

Middle School Mathematics Competition - Practice Test A
Delta College

1. If $x > 0$, $y > 0$, $z < 0$, and $x + 2y = m$, then z^3m^2 is
 - (a) always negative
 - (b) always positive
 - (c) zero
 - (d) sometimes negative and sometimes positive
 - (e) there is not enough information to choose one of the four answers above

2. Suppose that we are continuously repeating a process in the laboratory and it takes 10 days to complete the process once. If we start on a Tuesday, the 3rd cycle ends on which day?
 - (a) Monday
 - (b) Wednesday
 - (c) Thursday
 - (d) Friday
 - (e) Saturday

3. A biologist studying wolves observes that there are initially 200 wolves in a specific region. After one year, the number of wolves in that region declined by 35%. The second year the number of wolves in that region increased by 50%. How many wolves were then in that region?
 - (a) 230
 - (b) 300
 - (c) 130
 - (d) 65
 - (e) 195

4. A chemist knows that she will need 100 milligrams of pure water for every 2 kilograms of base mixture, how many milligrams of pure water will she need if she has 11.4 kilograms of base mixture?
 - (a) 1140
 - (b) 480
 - (c) 2280
 - (d) 570
 - (e) 650

5. A 10 foot board is cut into three shorter boards. The second board is one foot longer than the first, and the third board is one foot longer than the second. Which of these measurements is closest to the length of the longest piece?
 - (a) 3.75 feet
 - (b) 4.0 feet
 - (c) 4.25 feet
 - (d) 4.5 feet
 - (e) 5.0 feet

6. The temperature at the beginning of an experiment is 23 degrees Celsius and the temperature drops 1.75 degrees Celsius every 30 seconds. What is the temperature 10 minutes after the experiment begins?
 - (a) -16°C
 - (b) -12°C
 - (c) -8°C
 - (d) 8°C
 - (e) none of the above

7. What is the number at the midpoint of $\frac{7}{8}$ and $\frac{2}{3}$ on a number line?
 - (a) $\frac{3}{4}$
 - (b) 1
 - (c) $\frac{37}{48}$
 - (d) $\frac{9}{24}$
 - (e) $\frac{7}{24}$

8. In an experiment, a robot car is set in motion down a long straight road traveling at 50 mph. Exactly one hour later, a second robot car is set in motion on the same road from the same starting point traveling at 70 mph. Assuming that they both continue at these speeds, how long will it take the second robot car to catch up to the first?
 - (a) 3.5 hours
 - (b) 2.5 hours
 - (c) 2.5 hours
 - (d) 1.75 hours
 - (e) none of the above

9. If a store advertises a \$1000.00 computer as now selling at 15% discount, and you have an additional 10% off coupon, what will be the price of the computer to you before adding sales tax?
 - (a) \$750.00
 - (b) \$800.00
 - (c) \$700.00
 - (d) \$765.00
 - (e) none of the above

10. The mean of a set of 5 numbers is 6. If a 6th number is added to the set, the mean increases to 7. What is the value of the 6th number?
- (a) 10 (b) 7 (c) 12 (d) 6 (e) none of the above
11. There are 8 red cards, 5 blue cards, 9 yellow cards, and 3 purple cards in a box, and you randomly select a card from the box. Find the probability that the card you select is not blue.
- (a) $\frac{4}{5}$ (b) 4 (c) $\frac{5}{9}$ (d) $\frac{3}{4}$ (e) none of the above
12. Write the decimal (base 10) number 57 in base 6.
- (a) $(214)_6$ (b) $(119)_6$ (c) $(93)_6$ (d) $(133)_6$ (e) $(223)_6$
13. If a and b are positive integers whose greatest common divisor is 20 and whose least common multiple is 120, then the product of a and b is
- (a) 60 (b) 240 (c) 6 (d) 2,400 (e) none of the above
14. At this point in the season, your basketball team has 4 wins and 6 losses. How many of the remaining 15 games must your team win to have a winning percentage of at least 70%?
- (a) 12
(b) 13
(c) 14
(d) 15
(e) it is no longer possible to reach a winning percentage of at least 70%
15. Which of the following numbers is between $\frac{22}{7}$ and $\frac{31}{10}$?
- (a) $61/20$
(b) 3.15
(c) $53/17$
(d) all of the above
(e) none of the above
16. How many positive integers less than 100 are the product of three distinct prime numbers?
- (a) 3 (b) 4 (c) 5 (d) 6 (e) none of the above
17. If x and y are positive integers and $x^2 - y^2 = 77$, then $3x - 2y$ is equal to which of the following?
- (a) 23 (b) 31 (c) 12 (d) -12 (e) none of the above
18. If there are 8 people in a room and everyone shakes hands with everyone else, then how many handshakes will there be?
- (a) 24 (b) 28 (c) 56 (d) 64 (e) none of the above

