**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. (C)** 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! = 5040

**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. Multiply x(x – 7) = x2 – 7x.

**10. B.** First, we convert 10 yards into 30 feet since the problem asks for the answer in feet. Using the Pythagorean theorem, a2 + b2 = c2. Plugging in 30 and 40 for a and b, 302 + 402 = c2. Simplifying, c2 = 2500, or c = 50 feet.

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

**12. C.** Convert 1 ft = 12 inches. 3 x 3x 12 = 108 in3.

**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.

**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. C.** Use order of operations. 5 + 4 x 3 = 5 + 12 = 17.

**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.** If x + y = 13 and x2 + y2 = 89, then x = 8 and y = 5 (or vice versa). xy = 8 x 5 = 40.

**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.** Multiply to determine the amount of pure lemon juice. (0.25)(12) + (0.05)(12) = 3 + 0.6 = 3.6.

**22. A.** To determine if a number is divisible by 9, add the digits and, if the resulting sum is divisible by 9, then the entire number is. Only choice A works.

**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. B.** A school day is 6 hours and 20 minutes long. 6 x 60 + 20 = 380 minutes.

**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 goes into 87 and 174 evenly. So, the remainder is 86.

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