

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

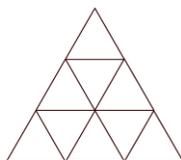
1. Simplify: $(5x^3y^4z^2)(3xy^2z^3)^2$

- (A) $15x^4y^6z^5$ (B) $45x^5y^8z^{11}$ (C) $45x^5y^8z^8$ (D) $15x^5y^8z^8$ (E) NOTA

2. Which property of real numbers is shown in the following equation: $a + (b + c) = (b + c) + a$?

- (A) Distributive Property (B) Associative Property of Addition
(C) Commutative Property of Multiplication (D) Identity Property of Addition
(E) NOTA

3. How many triangles are in the figure below?



- (A) 10 (B) 9 (C) 13 (D) 14 (E) NOTA

4. If 5 sanjitas = 6 sanjahitas, 2 sanjahitas = 3 sanhajitas, and 18 sanhajitas = 23 santijas, how many sanjitas = 92 santijas?

- (A) 10 (B) 30 (C) 40 (D) 20 (E) NOTA

5. $9^{-\frac{3}{2}} = 81^x$. Solve for x .

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

6. What is the slope of the line that is perpendicular to the line parallel to the line perpendicular to the line containing the points $(5, -7)$ and $(-23, 27)$? Provide your answer as a mixed number.

- (A) $\frac{17}{14}$ (B) $-\frac{17}{14}$ (C) $-1\frac{3}{17}$ (D) $-1\frac{3}{14}$ (E) NOTA

7. Aarushi is trying to clean the top of her bookshelves, but she is too short; Aarushi is 3 ft 7 in, while the bookshelf is 4 ft. Aarushi decides to use a 5 ft ladder to assist her in cleaning the top of her bookshelf. If Aarushi leans the ladder against her bookshelf, such that the top of the ladder touches the top of the bookshelf, what is the distance between the base of the ladder and the bottom of the bookshelf?

- (A) 3 in (B) 4 in (C) 36 in (D) $\sqrt{41}$ in (E) NOTA

8. Solve for the value(s) of x , given: $\sqrt{6+x} = x$.

- (A) $\{-3, 2\}$ (B) $\{-2\}$ (C) $\{-2, 3\}$ (D) $\{3\}$ (E) NOTA

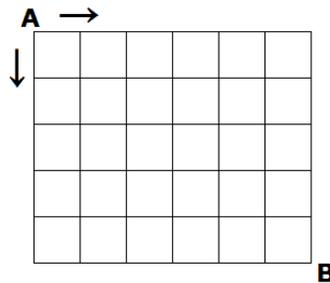
9. Solve for $x + 1$, given: $14x - 15 = 27$.

- (A) 4 (B) 3 (C) $\frac{13}{7}$ (D) 5 (E) NOTA

10. Tanvi and Tanusri decide to go shopping. Tanvi buys 7 shirts and 7 shorts for \$175. Tanusri buys 7 shorts and 6 shirts for \$165. How much do two shorts cost? (Assume that all shirts and shorts cost the same amount.)

- (A) \$30.00 (B) \$10.00 (C) \$14.50 (D) \$15.00 (E) NOTA

11. Ms. Pickett tells Jason, Rayyan, Anirudh, and Siddharth to stand in a line. Jason and Rayyan threaten to start crying if they don't get to stand together in the line. How many distinct arrangements can the boys stand in such that no one cries?
 (A) 24 (B) 60 (C) 12 (D) 48 (E) NOTA
12. Ms. Pickett orders the same boys from Question 11 to now sit in a circle, but Ms. Pickett has headphones and doesn't mind the crying anymore (i.e. Jason and Rayyan don't necessarily have to sit together anymore). How many distinct arrangements can the boys sit in?
 (A) 12 (B) 24 (C) 3 (D) 6 (E) NOTA
13. What is the Least Common Multiple of 121 and 1001?
 (A) 1001 (B) 11 (C) 11011 (D) 2002 (E) NOTA
14. Ria decides to interview 100 students at Rickards High School to find out what sport they play (All students play at least one sport out of Tennis, Football, or Swimming). Of the 100 students, 48 students swim, 59 students play tennis, and 37 students play football. 20 students play both tennis and football, 13 students both play football and swim, and 28 students both play tennis and swim. 5 students played all 3 sports. How many students refused to answer Ria's question?
 (A) 88 (B) 11 (C) 10 (D) Not Enough Information (E) NOTA
15. Aliana is trapped inside a maze, and she is trying to escape from Anagha, a fire-breathing dragon. Aliana starts at Point A, and she has to get to Point B to be able to leave the maze where Anagha is keeping her. If Aliana can move only right or down, in how many distinct ways can she get from Point A to Point B?



