

Arkansas Comprehensive Testing, Assessment & Accountability Program

Algebra I Spring End of Course Examination Released Item Booklet

April 2005 Administration

This document is the property of the Arkansas Department of Education and all rights of this document are reserved by the Arkansas Department of Education. Arkansas public schools may reproduce this document in full or in part for use with teachers, students, and parents. All other uses of this document are forbidden without written permission. All inquiries should be sent to Dr. Gayle Potter at the Arkansas Department of Education, 501-682-4558.

Arkansas Department of Education

- A plumber extended the length (x) of an existing drainpipe. He doubled the length and added 7 more inches. The extended drainpipe has a total length of 32 inches. Which equation represents the length of the extended drainpipe?
 - A. 2x 7 = 32
 - * B. 2x + 7 = 32
 - C. 2(x + 7) = 32
 - D. 7(2x) = 32
- 2. Mark has \$100 in his bank account. He spends \$5 per week on comic books. After how many weeks will Mark first have less than \$20 in his bank account?
 - A. 5 weeks
 - B. 6 weeks
 - * C. 17 weeks
 - D. 25 weeks

- 3. What is the domain of $F = \{(2, 1), (4, 3), (7, 8), (9, 8)\}$?
 - A. {1, 2, 3, 4, 5, 6, 7, 8, 9}
 B. {1, 2, 3, 4, 7, 8, 9}
 C. {1, 3, 8}
 * D. {2, 4, 7, 9}
- **4.** Jenny's dog had 6 puppies that weighed 20 ounces, 16 ounces, 22 ounces, 16 ounces, 19 ounces, and 15 ounces at birth. What is the mode weight of the puppies?
 - A. 6 ounces
 - * B. 16 ounces
 - C. 17.5 ounces
 - D. 18 ounces
- 5. Solve:

$$2x^2 - 4x = 6$$

* A.
$$x = -1 \text{ or } x = 3$$

B. $x = 1 \text{ or } x = -3$

- C. x = 2 or x = 0
- D. x = -2 or x = 0

Use the matrices below to answer question 6.

	Regular Price (dollars)			Sale Price (dollars)		
	Pants	Shirts		Pants	Shirts	
Blue	35	22	Blue	25	18	
Red	28	25	Red	22	21	
Black	_ 30	18	Black	25	16	

6. Dan bought 1 shirt and 1 pair of pants in each color at the sale prices. Which matrix shows how much money Dan saved on each item?

	13	7		60	40
A.	3	1	B.	50	46
	12	9		_55	34_
	10	17		10	4
C.	6	7	* D.	6	4
	5	14		5	2_

7. Mitch has 2 trees in his yard. The height of the taller tree is 4 feet more than 3 times the height of the shorter tree (s). Which expression represents the height of the taller tree?

- * A. 3s + 4
 - B. 3s 4
 - C. 3(s + 4)
 - D. 3(s 4)

8. Simplify:

$$-3x + 5y - 2y + 4 + 5x$$

A. 9
B. 9xy
C. 2x + 3y

* D.
$$2x + 3y + 4$$

- **9.** Which is an equation?
 - A. 3x + 2
 - B. 2x + 3x + 6
 - * C. 4x + 2 = 10
 - D. 6 + 3x + 4
- **10.** Which represents the sum of 4 and 5 added to the product of -3 and 2?
 - * A. 3
 - B. 8
 - C. 14
 - D. 19

11. Solve:

$$3x + 2 \ge 7$$

- A. $x \le \frac{5}{3}$ * B. $x \ge \frac{5}{3}$
 - C. $x \leq 3$
 - D. $x \ge 3$

Use the graph below to answer question 12.



