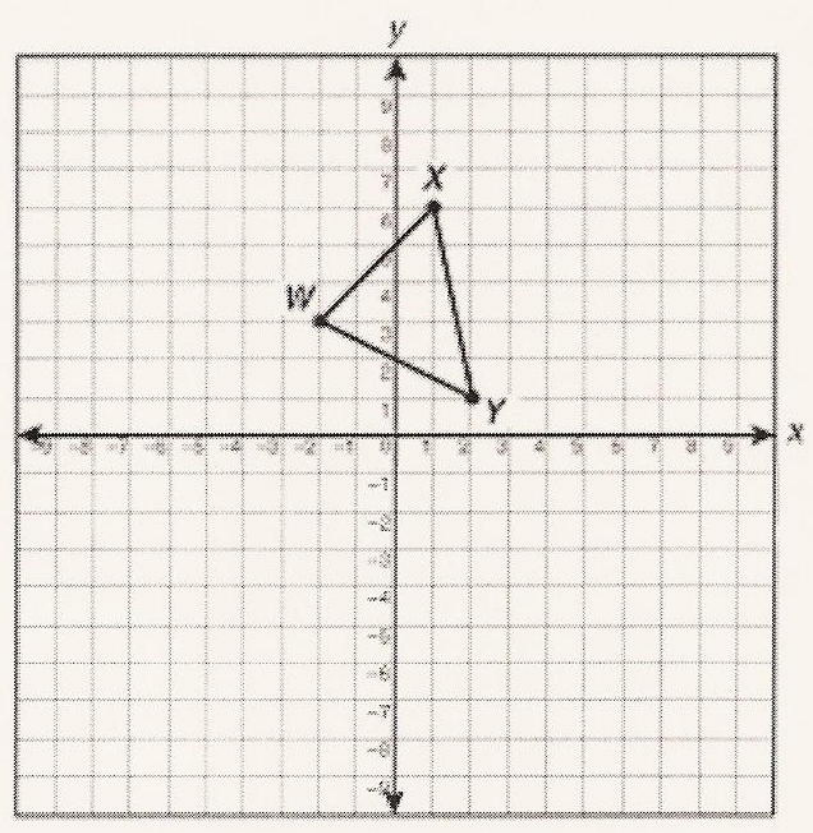
B $y = x - 1$

C $y = 2x - 3$

D $y = -2x + 5$

Go On

16. **What is the apparent image of *X* when triangle *WXY* is translated 2 units down and 5 units right?**



A (1, 3)

B (3, 1)

C (4, 6)

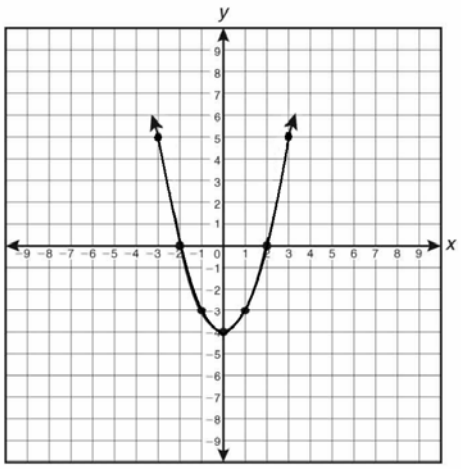
D (6, 4)

Go On

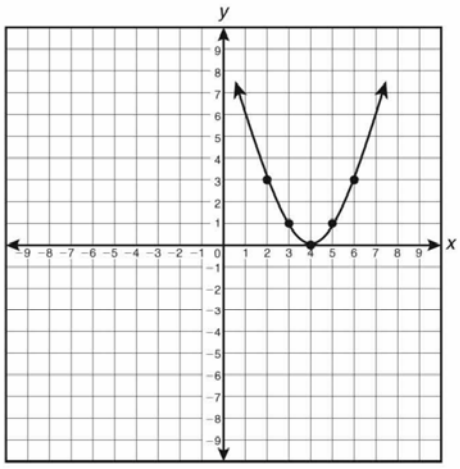
17. **Which of the following represents the graph of the equation below?**

