

2000 Mu Alpha Theta National Convention

THETA APPLICATIONS

Figures are not drawn to scale. NOTA means None Of The Above.

1. Thomas invested part of his \$100,000 at 7% and the rest at 9.5%. If he earns \$8550 in simple interest this year, how much did he invest at 7%?
 - A. \$ 35,000
 - B. \$ 38,000
 - C. \$ 62,000
 - D. \$ 65,000
 - E. NOTA
2. A bar of negligible weight is in balance when a 1000 pound weight is placed 12 feet from the fulcrum and two weights differing by 400 pounds are placed on the other side so that the lighter weight is 9 feet from the fulcrum and the heavier weight is 3 feet from the fulcrum. How much is the lighter weight?
 - A. 1300 pounds
 - B. 500 pounds
 - C. 700 pounds
 - D. 900 pounds
 - E. NOTA
3. A grocer bought 500 pounds of apples. He marked up the price 75% and sold 400 pounds. The other 100 pounds rotted and had to be thrown out. His profit was \$216.00. Find the selling price, per pound, of the apples.
 - A. \$ 1.08
 - B. \$ 1.10
 - C. \$ 1.12
 - D. \$ 1.16
 - E. NOTA
4. Morris construction has been hired to create a 2 foot wide walk around a 30 foot by 800 foot garden. If the walk is to be three-fourths of a foot deep, how many cubic yards of concrete will be needed?
 - A. 278 cubic yards
 - B. 524 cubic yards
 - C. 3312 cubic yards
 - D. 2502 cubic yards
 - E. NOTA
5. Thom has been placed in charge of ticket sales for the school play. He sells the student tickets for \$ 4.00 and the adult tickets for \$ 5.00. He counts the money and tickets and finds he has sold out the auditorium taking in \$2116.00. If the auditorium holds 500 people, how many student tickets were sold?
 - A. 416
 - B. 396
 - C. 384
 - D. 358
 - E. NOTA
6. Thom is planning a pool party for his friends on the first Sunday of summer vacation. He starts emptying the pool on Thursday night so that he can clean the pool on Saturday. After cleaning the pool he starts to refill it using the main fill pipe, which can fill the pool in 8 hours, and his garden hose that can fill the pool in 24 hours. If he accidentally left the drain, which empties the pool in 16 hours, open, how long will it take before the pool is full?
 - A. 9 hours and 36 minutes
 - B. 12 hours and 48 minutes
 - C. 16 hours and 24 minutes
 - D. pool will never fill
 - E. NOTA

THETA APPLICATIONS

7. Thomas leaves for a Saturday mathematics competition on Friday at 4 p.m. The van Thomas uses travels at a constant speed of 45 miles per hour. Thirty minutes after he leaves a coworker departs from the same spot after him with the answer sheets he has forgotten. If the coworker travels at a constant speed of 54 miles per hour, how far from the departure point will his coworker catch up to Thomas?
- A. 162 miles
B. 143 miles
C. 135 miles
D. 127 miles
E. NOTA
8. Susan sells candy for Thom's Candy Store. Towards the end of the week she finds that she has 8 pounds of a \$ 1.60 per pound candy and 12 pounds of a \$ 2.20 per pound candy. To save space she puts both into a container and mixes them together. How much per pound should she sell this mixture for to maintain the same profit?
- A. \$ 2.03 per pound
B. \$ 1.96 per pound
C. \$ 1.91 per pound
D. \$ 1.89 per pound
E. NOTA
9. Thom buys his girlfriend a charm bracelet. If the charms on the bracelet can be arranged in 60 unique ways, how many charms are on the bracelet?
- A. 5
B. 6
C. 8
D. 10
E. NOTA
10. The probability that Thom will wash his car is .3. The probability that it will rain is .5. What is the probability that if Thom washes his car it will rain?
- A. 15%
B. 30%
C. 35%
D. 70%
E. NOTA
11. By grafting, a nursery can propagate 4000 plants on 500 trees in 2 years. At this rate, how many trees are needed to propagate 100,000 plants in 2 years?
- A. 2,500 trees
B. 25,000 trees
C. 1250 trees
D. 12,500 trees
E. NOTA
12. A town is 16 miles due east of a north-south road. Thirty miles south on the road another town is 24 miles due east from the road. Because of construction costs and maintenance costs the two towns agree to build a power plant that both towns can use. They wish the plant to be located so that is at the most convenient location to both towns and that it also be built on the side of the existing north-south road. What is the sum of the most direct distances from the two towns to the projected power plant location. Give answer to the nearest tenth of a mile.
- A. 62.0 miles
B. 57.5 miles
C. 52.2 miles
D. 50.0 miles
E. NOTA

