**Directions:** You have 60 minutes to complete the following 25 multiple-choice questions. Choices A through D are answer choices for every problem. Choice E stands for “none of the above,” or NOTA. Scoring is as follows: 5 points for a correct answer, 1 point if left unanswered, and 0 points for an incorrect response. **Note: sometimes this test uses “blocks” as a unit. Treat it as you would any other unit.** Figures are not necessarily drawn to scale.Good luck!

1) Ray and Gavin are trying to build the Tower of Math which is made of gold slabs in the shape of a rectangular prism. The tower has a base of only one slab and is four slabs tall. If one gold slab requires nine gold ore to create, how much goldore will be needed to build the tower?

**A) 4 B) 9 C) 16 D) 36 E) NOTA**

2) Daniel wants to measure the volume of an underwater lake in the shape of an inverted right circular cone. If the lake is 3 blocks deep and has a radius of 5 blocks at the surface, what is the lake’s volume in cubic blocks?

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

3) Which of the following must be logically equivalent to the statement “If Nilay can find a diamond, he is rich”?

I. If Nilay is rich, he can’t find diamond.

II. If Nilay can’t find diamond, he isn’t rich.

III. Nilay is rich if he can find diamond.

IV. If Nilay isn’t rich, he can’t find diamond.

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

4) Andrew is building a house in the shape of a convex pentagon. Find the sum of the measures of all of the exterior angles.

**A) 720° B) 360° C) 144° D) 180° E) NOTA**

5) A block of TNT forms an explosion in the shape of a sphere with a diameter of 8 blocks. What is the volume of the explosion, in cubic blocks?

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

6) Jonathan wants his new house to have a triangular roof balanced on a single point. At what point on the roof should he place a support to balance it?

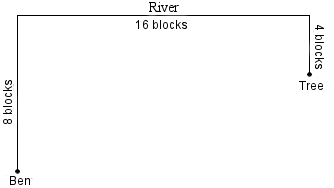
**A) Centroid B) Circumcenter C) Incenter D) Orthocenter E) NOTA**

7) Geoff and Michael want to create a map for their rectangular town. One inch on the map will represent 2.5 blocks. If the town is 50 blocks long and 80 blocks wide, what would the area of their map be? All answers are in square inches.

**A) 256 B) 640 C) 1,600 D) 25,000 E) NOTA**

8) Jamie wants to build a structure in the shape of a triangular prism. If the base is an equilateral triangle of side length 3 and the prism has a height of 4, what is the prism’s **lateral** surface area?

**A)**  **B)**  **C) 36 D) 0 E) NOTA**

9) Ben is about to leave his house to gather some wood from a certain tree. His house is 8 blocks away from a nearby river that is a straight line. The tree is 16 blocks down the river from his house and 4 blocks away from the river. What is the shortest distance Ben can travel to the tree if he must first stop by the river to collect water? Note the diagram below is not drawn to scale.

**A) 12 B) 16 C) 20 D) 25 E) NOTA**

10) Which of the following is NOT a platonic solid?

**A) Tetrahedron B) Decahedron C) Icosahedron D) Cube E) NOTA**

11) Cayle is building a cube-shaped house that is perfectly inscribed within a sphere-shaped cave of radius 6. What is the volume inside the cave but outside the house?

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

12) Kevin just finished building his new house, but there’s one problem – he built it in the wrong place! He will have to push it 50 blocks south. What is this transformation called?

**A) Translation B) Rotation C) Reflection D) Dilation E) NOTA**

13) Doreen is exploring a stronghold when she stumbles upon an old library where she finds an ancient mathematics book written by *“The Father of Geometry”*. Who is the author?

**A) Archimedes B) Descartes C) Euclid D) Pythagoras E) NOTA**

14) Nathan wants to make an animal pen in the shape of a regular polygon with 65 diagonals. How many sides should it have?

**A) 0 B) 11 C) 19 D) 21 E) NOTA**

15) A 3x3x3 cube made of cobblestone blocks needs to be fortified with a layer of obsidian blocks. How many obsidian blocks would it take to add another layer of blocks to the cube?

**A) 27 B) 37 C) 64 D) 98 E) NOTA**

16) Circle O has chord CD of length 8 and a diameter of 10. CD has a midpoint labeled X. What is the shortest possible distance from X to the edge of the circle?

**A) 5 B) 4 C) 3 D) 2 E) NOTA**

17) Jessie is exploring the world when she comes across a hole in the shape of an equilateral triangle of side length 1 block. She decides to walk around the hole, maintaining a distance of 1 block from the hole at all times. How far has she walked when she returns to her original starting position? Assume her starting point is one block away from the triangular hole.

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

18) Which type of line segment does not necessarily contain a vertex of the triangle?

**A) Altitude B) Angle Bisector C) Median  
D) Perpendicular Bisector E) NOTA**

19) While wandering the desert, Shiming stumbles upon a giant pyramid in the shape of a regular tetrahedron. Starting from the midpoint of the bottom edge, he begins to climb up the pyramid in a straight line toward the peak, measuring the distance he travels as he goes along. Upon reaching the top, he determines that he has traveled 12 blocks. What is the volume of the pyramid?

**A)**  **B) 128 C)**  **D)**  **E) NOTA**

20) Stacy is deep underground mining for diamonds. She travels 20 blocks north, 5 blocks west, 3 blocks north, 11 blocks east, 8 blocks south, and 2 blocks east. How far is she from her starting position, rounded to the nearest block?

**A) 21 B) 17 C) 13 D) 8 E) NOTA**

21) The sum of the measures of the interior angles of a regular convex polygon is 2880 degrees. What is the measure of one of its exterior angles?

**A) 10° B) 16° C) 24° D) 160° E) NOTA**

22) In Minecraft, the angle of the sun with the horizon is directly related to the time. When the sun is at a 0° angle, the time is 6 AM, and when the sun is at a 180° angle, the time is 6 PM. What time is it when the sun is at a 136° angle?

**A) 2:48 PM B) 3:04 PM C) 4:24 PM D) Noon E) NOTA**

23) Triangle XYZ is inscribed in a circle. The measure of angle X is 48 degrees and angle Y is 65 degrees. What is the measure of arc XY?

**A) 24° B) 67° C) 130° D) 134° E) NOTA**

24) A triangle of integer side lengths has two sides of length *n* and 3*n*. How many possibilities are there for the third side for all?

**A) 1 B) *n* – 3 C) 2*n* – 1 D) 3*n* E) NOTA**

25) While fighting the final boss, the Ender Dragon, Thomas shoots an arrow into the air that follows the trajectory of a parabola. He shoots from the point (3, 0) and the arrow lands at (11,0). If the arrow reaches a maximum height (y-direction) of 15 blocks, what are the coordinates of the vertex of the parabola? All coordinates are in terms of blocks.

**A) (3, 0) B) (7, 0) C) (7, 15) D) (7, 7.5) E) NOTA**

