**Choose the letter of the correct answer. For all problems, E) NOTA means, “none of these answers”.**

1. Welcome to the wonderful world of biathlon and snowboarding! Please evaluate:

2 + 15 ÷ 10 – 5 + 7 • 3

**A) 11.1 B) 18.5 C) 19.5 D) 26 E) NOTA**

2. Victoria skis on the Cartesian plane from (8, 14) directly to (14, 8). She wants to know at which point she is exactly halfway between the two points. What point is this?

**A) (8,8) B) (11, 11) C) (14, 14) D) (22,22) E) NOTA**

3. Tommy is skiing along the line defined by . If Aidan is skiing along the line defined by , what is the y-coordinate of their point of intersection?

**A) B) C) −1 D) E) NOTA**

4. Since 1998, the US has collected a total of 24 Olympic snowboarding metals. What is the sum of all positive integral divisors of 24?

**A) 24 B) 36 C) 48 D) 60 E) NOTA**

5. Andrew, Brandon, Townsend, Josh, Sri, and Nihar are racing each other in an epic Chiles vs. Rickards showdown.

Brandon falls and is unable to get up, placing last.

Sri is closer to last than first.

Townsend is not third.

Josh is two places in front of Sri.

Nihar places behind Sri.

What place did Andrew come in?

**A) Second B) Third C) Fourth D) Fifth E) NOTA**

6. One-hundred students were surveyed about what Winter Olympic events they were planning on watching. Fifty-seven students said they would watch snowboarding, 39 said they would watch biathlon, and 23 said they would watch neither. How many will watch both snowboarding and biathlon?

**A) 5 B) 19 C) 21 D) 27 E) NOTA**

7. Shaun White is an American Olympic snowboarder. The number of irrational numbers in this list:

 π

is equivalent to the number of gold medals he has won. How many gold medals has White won?

**A) 0 B) 1 C) 3 D) 5 E) NOTA**

8. What is the value of the discriminant of ?

**A) B) C) 264 D) 270 E) NOTA**

9. The probability that Andrew wins a gold medal in biathlon is . What are the odds that he does not win the gold medal in biathlon?

**A) 2:5 B) 3:5 C) 2:3 D) 3:2 E) NOTA**

10. Now, Brandon, Andrew, Jennifer, and Victoria are chasing gold in half-pipe snowboarding! Brandon receives a perfect score of 10.0, Andrew receives an 8.9, Jennifer receives a 9.4, and Victoria receives a 9.3. What is the sum of the median and mean score for the four, to the nearest tenth?

**A) 18.0 B) 18.3 C) 18.7 D) 18.8 E) NOTA**

11. Help determine Tommy’s competition outfit! Tommy owns two different colored snowboards, four different colored shirts, and three different colored pants. How many distinct outfits can he generate including his snowboard?

**A) 24 B) 20 C) 18 D) 11 E) NOTA**

12. Let $ = and # = . What is 16 # (34 $ 3)?

**A) -9 B) 0 C) 11 D) 21 E) NOTA**

13. What is the product of the roots of ?

**A)  B)  C)  D)  E) NOTA**

14. Andrew is competing in biathlon. He skis due north for 4.5 kilometers (km), immediately turns due east and skis for 6 km, then immediately turns due south and skis for 2 km, then finally stops. How many kilometers is he from his starting point when he stops?

**A) 4 km B) 6.5 km C) 8.5 km D) 12.5 km E) NOTA**

15. Victoria and Jennifer are snowboarding on two separate mountains. While skiing, the line between the girls must always be perpendicular to the line represented by the equation

. Which of the following could be a line perpendicular to the line between Jennifer and Victoria?

**A) B) C)**

**D) E) NOTA**

16. Having lost a bet with Andrew, Brandon has to clean snowboards. Brandon cleans for one hour before Andrew feels bad and decides to help Brandon. Working alone, Brandon can clean all the snowboards in 2 hours, and Andrew can clean all the snowboards in 1.5 hours. How long will it take both boys, from the time Brandon starts cleaning, to clean all the snowboards? Assume Andrew and Brandon work independently.

**A)  hours B)  hours C)  hours**

**D)  hours E) NOTA**

17. Victoria is competing in biathlon, and must shoot ten targets (she can only shoot at each target once). The number of shots she makes is equivalent to the number of odd primes less than 10. How many shots does she miss?