$$y = x^2 - 4$$

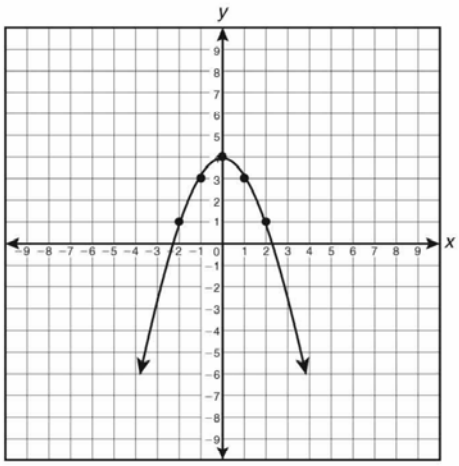
A



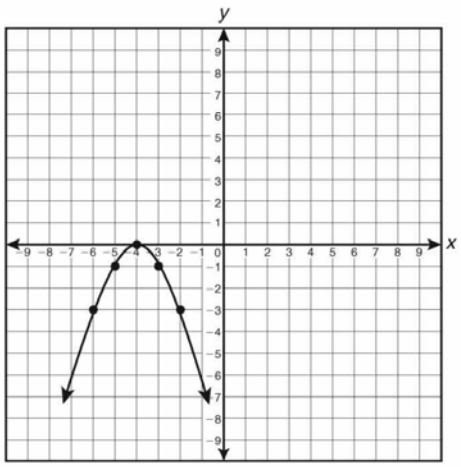
C



B



D



Go On

18. **Which of the following could be a correct procedure for solving the inequality shown below?**

$4x + 6 \leq 6x + 15$

A $4x + 6 \leq 6x + 15$
$-2x + 6 \leq 15$
$-2x \leq 9$
$x \geq -\frac{9}{2}$

B $4x + 6 \leq 6x + 15$
$-2x + 6 \leq 15$
$-2x \leq 21$
$x \leq -\frac{21}{2}$

C $4x + 6 \leq 6x + 15$
$-2x + 6 \leq 15$
$-2x \leq 9$
$x \leq -\frac{9}{2}$

D $4x + 6 \leq 6x + 15$
$-2x + 6 \leq 15$
$-2x \leq 9$
$x \geq -\frac{21}{2}$

19. **What is the value of the expression below?**

$5 - |4| + |8 - 10|$

A –1

B 3

C 7

D 11

Go On

20. **Which of the following could represent a census of a school?**

A sophomore class

B P.E. classes

C math club members

D entire student body

21. **Which of the following is always true?**

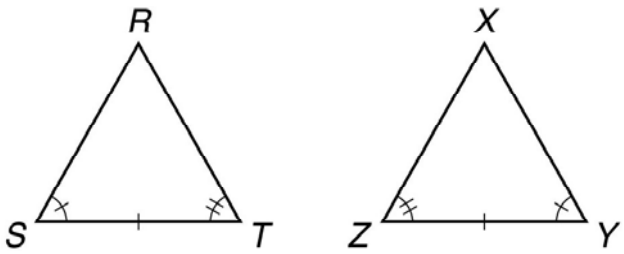
A A rectangle is a square.

B A rhombus is a rectangle.

C A parallelogram is a rhombus.

D A rectangle is a parallelogram.

22. **Which principle of congruence could be used to prove triangle RST is congruent to triangle XYZ?**



A Side-Side-Side (SSS)

B Side-Angle-Side (SAS)

C Angle-Side-Angle (ASA)

D Side-Side-Angle (SSA)

Go On

23. **The statements below are out of order.**

W: If blitz, then kerd.
X: If mot, then det.
Y: If kerd, then mot.
Z: If toc, then blitz.

Which of the following puts the nonsensical if-then statements in logical order?

A W → Z → X → Y

B Z → W → Y → X

C W → Y → X → Z

D Z → X → Y → W

24. **Each event described below is performed randomly. Which is a dependent event?**

A From a bag of 10 marbles (4 red, 6 blue), Sam pulls a blue marble, puts it back, and then pulls a red marble.