THETA APPLICATIONS

13. Thom's bowling scores in five successive games were 153, 132, 147, 161, and 140. What minimum score must Thom roll on his next game to have an average of at least 150?
- A. 153
B. 160
C. 167
D. 170
E. NOTA
14. Mr. Morris wants to purchase some stocks over the internet. If the stock he wants is selling for $27\frac{5}{8}$, the brokerage fee is \$ 29.50, and he has \$ 4000.00 to invest, what is the maximum number of shares that he can purchase?
- A. 136
B. 143
C. 152
D. 167
E. NOTA
15. Assuming no duplication of ancestors, how many great, great, great, great, great grandparents do you have?
- A. 128
B. 256
C. 512
D. 64
E. NOTA
16. A four year study showed the population of the central area of a city decreased from 64,000 at the start of the study to 42,875 at the start of the fourth year. If the population decrease was geometric, find the percent of decrease correct to the nearest tenth.
- A. 87.5%
B. 83.3%
C. 75%
D. 62.5%
E. NOTA
17. Thom started working for \$ 6,000.00 a year. Each year he is given a \$ 1300.00 raise. How much total money did he earn through his first 17 years on the job?
- A. \$ 43,800.00
B. \$ 204,800.00
C. \$ 227,800.00
D. \$ 278,800.00
E. NOTA
18. How many seats are in a theater with 42 rows, if the first row has 23 seats and each succeeding row has 3 additional seats?
- A. 7098 seats
B. 4361 seats
C. 3549 seats
D. 3486 seats
E. NOTA
19. Thom is building a trapezoid pattern of colored bricks in his wall. He uses twice the bricks on each lower row. If the top row uses 16 bricks and the wall has 12 rows, how many bricks will he use in the bottom row?
- A. 16,384
B. 32,768
C. 65,536
D. 131,072
E. NOTA

THETA APPLICATIONS

20. Two broadcasting towers, one 200 feet tall and the other 180 feet tall are grounded to each other by wires running from the top of each one to the bottom of the other one. Because of a signal bleed over the towers are moved an additional 1000 feet apart. New grounding wires are run. Which of the following is true about these grounding wires after the towers were moved?

- A. They now cross each other at a higher point.
- B. They now pass each other at a lower point.
- C. They pass each other at the same height as before.
- D. There is not enough information to solve this problem.
- E. NOTA

21. To make the design for his company's logo Thom uses an equilateral triangle inscribed within a circle. What is the ratio of the area of triangle to the area of the circle not covered by the triangle?

- A. $\frac{\sqrt{3}}{8\pi - \sqrt{3}}$
- B. $\frac{\pi\sqrt{3} - 24}{3}$
- C. $\frac{8 - \sqrt{3}}{\pi - \sqrt{3}}$
- D. Cannot be determined from the given information.
- E. NOTA

22. A major appliance dealer has overhead expenses of \$2000.00 a month. The dealer makes an average of \$175.00 on each major appliance sold. How many major appliances must be sold in a month to make at least a \$2500.00 profit?

- A. 180
- B. 72
- C. 32
- D. 26
- E. NOTA

23. On Mr. Morris' Calculus test there were 42 problems. If the test has a total of 100 points and questions are worth either 2 points or 3 points, how many 2 point questions did the test have?

- A. 26
- B. 24
- C. 18
- D. 16
- E. NOTA

24. Find $\| \| x \| \| + \| \| y \| \|$, where $\| \| \| \|$ is the greatest integer function, and $2x + 3xi - 4y + 6yi = 7 - 3i$.

- A. 3
- B. 2
- C. -3
- D. -1
- E. NOTA

THETA APPLICATIONS

25. Mr. Morris missed his cruise ship, which left port at 6:00 am. One-half hour after the cruise ship left port, Mr. Morris passed over the port in a helicopter in an effort to catch the ship. If the ship travels 30 knots per hour and the helicopter travels 35 knots per hour, and it takes 10 minutes to get Mr. Morris on to the deck of the ship after they helicopter catches the ship, at what time will Mr. Morris step on to the deck?
- A. 9:00 am
B. 9:10 am
C. 9:40 am
D. 10:10 am
E. NOTA
26. There are four cash prizes in the sweepstakes. The first place winner gets an amount equal to one-half the sum of the other three cash prizes. The second place winner gets an amount equal to one-third the sum of the other three prizes. The fourth place winner gets an amount equal to one-fourth the sum of the other three prizes. If the third place winner makes three thousand dollars more than the fourth place winner, how much money did the first place winner receive?
- A. \$90,000
B. \$75,000
C. \$60,000
D. \$50,000
E. NOTA
27. How far will a ball travel until it comes to rest if it is dropped from a tower 120 feet tall and rebounds four-fifths of it dropped height each time?
- A. 1080 feet
B. 960 feet
C. 600 feet
D. 480 feet
E. NOTA
28. The equation that describes a slice of a parabolic mirror is $y = \frac{1}{8}x^2 - \frac{3}{4}x + \frac{1}{8}$. From this equation, what are the coordinates of the focus of this parabolic curve?
- A. (5, -1)
B. (3, -1)
C. (1, -1)
D. (3, 1)
E. NOTA
29. From a school faculty of 61 people including the principal, how many ways can a committee of five be selected if the principal must be on that committee?
- A. 5949147
B. 487635
C. 11703240
D. 305
E. NOTA
30. Thom went to the casino to the dice table. What are the odds of having the sum of the numbers, that show on the top of a fair pair of dice, be seven on the first roll?
- A. 6 to 1
B. 1 to 6
C. 1 to 5
D. 1 to 7
E. NOTA