

Arkansas Comprehensive Testing, Assessment, and Accountability Program

Released Item Booklet

Benchmark Examination Grade 8

April 2007 Administration

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Arkansas Department of Education

CALCULATOR NOT PERMITTED—ITEMS 1–8

1. Which is a **correct** statement of the Pythagorean theorem, using the figure below?



$$A. \quad E^2 = F^2 + D^2$$

$$B. \quad D^2 = E^2 + F^2$$

- * C. $F^2 = D^2 + E^2$
 - $D. \quad F^2 = D^2 E^2$
- 2. The box-and-whisker plots below show the bushels of corn harvested, per acre, for two companies.

Which identifies the company having the largest interquartile range for its crop and the **correct** value for that range?

- A. Company A, 35 bushels
- B. Company B, 53 bushels
- C. Company A, 20 bushels
- * D. Company B, 24 bushels

3. A scatterplot was constructed showing the sales and advertising costs for ten companies in 1995.



Why was a scatterplot a good choice for displaying these data?

- * A. It displays relationships between two variables.
 - B. It displays change over time.
 - C. It displays parts of a whole.
 - D. It displays categories.
- 4. Which lists the numbers below in order from **least** to **greatest**?

 3.2×10^{5} 32,000 3.2×10^{-5}

- A. 32,000 3.2×10^{-5} 3.2×10^{5}
- B. 3.2×10^{-5} 3.2×10^{5} 32,000

C.
$$3.2 \times 10^5$$
 3.2×10^{-5} $32,000$

* D.
$$3.2 \times 10^{-5}$$
 32,000 3.2×10^{5}

- 5. Sara keeps track of the number of miles she runs each day. She starts by running 2 miles the first day, and then increases the distance by $\frac{1}{4}$ of a mile each day. Which statement is true about the number of miles Sara runs in relation to the number of days she runs?
 - A. The number of miles is the independent variable.
 - * B. The number of days is the independent variable.
 - C. Neither the number of miles nor the number of days are the independent variable.
 - D. There is not enough information to tell which is the independent variable.
- 6. The figure below is a small section of an inch ruler. What are the smallest graduation marks on this ruler?



- A. $\frac{1}{8}$ inch
- B. $\frac{1}{16}$ inch

* C.
$$\frac{1}{32}$$
 inch

D.
$$\frac{1}{64}$$
 inch

7. Kara is a waitress in a restaurant. For three days she counted the number of different drinks she served and put the results in a pie chart, as shown below. Which beverage is represented by a 70-degree angle? You may use your protractor.



- B. soft drink
- C. water
- D. coffee
- 8. Which operation should be used first to solve the equation below?

$$\frac{x}{2} + 3 = 11$$

- * A. Subtract 3 from both sides.
 - B. Multiply both sides by *x*.
 - C. Divide both sides by 2.
 - D. Add 11 to both sides.

CALCULATOR PERMITTED—ITEMS 9-40

9. The manager of an ice cream store noticed that, on average, the number of chocolate milkshakes sold is 1 more than twice the number of strawberry milkshakes sold. Which table **best** represents this pattern?

A.	strawberry	1	2	3
	chocolate	1	3	5

B.	strawberry	1	2	3
	chocolate	2	3	4

C.	strawberry	1	2	3
	chocolate	2	5	10

*D.	strawberry	1	2	3
	chocolate	3	5	7

- 10. Tereese needs to add $1\frac{1}{2}$ gallons of fluid to her mixture. She only has a 1-cup measure. How many cups should she add to her mixture to equal $1\frac{1}{2}$ gallons?
 - A. 16 cups
 - B. 18 cups
 - * C. 24 cups
 - D. 48 cups

11. Officer Jackson is researching recorded speeds on a particular roadway. Which data set has a mean closest to 34 mph?

A.	34	34	36	37	38	44	45
B.	29	28	31	34	39	40	50
C.	30	29	28	40	55	24	25
* D.	14	34	25	36	38	39	54

12. Figure ABCD is similar to figure WXYZ.



Which completes the ratio below?

$$\frac{\overline{\mathrm{BC}}}{\overline{\mathrm{XY}}} = \frac{\overline{\mathrm{CD}}}{?}$$

A.
$$\overline{WX}$$

- B. \overline{WZ}
- * C. \overline{YZ}
 - D. \overline{XY}

Released Mathematics Items—2007 Benchmark Grade 8 PART II

13. What is the value of the expression below?

$$\frac{1}{5}$$
 [(5 + 14) – 2(7)]

* B. 1
C.
$$23\frac{4}{5}$$

1

- 25 D.
- 14. Values for the equation y = 3x 1 are given in the table below.

x	у
1	2
2	5
3	8
4	11

Which statement is true?