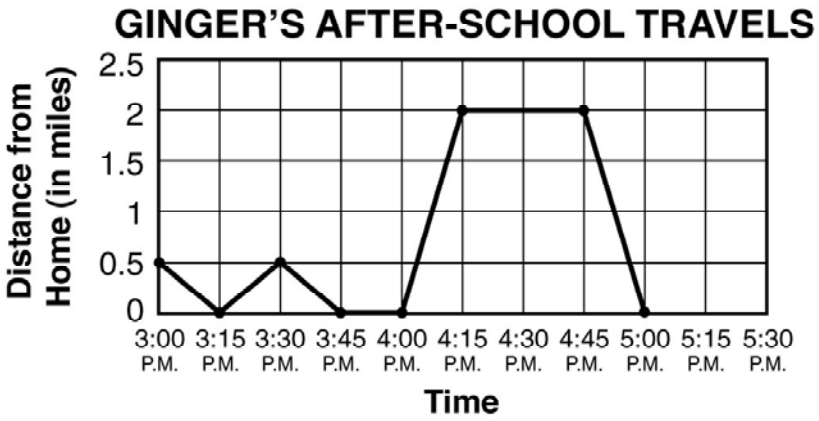
B On a spinner with 6 congruent sectors numbered 1 through 6, Greg first spins a 4 and then a 2 on the second spin.

C From a pack of 20 cards, Jose picks 1 card, sets it aside, and then picks a matching card on his second try.

D Monica tosses a fair coin two consecutive times, and it lands on heads both times.

Go On

25. **Ginger left school at 3:00 P.M. and walked home, but went back to school for a book. She then walked home, had a snack, and took a bus downtown. Later, she took a bus home, arriving at 5:00 P.M. Which of the following statements is true?**



A Ginger's maximum distance from home was 2 miles.

B Ginger's minimum distance from home was 0.5 miles.

C At 3:30 P.M., Ginger is at her furthest distance from home.

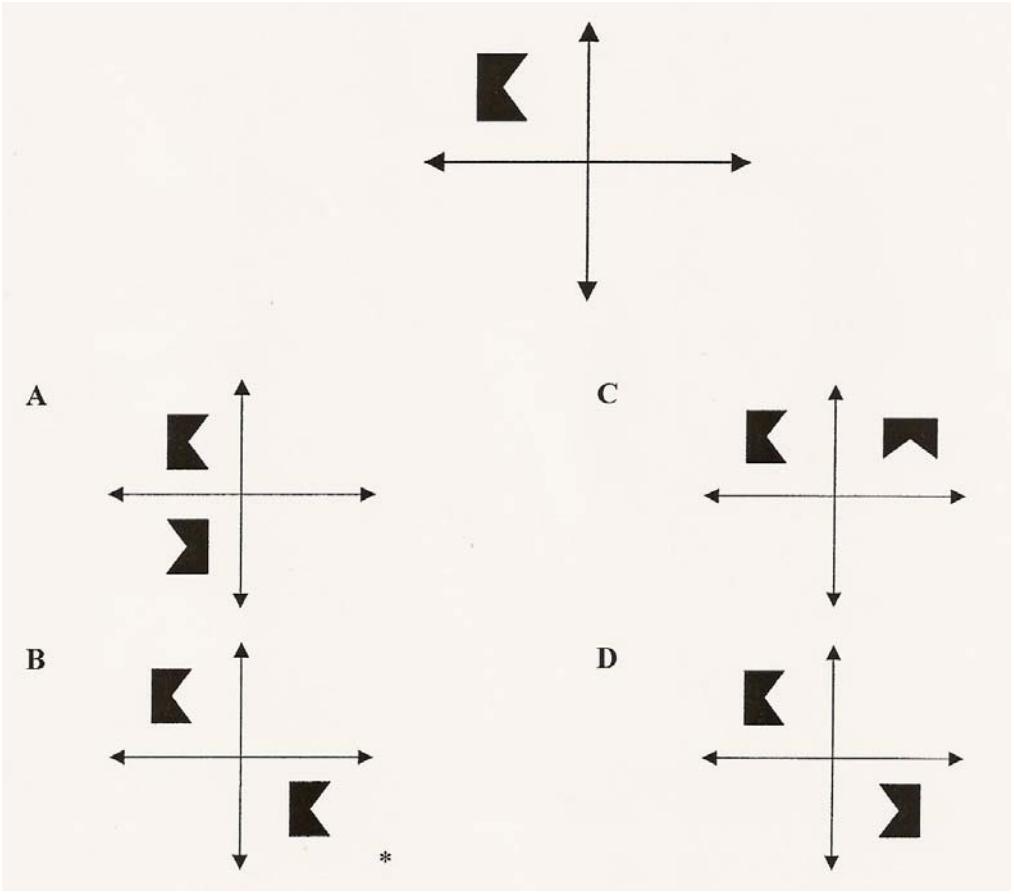
D At 4:30 P.M., Ginger is back at her home.

