

Kansas City Area Teachers of Mathematics
2011 KCATM Math Competition

ALGEBRA
GRADE 5

INSTRUCTIONS

- **Do not open this booklet** until instructed to do so.
- Time limit: **20 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 Scantron sheet by **FILLING in the oval**.
- You **may not use rulers, protractors, or other measurement devices** on this test.

- Find the next number in the sequence: -16, 32, -64, 128, ...
 A. 192 B. 256 C. -256 D. -246 E. None of the above
- What would the 4th pentagonal number be in **Figure 1** if you follow the same pattern?

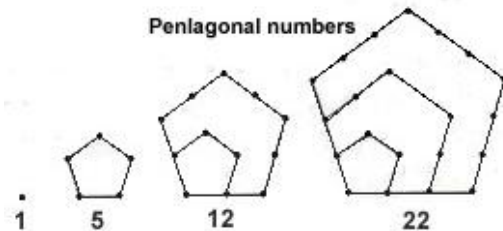


Figure 1

- A. 35
- B. 32
- C. 33
- D. 44
- E. None of the above

- Write the expression for “two less than five a number”.
 A. $2 - 5n$ B. $5 - 2n$ C. $5n - 2$ D. $2n - 5$ E. None of the above
- Find the value of x that makes the sentence true: $(\frac{1}{2})x + 3 = 41$
 A. 19 B. 88 C. 22 D. 76 E. None of the above
- Which sign would be correct when comparing the following numbers:
 0.125 ___ $\frac{1}{8}$
 A. < B. > C. \leq D. \geq E. None of the above
- Which inequality is **incorrect**?
 A. $0.45 > 0.445$ B. $50\% > 0.52$ C. $2.3 < 2.31$
 D. $9.14 > 9.139$ E. None of the above
- Three times a number plus eight is eleven. What is the number?
 A. 1 B. 2 C. 3 D. 4 E. None of the above
- In the table of values in Figure 2, what would be the missing value?

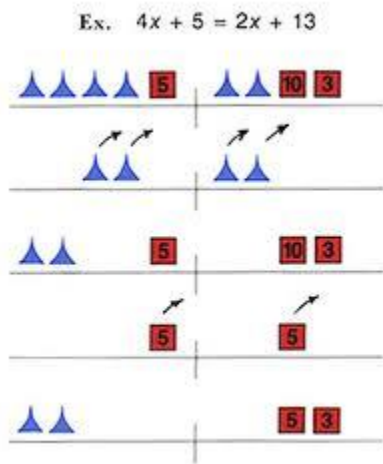
Input	4	5	6	7	8
Output	18	22	26	30	?

Figure 2

- A. 32 B. 34 C. 36 D. 38 E. None of the above
- Find the value for the expression: $[3 \times (5 - 1)^2]$
 A. 12 B. 144 C. 14 D. 48 E. None of the above
- Distribute: $-1(2x - 9) =$
 A. $-11x$ B. $-2x - 9$ C. $-2x + 9$ D. $7x$ E. None of the above

11. Which statement shows the **commutative property of multiplication**:
- A. $5 \times 3 \times 4 = 5 \times 4 \times 3$ B. $9 \times 8 = 3 \times 3 \times 8$
C. $9 + 8 + 2 = 2 + 9 + 8$ D. $3 \times (4 + 1) = 12 + 3$
E. None of the above
12. Which statement shows the **associative property of addition**?
- A. $(3 + 4) + 2 = 3 + (4 + 2)$ B. $(7 \times 8) \times 2 = 7 \times (8 \times 2)$
C. $4(5 + 1) = 20 + 2$ D. $9 + (2 + 5) = 9 + (5 + 2)$
E. None of the above
13. Mallory and Jaci each have \$20 in one dollar and five dollar bills. Mallory has one more \$5 bill than Jaci. If Jaci has 15 one dollar bills, how many one dollar bills does Mallory have?
- A. 0 B. 5 C. 10 D. 15 E. None of the above
14. Danny is 35. His son is 9 years old. Which equation is NOT correct in finding how old Danny was when his son was born?
- A. $9 + n = 35$ B. $35 - n = 9$ C. $35 - 9 = n$
D. $35 + n = 9$ E. None of the above
15. Seven buses, each holding 60 people, plus a van holding eight people headed to Haiti to help with the recovery of the earthquake in January 2010. How many people were travelling to Haiti to do community service on this trip?
- A. 73 B. 358 C. 116 D. 428 E. None of the above
16. What is three-fourths of one half of sixteen?
- A. 12 B. 8 C. 6 D. 4 E. None of the above
17. You want to leave exactly a 15% tip at a pizza restaurant. The bill for the pizza was \$24. With the 15% tip, how much did it cost to eat out at the restaurant?
- A. \$25.50 B. \$26.60 C. \$26.80 D. \$27.00 E. None of the above
18. What is the value of 2^4 ?
- A. 6 B. 8 C. 16 D. 24 E. None of the above
19. If $f(x)$ is defined as: $f(x) = 14x - 11$. What is the value of $f(3)$?
- A. 6 B. 31 C. 1 D. 53 E. None of the above

20. The following problem is represented by the Hands on Equations[®] balance in Figure 3. What is the value of x ?



- A. 8
- B. 2
- C. 4
- D. 16
- E. None of the above

Figure 3

21. A sports store is having a sale on t-shirts for your college basketball team. The sale is “buy one, get one half off”. The lowest price is the one you given half off the price. Which expression gives you the final cost of the two t-shirts?