19. A restaurant offers a dinner special that lets you choose from among 8 main courses, 4 side dishes, and 5 desserts. You can choose one main course, two side dishes and one dessert. How many different dinner specials are possible?
- (a) 160 (b) 480 (c) 640 (d) 1,920 (e) none of the above
20. If the price of an iPhone has been reduced by 25%, then that reduced price is again reduced by 10%, which of these percentages is closest to the the overall percent reduction in price of the iPhone from its original price.
- (a) 33%
 (b) 35%
 (c) 65%
 (d) 67%
 (e) there is not enough information given to answer the question
21. Let N be the number of positive integers less than 400 that include the digit 4. The sum of the digits of N is
- (a) 9 (b) 11 (c) 13 (d) 15 (e) none of the above
22. The 15 starters on the rugby team have an average height of 62 inches, while the 5 starters on the basketball team have an average height of 68 inches. No person is on both teams. What is the average height of these 20 people in inches?
- (a) 63.0 (b) 63.5 (c) 64.0 (d) 64.5 (e) 65.0
23. Let S be the sum of the first 20 positive even integers. What is the sum of the digits of S ?
- (a) 6 (b) 8 (c) 10 (d) 12 (e) none of the above
24. For how many positive integers n is $n^2 - 3n + 2$ a prime number?
- (a) none
 (b) one
 (c) two
 (d) more than two, but not infinitely many
 (e) infinitely many
25. Let N be the number of distinct ways that you can rearrange the letters of the word "FOLLOW". The sum of the digits of N is
- (a) 9 (b) 13 (c) 17 (d) 18 (e) none of the above
26. What is two and four-fifths divided by three-fourths?
- (a) $2\frac{1}{10}$ (b) $\frac{35}{6}$ (c) $4\frac{1}{5}$ (d) $\frac{56}{15}$ (e) none of the above

27. The half-life of Fermium-253 is 3 days. If you have a sample of Fermium-253, then after 3 days you will only have half of the the Fermium-253 that you started with. If you have a sample of 120 kg of Fermium-253, which of the following is closest to the number of days until the sample contains only 4 kg of Fermium-253?

(a) 8 (b) 11 (c) 14 (d) 17 (e) 20

28. Pipe A can drain a pool in 2 days, while pipes B and C can fill the same pool in 4 days and 5 days, respectively. How long will it take to drain the pool with pipe A if pipes B and C are filling the pool at the same time pipe A is draining it?

(a) 7 days
(b) 9 days
(c) 11 days
(d) 20 days
(e) The pool will not drain, it will overflow

29. A wildlife biologist tags and releases 300 perch in an isolated lake. Three weeks later, examining the catch of local fisherman, the biologist records that 7 of the 30 perch caught were tagged. Assuming that the proportion of tagged perch caught is the same as the proportion of tagged perch in the lake, about how many perch are in the lake?

(a) 1,100 (b) 1,200 (c) 1,300 (d) 1,400 (e) more than 1,500

30. The Farenheit (F) and Celsius (C) scales for measuring temperature are both linear scales. In addition, 0°C is the same as 32°F and 100°C is the same as 212°F . With that information, approximately what would be the temperature on the Celsius scale corresponding to 28°F ?

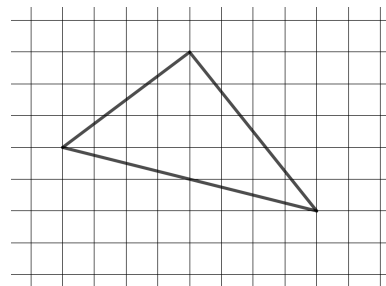
(a) 22°C (b) 14°C (c) 6°C (d) -2°C (e) -10°C

31. To convert a value measured in square centimeters to a value in square meters you would

(a) multiply by 1,000
(b) multiply by 100
(c) divide by 100
(d) divide by 1,000
(e) divide by 10,000

32. If each square in the figure on the right is exactly one square unit, then the area of the triangle in the figure is

(a) 10 square units
(b) 12 square units
(c) 16 square units
(d) 18 square units
(e) more than 18 square units



33. A *triangulation* of a convex regular polygon is a partition of the polygon into triangles created by adding diagonals that do not intersect each other inside the polygon. How many diagonals does a triangularization of a convex regular polygon with 1,105 sides have?

(a) 1,013 (b) 1,014 (c) 1,015 (d) 1,016 (e) none of the above

34. A very small frog is at the bottom of a well 20 feet deep. Each day while active the frog can advance $1\frac{1}{2}$ feet up the well, and while resting slides $\frac{1}{4}$ feet back down the well. On which day will the frog reach the top of the well?
- (a) 14th (b) 15th (c) 16th (d) 17th (e) none of the above
35. A cardboard shipping box has a length of 3 feet, a width of 2 feet, and a height of 1 foot. If you can only increase one of these dimensions by six inches, which one should you increase to get the greatest increase in the volume of the box?
- (a) the length
(b) the width
(c) the height
(d) it does not matter
(e) there is not enough information to answer the question
36. Walnut has a morning trip to school which consists of being driven for 10 minutes at a speed of 30 miles per hour followed by walking 5 minutes at a speed of 3 miles per hour. What is Walnut's average speed on the morning trip to school in miles per hour?
- (a) 14 (b) 21 (c) 22 (d) 26.5 (e) 28
37. A box contains 2 blue marbles and 3 yellow marbles. Two marbles are removed from the box at the same time. What is the probability that the marbles are both yellow?
- (a) $\frac{3}{5}$ (b) $\frac{2}{5}$ (c) $\frac{1}{10}$ (d) $\frac{3}{10}$ (e) none of the above
38. Over the last hour, 8 people have purchased loaves of bread at your bakery and you have sold 44 loaves of bread. You can say with certainty that
- (a) all 8 people bought at least 5 loaves
(b) no one has purchased 10 loaves or more
(c) at least 7 people bought 6 loaves or more
(d) one person bought at least 6 loaves
(e) no more than 5 people bought at least 7 loaves
39. As you set up chairs for the music recital, you observe that you will have 3 chairs left over if you set up rows of 7 and 1 chair left over if you set up rows of 5. You know that you have less than 60 chairs. Which one of these conclusions must be true?
- (a) you have less than 30 chairs
(b) you have an even number of chairs
(c) you have a prime number of chairs
(d) you have more than 40 chairs
(e) none of the above
40. In a race between three horses, where ties are allowed, how many different ways can the race end?
- (a) between 6 and 10
(b) between 11 and 15
(c) between 16 and 20
(d) between 21 and 25
(e) none of the above