Item	Item Data

1

Item Number	2019577	Correct Answer	B	p-value	.426	Equated Rasch value	.45
				2002 Aligned PO		RHS-S4C3-PO4	

1. Which of the following represents a translation of the figure?



2

Item Number	2019601	Correct Answer	D	p-value	.668	Equated Rasch value	-.58
				2002 Aligned PO		RHS-S2C4-PO2	

2. Student council is planning lunchtime activities for Spirit Week. They want to survey students to determine which activities are the most popular. Which of the following is the best group for them to survey?

A The Freshman, JV, and Varsity football teams.

B The Dance Team and the Band.

C The Speech Club and the Drama Club.

D One English class at each grade level.

3

Item Number	2019608	Correct Answer	C	p-value	.763	Equated Rasch value	-.5736
				2004 Aligned PO		RHS-S6C5-PO1	

3. Which of the following expressions is equivalent to $(6xy)^2$?

A $12x^2y^2$

B $6xy^2$

C $36x^2y^2$

D $6x^2y^2$

4

Item Number	3015009	Correct Answer	A	p-value	.729	Equated Rasch value	-.359
				2004 Aligned PO		RHS-S4C3-PO3	

4. Which of the following transformations always preserves the dimensions of a figure?

I. translation
II. rotation
III. reflection
IV. dilation

A **I, II,** and **III**

B **I, II,** and **IV**

C **I, III,** and **IV**

D **II, III, and IV**

5

Item Number	3015062	Correct Answer	A	p-value	.552	Equated Rasch value	.6121
				2004 Aligned PO		RHS-S4C5-PO1	

5. Which statement is true about the graphs of these equations?

$y = 6x + 4$
$y = 5x - 2$

A The lines intersect, but are not perpendicular.

B The lines are parallel.

C The lines are perpendicular.

D The lines coincide (same line).

6

Item Number	3015162	Correct Answer	A	p-value	.78	Equated Rasch value	-1.1088
				2003 Aligned PO		RHS-S3C6-PO2	

6. **Evaluate the expression $2(x - 3) + 3y$ when $x = 5$ and $y = 3$. Mark the correct answer.**

A 13

B 15

C 16

D 25

7

Item Number	3015172	Correct Answer	C	p-value	.56	Equated Rasch value	.136
				2003 Aligned PO		RHS-S5C3-PO2	

7. **Steps 1 and 2 describe an algorithm.**

Step 1: Isolate the variable.
Step 2: Take the square root of both sides of the equation. You now have your answer.

Which of these equations can be solved by the algorithm above?

