Kansas City Area Teachers of Mathematics
2016 KCATM Math Competition

ALGEBRAIC REASONING
GRADE 5

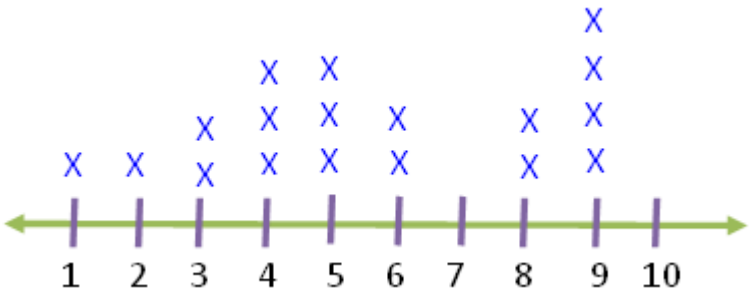
INSTRUCTIONS

- **Do not open this booklet** until instructed to do so.
- Time limit: **15 minutes**
- You **may use calculators** on this test.
- Use the π **key** on your calculator **or 3.14** as the approximation for pi.
- Mark your answer on the answer sheet by **FILLING in the oval**.
- You **may not use rulers, protractors, or other measurement devices** on this test.

Student Name _____

School _____

Use the line plot graph showing how many times a day students get on Facebook for problems #101-103.



101. Find the **mean** (average) times per day a student gets on Facebook. Round your answer to the nearest tenth.

A. 5.6 B. 2.1 C. 9.0 D. 4.5 E. None of the above

102. What is the median?

A. 4 B. 5 C. 6 D. 7 E. None of the above

103. What is the mode?

A. 4 B. 5 C. 9 D. 8 E. None of the above

Write the expressions for #104-106.