- 12. As a cold front approached, Keith recorded the time-versus-temperature data above. What are the zeros of this function?
 - A. (0, 0), (1, 0) B. (1, 0), (3, 0) * C. (1, 0), (6, 0) D. (6, 0), (10, 0)
- **13.** The exam scores from a small algebra class are 61, 73, 83, 94, and 94. What is the mean of the scores?
 - A. 61
 - * **B**. 81
 - C. 83
 - D. 94

Use the equation below to answer question 14.

$$f(x) = 3x + 4$$

- **14.** What is *f*(2)?
 - A. 6
 - B. 7
 - * C. 10
 - D. 14
- 15. The speed of light is 1.86×10^5 miles per second. How many miles does light travel in 1 hour?
 - A. 6.696×10^5
 - B. 3.348×10^{6}
 - C. 5.58×10^7
 - * D. 6.696×10^8

16. Kara pays her electric bill every month. During the 6 warmest months, her bill is x dollars each month. During the 6 coldest months, her bill is y dollars each month. Kara's annual cost is shown in the formula below:

Annual Electric Cost = 6(x + y)

Kara simplified the right side of the equation to be 6x + 6y.

Which algebraic property did Kara use?

- A. associative
- B. commutative
- * C. distributive
 - D. reflexive

- 17. Albert has a water pump that fills a 750-gallon tank in 35 minutes. About how long will it take Albert to fill a 1,000-gallon tank with the same pump?
 - A. 26 minutes
 - * B. 47 minutes
 - C. 215 minutes
 - D. 250 minutes
- 18. Joe planted 315 acres of beans and hay. He planted 85 more acres of beans (b) than hay (h). Joe wrote the 2 equations below to represent the amount of each crop he planted:

$$b + h = 315$$
$$b = h + 85$$

How many acres of each crop did Joe plant?

- * A. 200 of beans and 115 of hay
 - B. 115 of beans and 200 of hay
 - C. 230 of beans and 85 of hay
 - D. 85 of beans and 230 of hay

19. A telephone service costs \$15 per month plus 10 cents per minute. Which is the correct function notation for this relationship, where *m* is the number of minutes?

A.
$$C(m) = 15m + 0.10$$

B. C(m) = 15.10m

C.
$$C(m) = 15m + 0.10m$$

* D. C(m) = 15 + 0.10m

Use the figure below to answer question 20.

$$x - 3$$
 Area = 54 x



20. Tim wrote this equation to find the area of the rectangle above:

$$x(x - 3) = 54$$

Which equation is equivalent to the one Tim wrote?

* A.
$$x^2 - 3x - 54 = 0$$

B. $x^2 - 3x + 54 = 0$
C. $x^2 + 3x - 54 = 0$
D. $x^2 + 3x + 54 = 0$

Use the graph below to answer question 21.



- 21. The length of the line in the graph can be found by simplifying $\sqrt{(4^2 + 1^2)} + 3 + \frac{(2)(\pi)(3)}{4}$. What is the length of the line? (Round to the nearest hundredth.) Use $\pi = 3.14$.
 - A. 6.49
 - B. 10.87
 - * C. 11.83
 - D. 12.71
- 22. The distance between Earth and the star Alpha Centauri is about 25×10^{12} miles. One light-year measures 5.83416×10^{12} miles. About how many light-years are between Earth and Alpha Centauri?
 - A. 0.23
 - B. 3.3
 - * C. 4.3
 - D. 15

Use the figure below to answer question 23.



- **23.** A length of wire needs to be cut in a ratio of 1:3. The original length of the wire was 24 inches. After the wire has been cut, what is the length of the longer piece of wire?
 - A. 6 inches
 - * B. 18 inches
 - C. 20 inches
 - D. 23 inches
- 24. Suzzi is training for her upcoming athletic season. She set a goal to run at least 40 miles in 7 days. She ran 4 miles on the first day. What is the least number of miles she must run over each of the remaining 6 days to reach her goal?
 - A. 4 miles
 - * B. 6 miles
 - C. $7\frac{1}{3}$ miles
 - D. 30 miles

25. Joe's car gets 20 miles per gallon of gas. Which table represents the relationship between gallons of gas and distance traveled?

A.	Gallons	Distance
	1	20
	2	10
	4	5
	5	4

C.	Gallons	Distance
	1	20
	2	30
	3	40
	4	50

Gallons	Distance
0	20
1	40
2	60
3	80

* D.

B.

