**1. (D)** *pages = rate x time*. Since the rates are given in pages per hour, but the times are given in minutes, we will need to convert the times to hours first. There are 60 minutes in 1 hour so 36 minutes is equivalent to or hour and 12 minutes is equivalent to or hour. Plugging in the values given in the problem, we have *pages from Gutenberg =* *= 15* and *pages from Asian = = 40*. Adding the two resulting number of pages gives a total of 55 pages.

**2. (B)** The number 40 can be represented as a multiple of two positive integers in four different ways: . Adding together each pair of integers gives 41, 22, 14, and 13. The only answer choice that is not one of these resulting sums is 20.

**3. (B)** The number of ways you can rearrange the letters in a word is the factorial of the number of letters in that word divided by the factorial of the number of repeated letters in that word. In this case, there are 7 letters in the word REBIRTH, so we have 7!. Now, we divide by the 2!, since there are two of the letter R, which repeats. = = 2520.

**4. (C)** 0 is an integer and a whole number. Irrational numbers are numbers that cannot be written as a fraction of two integers, but 0 can be written as , where is any integer besides 0. Natural numbers are positive integers, and 0 is neither positive nor negative.

**5. (A)** The gelato cone is a triangle combined with a semi-circle. To find the total area, find the area of each individual shape and combine. The area of a triangle is . Plugging in the values from the diagram, we have which equals 48. The area of a semi-circle is . The radius of the semicircle is , or 4. Thus, the area of the semi-circle is , or . Adding the two areas together gives the total area of .

**6. D.** The associative property of addition says that the sum of three or more numbers remains the same regardless of how the numbers are grouped. Here, the only thing that changes is the parenthesis which group the letters a + b and b + c. Since nothing else changes, this demonstrates the associative property.

**7. C.** The possible sums (not necessarily distinct) are as follows: 1+1, 1+3, 1+4, 1+6, 3+3, 3+4, 3+6, 4+4, 4+6, and 6+6. Adding them together, we get: 1, 4, 5, 7, 6, 7, 9, 8, 10, and 12. The number 7 repeats twice, but the question asks for *distinct* sums, so we will only count one of them. This leaves us with a total of 9 distinct sums.

**8. B.** The slope of a line in slope-intercept form y = + b is equal to m. We need to get the equation in slope intercept form to calculate the slope. Subtracting 4 and dividing by -3, we get y = . The slope of a line perpendicular to another line is – . So, – = – .

**9. D.** To find the area of a rectangle we need to multiply the length times the width. Since length and width are given by the roots, we factor and get ( – 6)(– 7) = 0. Therefore, 6 and 7 are the roots, and 6 x 7 = 42. Note: We could have used Vieta’s formulas to find the product of the roots, or c/a. However, we do not know if the roots are distinct, so we should factor to make sure.

**10. C.** First, we convert 30 yards into 90 feet since the problem asks for the answer in feet. Using the Pythagorean theorem, a2 + b2 = c2. Plugging in 90 and 400 for a and b, 902 + 4002 = c2. Simplifying, c2 = 168100, or c = 410 feet.

**11. B.** 12% = 0.12 = = = .

**12. E. 0** There is no dirt in a hole, giving us 0, or E. NOTA.

**13. A.** We know that the volume of a cylinder is the area of the base times the height. We have that the height is 9 units, and the volume is 36π, so the area of the base is 4π. Since a cylinder has a circle for a base, and the area of a circle is πr2, we set πr2 = 4π and solve for r. Simplifying, we get r equals 2 units.

**14. D.** Since Ben thinks of an opening every 3 hours, he does of an opening every hour. Jack thinks of an opening every 7 hours, so he does of an opening every hour. Therefore, they do + = of an opening every hour. 5 openings divided by openings per hour gives you hours for 5 openings. Since the question is asking for time in minutes, x 60 = 630 minutes.

**15. B.** The ratio 2:5 means that there are 2 girls for every 5 boys on the invite list for the ball. Adding the two sides of the ratio (2 and 5) gives a total of 7. The total number of invitees (35) divided by the sum of the two sides (7) results in the number 5. This means that the ratio needs to be multiplied by 5 on each side in order for it to equal the proportion of girls to boys on the invite list. Multiplying both sides by 5 gives 10:25. This means that there are 10 girls for every 25 boys on the invite list. This means that there are 15 (25-10) more boys than girls on the invite list.