104. **Five times the sum of a number, x, and 6**

A. 5x + 6 B. 5(x + 6) C. 5(6) + x
D. x(5 + 6) E. None of the above

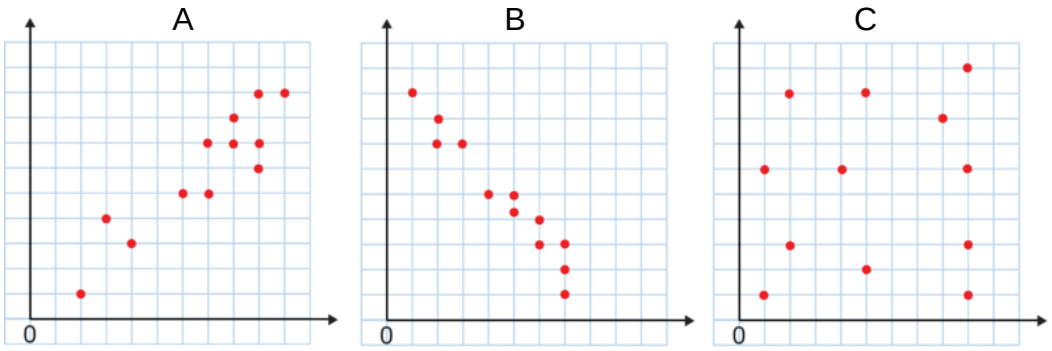
105. **Seven less than a number, x.**

A. 7 + x B. 7 - x C. x - 7 D. 7x E. None of the above

106. The **product of two consecutive integers**, such as 4 x 5 or 10 x 11.

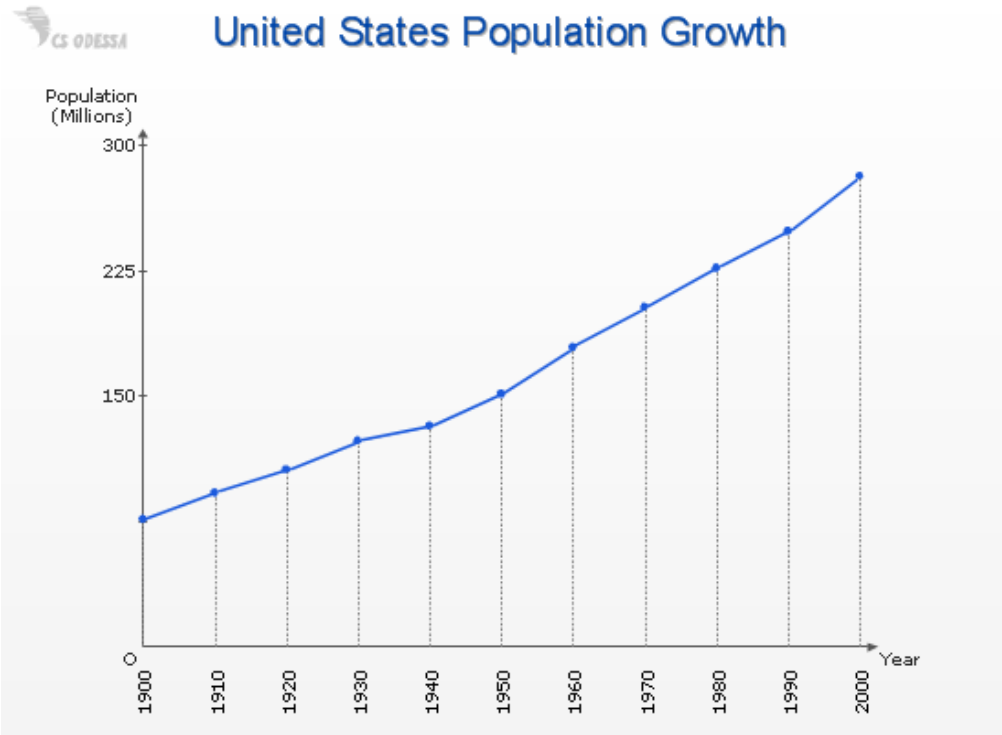
A. (n)(n + 1) B. (n)(n + 2) C. n x n
D. n x 2n E. None of the above

107. Which of the following graphs shows a **negative correlation** (trend)?



E. None of the above

Use the US Population Graph for problems #108-109.



108. Which year did the US Population reach 150 million?

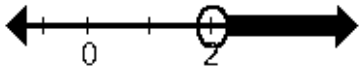
A. 1940 B. 1950 C. 1960 D. 2000 E. None of the above

109. If the trend continued, what would you estimate the population to be in 2010?

A. 310 million B. 380 million C. 400 million
D. 280 million E. None of the above

110. Which graph shows the inequality: **$y \geq 2$** ?

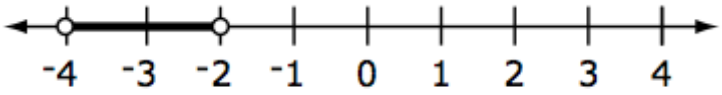
A. 

B. 

C. 

D. 

111. **Which inequality** is graphed below?



A. $-4 < x < -2$ B. $-4 \leq x \leq -2$ C. $-2 > x > -4$
D. $-4 > x > -2$

Solve for x, which means to find the value of x that makes the equation true, in problems #112-116.