- * A. The independent variable is increasing by 1.
 - B. The dependent variable is decreasing by 3.
 - C. The independent variable is increasing by 3.
 - The value of the independent variable is D. twice the value of the dependent variable.

15. What is the solution to the inequality below?

8 - 5x > 33

- * A. x < -5
 - B. x > -5
 - C. *x* < 11
 - D. x > 11

Maria compared her eating habits with the 16. daily recommended values in the graph below.



Maria needs to eat more of which foods?

- grain and meat A.
- grain and fruit B.
- vegetables and fruit * C.
 - milk and meat D
- 17. If $y = -2\frac{1}{8}$, and $x = 1\frac{1}{4}$, what is the solution for the expression below?

$$8y + 12x$$

$$-3\frac{7}{8}$$

$$-2$$

$$20\frac{7}{8}$$

$$32$$

A.

* B.

C.

D.

- 18. Don is going to paint his garage, and he needs to calculate the surface area to determine how much paint to buy. What is the **best** unit of measure for this task?
 - * A. square feet
 - B. square inches
 - C. square millimeters
 - D. square centimeters
- **19.** The unknown side length, *a*, is the leg of the triangle, and **not** the hypotenuse because



- A. it is the longest side next to the right angle.
- B. it has to equal 8, so it is the shortest side.
- * C. it is not opposite the right angle.
 - D. it is on the top of the triangle.
- **20.** What is the solution to the equation below?

$$-\frac{x}{6} + 2 = 14$$

- A. x = -96
- B. x = 72
- C. -x = 72
- * D. x = -72

21. Mayra wants to find the height of her school building. She stands 40 feet away from the building. A 5-foot-tall friend stands 8 feet in front of her.



What is the height of Mayra's school building?

- A. 20 feet
- * B. 25 feet
 - C. 40 feet
 - D. 64 feet
- 22. What is the solution to the expression below when x = 3, and $y = \frac{1}{2}$? $2x^2 - 4y$ A. 8 * B. 16 C. $17\frac{1}{2}$ D. 34

- 23. Jim measured the length of his rope to be 5 yards plus 384 inches. What is the length of Jim's rope, in feet?
 - A. 37 feet
 - B. 45 feet
 - * C. 47 feet
 - D. 53 feet
- 24. In basketball, players shoot free throws after they have been fouled. Assume the theoretical probability of making a free throw is $\frac{1}{2}$. Justin made 28 out of 35 free throws. How do the two probabilities compare?
 - A. The two probabilities are equal.
 - B. The difference of the two probabilities is $\frac{27}{33}$.
 - C. The theoretical probability is 30% higher than Justin's experimental probability.
 - * D. Justin's experimental probability is 30% higher than the theoretical probability.
- 25. A \$53 racquet at Sports Heaven is on sale for 20% off the regular price. Sales tax is $8\frac{1}{4}$ %. What will be the total cost of the racquet, including the discount and taxes?
 - A. \$38.90
 - B. \$42.40
 - C. \$45.00
 - * D. \$45.90

26. Emma climbs up a ladder to get into a hot-air balloon. The balloon is set to rise at a constant rate. Below is a graph of the balloon's height from the ground as it begins to rise.



Which statement is true?

- A. The ladder Emma climbed is 3 feet tall.
- * B. The ladder Emma climbed is 10 feet tall.
 - C. The balloon rises at a rate of 10 feet per minute.
 - D. The balloon rises at a rate of 13 feet per minute.

27. The measurements of the one-centimeter (cm) cube shown below are displayed in the following table.



·····

Weasurements of Cube				
	One-Centimeter Cube	Two-Centimeter Cube		
length of an edge	1 cm	2 cm		
perimeter of a face	4 cm	Р		
area of a face	1 cm^2	A		
volume of the cube	1 cm^3	V		

Which values correctly complete the table?

