For all questions, answer choice (E) NOTA means that none of the given answers is correct. Good Luck!

1. Given the numbers a and b, let $a@b$ equal $\frac{1}{9}a - 0.25b$. For example, $2@4 = \frac{1}{9} * 2 - 0.25 * 4$. Evaluate $54@16$.
   (A) 24 (B) 1 (C) 2 (D) 10 (E) NOTA

2. Solve for x: $9^{(3x-\frac{3}{2})} - 27^{(x+3)} = 0$.
   (A) 4 (B) $\frac{1}{2}$ (C) 0 (D) 3 (E) NOTA

3. Shawn wants to make his special smoothie but has forgotten the recipe, so his best friend Gus must help him out. Gus gives Shawn the following clues:

   - The amount of bananas, b, needed is equivalent to the GCF of 126 and 28.
   - The number of strawberries, s, needed is equivalent to the LCM of 9 and 7
   - The number of pineapples, p, needed is equivalent to the largest two-digit prime number.

   Using the clues from Gus, what is the numerical equivalent of the number of b-s+p?
   (A) 48 (B) 46 (C) 36 (D) 38 (E) NOTA

4. Compute $|15 + (-24)| + 6 + 19$
   (A) -14 (B) 16 (C) 34 (D) 64 (E) NOTA

5. Cherry is on her way to watch her favorite K-pop boy band, SHINee, perform and drags a reluctant Anvitha with her. The cost per ticket is 14 dollars for each person. After watching SHINee perform they decide that they are hungry, having worked up an appetite from crowd surfing at the concert, so they head to their local No-cowz-z. When they approach the counter they are surprised to see their cashier is Rithik (recently fired from his job at an Apple Store), who never gives a straight answer. He gave them this equation to solve for x, which is equal to the cost of the meal: $\frac{3x}{2} = \frac{x^2}{12}$. Using all the information provided, how much money did Cherry and Anvitha spend total??
   (A) \$18.00 (B) \$46.00 (C) \$32.00 (D) \$36.00 (E) NOTA

6. Which of the following statements are true?
   I. $\sqrt{2} < \sqrt{17} < \frac{16}{5} < \frac{1}{3}$
   II. A square is always a rectangle
   III. $\pi = \frac{Circumference}{2(Radius)}$
   (A) III only (B) I and III only (C) I, II, and III (D) II only (E) NOTA

7. Sid and Aman are chasing a Vampire gone rogue in their car. The Vampire is running at 90 mph and the car is moving at 115 mph. The Vampire started running at 5:00 pm, gaining an advantage over Sid and Aman who started chasing after the Vampire at 7:30 pm. When will they catch the Vampire?
   (A) 11:30 pm (B) 2:00 am (C) 10:00 pm (D) 4:30 am (E) NOTA

8. Joshua's grandmother leaves him, making him cry. Sri attempts to stop Joshua's grandmother from leaving, but starts crying as well. The number of tears Joshua shreds is given by the solution to $6x + 5 = 59$. The number of tears Sri sheds is given by the positive solution to $x^2 = 16$. How many tears did they shed together?
   (A) 6 (B) 50 (C) 13 (D) 14 (E) NOTA

9. What is the sum of the roots of the following equation? $0.5x^2 + 7x = 25.5$
   (A) -14 (B) 14 (C) 25.5 (D) -7 (E) NOTA

10. Nihar is trying to clean his gutters. His house is 24ft high, and he has a 25ft long ladder. If he leans the ladder against the house, such that the top of the ladder touches the top of the house, what is the distance between the base of the ladder and the bottom of the house? Answers are in feet.

    (A) 7 (B) 8 (C) 9 (D) 10 (E) NOTA

11. What is the area of the figure with vertices at the point (-1,3), (0,-2), and (1,3)?

    (A) 3 (B) 10 (C) 5 (D) 9 (E) NOTA

12. Griana Arande the lumberjack loves chopping logs. If she can saw four pieces of wood from one log in 5 minutes how many minutes will it take her to saw 10 pieces from another log?

    (A) 10 minutes (B) 8 minutes (C) 12.5 minutes (D) 15 minutes (E) NOTA

13. What is $3x + 4y = 24$ in slope intercept form?

    (A) $y = \frac{3}{4}x + 6$ (B) $y = \frac{-3}{4}x + 6$ (C) $y - 3 = \frac{3}{4}(x - 4)$ (D) $y - 3 = \frac{-3}{4}(x - 4)$ (E) NOTA

14. Raven and Clarke's explosive is decaying. The half-life is 16 hours after exposure to air, which means the substance decays by one half every 16 hours. They need to ignite it when it's $\frac{3}{4}$ through its life. At what time would this be? All answers are in hours after exposure to air.

    (A) 4 hours (B) 8 hours (C) 16 hours (D) 64 hours (E) NOTA

15. Which property of real numbers is shown below?

    If a=b, then a+c=b+c and c+a=c+b.

