**Directions: Select the correct answer choice for each question and bubble it in the appropriate place on your Scantron. For all questions, “E) NOTA” means “None of These Answers.” Good Luck!**

1. The Renaissance was a period of history between the fourteenth and seventeenth centuries that was associated with a wave of artistic, scientific, and cultural achievements. One of these achievements was the invention of the moveable printing press by Johannes Gutenberg in 1450. It was estimated to have printed at a rate of 25 pages per hour. At the same time, printing presses in Asia were said to have printed at a rate of 200 pages per hour. If Kaitlyn used the Gutenberg printing press for 36 minutes and then used the Asian printing press for 12 minutes, how many pages did she print in total?

**A. 3300 pages B. 180 pages C. 95 pages D. 55 pages E. NOTA**

2. Uh oh! Kaitlyn made a huge mistake and printed the same page 40 times. If the product of two positive integers is 40, which of the following *cannot* be the sum of the two integers.

**A. 22 B. 20 C. 14 D. 13 E. NOTA**

3. The word Renaissance is the French word for REBIRTH. How many distinct ways can you rearrange the letters in the word REBIRTH?

**A. 7 B. 2520 C. 5040 D. 823543 E. NOTA**

4. During the 13th century, the use of the number zero in Florence, Italy was banned. However, by the time then 15th century began, the number zero started to reappear in Florence. Which of the following terms describes the number 0?

I. Irrational Number

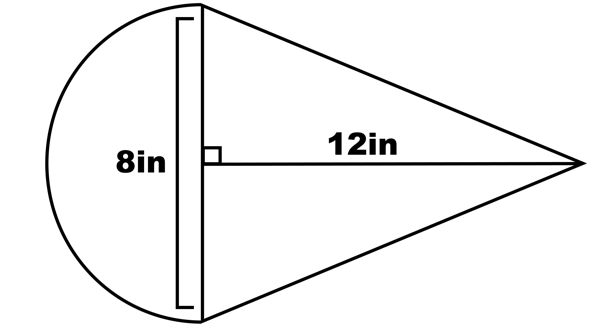
II. Integer

III. Natural Number

IV. Whole Number

**A. I and IV only B. II and III only C. II and IV only D. II, III, and IV E. NOTA**

5. Created in the 1500s by artist and military engineer Bernardo Buontalenti, gelato is one of the most popular frozen desserts that emerged from the Renaissance. John, a big fan of sweet treats, would like to buy some gelato to cool off. However, John has no money. Luckily, the shop owner agrees give the dessert to him if he can find the area of a two-dimensional gelato cone (composed of a semi-circle and a triangle). Unfortunately, John is stumped and needs your help! Find the area (in inches squared) of the gelato cone pictured below.



**A. B. C. D. E. NOTA**

6. Johannes Kepler was a Renaissance-era mathematician and astronomer. After learning of Kepler’s many accomplishments, Sandhya becomes inspired and starts studying the different properties of addition and multiplication. During her studies, she stumbles across a new equation and wonders what property it demonstrates. Help Sandhya and determine which property is demonstrated here: (a + b) + c = a + (b + c)

**A. Commutative Property of Addition B. Commutative Property of Multiplication**

**C. Associative Property of Multiplication D. Associative Property of Addition**

**E. NOTA**

7. During the Renaissance, many games involved a very unique kind of die made from the knucklebones of sheep. These dice have four faces, labeled 1, 3, 4, and 6. If two of these knucklebones are thrown, and the numbers on the upper faces are added, the number of possible *distinct* sums is

**A. 5 B. 6 C. 9 D. 10 E. NOTA**

8. The perpendicular style was a phase of late Gothic architecture in England. During the late 16th century, Renaissance elements were combined with the Perpendicular style to create the Tudor style of architecture. Brighten wants to replicate this style by drawing a perpendicular line. What is the slope of the line perpendicular to 4x – 3y = –2?

**A. B. C. D. E. NOTA**

9. Renaissance buildings heavily relied on the use of geometry to create their designs. Shapes such as triangles, circles and squares were used to create more complex designs. Find the area of a rectangle in square units with dimensions of the distinct roots of the equation x2 – 13x + 42 = 0.