- A. $\$15 + \12
- B. $\$15 + \$12/2$
- C. $\$12 + \$15/2$
- D. $(\$15 + \$12)/2$
- E. None of the above

22. Three consecutive odd integers have a sum of 51. Which equation helps you solve for the numbers?

- A. $n + n + 1 + n + 3 = 51$
- B. $3n = 51$
- C. $n + n + 2 + n + 4 = 51$
- D. $n + n + 1 + n + 3 = 51$

23. Today is February 26, 2011. What date will it be 3 weeks from today?

- A. March 18th
- B. March 19th
- C. March 20th
- D. March 21st

24. Use the function machine in **Figure 4** to determine the output when the input is 20.

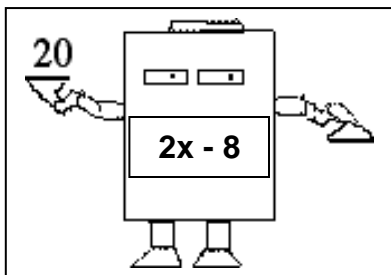


Figure 4

- A. 32
- B. 24
- C. 14
- D. 12
- E. None of the above

25. On the partial ruler in **Figure 5**, you want to determine the end value when you start at $2\frac{1}{2}$ inches and move **nine** $\frac{1}{8}$ inch jumps to the right. What number would the result be when you finish jumping?



- A. $4\frac{1}{2}$ in. B. $4\frac{3}{4}$ in. C. 5 in. D. $5\frac{1}{4}$ in. E. None of the above

26. Which expression would you use to find the total number of wheels on 40 bicycles, 13 tricycles, and 5 unicycles? (See **Figure 6** for a unicycle.)

Unicycle:



Figure 6

- A. $40 + 13 + 5$
 B. $2(40 + 13 + 5)$
 C. $(40 \times 2) + (13 + 5) \times 3$
 D. $(40 \times 2) + (13 \times 3) + 5$
 E. None of the above

27. You want to order two Super Mario game for the Wii at \$35 each, plus a fitness game for \$30. Shipping is \$8. What is the cost of your order?

- A. \$68 B. \$103 C. \$108 D. \$100 E. None of the above

28. Evaluate the expression using the order of operations: $4 + (8)(2^2)/4$

- A. 8 B. 6 C. 12 D. 32 E. None of the above

29. Approximate the value to the nearest tenth of $\sqrt{15}$.

- A. 2.8 B. 3.7 C. 3.8 D. 3.9 E. None of the above

30. Which of the following arrangements is **NOT** a way to express 50.34?

- A. $5 \times 10 + 0.34$ B. $5 \times 10 + 3 \times (0.1) + 4 \times (0.01)$
 C. $50 + 34/100$ D. 25.17×2 E. None of the above

31. Use the number line in **Figure 7** to help you find the value of: $-8 + 3$

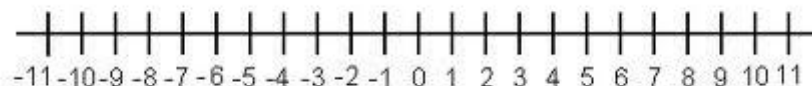
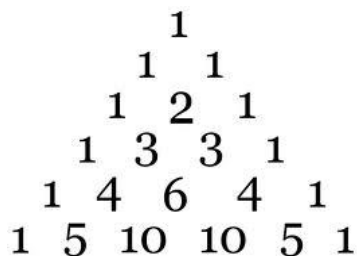


Figure 7

- A. -11 B. -5 C. -24 D. 5 E. None of the above

32. What is $(-5)^2$?
 A. -10 B. 10 C. 25 D. -25 E. None of the above
33. Write the expression for the perimeter of a square with sides $(N + 2)$
 A. $4N + 2$ B. $(N + 2) \times (N + 2)$ C. $(N + 2) + (N + 2) + (N + 2)$
 D. $4N + 8$ E. None of the above
34. Solve for the value of x that makes the equation true: $3x - 5 = x + 7$
 A. $x = 4$ B. $x = 3$ C. $x = 8$ D. $x = 6$ E. None of the above
35. Joel is two years younger than his brother Jaime. The sum of their ages is fifty-five. How old is Joel?
 A. 25 B. 26 C. 27 D. 29 E. None of the above
36. Ruth has one-third as much money as Stephanie. Together they have \$64. How much money does Ruth have?
 A. \$8 B. \$21.33 C. \$16 D. \$24 E. None of the above
37. The 2011 unemployment rate in the United States is 9.4%. If there are approximately 1,440,000 people in Missouri, how many would be unemployed? Round your answer to the nearest thousand.
 A. 135,000 B. 134,000 C. 133,000 D. 136,000
 E. None of the above
38. Evaluate: $\frac{11 - (1 + 8)}{6}$
 A. $\frac{2}{3}$ B. 3 C. $\frac{1}{3}$ D. $\frac{1}{2}$ E. None of the above
39. What is the next number in the pattern: 1, 8, 27, ____
 A. 34 B. 36 C. 64 D. 81 E. None of the above
40. What is the next row in the Pascal's Triangle in **Figure 8**.



- A. 1 5 10 20 10 5 1
 B. 1 6 15 20 15 6 1
 C. 1 6 16 20 16 6 1
 D. 1 9 16 16 9 1
 E. None of the above

Figure 8