- (A) 462 (B) 86400 (C) 402 (D) 482 (E) NOTA
16. Which quadrants does the line $y = -7x + 4$ pass through?
 (A) I, III only (B) I, III, IV only (C) I, II, III only (D) I, II, IV only (E) NOTA
17. Find the diameter of a sphere with surface area 100π in². (Assume all answers are in inches)
 (A) $2\sqrt[3]{75}$ (B) 5 (C) $\sqrt[3]{75}$ (D) 10 (E) NOTA
18. Find the sum of all integral factors of 2017.
 (A) 2017 (B) 2313 (C) 0 (D) 2018 (E) NOTA
19. Find the equation of the line that is perpendicular to $y = 3x + 5$ and passes through the point $(-7, -8)$.
 (A) $y = -\frac{1}{3}x - \frac{17}{3}$ (B) $y = -\frac{1}{3}x - \frac{31}{3}$ (C) $y = \frac{1}{3}x - \frac{31}{3}$ (D) $y = -\frac{1}{3}x + \frac{31}{3}$ (E) NOTA

20. Evaluate: $(20 - 10)(19 - 10)(18 - 10) \dots (3 - 10)(2 - 10)(1 - 10)$
 (A) 3628800 (B) -200 (C) 200 (D) -3628800 (E) NOTA
21. Deekshita, Diyah, Raksha, Keerthana, and Chaqualya decide to run a race. Deekshita finishes behind Diya. Raksha finishes ahead of Keerthana. Chaqualya finishes directly behind Keerthana. Diyah finishes directly behind Raksha. Keerthana finishes ahead of Deekshita. Who finishes 3rd in the race?
 (A) Keerthana (B) Diyah (C) Chaqualya (D) Deekshita (E) NOTA
22. Tanmay and Shubham, working together, take 4 hours to mow the lawn (Assume Tanmay and Shubham work at the same rate). Alone, Karthik can mow the lawn in 2 hours. If Tanmay, Shubham, and Karthik work together, how long will it take them to mow the lawn? Answers are in minutes. (Assume everyone works at a constant rate.)
 (A) 10 min. (B) 80 min. (C) 120 min. (D) 160 min. (E) NOTA
23. Isiah is a very punctual person, so he decides to major in horology (the study and measurement of time). In order to complete his degree in horology, Isiah must be able to find the number of degrees in the angle formed by the minute and hour hands of a clock. At 6:32, what is the the number of degrees formed by the larger angle of the minute and hour hands?
 (A) 4 (B) 8 (C) 356 (D) 352 (E) NOTA
24. Anagha (the evil fire-breathing dragon from Question 15) drinks beet juice stew every morning in order to enhance her fire-breathing qualities. She decides to make some stew this morning, but she needs help in getting her proportion of beet juice perfect. She has a 30-ounce mixture that is 60% beet juice. How many ounces of 90% beet juice does she need to add to this mixture to get a new mixture that is 80% beet juice?
 (A) 90 (B) 30 (C) 80 (D) 60 (E) NOTA
25. Which of the following points is on the line $-5x + 3y = 4$?
 (A) (3, 1) (B) (-2, 3) (C) (1, 3) (D) (2, -3) (E) NOTA
26. Two trains 240 miles apart are traveling toward each other along the same track. The first train is travelling at a mere 40 miles per hour; the second train is travelling at an astonishing 80 miles per hour. Apurva is a pesky fly who is hovering just above the nose of the first train. He buzzes from the first train to the second train, turns around immediately, flies back to the first train, and turns around again. He goes on flying back and forth between the two trains until they collide. If Apurva's speed is 180 miles per hour, how far will he travel in miles before he is squashed between the two trains?
 (A) 1080 (B) 180 (C) 360 (D) 30 (E) NOTA
27. Siddhi has taken a total of 20 tests for his Pokémon Go class. If his average for the 20 tests is a 98, what is the lowest score he could have gotten on his 13th test? Assume that all tests received a score between 0 and 100 inclusive. (A) 100 (B) 60 (C) 0 (D) 40 (E) NOTA
28. Solve for x in the equation, $x = 1 + \frac{1}{2 + \frac{1}{2 + \dots}}$
 (A) -2 (B) $\frac{4}{3}$ (C) $\sqrt{2}$ (D) $\frac{3}{2}$ (E) NOTA
29. If the expression, $(-6x^2 + 5x - 3) - 3(2x^2 - 3x + 7)$ is rewritten in the form $ax^2 + bx + c$, such that a , b , and c are constants, what is the value of b ?
 (A) 2 (B) 14 (C) -4 (D) 24 (E) NOTA
30. If $i = \sqrt{-1}$ and $i^2 = -1$, find the value of $4i^3 - 3i^2$ in terms of i .
 (A) $4i - 3$ (B) $-4i + 3$ (C) $-4i - 3$ (D) $-3i + 4$ (E) NOTA