8th Grade 2024 Exam

Name:_____   School:_____

1. Santiago was abducted by aliens. In their spaceship, he was shown to a room of relics. One tells him that he may take 0.142857, repeating, of the relics back to earth with him, but there will be consequences if he takes more than what he is allowed to. What fraction of the relics may Santiago take back with him.

    A. 7/31
    B. 2/15
    C. 3/13
    D. 1/7
    E. 9/21

2. Anthony is a baker. He likes to follow recipes strictly. He has, however, run into an issue. An odd recipe book calls for 3.8383 repeating – 2.5454 repeating cups of granulated sugar. To complete the recipe, he must know the value in its fractional form. Which fraction is equivalent to the value.

    A. 128/99
    B. 380/99
    C. 508/99
    D. 632/99
    E. 252/99

3. Langston is a carpenter. He is also a trickster. For his latest trick. He is going to make a wooden, cubic case with a spherical weight hidden inside it. When someone tries to lift it, they will be unable to. The volume of the cube before it is hollowed out is 1,331 cubic centimeters and the volume of the sphere is 36π cubic centimeters. What is the difference between the side length of the cube and the radius of the sphere in millimeters?

    A. 11
    B. 8
    C. 110
    D. 3
    E. 80

4. A 2 dimensional square has the square root of its area taken and cubed to produce a 3 dimensional shape. This shape has its volume divided into 8 shapes of equal volume. The cube root of the volume of one of those shapes is taken and squared to produce a 2 dimensional shape. If the new 2 dimensional shape has an area of 1, what was the area of the original 2 dimensional shape?

   A. 16
   B. 4
   C. 8
   D. 1
   E. 22.63

5. After a week, Lindsey is finally on the last problem of her homework. The solution came out to $\sqrt[3]{216a^6 * y^2}$, but she needs to simplify it. What is the simplification of the solution?

   A. $6a^2 * y^{\frac{3}{2}}$

   B. $8a^2 * y^{\frac{2}{3}}$

   C. $6a^2 * y^{\frac{2}{3}}$

   D. $8a^2 * y^{\frac{3}{2}}$

   E. $6a^2 * y$

6. A potatoes processing plant produces $4.5*10^9$ kg of French fries every minute. If 3 kg of French fries costs $\$1.50*10^2$, what is the plant's revenue after $8.0*10^0$ minutes pass.

   A. $\$1.8*10^9$

   B. $\$5.4*10^9$

   C. $\$1.8*10^{12}$

   D. $\$7.2*10^9$

   E. $\$5.4*10^{12}$

7. Solve for x:
$$x = \left(\frac{2 \cdot 2 \cdot 2 \cdot \frac{7^3}{7^2}}{\left(a^3\right)^2 \cdot (7(7))^{\frac{1}{2}}} \right)^4$$

A. Undefined

B. $\dfrac{4096}{a^{18}}$

C. $\dfrac{512}{a^{24}}$

D. $\dfrac{512}{a^{18}}$

E. $\dfrac{4096}{a^{24}}$

8. There are 2 linear equations: y-7=3(x-5) and $y-3=0.8(\dfrac{x^2}{x})$. At what point do the lines produced from these equations intersect?

   A. (-8,3)
   B. (15,15)
   C. (7,5)
   D. (5,7)
   E. (3,-8)

9. A group of friends decide to pool their spare change in order to purchase a gaming console. They ended up pooling 276 dollars. If the value of the money pooled by the group can be represented by a set of 6 consecutive odd integers, what is the median value of the amounts put into the money pool?

   A. 46
   B. 41
   C. 51
   D. 47
   E. 45

10. There are 5 days left on a holiday candy calendar. The amount of candy left on each day can be described as a set of 5 consecutive even integers. If there are 50 candies in total, what is the mean value of the candy amounts?

   **A.** 14
    B. 50
    C. 6
    D. 10
    E. 5

11. Donald and Ronald are soccer players. When Donald's mom showed up late to his soccer game, Donald had scored six goals and was steadily scoring one goal per minute. Ronald, however, had only scored four goals, but he was steadily scoring two goals per minute. How many minutes did Donald's mom have to wait until Donald and Ronald had scored the same amount of goals?