I. $x^2 - 2x - 3 = 0$
II. $x + 5 = 0$
III. $x^2 - 9 = 0$
IV. $x^3 + 2x + 6 = 0$

A **I**

B **II**

C **III**

D **IV**

8

Item Number	3015214	Correct Answer	A	p-value	.661	Equated Rasch value	.0337
				2004 Aligned PO		RHS-S3C6-PO9	

8. **Which is the solution to the following inequality?**

$$2x - 7 \geq 9$$

A $x \geq 8$

B $x \geq 1$

C $x \leq 8$

D $x \geq -1$

9

Item Number	3015219	Correct Answer	A	p-value	.39	Equated Rasch value	1.4433
				2004 Aligned PO		RHS-S3C6-PO10	

9. **Which of these is equivalent to the equation below?**

$$A = \frac{1}{2}bh$$

A $b = \frac{2A}{h}$

B $b = \frac{A}{2h}$

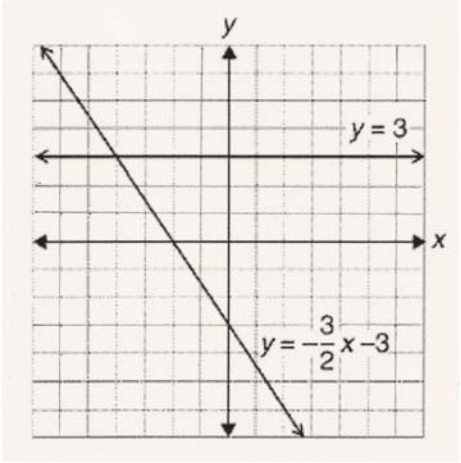
C $b = \frac{Ah}{2}$

D $b = 2A - h$

10

Item Number	3015271	Correct Answer	A	p-value	.627	Equated Rasch value	.2202
				2004 Aligned PO		RHS-S3C7-PO3	

10. **Which point best represents the solution to the system of linear equations shown in the graph below?**



A (–4, 3)

B (3, –4)

C (4, –3)

D (–3, 4)

11

Item Number	3140637	Correct Answer	B	p-value	.367	Equated Rasch value	1.5232
				2004 Aligned PO		RHS-S1C1-PO2	

11. Which of the following addition properties justifies the statement below?

$2 + 0 = 2$

A Commutative

B Identity

C Inverse

D Closure

12

Item Number	3140641	Correct Answer	B	p-value	.744	Equated Rasch value	-.4856
				2004 Aligned PO		RHS-S1C3-PO1	

12. A car made a trip of 352 miles on 16.8 gallons of gasoline. Which is closest to the number of miles per gallon the car got on that trip?

A 10 mpg

B 20 mpg

C 30 mpg

D 40 mpg

13

Item Number	3140647	Correct Answer	D	p-value	.777	Equated Rasch value	-.6142
				2004 Aligned PO		RHS-S2C1-PO9	

13. The table represents how the air temperature combines with the humidity to form the heat index.

HEAT INDEX TABLE

Relative Humidity	Air Temperature (°F)				
	85	90	95	100	105
60	90	100	114	132	149
55	89	98	110	126	142
50	88	96	107	120	135
45	87	95	104	115	129
40	86	93	101	110	123
35	85	91	98	107	118
30	84	90	96	104	113

Which statement is correct?

A As the humidity and temperature decrease, the heat index increases.

B As the humidity and temperature increase, the heat index decreases.

C As the humidity increases and the temperature decreases, the heat index increases.

D As the humidity and temperature increase, the heat index increases.

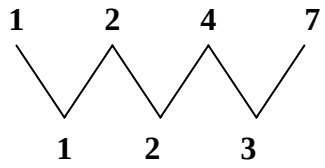
14

Item Number	3140653	Correct Answer	D	p-value	.832	Equated Rasch value	-1.0403
				2004 Aligned PO		RHS-S3C1-PO1	

14. **Sally wrote the number pattern shown below.**

1, 2, 4, 7, . . .

She noticed another pattern when she found that the difference between consecutive numbers increased by 1 as shown below.



If the difference continues to increase by 1, what will be the next two terms of the original pattern?