- * A. $P = 8 \text{ cm}, A = 4 \text{ cm}^2, V = 8 \text{ cm}^3$
 - B. $P = 8 \text{ cm}, A = 4 \text{ cm}, V = 8 \text{ cm}^3$
 - C. $P = 8 \text{ cm}, A = 4 \text{ cm}^2, V = 4 \text{ cm}^3$
 - D. $P = 4 \text{ cm}, A = 8 \text{ cm}^2, V = 8 \text{ cm}^3$
- **28.** Which number can be found on the number line below?

$$\begin{array}{c} \bullet & \bullet & \bullet & \bullet \\ -2 & -1 & 0 & 1 & 2 & 3 & 4 & 5 & 6 \end{array} \\ A. & -\sqrt{6} \\ B. & -(1.5)^2 \\ * C. & \sqrt{22} \\ D. & 3.8^2 \end{array}$$

29. Which rule **correctly** describes the function table below?

	x	-3	-1	0	2	4
	f(x)	6	-2	-3	1	13
	<i>(</i>)	2	2			
А.	$f(x) = x^2 + 3$					
* B.	$f(x) = x^2 - 3$					
C.	f(x)	$= -x^{2}$	² + 3			

D. $f(x) = -x^2 - 3$

30. The weights, in pounds, of pumpkins exhibited at the state fair are shown in the table below.

Name	Pumpkin Weight
Sam	48
Jenna	46
Taylor	54
Derek	52
Tasha	32
Kristin	5
Nate	59
Logan	38
Myki	41

Kristin's pumpkin weighs considerably less than the other pumpkins. How does the inclusion of this outlier affect the measures of central tendency in this table?

- A. The range is lower.
- * B. The mean is lowered.
 - C. The mode is changed.
- * D. The median is changed.

*Responses B and D are both correct for item 30. Students were given credit for either answer.



31. A tree diagram of the outcomes of flipping a fair coin and spinning the spinner is shown below.

What is the probability of flipping a head with the fair coin and landing on the green space on the spinner?



32. The isometric drawing below is the back-left view of the object. What view is represented in the figure to the right of the isometric drawing?



- * A. top view
 - B. left view
 - C. right view
 - D. front view

33. Figure ABCD is shown below.



Which is the reflection of figure ABCD over the *x*-axis?



 $\xrightarrow{\mathbf{D} \subset \mathbf{C}} x$

34. Penny is using the map below for directions to drive to her friend's house. Once she gets to point X on the map, she is to go south $1\frac{1}{4}$ in.,

and then go east $\frac{9}{16}$ of an in. At what point should she end? You may use your ruler.



35. What is the area, in square feet, of the figure below?



36. In the graph below, when points A, B, and C are connected, they form a right triangle. What is the distance from point B to point C?



- B. $\sqrt{41}$
- C. $\sqrt{116}$
- * D. $\sqrt{164}$
- **37.** What are the LCM and GCF of the algebraic expressions below?

$$8x^{3}y^{2}$$

$$12x^{4}y^{3}$$

$$16x^{3}y^{3}$$

* A. $LCM = 48x^4y^3$, $GCF = 4x^3y^2$

- B. LCM = $4x^3y^2$, GCF = $48x^4y^3$
- C. LCM = $24x^4y^3$, GCF = $4x^3y^2$
- D. LCM = $4xy^2$, GCF = $8x^3y^2$

38. Given lines *a* and *b* shown below, which is true?



Lines a and b are perpendicular because

- A. the slope of line *a* is $\frac{1}{3}$, and the slope of line *b* is 3.
- * B. the slope of line *a* is $\frac{1}{3}$, and the slope of line *b* is -3.
 - C. the slope of line *a* is 3, and the slope of line *b* is $\frac{1}{3}$.
 - D. the slope of line *a* is -3, and the slope of line *b* is $-\frac{1}{3}$.

39. A red, a white, and a blue jelly bean are in a cup. Three students each draw one jelly bean from the cup, without replacing it.



According to the tree diagram above, what is the theoretical probability of drawing a red jelly bean first, a white second, and a blue third?

- A. 2 out of 6
- * B. 1 out of 6
 - C. 1 out of 3
 - D. 1 out of 2

- **40.** On average, Juan types 35 words per minute. The time it takes Juan to type a book report depends on how many words are in his report. This would be described as $f(x) = \frac{x}{35}$. What is the independent variable in this case?
 - A. the length of the book read
 - B. the rate at which Juan types
 - * C. the number of words in the report
 - D. the time it takes Juan to type the report

MATHEMATICS OPEN-RESPONSE ITEM A

A. Greg and Pam are each building a pyramid of blocks. The number of blocks needed is represented by the rule $\frac{n(n+1)}{2}$, where *n* is the number of levels in the pyramid. The pattern for the pyramid is shown below.



- 1. In your answer document, draw the next pattern in the sequence.
- 2. How many blocks would be in a 10-level pyramid? Show your work.
- 3. Greg has 4-inch blocks, and Pam has 2-inch blocks. They are each going to build a 24-inch tall pyramid. Greg predicts he will need half as many blocks as Pam since his blocks are twice as large. Compare the pyramids to explain why Greg is incorrect.