   A. 14
   B. 0
   C. 2
   D. 4
   E. 5

12. Casey is an artist. Starting from Sunday, she began to record how many paintings she produced. After 5 days, she had 19 paintings. After 10 days, she had 34. How many paintings did she start with on Sunday?

   A. 15
   B. 14
   C. 3
   D. 4
   E. 0

13. Samson is a professional basketball player with compromised vision. He can shoot 60 balls every minute with his right eye closed and 30 balls per minute with his left eye closed. During a game, Samson spent a total of 60 minutes shooting the ball (either with his left eye closed or his right eye closed at any given time). He made 45 more shots with his left eye closed than with his right eye closed. How many shots did he make with his right eye closed?

   A. 40.5
   B. 1170
   C. 1215
   D. 1125
   E. 19.5

14. You travel to a brick market to examine the bricks that they have for sale. You notice one man purchases 10 clay bricks and 40 concrete bricks for $130 while another man sells 8 clay bricks and 60 concrete bricks for $188 dollars. If the brick merchants have a brick merchant union which establishes the minimum price at which bricks may be sold and the two sellers in this situation sell their bricks at the minimum price, what is the price of 60 concrete bricks represented through scientific notation?

A. $\$6.0*10^2$

B. $\$6.0*10^1$

C. $\$1.8*10^2$

D. $\$1.8*10^1$

E. $\$2.4*10^2$

15. An ecologist is conducting a study into a rare variety of trees. They create a plot that shows the relationship between the height of a given tree and the number of fruit present on its branches. Determine the line of best fit.

Height	0	10	15	25	45	50	55	70	80
Fruit #	0	39	110	165	245	265	388	423	500

Scatter plot of tree height and corresponding fruit number
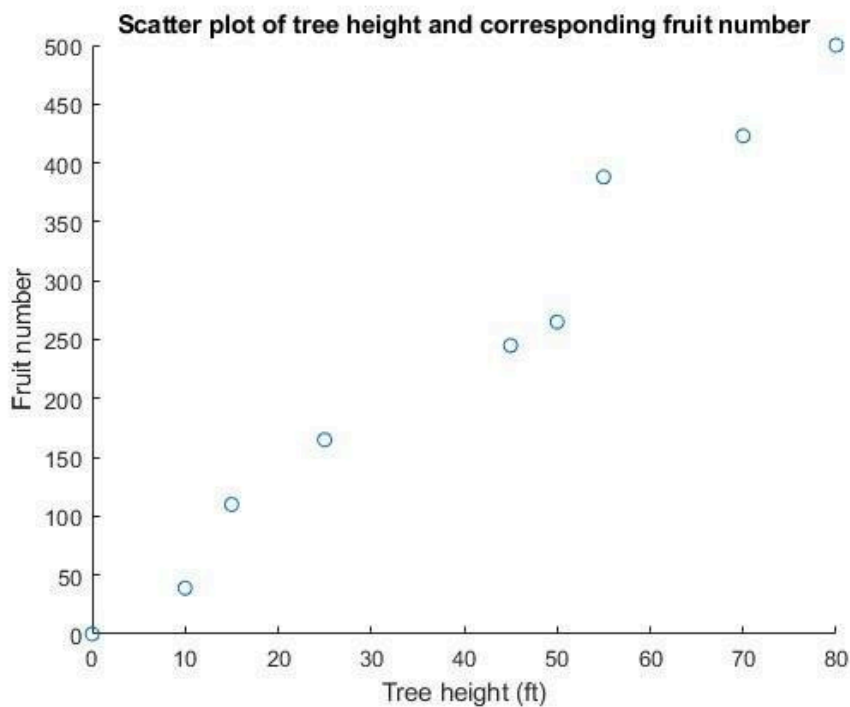
A. y= 2.3x + 50.7

B. y = 6.2x - 3.8

C. y = 10.1x + 100.9

D. y = 1.8x − 25.4

E. y = 8.7x + 75.2

**Problems 16-19 are based on the following table:**

	Science	Technology	Engineering	Mathematics
6th Grade	104	121	27	117
7th Grade	81	12	61	69
8th Grade	121	129	34	124
Total	306	262	122	310

16. If a student was randomly selected from the total number of students, what is the probability the student is enrolled in 6th grade or enrolled in 8th grade level mathematics?

