

MONTANA COUNCIL OF TEACHERS OF MATHEMATICS
2017 MATH CONTEST
APPLIED

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

- Suppose that someone randomly guesses on the first three questions on this test. What is the probability of getting all three questions correct?
A) $1/243$ B) $1/125$ C) $1/15$ D) $1/3$ E) none of these
- Jack has five different novels, two of which are written by his favorite author J.C. Mellencamp. If Diane borrows the books and then places them randomly on a shelf, what is the probability that the two Mellencamp books are next to each other?
A) $1/30$ B) $1/15$ C) $1/6$ D) $2/5$ E) none of these
- John travels to Canada and tries to determine how gas prices compare to his hometown in the good old USA. In the United States, he is used to paying \$2.28/gallon. In Canada, he sees the price in Canadian dollars is \$1.20/liter. How do these prices compare in American dollars? Use the fact that 3.785 liters = 1 gallon and that one American dollar was equivalent to \$1.30 Canadian dollars to determine the price of Canadian gasoline in American dollars/gallon to the nearest penny.
A) \$0.24/gallon B) \$0.40/gallon C) \$3.49/gallon D) \$6.05/gallon E) none of these
- The price of gasoline in Canada suddenly spikes, and goes up to \$1.60/liter. If it was originally \$1.20/liter, what is the percent increase (to the nearest percent)?
A) 25% B) 33% C) 40% D) 75% E) none of these
- Debbie starts work at the local bakery in January of 2015. She earns a 5% raise in January of 2016 and another 5% raise in January of 2017. If she now earns \$9.25/hr, what was her starting wage?
A) \$8.33/hr B) \$8.37/hr C) \$8.39/hr D) \$8.45/hr E) none of these
- A car's tire pressure increases about 1 psi (pounds per square inch) for each $10^{\circ}F$ increase in air temperature. At an air temperature of $48^{\circ}F$, the tire pressure is 29 psi. Write an equation that models the tire's pressure (P) as a function of the air temperature (t).
A) $P = 10t + 29$ B) $P = 10t - 451$ C) $P = 48t + 29$ D) $P = .1t + 24.2$ E) none of these
- After 3 hours of snowfall, the snow depth is 5 inches. After 5 hours of snowfall, the depth is 7.25 inches. Assuming the snow depth is increasing at a constant rate, what would the depth of the snow be after 10 hours? Round your answer to the nearest tenth.
A) 11.3 inches B) 12.9 inches C) 14.5 inches D) 16.7 inches E) none of these

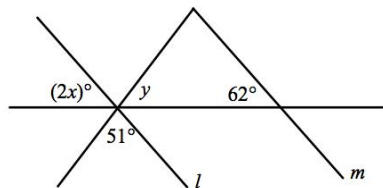
Problems 8-10: Two points, P and Q, have the coordinates P(3,2) and Q(-4,-1).

- Determine the distance between points P and Q. Round answer to the nearest hundredth.
A) 6.32 B) 7.48 C) 7.62 D) 9.02 E) none of these
- Determine the coordinates of the midpoint between points P and Q.
A) (0,0) B) $(-\frac{1}{2}, \frac{1}{2})$ C) $(-\frac{1}{2}, -\frac{1}{2})$ D) $(\frac{1}{4}, \frac{1}{2})$ E) none of these
- Determine the slope of a line perpendicular to the segment connecting points P and Q.
A) $-\frac{7}{3}$ B) $-\frac{3}{7}$ C) $\frac{3}{7}$ D) $\frac{7}{3}$ E) none of these

APPLIED 2017 page 2

11. A automobile windshield is approximated by the shape of a trapezoid. The lengths of the bases are 64 inches and 72 inches. The height between the bases is 32 inches. Determine the area of the glass in the windshield.
- A) 1088 sq. in. B) 1440 sq. in. C) 1776 sq. in. D) 2176 sq. in. E) none of these
12. Mr Dominic buys a 30 cm diameter pizza and proceeds to eat a part of the pizza in the shape of a sector which has a central angle measurement of 50° . Determine the area covered by the consumed pizza. Round answer to nearest tenth.
- A) 31.3 sq. cm. B) 92.8 sq. cm. C) 94.6 sq. cm. D) 98.2 sq. cm. E) none of these
13. A rectangular brick has a total volume of 63 square inches. If the base of the brick has length 8 inches and width 3.5 inches determine the height of a brick. Round answer to nearest hundredth.
- A) 1.25 sq. in. B) 2.20 sq. in. C) 2.25 sq. in. D) 2.30 sq. in. E) none of these
14. A conical water cup has 10 cm height and 6 cm radius. If completely filled with water determine the volume of the water. Round to the nearest whole unit
- A) 63 sq. cm. B) 377 sq. cm. C) 628 sq. cm. D) 1131 sq. cm. E) none of these

Problems 15-17: In the following diagram lines l and m are parallel.



15. Determine the value of x .
- A) $x = 31$ B) $x = 48$ C) $x = 51$ D) $x = 62$ E) none of these
16. Determine the measure of angle y .
- A) 64° B) 65° C) 66° D) 67° E) none of these
17. What is the relationship between the angle marked $(2x)^\circ$ and the angle marked 62° ?
- A) alternate exterior angles B) alternate interior angles C) consecutive interior angles
D) corresponding angles E) none of these
18. A six foot tall man casts a shadow that is 33 feet long when standing 44 feet away from a streetlight. How high above the ground is the lamp?
- A) 8 feet B) 12 feet C) 14 feet D) 18 feet E) none of these
19. A 25-foot long loading ramp is placed in front of a factory window so that it rises 7 feet above the ground. Assuming level ground, how far away from the factory must the bottom of the ramp be placed?
- A) 18 feet B) 20 feet C) 22 feet D) 24 feet E) none of these
20. A cube has a volume of 8 cm^3 . If the length of all sides are increased by 25% what will be the volume of the new cube? Round your answer to the nearest tenth of a cubic centimeter.
- A) 10.0 cm^3 B) 15.6 cm^3 C) 37.5 cm^3 D) 85.3 cm^3 E) none of these

APPLIED 2017 Answer Key

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