

1. (C) Today is Saturday, which is the 6th day of the week. Therefore,  $n^2 = 6^2 = 36$ .
2. (D) The distributive property says that  $a(b + c) = ab + ac$ . This is equivalent to choice D.
3. (C) You can lose a maximum of 3 times; consider losing at 10, 40, 70.
4. (D) By a factor tree or other method, the complete factorization is  $2^2 \times 3^2$ .
5. (D) Using the slope formula, the slope is  $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{9 - 3}{5 - 2} = \frac{6}{3} = 2$ .
6. (D) If it takes on water at 7 gallons per minute, it will take  $\frac{252}{7} = 36$  minutes to explode.
7. (C) We have  $\frac{\frac{12+1}{6}}{\frac{36+1}{6}} = \frac{13}{37}$ .
8. (D) This is the Pythagorean Theorem.
9. (D) The absolute value, a distance, can never be negative; there are no solutions.
10. (B) Isolating the  $x$  variable gives  $3x = -2$ . Dividing by 3 results in  $x = -\frac{2}{3}$ .
11. (A) If  $k$  is the answer to the question, then  $5k - 4 = k$ . This gives  $k = 5k - 4 = 1$ .
12. (B) The sum of the first  $n$  natural numbers is  $\frac{n(n+1)}{2} = \frac{20 \times 21}{2} = 210$ .
13. (B) Since speed is  $\frac{\text{distance}}{\text{time}}$ , we have  $\frac{2 \text{ km}}{10 \text{ min}} \left( \frac{1000 \text{ m}}{1 \text{ km}} \right) \left( \frac{1 \text{ min}}{60 \text{ s}} \right) = \frac{10}{3} \text{ m/s}$ .
14. (D)  $\sqrt{432} = \sqrt{144 \times 3} = \sqrt{12^2 \times 3} = 12\sqrt{3}$ .
15. (B) We begin with the exponent, then addition/subtraction:  $-4 + 2 + 1 = -1$ .
16. (A)  $\frac{\sqrt{2}}{\sqrt{10} - \sqrt{5}} \left( \frac{\sqrt{10} + \sqrt{5}}{\sqrt{10} + \sqrt{5}} \right) = \frac{\sqrt{20} + \sqrt{10}}{10 - 5} = \frac{2\sqrt{5} + \sqrt{10}}{5}$ .
17. (C) The sum  $1 + 1$  equals 2.
18. (B) The prime numbers written are 2, 3, 5, and 7. The probability is  $\frac{4}{10} = \frac{2}{5}$ .
19. (B) A rational number is one which can be written as  $\frac{a}{b}$  where  $a$  and  $b$  are integers. We have this for I. This is impossible II. For III. we have  $\frac{167}{300}$ , and for IV. we have  $\frac{1}{1}$ .
20. (A) Plugging in each point into the inequalities shows that only  $(-1, 1)$  works.
21. (E) We have  $x + 1 = x^2 + x + 1$ , which gives  $x^2 = 0 \rightarrow x = 0$ , so  $y = 0 + 1 = 1$ . The point is  $(0, 1)$ .
22. (C)  $\frac{1}{4}$  of 100 percent is 25 percent.
23. (C) Since 3 is prime, the values must be (in any order) 1, 1, and 3. The sum is  $1 + 1 + 3 = 5$ .
24. (A) Since  $\zeta(x, y) = xy + x + y + 1$ , we have  $\zeta(1, y) = y + 1 + y + 1 = 3$ . Thus,  $2y = 1 \rightarrow y = .5$ .
25. (D) The value is  $\frac{3^2}{4} + \frac{4^2}{3} = \frac{9}{4} + \frac{16}{3} = \frac{27}{12} + \frac{64}{12} = \frac{91}{12}$ .
26. (B) The most number of states in a group in which all border each other is 3. Consider the coloring Blue (Iowa, Kansas, North Dakota), Green (Missouri, South Dakota, Wisconsin), and Red (Illinois, Minnesota, Nebraska).
27. (A) In a 40 hour period, Eli loses 8 times and Pratik loses 5 times. Thus, Eli would pay Pratik  $8 \times 3 = 24$  dollars every 40 hours, but Pratik would pay  $5 \times 5 = 25$  dollars every 40 hours.
28. (B) Setting the given equations equal, we have  $2\pi r = \pi r^2$ , so  $2r = r^2$ . Thus,  $r = 2$ .
29. (D) Testing each of these numbers, the only one which fits is  $28 = 1 + 2 + 4 + 7 + 14$ .
30. (A) There are three scenarios: you originally pick either the car, goat A, or goat B. If you chose the car, switching will result in getting one of the two goats. If you chose goat A, the host will reveal goat B, and switching will leave you with the car. If you chose goat B, the host will reveal goat A, and switching will leave you with the car. Therefore, switching gives you a  $\frac{2}{3}$  chance of winning the car.