112. $3x = 42$

A. 12 B. 14 C. 15 D. 16 E. None of the above

113. $\frac{x}{4} = 6$

A. 10 B. 20 C. 24 D. 26 E. None of the above

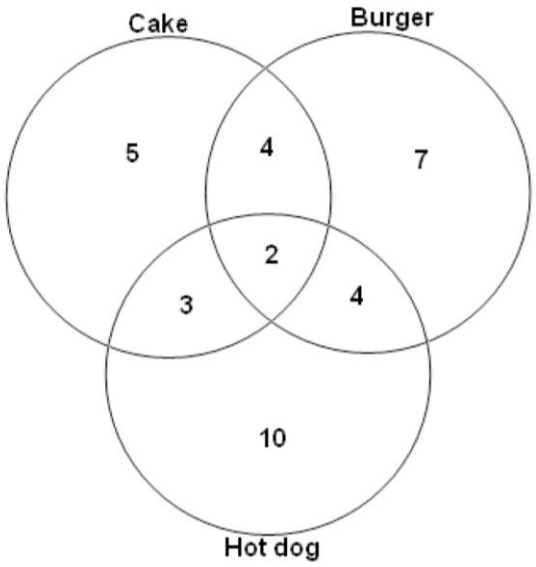
114. $2x - 5 = 19$

A. 12 B. 14 C. 15 D. 16 E. None of the above

115. $\frac{3}{2}x = 12$

A. 4 B. 6 C. 8 D. 10 E. None of the above

Use the Venn Diagram for birthday party food choices in problems #116-117.



116. How many people **chose a burger and cake**?

A. 4 B. 6 C. 17 D. 13 E. None of the above

117. How many people **chose a hot dog, burger, and cake?**

A. 19 B. 9 C. 7 D. 2 E. None of the above

Find the <u>value of the expression</u> when you are given the value of the variable for #118-119.

118. Evaluate: $2(x + 3)$ when $x = 5$

A. 13 B. 10 C. 14 D. 16 E. None of the above

119. Evaluate: $-x + 5$ when $x = 4$

A. 1 B. -1 C. 9 D. -9 E. None of the above

120. Juan's father is five years more than 3 times Juan's age. If his father is 35, **how old is Juan?**

A. 8 B. 9 C. 10 D. 11 E. None of the above

121. The length of a rectangle is twice its width, w. **What is the expression for the perimeter?**

A. 8w B. 2w C. 4w D. 6w E. None of the above

122. What is $\mathbf{5^2}$?

A. 10 B. 25 C. 7 D. 3 E. None of the above

123. **Evaluate** the expression using your order of operations: $6^2 - 2(6 + 2)$

A. 2 B. -2 C. 20 D. 272 E. None of the above

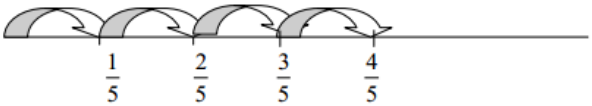
124. What is the probability of tossing a tails on a coin?

A. 1/2 B. 1/3 C. 1/4 D. 1 E. None of the above

125. Simplify the expression: 5y + 2 + 6y – 8

A. 14y + 10 B. 4y - 6 C. 8y + 6 D. 11y E. None of the above

126. Which statement below is correct based on the number line below?



A. 5(1/5) B. 4(1/5) C. 1 D. 1/5 + 1/5 + 1/5 E. None of the above

127. **Which inequality statement is <u>correct</u>?**

A. $3.14 < \pi$ B. $3.14 > \pi$ C. $3.15 = \pi$
D. $3.14159 < 3.14$ E. None of the above

128. Which **property** is **<u>NOT</u>** used to solve this problem?

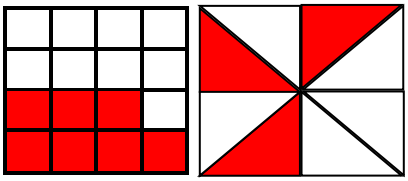
$$4n - 2 = 13 + n$$
$$3n - 2 = 13$$
$$3n = 15$$
$$n = 5$$

A. Addition property of equality B. Division property of equality
C. Distributive property D. Subtraction property of equality
E. All properties above are used.

129. Evaluate: **4 x 2 – 2 x 2 + 4 ÷ 2 – 2 x 2**

A. 2 B. 1 C. 0 D. -2 E. None of the above

130. The shaded parts of shape A represent fraction A, and the shaded parts of shape B represent fraction B. **Evaluate: A + B**



