**You have 60 minutes to complete the following 30 multiple-choice questions. Choices A through D are answer choices for every problem. Choice E stands for "none of these answers," or NOTA. Scoring is as follows: 5 points for a correct answer, 1 point if left unanswered, and 0 points for an incorrect response. Units are assumed. Diagrams not to scale.**

1) Welcome to Medieval England! You have just walked into a town and see four paths that each have their own ratio of knights to peasants. Each path is unique: 2:5, 7:9, 1:2, and 6:11 (knights:peasants). Which path has the largest proportion of peasants?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **1:2** | 1. **2:5** | 1. **6:11** | 1. **7:9** | 1. **NOTA** |

2) Clown shoes were very trendy during this time, and you see everyone wearing them! Someone comes and offers you a pair but only if you tell him the sum of the natural numbers that are in the interval -5 < x < 4. What did you tell him if you answered correctly?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **-9** | 1. **-5** | 1. **6** | 1. **10** | 1. **NOTA** |

3) Suddenly, someone approaches you and says, “My shoes look better than yours because I dyed them purple!” How many ways can you order the letters in the word “purple”?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **60** | 1. **120** | 1. **360** | 1. **720** | 1. **NOTA** |

4) She introduces herself as Vera. The letter “V” resembles the graph of y= I-xI. Which quadrants will this graph pass through?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **I, III** | 1. **I, IV** | 1. **II, III** | 1. **III, IV** | 1. **NOTA** |

5) Kaitlyn wants to go to her favorite restaurant that serves swans (a popular dish during the time)! While walking, she decides to do some mental math. If f(x)= 2x+2 and g(x)= x-1, what would f(-5) + g(-5) equal?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **-14** | 1. **-11** | 1. **-9** | 1. **-2** | 1. **NOTA** |

6) John is waiting in line for some food at the Royal Food Court. The number of people in front of him is equal to the smallest prime number, and the number of people behind him is equal to the number of faces on a cube. How many total people are standing in the line?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **6** | 1. **7** | 1. **8** | 1. **9** | 1. **NOTA** |

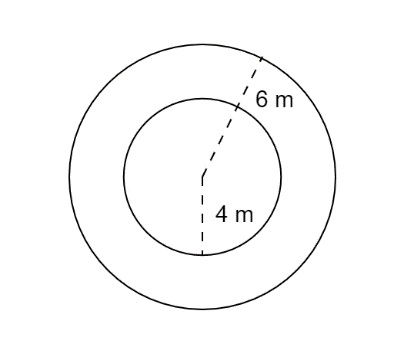
7) The number of medieval pizza slices Arib can eat is equal to 25% of 18% of 50% of 800. How many slices can he eat?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **18** | 1. **36** | 1. **72** | 1. **144** | 1. **NOTA** |

8) Rahul is walking around and sees a sign that has a fancy “” that looks exactly like the imaginary symbol we use in math. What is the value of ?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **no value** | 1. **42** |  |  | 1. **NOTA** |

9) There’s another sign that consists of two concentric circles as shown. What is the area, in , of the space between the two circles?



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **12π** | 1. **16π** | 1. **20π** | 1. **52π** | 1. **NOTA** |

10) Did you know animals could be convicted of crimes during this time? One was just put on trial exactly 0. minutes ago. What is this decimal expressed as a fraction in lowest terms?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  | 1. **NOTA** |

11) Evaluate the following expression:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **170** | 1. **178** | 1. **190** | 1. **198** | 1. **NOTA** |

12) York, Oxford, and Winchester are all locations in Medieval England. Their populations during this time are 13110, 5211, and 8136 respectively. What is the mean of the populations of these three towns?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **26,457** | 1. **8819** | 1. **8818** | 1. **8817** | 1. **NOTA** |

13) On a straight path that connects the cities Oxford and York, Brighten and Filippo are 200 miles apart, heading towards each other, walking at speeds of 20 mph and 30 mph respectively. A fly is going back and forth in a straight line between the two boys, and each time it reaches one person, it immediately turns and heads back towards the other. If it flies at a speed of 16 mph, how much distance does it cover until the two meet? All answers in miles

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **64** | 1. **107** | 1. **160** | 1. **200** | 1. **NOTA** |

14) Yangyang is rolling a die with faces showing 1, 2, 3, 4, 6, and 6. If he has 8 points right now, what is the probability he gets 10 total points after his next?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **0** |  |  | 1. **1** | 1. **NOTA** |

15) Halfway there! What is the midpoint of coordinate points (-7, -3) and (1, 10)?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **(-3.5, 3.5)** | 1. **(-3.5, 4)** | 1. **(-3, 3.5)** | 1. **(-3, 4)** | 1. **NOTA** |