**A) 3 B) 4 C) 5 D) 6 E) NOTA**

18. Andrew is such a man! In training for biathlon, he decides that he needs to start an intensive weight training regimen. On day 1, he lifts 15 pound weights, and every day afterwards, he adds .75 pounds to his weights (i.e. he lifts 15.75 pounds on day 2). How many pounds will he lift on day 30?

**A) 21.75 B) 22.5 C) 36.75 D) 37.5 E) NOTA**

19. Andrew’s efforts paid off! He set a new world record in biathlon, completing the 10 km course in exactly 20 minutes. Andrew’s little brother, Alex, challenges him to race 10 km in biathlon. In a spurt of brotherly compassion, Andrew offers Alex a five minute head start. Assuming Andrew can once again finish in 20 minutes, what is the minimum speed Alex could ski, in kilometers per hour, and still tie?

**A) 0.4 B) 0.6 C) 0.8 D) 1.0 E) NOTA**

20. can be rewritten in the form of . What is?

**A) -153 B) 8 C) 26 D) 153 E) NOTA**

21. Brandon LOVES to sleep. His first competition is at 9:00 a.m. Before competing, he must spend exactly 17 minutes on personal hygiene, 25 minutes eating, 32 minutes travelling to the competition site, and finally 50 minutes warming up. He must get at least hours of sleep. Assuming, he does every action immediately following the previous, when is the latest he could start to sleep, and still make it to his competition on time?

**A) 8:10 p.m. B) 8:11 p.m. C) 9:10 p.m. D) 9:11 p.m. E) NOTA**

22. Line A has a y-intercept at 6, and slope of 5.

Line B goes through the points (1, 0) and (3.5, 12.5).

I. Dependent II. Independent III. Consistent IV. Inconsistent

Which of these describes the two lines?

**A) II only B) IV only C) I and III D) I and IV E) NOTA**

23. Olympic snowboarders make everything look so easy on the half-pipe, but before nailing a trick, they have to put in hours and hours of practice. The number of hours Townsend practiced before nailing his signature move is equal to the sum of this sequence:

20 – 19 + 18 – 17…+ 4 – 3 + 2 – 1

How many hours did Townsend practice?

**A) 5 B) 10 C) 15 D) 20 E) NOTA**

24. The place Andrew gets in snowboarding is directly proportional to the square root of the number of Pokémon he catches. If Andrew catches 16 Pokémon, he gets sixth place. What place will Andrew get if he catches 4 Pokémon?

**A) First B) Second C) Third D) Fourth E) NOTA**

25. How many of these are not functions?

I. II. III. IV.

**A) 0 B) 1 C) 2 D) 3 E) NOTA**

26. Today, December 10, 2016, is a Saturday. The Winter Olympics begin on February 9, 2018. What day of the week is this?

**A) Thursday B) Friday C) Saturday D) Sunday E) NOTA**

27. What is the sum of all distinct values of x that make true?

**A) B) C) 5 D) E) NOTA**

28. Jennifer has been competing in biathlon and she is thirsty. She is just about to shoot at her last target but she must get a drink of water before shooting or she’ll collapse from exhaustion. Conveniently, there is a small pond at (16, 23). Currently, Jennifer is at (6, 13) and she walks to the small pond using the shortest possible distance. What is this distance?

**A) B) 20 C) D) E) NOTA**

29. Jennifer is parched again and is in need of something to drink. Luckily, Brandon has some water, but he will only give it to Jennifer if she can answer this math problem correctly:

How many real roots does have?

Can you save Jennifer from dying of thirst by finding the correct answer to this problem?

**A) 1 B) 2 C) 3 D) 4 E) NOTA**

30. In a crazy world where people are willing to trade their Olympic medals, a gold medal is worth 123 Big Macs, and one Big Mac is worth 17 chicken nuggets. Now over her parched throat (because you should’ve answered Brandon’s question correctly ☺), Jennifer is starving! Conveniently, she won a gold medal (because you were able to calculate the shortest route for her to travel). Since she is willing to part ways with her gold medal for food, what is the greatest number of chicken nuggets she could trade her medal for?

**A) 2016 B) 2091 C) 2171 D) 2267 E) NOTA**