A B

A. $\frac{13}{16}$ B. $\frac{1}{4}$ C. $\frac{1}{16}$ D. $\frac{1}{8}$ E. None of the above

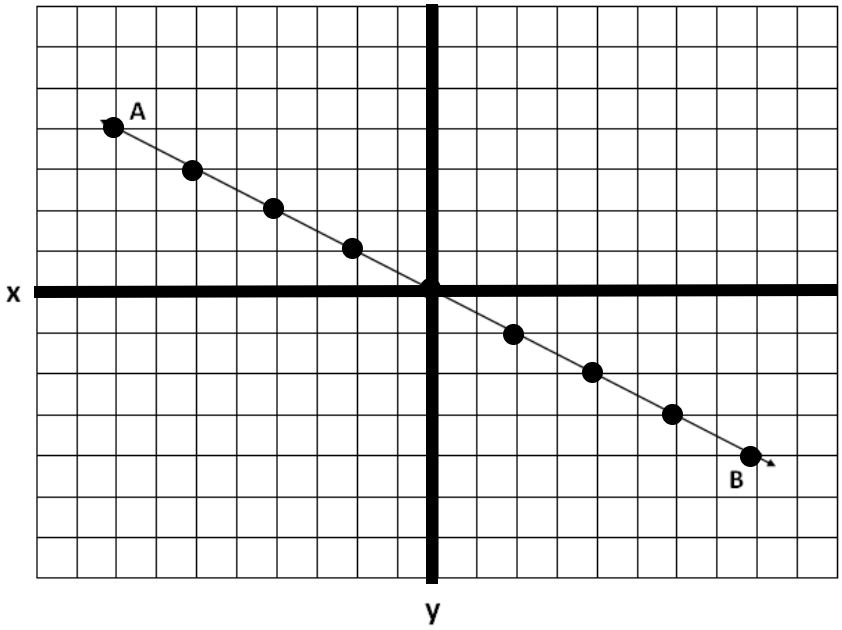
131. $f(x) = 4x + 2(x - 5)$ Find f(3). *(Hint: Substitute 3 in for the value of x.)*

A. -20 B. 25 C. 0 D. 8 E. None of the above

132. What is the **inverse operation for addition**? *(Hint: the operation that "undoes" addition)*

A. Subtraction B. Multiplication C. Division D. Sq. Root E. None of the above

Use the coordinate plane with the points graphed below for problems #133-137.



133. What are the **coordinates** of pt. B?

A. (-8, -4) B. (8, -4) C. (9, -3) D. (-8,4) E. None of the above

134. What is the **slope** (rise/run) of the $\overline{AB}$?

A. Undefined B. zero C. - 1/2 D. - 2 E. None of the above

135. What are the coordinates of the **midpoint** of $\overline{AB}$?

A. (2, -1) B. (0, 0) C. (-2, 1) D. (-8, 4) E. None of the above

136. **Which example best fits the trend of the graph?**

A. Your company is making money. B. Your company is breaking even.
C. Your company is losing money.

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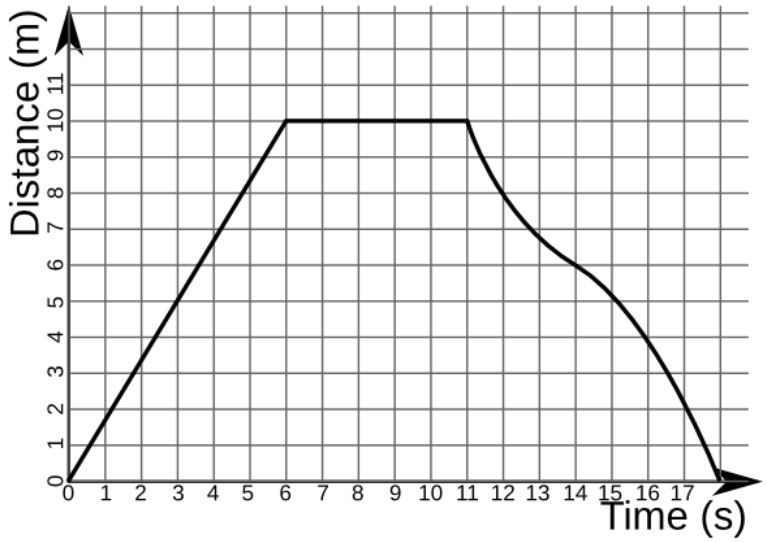
137. You bought 3 gifts for $30 each and 4 of another gift and spent $190. Which of the following equations would **NOT** help you find the cost of each of the 4 gifts?