   A. 124/1000
   B. 493/1000
   C. 369/1000
   D. 245/1000
   E. 306/1000

17. What is the difference between the median number of students enrolled in engineering and the mean number of students of all grades enrolled in a given class (science, technology, engineering, or mathematics)?

   A. 216
   B. -223
   C. 250
   D. 223
   E. -216

18. Which group of students represent 8.3333 repeating % of their grade level?

   A. 7th grade technology
   B. 8th grade engineering
   C. 6th grade engineering
   D. 7th grade engineering
   E. 7th grade science

19. Which grade has the highest percentage of its students enrolled in mathematics?

   A. 6th grade
   B. 7th grade
   C. 8th grade
   D. 6th and 7th grade
   E. They all have the same probability

20. Fredrick is designing a gardening bed. He is designing the bed to have 3 sides and 3 corners. The length of side AB is 10 inches, the length of side BC is $10\sqrt{3}$ inches, and the length of side AC is 10 inches. Fredrick needs the angle at each corner to complete his plans. If the angle at B is 30 degrees, what is the difference between the angle at A and angle at C.
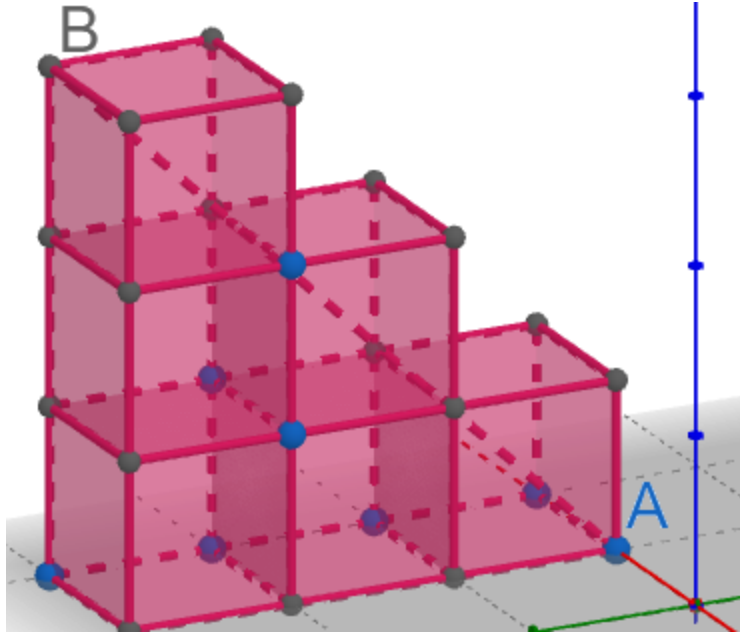
   A. 30
   B. 0
   C. 90
   D. 120
   E. 60

21. A square pyramid is as shown below. The length of its base edge is $4\sqrt{2}$ in. Its height is 3 in. Determine the length of line AB. A is located at the origin.
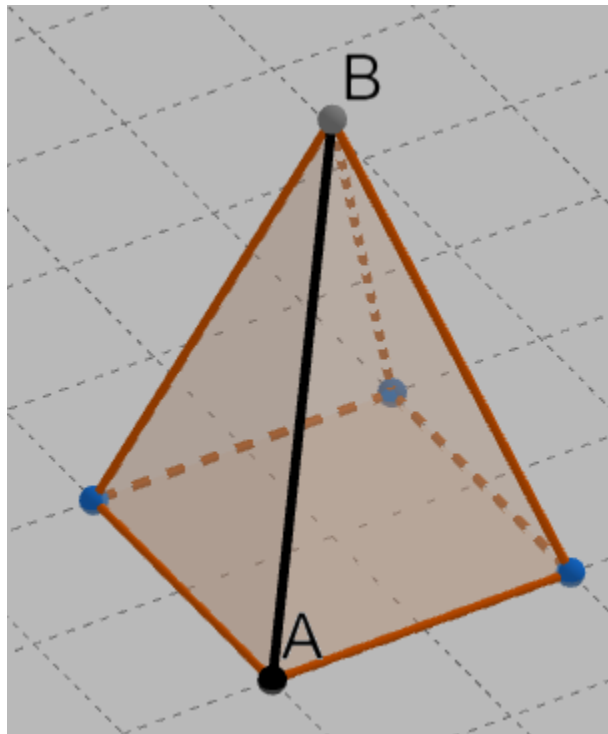
   A. 5
   B. 4
   C. 3
   D. 2
   E. 1