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

SCORE	DESCRIPTION
4	The student earns 4 points. The response contains no incorrect work.
3	The student earns $3-3\frac{1}{2}$ points.
2	The student earns $2-2\frac{1}{2}$ points.
1	The student earns $\frac{1}{2}-1\frac{1}{2}$ points, or some minimal understanding is shown.
0	The student earns 0 points. No understanding is shown.
В	Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)

RUBRIC FOR MATHEMATICS OPEN-RESPONSE ITEM A

MATHEMATICS OPEN-RESPONSE ITEM B

B. The eighth-grade students at River Middle School were surveyed to see what type of television show was their favorite. Below are the results.

of Television Show				
Type of Show	Number of Boys	Number of Girls		
comedy	40	32		
reality	18	13		
cartoons	32	15		
drama	10	40		

Survey of 200 Eighth-Grade Students' Favorite Type of Television Show

- 1. On the grid provided in your answer document, draw a double-bar graph of the data given in the table in order to compare the boys to the girls. Remember to use all graphing techniques in completing your graph.
- 2. According to the shape of the data in your bar graph, what is one conclusion that can be made about the outcome of the survey?

BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

RUBRIC FOR MATHEMATICS OPEN-RESPONSE ITEM B

SCORE	DESCRIPTION
4	The student earns 4 points. The response contains no incorrect work.
3	The student earns 3 points.
2	The student earns 2 points.
1	The student earns 1 point, or some minimal understanding is shown.Ex: 2 major errors.Ex: 1 major error and 4 or 5 minor errors if the bar heights are off by no more than 5 units.
0	The student earns 0 points. No understanding is shown.
В	Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)

MATHEMATICS OPEN-RESPONSE ITEM C

- C. Answer the following.
 - 1. On the grid provided in your answer document, plot a triangle with the vertices (2, 5), (-3, 6), and (-2, 3).
 - 2. Plot a triangle congruent to the triangle in Part 1, located 5 units to the right and 3 units down. What are the new coordinates of the vertices after the transformation has been performed?
 - 3. Classify the transformation as being either a reflection, translation, or rotation.

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

RUBRIC FOR MATHEMATICS OPEN-RESPONSE ITEM C

DESCRIPTION
The student earns 4 points. The response contains no incorrect work.
The student earns 3 points.
The student earns 2 points.
The student earns 1 point.
The student earns 0 points. No understanding is shown.
Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item Score of "0" assigned for the item)

MATHEMATICS OPEN-RESPONSE ITEM D

D. The figure below is a pyramid with a slant height of 10 inches and a 12-inch square base.



- 1. What is the surface area of the pyramid? Show your work.
- 2. Find the height, *h*, of the pyramid. Show your work.
- 3. What is the volume of the pyramid? Show the formula and your work.

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

SCORE	DESCRIPTION	
4	The student earns 6 points. The response contains no incorrect work. The response contains the correct labels of "square inches" in Part 1, "inches" in Part 2, and "cubic inches" in Part 3.	
3	The student earns 4–5 points.	
2	The student earns 3 points or 2 points if the points are from different parts.	
1	The student earns 2 points from the same part, or the student earns 1 point, or some minimal understanding is shown.Ex: The student finds the area of the base and four triangles in Part 1 but does not add.Ex: The student finds the area of at least one triangle in Part 1.	
0	The student earns 0 points. No understanding is shown.	
В	Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)	

RUBRIC FOR MATHEMATICS OPEN-RESPONSE ITEM D

MATHEMATICS OPEN-RESPONSE ITEM E

- **E.** Answer the following.
 - 1. On the grid provided in your answer document, write the numbers below in order from **least** to **greatest**.

5 3.14159
$$\sqrt{3}$$
 -2 $\frac{3}{4}$ -0.5 -1.51511

- 2. Draw a number line on which all the numbers will fit.
- 3. Plot each number on the number line from Part 2, using a dot for each, and label the number.

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

RUBRIC FOR MATHEMATICS OPEN-RESPONSE ITEM E

SCORE	DESCRIPTION
4	The student earns 4 points. The response contains no incorrect work.
3	The student earns $3-3\frac{1}{2}$ points.
2	The student earns $2-2\frac{1}{2}$ points.
1	The student earns $\frac{1}{2}-1\frac{1}{2}$ points.
0	The student earns 0 points. No understanding is shown.
В	Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)