



MONTANA COUNCIL OF TEACHERS OF MATHEMATICS
2011 MATH CONTEST
INTERMEDIATE TEST

DIRECTIONS: DO NOT WRITE ON THIS TEST. Place the best answer for each question on the separate answer sheet.

1. The various averages (arithmetic means) of three of the four numbers c , d , e , and f are calculated, and are arranged from greatest to least as follows:
- The average of c , d , and e
 - The average of d , e , and f
 - The average of e , f , and c
 - The average of f , c , and d
- Which of the following correctly orders c , d , e , and f from greatest to least?
- (A) $c > d > f > e$ (B) $d > f > e > c$
(C) $d > e > c > f$ (D) $e > d > c > f$
2. Which one of these statements could possibly be modelled by an equation where y is directly proportional to x ?
- (A) Time (x) and the distance (y) travelled by a car going down the highway at a constant rate.
(B) The price of gasoline (x) at the Town Pump and the number of gallons (y) of gasoline purchased there.
(C) The time (x) and the height (y) of a burning candle.
(D) The number of miles (x) on the odometer of an automobile and its trade-in value (y).
3. The volume of a gas varies inversely with its pressure and directly with its Kelvin temperature. If a particular gas has a volume of 288 m^3 under a pressure of 180 kPa (kilopascals) at a temperature of 320°K , what will be the volume if the temperature is increased by 40°K but the pressure is decreased by 20 kPa ?
- (A) 238.4 (B) 279.6 (C) 364.5 (D) 421.6
4. A recent census indicates the global population is 6.3 billion. A projected growth rate of 3.7% annually has been forecast for each of the next 25 years. What will be the projected global population at that time?
- (A) 9.2 billion (B) 11.3 billion (C) 13.7 billion (D) 15.6 billion
5. The mean weight of 36 apples and oranges is 5.9 ounces. If the mean weight of the 20 apples is 5.5 ounces, what is the mean weight of the oranges?
- (A) 6.6 ounces (B) 6.5 ounces (C) 6.4 ounces (D) 6.3 ounces
6. The age of the people on your block are 50, 45, 48, 78, 51, 50, 18, 32, 29, 6, 5, 3, 2, 28, 26, 80, 80, 45, 44, and 15. What are the upper and lower quartile values?
- (A) U 50, L $16\frac{1}{2}$ (B) U 51, L 13 (C) U 50, L 18 (D) U $50\frac{1}{2}$, L $15\frac{1}{2}$
7. What is the value of the third quartile for the following grouped frequency distribution?
- | <u>Class</u> | <u>Frequency</u> |
|--------------|------------------|
| 9 – 12 | 3 |
| 13 – 16 | 4 |
| 17 – 20 | 1 |
| 21 – 24 | 12 |
- (A) 23.8333... (B) 23.1666... (C) 22.8333... (D) 22.1666...

INTERMEDIATE 2010 page 2

8. Alicia works at Safeway and stacks 140 oranges in one large square-based pyramid. She sells 50 oranges. At the end of the day, she decides to restack the remaining oranges as a triangular-based pyramid. How many complete layers can she make with the available oranges?
(A) 6 layers (B) 7 layers (C) 8 layers (D) 5 layers
9. Solve: $3x^2 - 6x - (9 - x^2) = (4x - x) - (3 - x)$
(A) -5 (B) 5 (C) 0.5 (D) -0.5
10. Consider the following three statements. One pax is worth five pexes. One pex is worth two pyxes. One pix is worth four pyxes. Which of the following shows the correct order of the value of each of these, from lowest to highest?
(A) pyx, pex, pax, pix (B) pyx, pix, pax, pex
(C) pyx, pix, pex, pax (D) pyx, pex, pix, pax
11. If you drive at a speed of 110 feet/second, what is this speed expressed to the nearest mile per hour?
(A) 55 mph (B) 70 mph (C) 75 mph (D) 82 mph
12. Solve $|x - 3| < 2$
(A) $-1 < x < 5$ (B) $-5 < x < 5$ (C) $1 < x < 5$ (D) $-5 < x < -1$
13. $a/b - 1/c + 1/d = h$; find d.
(A) $(ac)/(a - c - ach)$ (B) $(a)/(ac - a - ach)$
(C) $(-bc)/(ac - b - bch)$ (D) $(ac)/(ac - a - ach)$
14. For a set of test scores, the mean is 82 and the standard deviation is 3.5, then 97.5% of the scores were below which score?
(A) 87 (B) 89 (C) 91 (D) 92.5
15. Find the 8th term of the following sequence: 8, 11, 16, 23, 32, ...
(A) 71 (B) 41 (C) 47 (D) 40
16. What is the slope of a line perpendicular to the line with the equation $7x + 3y = 21$?
(A) $3/7$ (B) 7 (C) 3 (D) $-7/3$
17. Solve the following equation: $(B + 2)/3 - (B - 2)/7 = 2$
(A) 5.5 (B) 8.5 (C) -4.5 (D) -1.5
18. How many real solutions does the equation $5x^2 - 7x + 2 = 0$ have?
(A) 0 (B) 1 (C) 2 (D) 3
19. Montana's speed limit on interstate highways is 75 miles per hour. Convert this to feet per second.
(A) 110 ft/sec (B) 51 ft/sec (C) 6600 ft/sec (D) 315 ft/sec
20. Simplify: $(cx^2 - 4c)/(cx^2 + c) \div (4 - x^2)/(bx^2 + b)$
(A) -b (B) $x - c$ (C) c (D) $x + b$
21. Find the minimum value of $y = x^2 + 6x + 5$
(A) 5 (B) -4 (C) -6 (D) -3
22. If you could say one number every second, which of the following is the best estimate of how long it would take to count to one trillion?
(A) 32 days (B) 32 years (C) 32,000 years (D) 32 million years

INTERMEDIATE 2011 Answer Key

- 1.) D
- 2.) A
- 3.) C
- 4.) D
- 5.) C
- 6.) B
- 7.) C
- 8.) B
- 9.) D
- 10.) D
- 11.) C
- 12.) B
- 13.) C
- 14.) B
- 15.) A
- 16.) A
- 17.) A
- 18.) C
- 19.) A
- 20.) A
- 21.) B
- 22.) C