A. $190 - $90 = 4x B. $190 = 4x + 3($30) C. $190 – 4x = $30(3)
D. $190 – 3(x) = 4 E. None of the above

Use the graph below for problems #138-139.



138. **Which story can be used to <u>describe the function</u>** in the graph above?

en.wikibooks.org

A. In 6 seconds you were 10 meters away from home. You stopped for 5 seconds, then ran at a consistent rate all the way back home.

B. In 6 seconds you were 10 meters away from home. You stopped for 5 seconds, then ran fast, then slowed up and continued in an uneven pattern of running home.

C. After 6 meters, you stopped and ran home.

D. After running as fast as you could for 10 seconds, then stopped.

E. None of the above

139. The **horizontal line** in the graph **has a <u>slope</u>** that is ___

A. undefined B. zero C. positive D. negative E. None of the above

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140. If the first three tests you had you scored: 78%, 91%, 86%, **what would you have to <u>score on the 4th test</u> to earn <u>exactly</u> an 82% average (mean)?**

B. 82% B. 85% C. 75% D. 73% E. None of the above

Shade the correct answer!
Example: A ● C D E

Name_____

School _____

101.	A	B	C	D	E	121.	A	B	C	D	E
102.	A	B	C	D	E	122.	A	B	C	D	E
103.	A	B	C	D	E	123.	A	B	C	D	E
104.	A	B	C	D	E	124.	A	B	C	D	E
105.	A	B	C	D	E	125.	A	B	C	D	E
106.	A	B	C	D	E	126.	A	B	C	D	E
107.	A	B	C	D	E	127.	A	B	C	D	E
108.	A	B	C	D	E	128.	A	B	C	D	E
109.	A	B	C	D	E	129.	A	B	C	D	E
110.	A	B	C	D	E	130.	A	B	C	D	E
111.	A	B	C	D	E	131.	A	B	C	D	E
112.	A	B	C	D	E	132.	A	B	C	D	E
113.	A	B	C	D	E	133.	A	B	C	D	E
114.	A	B	C	D	E	134.	A	B	C	D	E
115.	A	B	C	D	E	135.	A	B	C	D	E
116.	A	B	C	D	E	136.	A	B	C	D	E
117.	A	B	C	D	E	137.	A	B	C	D	E
118.	A	B	C	D	E	138.	A	B	C	D	E
119.	A	B	C	D	E	139.	A	B	C	D	E
120.	A	B	C	D	E	140.	A	B	C	D	E

Shade the correct answer!
Example: A ● C D E

Name_____

School _____

ANSWER KEY

101.	●	B	C	D	E	121.	A	B	C	●	E
102.	A	●	C	D	E	122.	A	●	C	D	E
103.	A	B	●	D	E	123.	A	B	●	D	E
104.	A	●	C	D	E	124.	●	B	C	D	E
105.	A	B	●	D	E	125.	A	B	C	D	●
106.	●	B	C	D	E	126.	A	●	C	D	E
107.	A	●	C	D	E	127.	●	B	C	D	E
108.	A	●	C	D	E	128.	A	B	●	D	E
109.	●	B	C	D	E	129.	●	B	C	D	E
110.	A	B	C	●	E	130.	●	B	C	D	E
111.	●	B	C	D	E	131.	A	B	C	●	E
112.	A	●	C	D	E	132.	●	B	C	D	E
113.	A	B	●	D	E	133.	A	●	C	D	E
114.	●	B	C	D	E	134.	A	B	●	D	E
115.	A	B	●	D	E	135.	A	●	C	D	E
116.	A	●	C	D	E	136.	A	B	●	D	E
117.	A	B	C	●	E	137.	A	B	C	●	E
118.	A	B	C	●	E	138.	A	●	C	D	E
119.	●	B	C	D	E	139.	A	●	C	D	E
120.	A	B	●	D	E	140.	A	B	C	●	E