Gallons	Distance
1	20
2	40
3	60
4	80

Use the figure below to answer question 26.



26. In the figure above, the area of the parallelogram is $4x^2 - 6x - 3$. The area of the triangle is $2x^2 + 3x - 8$. What is the total area of the 2 shapes?

* A.
$$6x^2 - 3x - 11$$

B.
$$8x^2 - 18x + 24$$

C.
$$6x^2 + 9x - 11$$

D. $2x^2 - 9x + 5$

- 27. Jacob has a triangular flowerbed. Each side of the flowerbed is a different length. The lengths of the sides are the first 3 odd prime numbers. What is the difference between the longest side and the shortest side?
 - A. 2
 - B. 3
 - * C. 4
 - D. 5

28. Which represents a function?

- A. $\{(1, 0), (2, 1), (2, -2), (3, 2), (3, -2)\}$
- B. $\{(1, 0), (1, 1), (1, 2), (1, 3), (1, 4)\}$
- C. $\{(0, 0), (1, 1), (1, 2), (2, 1), (2, 2)\}$
- * D. $\{(0, 0), (1, -1), (2, -2), (3, -3), (4, -4)\}$

Use the matrix below to answer question 29.

	10	0
Matrix T =	50	70
	_30	-50

29. What is 4T?

* A.	$\begin{bmatrix} 40\\200\\120\end{bmatrix}$	0 280 -200
B.	$\begin{bmatrix} 14\\54\\31 \end{bmatrix}$	4 74 -46
C.	10 50	0 70

D. 10 0 50 70

Use the table below to answer question 30.

Tory's Shoe Sales

Shoe Size	Number Sold
8	5
$8\frac{1}{2}$	8
9	15
$9\frac{1}{2}$	21
10	20
$10\frac{1}{2}$	19
11	12
$11\frac{1}{2}$	6
12	2

- **30.** Tory runs a shoe store. He recorded his sales by shoe size, as shown above. What is the mode size of shoe sold?
 - A. 8
 - * B. $9\frac{1}{2}$
 - C. 10
 - D. 12

Use the graph below to answer question 31.



Months

- **31.** The graph above shows the profit for Steve's Car Care for the first 10 months of the year. What are the zeros of the graph?
 - A. (0, 0) and (5, -4)
 - B. (1, 12) and (10, 21)
 - * C. (3, 0) and (7, 0)
 - D. (5, -4) and (10, 21)

32. What is the value of $\frac{4(3-w)}{2w}$ when w = -3?

- * A. -4
- B. 0
- C. 4
- D. 12

33. Factor:

 $x^2 + x - 12$

* A.
$$(x - 3)(x + 4)$$

B. $(x + 3)(x - 4)$
C. $(x + 3)(x + 4)$
D. $(x - 3)(x - 4)$

- **34.** Which is an expression?
 - A. 3y + 7x < 5
 - * B. 3y + 7x 5
 - C. 3y + 7x = 5
 - D. $3y + 7x \ge 5$

Use the system of equations below to answer question 35.

$$\begin{cases} 4x + 2y = 4.10 \\ 3x + 5y = 5.00 \end{cases}$$

- **35.** Jasper spent \$4.10 on 4 candy bars and 2 cans of soda. Cecelia spent \$5.00 on 3 candy bars and 5 cans of soda. After solving the system of equations above, which best describes the situation?
 - A. Jasper spent \$0.55 on candy bars and \$0.75 on soda.
 - B. Jasper spent an average of \$0.55 and Cecelia spent an average of \$0.75.
 - C. Candy bars cost \$0.55 and soda costs \$0.75.
 - * D. Candy bars cost \$0.75 and soda costs \$0.55.

36. Kate has a 20-minute drive to work. She stopped at one stoplight before arriving at work. Which graph shows Kate's drive?



37. A scientist recorded a data set of approximate altitude (kilometers) versus temperature (degrees Celsius):

 $\{(10, -40), (20, -55), (30, -42), (40, -20), (50, -3)\}$

What is the domain of this relation?