**A. B. C. 13 D. 42 E. NOTA**

10. Northern Renaissance artists first introduced oil painting to Italy. Nathan decides he wants to try oil painting and decides to paint something. If Nathan is painting a right triangle with legs 30 yards and 400 feet. What is the hypotenuse of this triangle to the nearest foot?

**A. 399 B. 401 C. 410 D. 430 E. NOTA**

11. Approximately 12% of all women in Renaissance Florence were nuns. Which of the following fractions is equivalent to 12%?

**A. B. C. D. E. NOTA**

12. In the 1500s, the Italian artist Michelangelo created David, a sculpture carved from marble that is undoubtedly one of the most recognized symbols of the Renaissance. John is impressed by the sculpture and wants to create his own. To make room for a foundation for his masterpiece, John digs a rectangular-prism-shaped hole that measures 3 in by 3 in by 1 ft. How much dirt is in a hole, in cubic inches?

**A. in3 B. 9 in3 C. 108 in3 D. 1296 in3 E. NOTA**

13. After seeing John’s magnificent replica of Michelangelo’s David, Bryan is attempting to replicate a Renaissance column in the shape of a cylinder. Bryan only has 36π cubic feet worth of material to build his cylinder. If he wants the height to be 9 feet and he uses all his building material, what is the radius of Bryan’s cylinder?

**A. 2 ft B. 4 ft C. 2π ft D. 4π ft E. NOTA**

14. During the Renaissance, the modern history and rules of chess started to develop, including the establishment of the queen as a powerful piece. Ben thinks of a new chess opening every 3 hours and Jack thinks of a new chess opening every 7 hours. If they work together, then how many minutes will it take them to create 5 new chess openings (assuming they start at the same time and there can be partial chess openings)?

**A. B. C. 12 D. 630 E. NOTA**

15. Masquerade balls were generally elaborate dances held for members of the upper classes of society during the Italian Renaissance. Participants wore elaborate costumes and masks to conceal their identities and add an air of mystery to the festivities. To honor his culture, Filippo has decided to host one of these fabulous balls for his friends. The ratio of girls to boys on his invite list is 2:5. If there are 35 people on his invite list, how many more boys than girls are on the list?

**A. 11 B. 15 C. 21 D. 25 E. NOTA**

16. Food has always been an integral part of throwing a magnificent masquerade ball. At his ball, Filippo would like to serve blocks of cheese covered in slices of meat. If he covers a rectangular 5 x 4 x 3 slab of cheese with salami and then cuts the slab into unit cubes, how many of the resulting cubes have only one face with salami on it?

**A. 60 B. 52 C. 24 D. 22 E. NOTA**

17. Since only the social elite could attend masquerade balls in the Renaissance, anyone who was not invited to the ball may not enter. Unfortunately, Bryan was not invited, and cannot join in on the festivities. After listening to Bryan beg for two hours, the partygoers agree to let Bryan enter if he can answer a math problem. Help Bryan join in on the fun and find the value of x that completes the equation

**A. 387 B. 378 C. 111 D. 102 E. NOTA**

18. Just like Bryan, Vera was not invited to the masquerade ball. However, unlike Bryan, Vera does not want to beg for hours. Instead, she formulates a 13-part plan to sneak into the ball unnoticed. If x + y = 13, and xy = 27, then what is x2 + y2?

**A. 169 B. 142 C. 115 D. 90 E. NOTA**

19. Inspired by the food at the masquerade ball, Brighten and Rahul want to try cooking their own Renaissance cuisine. The foods from the Renaissance were seasoned mostly with spices – since salt was scarce at the time – but Brighten and Rahul have no spices! If Rahul travels 72 km to the nearest store in 24 minutes, his speed, in kilometers per hour, is:

**A. 6 km/hr B. 4 km/hr C. 3 km/hr D. 2 km/hr E. NOTA**

20. Italy had many different forms of currency during the Renaissance, including the scudo, lire, soldi, and denari. One scudo is worth 3 lire, 2 lire are worth 10 soldi, and 5 soldi are worth 12 denari. If Rahul only has scudo but wants to purchase some spices worth 72 denari, how many scudo does he need to buy the spices?