16) Aaron works at an animal farm. The farm has pigs, cows, and chickens. If the number of chickens is equal to double the sum of the number of pigs and cows, the number of pigs is three times the number of cows, and the total number of animal legs on the farm is 128, how many pigs are there? Assume that all of the animals have the proper amount of legs.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **4** | 1. **12** | 1. **16** | 1. **32** | 1. **NOTA** |

17) After work, Yimo stops by a tavern for dinner. He makes $24 every day, and the meal costs him $6. What percent of his daily earnings did he spend on dinner?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **40%** | 1. **25%** | 1. **24%** | 1. **5%** | 1. **NOTA** |

18) Surnames were introduced to England in 1066. When they were first introduced, surnames were often just a nickname. For example, someone named George with red hair might be called “George Red”, but it could change over time. David used to be called “David Brown” but he recently developed a patch of white hair, so his name is “David White”. What is the least common multiple of the number of vowels in each of his names (“David Brown” and “David White”)?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **12** | 1. **16** | 1. **24** | 1. **30** | 1. **NOTA** |

19) Caleb and Nima are competing at who is the most athletic through a series of competitions because they are the best athletes in England. However, only one person can go first, so they decide that whoever can correctly calculate the area of the parallelogram below goes first. What is the area in square centimeters?

Diagram

Description automatically generated

1. **10 B. 12.5 C. 15 D. 17.5 E. NOTA**

20) A “moment” is a medieval unit of time that is equal to 1.5 minutes. How many “moments” are in 2.5 hours?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **40** | 1. **60** | 1. **80** | 1. **100** | 1. **NOTA** |

21) While listening to Medieval rap music, Nelson and Nima are dancing. If Nelson can do 19 turns in two minutes and Nima can do 25 turns in 3 minutes, how many complete, total turns do they do if they each spin for 5 minutes? Assume that Nelson and Nima both turn at a constant rate.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 1. **41** | 1. **47** | 1. **89** | 1. **NOTA** |

**Use this information for questions 22-23.**

Ben, Linda, Linsey, David, Katharine, and Khawla are getting ready for a town council meeting. They sit around a circular table, with 6 evenly spaced seats.

22) If the surface area of the top of the table is 25π square feet. What is the diameter of the table in inches?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **5** | 1. **10** | 1. **60** | 1. **120** | 1. **NOTA** |

23) Here is how they sit around the table:

* David sits next to Ben
* Katharine is sitting in between Linda and Khawla
* Linsey isn’t sitting next to David or Khawla

Who (other than David) is sitting next to Ben?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **Linda** | 1. **Linsey** | 1. **Katharine** | 1. **Khawla** | 1. **NOTA** |

24) Jonathan wants to become a knight, but he isn’t strong enough. In order to prepare, he starts doing pushups every day. On the first day, he does 3 sets of 12. Every day after that he does double the sets (of 12) he did the day before. How many total pushups has he done after the 4th day?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **45** | 1. **144** | 1. **540** | 1. **576** | 1. **NOTA** |

25) Bruce goes to the bakery and sees that they are giving away a free loaf of bread for whoever can evaluate this expression:

He answers correctly and gets the bread. What answer did he get?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  | 1. **NOTA** |

26)

|  |  |  |
| --- | --- | --- |
| **A.** | **B. 4(BR) + 7(EAD)** | **C.** |
| **D.** | **E. NOTA** |  |

27) Nelson doesn’t really know grammar, and gets really excited whenever he writes numbers, so he always puts exclamation marks after them. Coincidentally, that also symbolizes a factorial: 4! = 4 · 3 · 2 · 1 and 6! = 6 · 5 · 4 ·3 ·2 · 1 Given this, what is ?

**A. B. C. 2020 D. 2021 E. NOTA**

28) James owns a shoe store. If *s* represents the number of pairs of shoes he has, and the following equation is true, how total many shoes does James have?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **21** | 1. **42** | 1. **60** | 1. **120** | 1. **NOTA** |

29) Cyrus needs to build a fence around his house, and he asks Wesley to help him. It takes both boys 4 days to build the fence working alone. If the boys work together, how many days does it take to finish the fence?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | 1. **2** | 1. **4** | 1. **NOTA** |

30) Walter’s head is a perfect sphere, and he is commissioning a statue of himself to show that off. He is also very rich, so the radius of the statue’s head is 3 times the radius of his actual head. What proportion of the statue head’s volume does his actual head take up? The volume of a sphere can be found by .

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  | 1. **Not enough information** |  |
| 1. **NOTA** |  |  |  |  |