- A. 40
- B. 52
- C. {-55, -42, -40, -20, -3}
- * D. {10, 20, 30, 40, 50}

38. Solve:

5x - 3 < 2x + 4

- A. x < -1B. $x < \frac{3}{7}$ C. x < 1* D. $x < \frac{7}{3}$
- **39.** An Internet company charges \$9.95 per month plus \$0.05 per hour of usage. Mary used 80 hours in January. How much will she be charged?
 - * A. \$13.95
 - B. \$25.95
 - C. \$49.95
 - D. \$409.95

Use the figure below to answer question 40.



40. The perimeter of the trapezoid above is 10x - 1. What is the length of the longest base?

A.
$$3x - 6$$

B. $3x - 4$
C. $3x + 4$
D. $7x - 5$

- **41.** Which represents the statement "the sum of 5 and a number is less than or equal to -8"?
 - * A. $x + 5 \le -8$
 - B. x + 5 < -8
 - C. $x + 5 \ge -8$
 - D. $5x \leq -8$
- **42.** 69% of the students at a school are involved in after-school activities. There are 598 students in the school. Which is the best estimate of the number of students in after-school activities?
 - A. 360 students
 - B. 380 students
 - * C. 420 students
 - D. 450 students

Use the system of equations below to answer question 43.

$$\begin{cases} y = 3x - 1\\ y = -2x + 4 \end{cases}$$

- **43.** Where will the lines intersect?
 - A. $\left(\frac{3}{5}, \frac{4}{5}\right)$ * B. (1, 2) C. (3, 8) D. (5, 14)

B.

44. Which chart represents a function?

A.	Ounces	Calories
	4	200
	1.5	350
	2	300
	4	400

Gallons	Distance
14	350
10	200
14	210
8	184

*	C
•	U.

Width	Perimeter
4	12
3	12
2	12
1	12

D.	Width	Area
	2	16
	4	16
	2	18
	3	24

- **45.** One raindrop has a mass of 0.000001 kg. What is the total mass of 5 raindrops in scientific notation?
 - A. 1×10^{-6} kg
 - B. 1×10^6 kg
 - * C. 5×10^{-6} kg
 - D. 5×10^6 kg

- **46.** Which must be a whole number?
 - A. the time it takes to drive 300 miles at 55 mph
 - B. the area of a circle with a radius of 5 feet
 - C. the area of a triangle with base of 15 and height of 9
 - * D. the number of books in 12 bookstores

47. The Barnett family's phone bill for 2 months was:

January	91 minutes long distance	\$42.30
February	142 minutes long distance	\$57.60

Using the pattern, which equation represents the cost (C) of a phone bill for *m* minutes of long distance?

- * A. C = 0.30m + 15
 - B. C = 0.30m + 78.31
 - C. C = 3.33m 260.73
 - D. C = 15m + 0.30
- **48.** A woman's height (*H*) in inches can be estimated by the length of her thigh bone (*b*) using the following formula:

$$H = 1.95b + 28.68$$

To the nearest hundredth, what is the height of a woman whose thigh bone is 18 inches long?

- A. 30.63 inches
- B. 48.63 inches
- * C. 63.78 inches
 - D. 91.03 inches

49. Will had \$250 and spent \$7.50 per movie ticket. The function f(m) = 250 - 7.50m represents the amount of money Will has after seeing *m* movies. After seeing how many movies will he have \$10 left?

- * B. 32
- C. 34
- D. 35

50. Completely factor:

 $3x^2 + 6x$

A. $9x^2$

B.
$$3(x^2 + 2x)$$

- C. x(3x + 6)
- * D. 3x(x + 2)
- **51.** The Saunders and Smith Fuel Company delivers home heating oil for 89.9¢ per gallon, plus a charge of \$10.00 for delivery. Which equation would the company use to compute a customer's cost (*C*) in dollars for a purchase of *g* gallons?