A 10, 13

B 10, 14

C 11, 15

D 11, 16

15

Item Number	3140660	Correct Answer	C	p-value	.663	Equated Rasch value	.0456
				2004 Aligned PO		RHS-S3C3-PO6	

15. **Which linear equation best represents the data in the table shown below?**

x	*y*
2	1
3	3
4	5

A $y = \frac{1}{2}x$

B $y = x - 1$

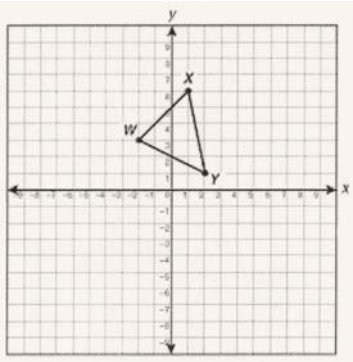
C $y = 2x - 3$

D $y = -2x + 5$

16

Item Number	3140697	Correct Answer	D	p-value	.683	Equated Rasch value	-.0552
				2004 Aligned PO		RHS-S4C2-PO3	

16. **What is the apparent image of *X* when triangle *WXY* is translated 2 units down and 5 units right?**



A (1, 3)

B (3, 1)

C (4, 6)

D (6, 4)

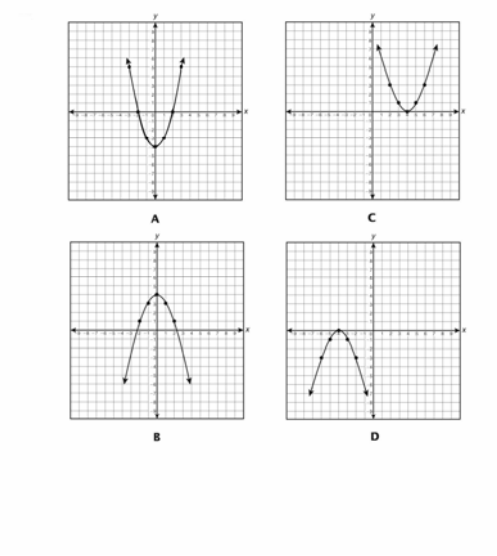
Item	Item Data

17

Item Number	3140699	Correct Answer	A	p-value	.679	Equated Rasch value	-.062
				2004 Aligned PO		RHS-S4C3-PO1	

17. **Which of the following represents the graph of the equation below?**

$y = x^2 - 4$



18

Item Number	3140710	Correct Answer	A	p-value	.543	Equated Rasch value	.6356
				2004 Aligned PO		RHS-S5C1-PO3	

18. **Which of the following could be a correct procedure for solving the inequality shown below?**

$$4x + 6 \leq 6x + 15$$

A $4x + 6 \leq 6x + 15$
$-2x + 6 \leq 15$
$-2x \leq 9$
$x \geq -\frac{9}{2}$

B $4x + 6 \leq 6x + 15$
$-2x + 6 \leq 15$
$-2x \leq 21$
$x \leq -\frac{21}{2}$

C $4x + 6 \leq 6x + 15$
$-2x + 6 \leq 15$
$-2x \leq 9$
$x \leq -\frac{9}{2}$

D $4x + 6 \leq 6x + 15$
$-2x + 6 \leq 15$
$-2x \leq 9$
$x \geq -\frac{21}{2}$

19

Item Number	3140725	Correct Answer	B	p-value	.669	Equated Rasch value	.0077
				2004 Aligned PO		RHS-S1C2-PO3	

19. **What is the value of the expression below?**

$$5 - |4| + |8 - 10|$$

A –1

B 3

C 7

D 11

20

Item Number	3140729	Correct Answer	D	p-value	.746	Equated Rasch value	-.4461
				2004 Aligned PO		RHS-S2C1-PO16	

20. **Which of the following could represent a census of a school?**

A sophomore class

B P.E. classes

C math club members

D entire student body

21

Item Number	3140872	Correct Answer	D	p-value	.607	Equated Rasch value	.355
				2004 Aligned PO		RHS-S4C1-PO2	

21. **Which of the following is always true?**

A A rectangle is a square.

B A rhombus is a rectangle.