**16. D.** The cubes that have one face covered in salami are the ones in the center of each face. This means that, with the exception of the unit cubes on the border of the slab of cheese, the cubes that make up the outer faces of the cheese are the only ones with one face covered in salami. For a 5 x 4 face, this means that there are 3 x 2 = 6 cubes that only have one face covered in salami. For a 4 x 3 face, there are 2 x 1 = 2 cubes with one face covered in salami. For a 5 x 3 face, there are 3 x 1 = 3 cubes with one face covered in salami. Since there are two of each type of face, multiply each number of cubes by 2 and add the results together to get a total of 22 cubes that have only one face covered in salami.

**17. D.** The square root of 9 is 3 and the square root of 289 is 17. Using this information, the left side can be simplified to 3 + 17 or 20. Squaring both sides of the equation gives us 202 = 289 + 9 + x. To solve for x, move all the other terms to one side. This gives 400 – 289 – 9 = x. Subtracting, we get x = 102.

**18. C.** First, square = 13, getting = 169, next subtract 2 times xy = 27 from both sides, getting = 169 – 54 = 115.

**19. E. 180 km/hr** *distance = rate x time*. 24 minutes is equal to 2/5 hour. 72 km = rate x (2/5 hour). km/hr = 180 km/hr.

**20. C.** If 12 denari are worth 5 soldi, then 72 denari are worth 30 soldi. If 10 soldi are worth 2 lire, then 30 soldi are worth 6 lire. If 3 lire are worth 1 scudo, then 6 lire are worth 2 scudoes. This means Rahul needs 2 scudoes to purchase the spices.

**21. B.** We want our 12 liter mixture to be 20% lemon, or 2.4 liters of lemon. We have 2 mixtures which contain 12(.25) = 3 liters of lemon and 12(.05) = 0.6 liters of lemon. Since we can only have 12 liters of mixture in total, we can set up an equation with 3 + 0.6(1 –) = 2.4. Since 12() + 12(1 – ) = 12, our equation adds up to 12 liters. Solving, 2.4 = 1.8, = 0.75. Therefore, we have 12(0.75) = 9 liters of 25% lemon and 12(1 – 0.75) = 3 liters of 5% lemon. Finally, = 2.

**22. E.** To find out if a number is divisible by 11, take the alternating sum of the digits in the number, read from left to right. If that is divisible by 11, so is the original number. Now, we test the 4 answer options. Answer choice A gives us 1 + 3 + 6 + 4 + 6 – 3 – 8 – 1 – 4 = 4, which is not divisible by 11. Answer choice B gives us 3 + 9 + 4 + 1 + 3 – 4 – 0 – 1 – 7 = 8, which is not divisible by 11. Answer choice C gives us 4 + 0 + 5 + 2 + 5 – 5 – 8 – 6 – 2 = –5, which is not divisible by 11. Finally, answer choice D gives us 9 + 7 + 1 + 3 + 7 – 8 – 8 – 3 – 9 = –1, which is not divisible by 11. Therefore, the answer is E. NOTA.

**23. A.** The prime factorization of 225 is . The sum of the distinct prime factors is thus 3 + 5 or 8.

**24. B.** *slope =* . Let (7, 7) be (x1, y1) and let (4, 6) be (x2, y2). Slope = = .

**25. A.** Using the clock angle formula, the angle between the minute hand is . Plugging in 10 for and 53 for , = . Since the problem is asking for the smallest angle, we check and see that is less than .

**26. E. 20** Music takes the same amount of time to be played despite the number of musicians playing it. Since the piece only requires 30 musicians to play, 45 musicians would play the piece the exact same amount of time as 60 musicians would, or 20 minutes.

**27. A**. *area of circle* = . The diameter is 14 mm, so the radius is 7 mm. mm2 = .

**28. E. 200** If 5 giraffes are escaping every 6 minutes, this means that 50 giraffes are escaping in 60 minutes (1 hour). Doubling each value gives us 100 giraffes escape in 120 minutes (2 hours). 100 is 1/3 of the original number of giraffes that were in the enclosure, meaning there were three times the amount that escaped (there were originally 300 giraffes). The problem asks for the number of giraffes that *did not* escape, which is 2/3 of the original, or 200 giraffes.

**29. A.** 87 = 3 x 29. 3 and 29 are both prime numbers, so when the product is divided by 87, the remainder turns out to be 0.

**30. C.** 2 x 8 = 16.