* A.
$$C = 0.899g + 10$$

B.
$$C = 10 + g$$

- C. C = 10g + 0.899
- D. C = 10g + 0.899g
- 52. The factory listing on Clint's new car indicated the average mileage would be 30 miles per gallon (mpg). Clint's gas mileages for the past 3 weeks were 27 mpg, 31 mpg, and 30 mpg. How many miles per gallon must Clint's car get next week so that the average is equal to the factory listing?
 - A. 29
 - B. 30
 - * C. 32
 - D. 33

- **53.** It is 234 miles from Little Rock to Gravette. Richard has already driven 60 miles and is currently traveling at a speed of 65 miles per hour. About how long will the rest of the trip take?
 - A. 2 hours
 - * B. 3 hours
 - C. 5 hours
 - D. 66 hours

Use the table below to answer question 54.

Monthly Internet Access

Hours	Cost
20	\$15
30	\$20
50	\$30
100	\$45
200	\$55

- **54.** The cost of Internet access is shown in the table above. What is the independent variable in this situation?
 - A. type of service
 - B. cost per month
 - C. cost per hour
 - * D. hours per month

Use the graph below to answer question 55.



- **55.** The graph above shows the price for a dozen eggs over the past 5 weeks. The price continues to change at the same rate. What will be the price next week?
 - * A. \$0.99
 - B. \$1.03
 - C. \$1.11
 - D. \$1.19
- **56.** Solve for *f*:

$$f^2 - 2f + 1 = 0$$

- * A. f = 1 only
 - B. *f* = -1, 1
 - C. *f* = -1, 2

D.
$$f = -1$$
 only

Use the table below to answer question 57.

Light Bulb Replacement

Month	Number of Bulbs Replaced
January	3
February	4
March	2
April	8
May	4
June	2
July	0
August	1
September	2
October	0
November	7
December	5

- **57.** The number of light bulbs replaced last year in the school auditorium is shown in the table above. What was the mean number of bulbs replaced per month? (Round to the nearest tenth.)
 - A. 2.0
 - B. 2.5
 - * C. 3.2
 - D. 3.8

58. Which graph represents a function?





- **59.** Jess raked leaves at a constant rate of 40 square meters per hour. How long did it take her to rake an area of 100 square meters?
 - A. $\frac{2}{5}$ hour
 - B. $\frac{2}{3}$ hour
 - C. 1 hour

* D.
$$2\frac{1}{2}$$
 hours

60. The area of a triangle is $6x^2 - 12x + 3$. What is this area in factored form?

* A.
$$3(2x^2 - 4x + 1)$$

- B. $3(x^2 4x + 1)$
- C. $6(x^2 2x + 2)$
- D. $2(3x^2 6x + 1)$

PART III Released Open-Response Items — Algebra I

CALCULATOR PERMITTED ON ALL ITEMS

ALGEBRA I OPEN-RESPONSE ITEM A

- A. Melinda drove 21 miles to Carrie's house at an average speed of 33 miles per hour.
 - 1. Determine the amount of time it took Melinda to drive to Carrie's house. Show or explain all of your work even if you use mental math or a calculator.
 - 2. After her visit, it took Melinda $\frac{1}{2}$ hour to drive 18 miles from Carrie's house to a store. Determine the rate that Melinda drove from Carrie's house to the store. Show or explain all of your work even if you use mental math or a calculator.

BE SURE TO LABEL YOUR RESPONSES (1) AND (2).

ALGEBRA I OPEN-RESPONSE ITEM B

B. Jamar and Bonita work in the marketing department of a computer company. Each developed a model to predict the annual profit for the company for the next 10 years:

Jamar's model: $P_1 = 0.2t + 3.1$ Bonita's model: $P_2 = 0.3t + 2.4$

where t is time in years from 1 to 10 and P_1 and P_2 represent profit in millions of dollars.

- 1. Explain how the 2 equations model profit. Be sure to describe any similarities or differences between the models. Show or explain all of your work even if you use mental math or a calculator.
- 2. Determine the year when the 2 models will show equal profits. Show or explain all of your work even if you use mental math or a calculator.

BE SURE TO LABEL YOUR RESPONSES (1) AND (2).