22. A cube has a volume of 729 cubic inches. They are stacked in the manner seen below. What is the distance between point A and point B?

A. $11\sqrt{9}$

B. $9\sqrt{11}$

C. $\sqrt{11}$

D. $9\sqrt{19}$

E. $19\sqrt{9}$

23. Nigel runs an ice-cream truck. His ice creams leave a lot to be desired; they can be described as a half-sphere grafted onto a solid cone. One of Nigel's cones has a volume of 42π cubic centimeters and a height of 14 centimeters. If the radius of the half-sphere is twice the radius of the base of the cone, what is the volume of the half-sphere in cubic centimeters?

A. 36π

B. 18π

C. 72π

D. 288π

E. 144π

24. There are 3 cylindrical cups labeled 1 through 3. The first cup has a diameter of 8 cm and a height of 30 cm. The second cup has a radius of 3 cm and a height of 45 cm. The third cup has a diameter of 5 cm and a height of 5 cm less than the combined height of the first two cups. Which cup has the greatest volume?

A. Cup 1
B. Cup 3
C. Cup 2
D. Cups 1 and 2
**E.** Every cup has the same volume

25. A spherical shell has a thickness of 3 inches. The volume enclosed by the outer surface of this shell is 972π cubic inches. If an object were enclosed inside the shell, what would be the maximum extent of its volume?

A. 144π
B. 288π
C. 144
D. 325
E. 360π

Tie Breakers

1. If $G(x) = 4x - 1$, $F(x) = x^2 - 4x + 4$, and $I(x) = x^3 - 25x$. Find $I(F(G(x)))$

2. How many units – a whole number – is b?

30°

a

6 units

60°

b
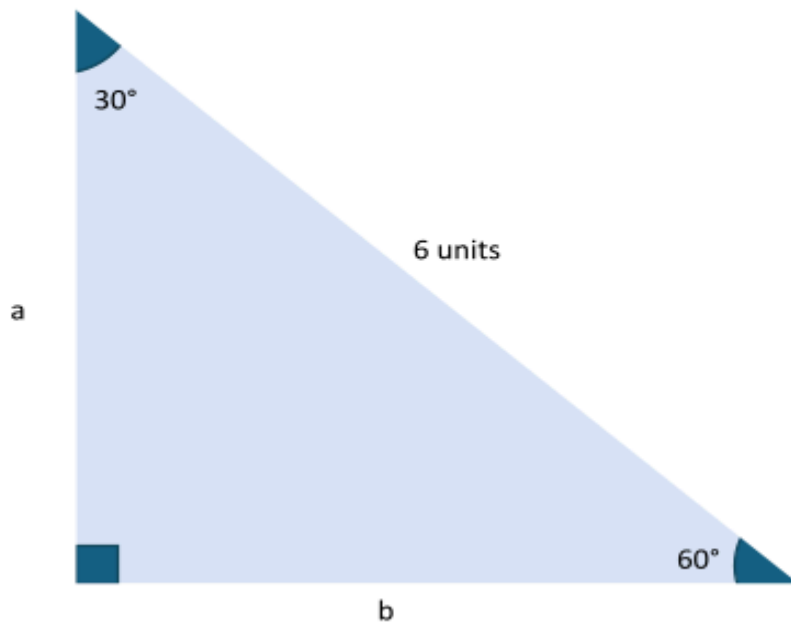
3. Completely factor $2268 + 252x + 7x^2$