**A. 6 scudo B. 4 scudo C. 2 scudo D. 1 scudo E. NOTA**

21. While waiting for Rahul to return with spices, Brighten decides to make a batch of lemonade. Brighten has two 12-liter mixtures, one consisting of 25% lemon juice and another consisting of 5% lemon juice. Using these two mixtures, Brighten wants to create a 12-liter batch of lemonade that is 20% lemon juice. If x liters of the 25% mixture and y liters of the 5% mixture need to be mixed to obtain the 12 liters of the 20% mixture, what is the value of ?

**A. 1 B. 2 C. 3 D. 4 E. NOTA**

22. During the Renaissance, coins were minted in either gold or silver. Chris notices that the number of gold coins he has is divisible by 11. Which of these numbers is evenly divisible by 11?

**A. 133861446 B. 349041173 C. 450856225 D. 987813397 E. NOTA**

23. Renaissance mathematician and astronomer Nicolaus Copernicus claimed the universe followed a heliocentric system, meaning that the Sun was the center of the solar system and not the Earth. He postulated that, if the Earth orbited around the Sun, then the other planets would fall into a relationship where their sidereal periods would increase from the Sun as follows: Mercury (88 days), Venus (225 days), Earth (1 year), Mars (1.9 years), Jupiter (12 years), and Saturn (30 years). What is the sum of the distinct prime factors of 225?

**A. 8 B. 9 C. 16 D. 17 E. NOTA**

24. The legendary architect and sculptor Filippo Brunelleschi invented linear perspective in the early 1400s. Find the slope of the line that passes through points (7, 7) to (4, 6) in the Cartesian plane.

**A. 3 B. C. D. -3 E. NOTA**

25.The clock, used to tell time, is arguably one of the most important inventions of the Renaissance. During that period, the newly invented clock measured time in 24 hours. While staring at the clock in class, Filippo decides to calculate the smallest angle between the hour and minute hand on the clock. What angle (in degrees) would Filippo calculate if the time was 10:53 pm?

**A. degrees B. 17 degrees C. 153 degress D. degrees E. NOTA**

26. O Rosa Bella is the title of two popular 15th century chansons, or French songs. These chansons reflected the heartbreak and pain of love, a theme that was extremely popular in the 15th century. An orchestra of 60 musicians takes 20 minutes to play O Rosa Bella. How long, to the nearest minute, would it take for 45 musicians to play the songs, assuming the songs only require 30 musicians to be successfully played and they play the song at the same speed.

**A. 15 minutes B. 25 minutes C. 26 minutes D. 27 minutes E. NOTA**

27. The Mona Lisa is an extremely famous half-length portrait painted by the world-renowned Renaissance painter Leonardo da Vinci. In fact, she is so famous that Kaitlyn would like to dress up as her for Halloween! To get the full Mona Lisa look, Kaitlyn must wear contacts and shave her eyebrows. Kaitlyn’s circular contacts are 14 mm in diameter. What is the area of her contacts (in mm2)?

**A. mm2 B. mm2 C. mm2 D. mm2 E. NOTA**

28. The Medici family ruled the city of Florence during the Renaissance. They were major patrons of the arts and promoted the concept of humanism. In one of Florence’s major squares, the Medicis kept a pair of lions and some giraffes. These giraffes would occasionally escape and wander through the streets of Florence. If one-third of the giraffes escaped, with 5 giraffes escaping every 6 minutes for 2 hours, how many giraffes *did not* escape?

**A. 60 giraffes B. 80 giraffes C. 100 giraffes D. 300 giraffes E. NOTA**

29. The Northern Renaissance was the part of the Renaissance that occurred in Europe outside of Italy. It was mostly centered in the area north of the Alps. It started around the year 1430 when artist Jan van Eyck started to incorporate Italian Renaissance techniques like linear perspective, naturalistic observation, and realistic figures into his paintings. If the product of all the prime numbers between 1 and 1430 inclusive is divided by 87, the resulting remainder is:

**A. 0 B. 2 C. 26 D. 38 E. NOTA**

30. The ceiling of the Sistine Chapel was painted over the course of 4 years by the Renaissance sculptor Michelangelo. Since he was primarily a sculptor, not a painter, Michelangelo had many worries when he accepted the commission from Pope Julius II. Unfortunately, his worries were not unfounded. In fact, the sculptor was so miserable that he wrote a poem about how terrible working on the Sistine Chapel was. Which of the following numbers is twice a multiple of the number 4?

**A. 12 B. 14 C. 16 D. 18 E. NOTA**