ALGEBRA I OPEN-RESPONSE ITEM C





(Not drawn to scale.)

- C. The parking lot at George's Grocery is 60 feet long and 40 feet wide. George plans to expand the parking lot by increasing the length and the width by the same amount (x).
 - 1. Write an expression in terms of x to represent the new length. Write a second expression in terms of x to represent the new width.
 - 2. George plans to build a fence all the way around the expanded lot except for a 15-foot entrance. Write an expression in terms of *x* that represents the amount of fence George needs to buy. Show or explain all of your work even if you use mental math or a calculator.
 - 3. The expanded parking lot will have twice the area of the original parking lot. Determine the dimensions of the expanded parking lot. Show or explain all of your work even if you use mental math or a calculator. Include units in your answer.

BE SURE TO LABEL YOUR RESPONSES (1), (2), AND (3).

ALGEBRA I OPEN-RESPONSE ITEM E

- **E.** Chad has a total of 5 people in his family.
 - Sally is Chad's twin sister.
 - Chad's sister Hailey is 4 years older than Chad.
 - Chad's mother was 24 when Chad was born.
 - Chad's father is 3 years older than his mother.
 - 1. Write an expression for each family member's age as a function of Chad's age (x). Clearly label each expression. Show or explain all of your work even if you use mental math or a calculator.
 - 2. The average age of the 5 family members is 22. Determine the age of Chad's sister Hailey. Show or explain all of your work even if you use mental math or a calculator.

BE SURE TO LABEL YOUR RESPONSES (1) AND (2).

ALGEBRA I OPEN-RESPONSE ITEM F

F. Julie needs to have her car repaired. Mechanic Mike charges a fee of \$25 plus \$30 per hour, plus the cost of any new car parts. He tells Julie that the cost of the parts will be \$235. This situation is represented in the function below:

$$C = 25 + 30t + p$$

In this function, C is the total cost, t is the number of hours, and p is the cost for new parts.

1. Julie wants to find the cost of her auto repair based on the number of hours for the repairs mechanic Mike will do. Copy and complete the table below in your Student Answer Document using the information and function above. Show or explain all of your work even if you use mental math or a calculator.

t 0 2 4 6	Cost of Auto Repair				
	t	0	2	4	6

Cost	of Auto	Repair
------	---------	--------

- 2. Julie's car has a value of \$770. Determine how long mechanic Mike can work on her car before the total charge equals the car's value. Show or explain all of your work even if you use mental math or a calculator.
- 3. Julie decides to get a second estimate. Mechanic Betty uses the same cost equation as mechanic Mike. However, mechanic Betty will buy used parts that cost 30% less than the new parts mechanic Mike will buy. Determine how long mechanic Betty can work on Julie's car before the total charge equals the car's value. Show or explain all of your work even if you use mental math or a calculator.

BE SURE TO LABEL YOUR RESPONSES (1), (2), AND (3).

C

Released Items for Algebra I *

ltem	Content Standard/Goals	Expectation
1	1	5
2	2	2
3	4	2
4	3	4
5	5	3
6	3	2
7	1	5
8	5	1
9	1	6
10	1	2
11	2	2
12	4	4
13	3	4
14	4	1
15	5	4
16	1	7
17	2	1
18	3	3
19	4	1
20	5	3
21	1	3
22	5	4
23	2	4
24	2	2
25	3	1
26	5	1
27	1	2
28	4	3
29	3	2
30	3	4
31	4	4
32	1	3
33	5	2

Item	Content Standard/Goals	Expectation
34	1	6
35	2	3
36	4	6
37	4	2
38	2	2
39	3	3
40	5	1
41	1	4
42	2	3
43	3	3
44	4	3
45	5	4
46	1	1
47	3	3
48	2	1
49	4	1
50	5	2
51	1	4
52	2	1
53	2	3
54	4	5
55	3	1
56	5	3
57	3	4
58	4	3
59	2	1
60	5	2
A	2	1
В	3	3
С	5	3
E	1	5
F	4	6

*Only the predominant Content Standard/Goals and learning expectation is listed for the Algebra I items.