    (A) Symmetric Property (B) Commutative Property
    (C) Associative Property (D) Additive Identity Property (E) NOTA

16. If x is equal to 60% of 45% of 50 and x is also equal to $\frac{1}{2}$ of y, what is y?

    (A) $13\frac{1}{2}$ (B) $6\frac{3}{4}$ (C) 54 (D) 27 (E) NOTA

17. Rory is on her way to Scotland and she wants to bring all her books, but can only fit 1 book in her carry on. Rory owns 10 blue books, 7 green books, 5 orange books, 8 red books, and 3 purple books. What is the probability that Rory will bring her green books or her purple books, if all books are equally likely to be picked?

    (A) 33 (B) $\frac{10}{33}$ (C) $\frac{13}{33}$ (D) $\frac{7}{363}$ (E) NOTA

18. Sid and Aman have caught the vampire! To celebrate they throw a party. They invite 8 people of varying heights to the party. These 8 people decide to shake hands with each other, but only with someone who is shorter than them. How many handshakes took place at their party?

    (A) 28 (B) 8 (C) 36 (D) 56 (E) NOTA

19. Evaluate: $\frac{1}{6} \div \frac{2}{3}$

    (A) 1 (B) $\frac{1}{9}$ (C) $\frac{1}{4}$ (D) $\frac{1}{3}$ (E) NOTA

20. I am now running from the wolf Maugrim. I start running from the Castle, located at the point (0, 2). I need to get to safety at Aslan's camp at the point (10,8). But, I can't risk bringing Maugrim to the camp, so I need to loose my scent. I decide to run from the Castle to the Great River which is flowing along $x = 2$, so that he will loose my scent. What is the shortest total distance I will need to run to make it safely to Aslan's camp?

(A) 10 (B) $2\sqrt{7} + 2$ (C) 12 (D) $2\sqrt{11} + 2$ (E) NOTA

21. Brady is putting on his socks. He has 8 distinct pairs of mittens. If he reaches into his drawer and pulls a mitten out one at a time without looking, what is the minimum number of times that he must reach into his drawer to ensure that he has a matching pair of mittens?

(A) 9 (B) 8 (C) 16 (D) 2 (E) NOTA

22. How many different words (even nonsense words) can be made by using all letters from the word $PRYTHIAN$?

(A) 13,440 (B) 24 (C) 36 (D) 40,320 (E) NOTA

23. Something went horribly wrong with my time machine! I'm now on Mars, with aliens. There are two types of aliens: purple ones and green ones. The purple aliens have 3 eyeballs. The green aliens have 5 eyeballs. If there are a total of 20 aliens and 76 eyeballs on the planet, then how many green aliens are present?

(A) 7 (B) 12 (C) 13 (D) 8 (E) NOTA

24. Diyah is fighting demons. She can fight 4 demons in 1 minute. Her friend Deekshita, who can fight 6 demons in 2 minutes, joins her in the fight against evil. How many minutes will Diyah and Deekshita take to fight off 56 demons?

(A) 3.5 (B) 8 (C) $\frac{98}{3}$ (D) 96 (E) NOTA

25. Macauley has an average of 88 in his Defense Against the Dark Arts class. If he has taken 4 tests so far, what is the minimum score he must get on the last test in order to have at least a 90 as his semester average?

(A) 110 (B) 100 (C) 98 (D) 96 (E) NOTA

26. If one Aures equals 25 Denarii , one Denarii equals 10 Galleons, and 4 Aures equal 10 Drachma, then how many Denarii equal one Drachma?

(A) 50 (B) 500 (C) 0.10 (D) 10 (E) NOTA

27. Kiran is a 5th year student at Hogwarts, and one of her electives is Sequency! While studying for her O.W.L exams, she stumbles across this problem: What is the 10th term in this sequence: 2, 2, 4, 6, 10, 16, 26 ?

(A) 42 (B) 55 (C) 110 (D) 21 (E) NOTA

28. In Algebra, the quadratic formula is often used to find the solutions of a quadratic equation in the form $ax^2+bx+c = 0$. The quadratic formula is $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$, and it gives both solutions to the equation. Using the quadratic formula, find the sum of the solutions of the equation $12x^2 - 13x - 35 = 0$.

(A) $\dfrac{13}{12}$ (B) $\dfrac{13}{11}$ (C) 1 (D) $\dfrac{13}{10}$ (E) NOTA

29. What is $0.\overline{13}$ expressed as a fraction in simplest form?

(A) $\frac{13}{100}$ (B) $\frac{13}{99}$ (C) $\frac{13}{101}$ (D) $\frac{13}{999}$ (E) NOTA

30. Chanda is bored. She has decided she wants to fly in a house tied to balloons. Her friend Russell decides that this is a good idea and starts helping Chanda inflate balloons. Before they can take off she needs to solve for $f(4)$. If $f(x) = 4x^2 - 12$, what is Chanda's answer, assuming she answered it correctly?

(A) 20 (B) 16 (C) 244 (D) 52 (E) NOTA