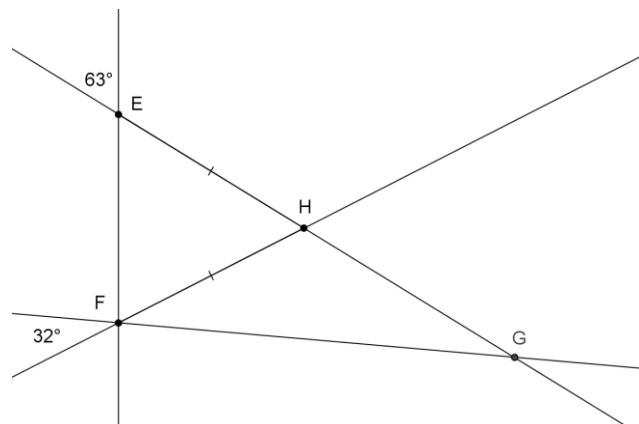


MONTANA COUNCIL OF TEACHERS OF MATHEMATICS 2016 MATH CONTEST APPLIED

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

1. Montana Silversmiths is holding its annual inventory elimination sale. Jeremy purchased 4 identical belt buckles. The buckles were on sale for 55% off of their list price. He used a coupon he received in the mail for an extra 50% off of a single item. His bill was \$299.25. Determine the list price for each of the buckles Jeremy purchased.
A) \$155.45 B) \$190.00 C) \$332.50 D) \$665.00 E) none of these
2. Snow depth measured at the Stuart Peak Snotel on the 1st of March was 67 inches. On the 31st of March the depth was reported at 54 inches. What was the percent change, to the nearest percent, in snow for the month?
A) -19% B) 24% C) 81% D) 19% E) none of these
3. A floor plan includes a breakfast nook in the shape of an isosceles trapezoid. The four sides of the isosceles trapezoid measure 5, 8, 5, and 16 feet. What is the area, in square feet, of the breakfast nook?
A) 80 square inches B) 40 square inches C) 48 square inches D) 60 square inches E) none of these
4. A circular pizza with a diameter of 18 inches is cut along radii into three wedge shaped slices. The measures of two of the central angles are 90 degrees and 130 degrees. What is the number of square inches in the area of the largest slice? Round to the nearest square inch.
A) 92 square inches B) 99 square inches C) 64 square inches D) 254 square inches E) none of these
5. An ice cream cone measures 6 centimeters in diameter and 16 centimeters in height. How many cubic centimeters of ice cream are needed to fill the cone and a hemisphere that is the same diameter of the cone?
A) $102\pi \text{ cm}^3$ B) $66\pi \text{ cm}^3$ C) $162\pi \text{ cm}^3$ D) $72\pi \text{ cm}^3$ E) none of these
6. Find the volume of steel needed to construct a blank for a half-inch hexagonal bolt if the blank consists of a right regular hexagonal prism of height $\frac{3}{8}$ inches and hexagonal base with a distance of $\frac{1}{2}$ inch between parallel sides.
A) $\frac{3\sqrt{3}}{64} \text{ in}^3$ B) $\frac{3\sqrt{3}}{8} \text{ in}^3$ C) $\frac{3}{32} \text{ in}^3$ D) $\frac{9}{64} \text{ in}^3$ E) none of these
7. A door opening in the shape of a rectangle measures 32 inches wide by 84 inches tall. An extremely long piece of very thin glass in the shape of a rectangle needs to pass through the door opening. Which glass width, among the choices below, is the largest that will fit through the door opening?
A) 84 inches B) 88 inches C) 90 inches D) 32 inches E) none of these
8. A shadow cast by a tree is 40 feet long when the angle of inclination of the sun above the horizon is 34° . Use this information to estimate the height of the tree. Round to the nearest tenth of a foot.
A) 27.0 feet B) 71.5 feet C) 59.3 feet D) 22.4 feet E) none of these
9. A surveyor has determined that lines EG, EF, FH and FG intersect as shown in the figure at right. Determine the measure of the angle FGH.

- A) 22 degrees
B) 32 degrees
C) 27 degrees
D) 28 degrees
E) none of these



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10. A passenger train leaves the train depot following a freight train that left 2 hours earlier. Both trains are travelling at a constant speed and the freight train is traveling 20 mph slower than the passenger train. Find the speed of the passenger train, if it overtakes the freight train in exactly three hours.

- A) 50 mph B) 30 mph C) 10 mph D) 18 mph E) none of these

Problems 11-14: Jeremy is comparing monthly costs of different cell phone plans. Plan A charges \$76 plus \$5 per megabyte of data used. Plan B charges \$58 plus \$7 per megabyte of data used. Plan C charges \$89 per month and offers unlimited data usage.

11. Which of the following represents the monthly cost, C , as a function of the number megabytes, m , used for plan B.

- A) $C(m) = 5m + 76$ B) $C(m) = 7m + 58$ C) $C(m) = 89$ D) $C(m) = 58 - 7m$ E) none of these

12. Which of the following represents the monthly savings, S , associated with choosing plan A over plan B as a function of the number megabytes, m , used.

- A) $S(m) = 18 - 12m$ B) $S(m) = 134 + 12m$ C) $S(m) = -18 + 2m$ D) $S(m) = 18 - 2m$ E) none of these

13. Determine the number of megabytes, m , for which the monthly cost of plan B is greater than plan A.

- A) $m \geq 11\frac{1}{11}$ B) $m > 9$ C) $m \geq 9$ D) $m > 11\frac{1}{11}$ E) none of these

14. Determine the number of megabytes, m , for which the monthly cost of plan C is less than plan B.

- A) $m \geq 21$ B) $m \geq 4\frac{3}{7}$ C) $m > 21$ D) $m > 4\frac{3}{7}$ E) none of these

Problems 15-20: A graphic designer has incorporated quadrilateral ABCD in a logo she is designing on a coordinate plane artboard in Adobe Illustrator. She has defined A(-14,11), B(3,9), C(7,-5) and D(-10,-3). Her artboard is laid out such that the distance from (0,0) to (0,1) is 0.5cm.

15. Find the length of segment AB in centimeters. Round to the nearest hundredth.

- A) 17.12cm B) 14.56cm C) 8.56cm D) 11.41cm E) none of these

16. Find the coordinates of the midpoint of segment AC.

- A) (-3.5,3) B) (3,-3.5) C) (-5.5,10) D) (-12,4) E) none of these

17. Find the slope of segment BC.

- A) $-\frac{7}{2}$ B) $\frac{7}{2}$ C) $-\frac{2}{7}$ D) $-\frac{2}{17}$ E) none of these

18. What is the most specific classification of quadrilateral ABCD?

- A) quadrilateral B) trapezoid C) parallelogram D) rectangle E) none of these

19. What is the area of quadrilateral ABCD? Round to the nearest hundredth.

- A) 62.32 cm^2 B) 57.50 cm^2 C) 230.00 cm^2 D) 249.28 cm^2 E) none of these

20. What is the correct classification of triangle ABC?

- A) scalene and right B) isosceles and acute C) equilateral D) scalene and obtuse E) none of these

APPLIED 2016 Answer Key

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