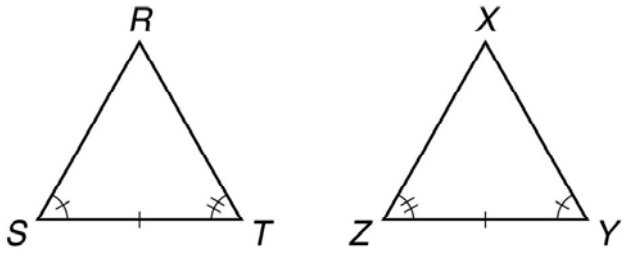
C A parallelogram is a rhombus.

D A rectangle is a parallelogram.

22

Item Number	3140879	Correct Answer	C	p-value	.707	Equated Rasch value	-.2361
				2004 Aligned PO		RHS-S4C1-PO11	

22. **Which principle of congruence could be used to prove triangle RST is congruent to triangle XYZ?**



A Side-Side-Side (SSS)

B Side-Angle-Side (SAS)

C Angle-Side-Angle (ASA)

D Side-Side-Angle (SSA)

23

Item Number	3140906	Correct Answer	B	p-value	.711	Equated Rasch value	-.2112
				2004 Aligned PO		RHS-S5C2-PO2	

23. **The statements below are out of order.**

W: If blitz, then kerd.
X: If mot, then det.
Y: If kerd, then mot.
Z: If toc, then blitz.

Which of the following puts the nonsensical if-then statements in logical order?

A W → Z → X → Y

B Z → W → Y → X

C W → Y → X → Z

D Z → X → Y → W

24

Item Number	3140911	Correct Answer	C	p-value	.371	Equated Rasch value	1.5366
				2004 Aligned PO		RHS-S2C2-PO6	

24. **Each event described below is performed randomly. Which is a dependent event?**

A From a bag of 10 marbles (4 red, 6 blue), Sam pulls a blue marble, puts it back, and then pulls a red marble.

B On a spinner with 6 congruent sectors numbered 1 through 6, Greg first spins a 4 and then a 2 on the second spin.

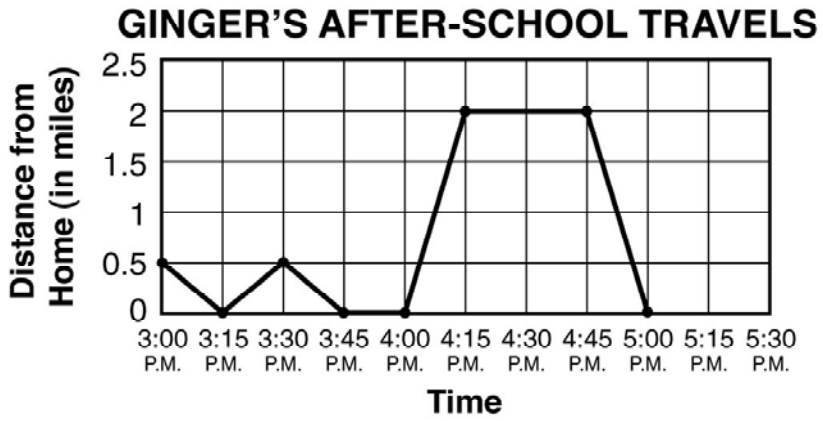
C From a pack of 20 cards, Jose picks 1 card, sets it aside, and then picks a matching card on his second try.

D Monica tosses a fair coin two consecutive times, and it lands on heads both times.

25

Item Number	3140928	Correct Answer	A	p-value	.74	Equated Rasch value	-.4219
				2004 Aligned PO		RHS-S3C2-PO6	

25. **Ginger left school at 3:00 P.M. and walked home, but went back to school for a book. She then walked home, had a snack, and took a bus downtown. Later, she took a bus home, arriving at 5:00 P.M. Which of the following statements is true?**



A Ginger's maximum distance from home was 2 miles.

B Ginger's minimum distance from home was 0.5 miles.

C At 3:30 P.M., Ginger is at her furthest distance from home.

D At 4:30 P.M., Ginger is back at her home.