

10th Annual

**9th and 10th Grade
Mathematics Exam**

Sponsored by:

TIME

1. If the perimeter of a regular hexagon is 72 units, what is the area of the figure?

- A. $120\sqrt{4}$
- B. $168\sqrt{3}$
- C. $216\sqrt{3}$
- D. $168\sqrt{5}$

2. If Jack's phone number is $90 \times 8!$, what is the prefix? (first 3 digits?)

- A. 662
- B. 326
- C. 263
- D. 362

3. A swimming pool is 30 feet long and 20 feet wide. In the shallow end, it is 3 feet deep, and it steadily increases to 10 feet deep in the deep end. How long will it take to fill the pool at a rate of $1 \text{ ft}^3/\text{min}$?

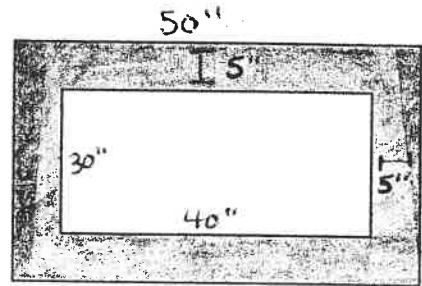
- A. 39 hours
- B. 65 hours
- C. 32 hours and 30 minutes
- D. 43 hours and 13 minutes

4. A rectangle is inscribed in a circle with radius of 30 units. If one side of the rectangle is $\frac{3}{4}$ the length of the side adjacent to it, what is the area of the rectangle?

- A. 1728 units²
- B. 1500 units²
- C. 1834 units²
- D. 1782 units²

5. In the picture to the right, what is the ratio of the shaded outside region to the area of the white inside region?

- A. 1:3
- B. 1:5
- C. 2:3
- D. 3:5



6. An X-ball court has dimensions 30 ft. x 150 ft. Find the difference in the area of the X-ball court and a square baseball diamond with the same perimeter.

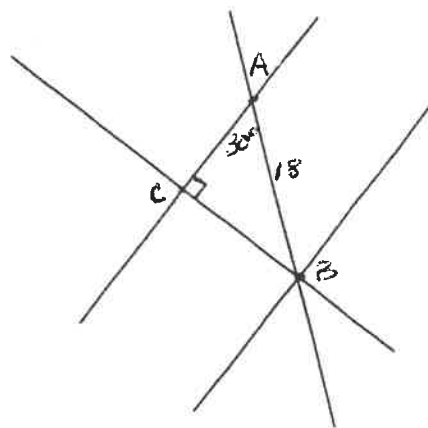
- A. 4,500 ft²
- B. 8,100 ft²
- C. 3,600 ft²
- D. 2,200 ft²

7. How many combinations can you make from the letters in the word TENNESSEE? (multiple letters are not distinct)

- A. 3,780
- B. 540
- C. 3,800
- D. 362,880

8. Using the information given in the diagram at the right, find the length of AC.

- A. 9
- B. $9\sqrt{3}$
- C. $9\sqrt{2}$
- D. $4\sqrt{2}$



9. How many different handshakes occur between the members of a group of 9 people if everyone shakes everyone else's hand exactly once?

- A. 72
- B. 8
- C. 81
- D. 36

10. If $[(3^2)^{x+2}] = 81^{36}$, find the value of x.

- A. 12
- B. 22
- C. 132
- D. 144

11. Given: $\tan \sigma = \frac{\sin \sigma}{\cos \sigma}$, $\sin^2 \sigma + \cos^2 \sigma = 1$

Which answer is equivalent to

$$\tan^2 \sigma \left(\frac{1}{1 - \cos^2 \sigma} \right)?$$

- A. $\frac{1}{\sin^2 \sigma}$
- B. $\frac{1}{1 + \sin^2 \sigma}$
- C. $\frac{1}{1 - \sin^2 \sigma}$
- D. $\frac{1}{1 + \cos^2 \sigma}$

12. $\frac{1}{3 + \frac{1}{4 + \frac{5}{7}}} = ?$

A. $\frac{33}{106}$

B. $\frac{106}{33}$

C. $\frac{33}{107}$

D. $3\frac{6}{33}$

13. Out of the first 50 positive numbers, how many are prime?

A. 13

B. 14

C. 15

D. 16

14. Two trains are 3,010 miles apart and traveling towards each other. If Train A is traveling at 60 mph and Train B is traveling at 80 mph, how long will it take for the trains to meet?

A. 21 hours

B. 21 hours and 30 minutes

C. 21 hours and 45 minutes

D. 22 hours

15. Solve for x:

$$15x - 12 > 156 - x$$

A. $x = \frac{21}{2}$

B. $x < \frac{21}{2}$

C. $x \geq \frac{21}{2}$

D. $x > \frac{21}{2}$

16. Dave has 4 jars that contain yellow and blue skittles.

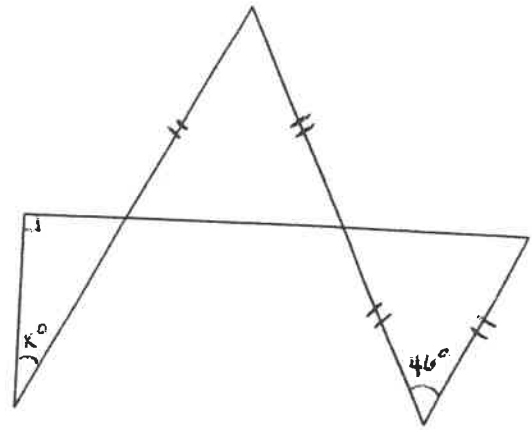
- Jar A has 5 yellow and 4 blue skittles
- Jar B has 7 yellow and 6 blue skittles
- Jar C has 8 yellow and 7 blue skittles
- Jar D has 9 yellow and 6 blue skittles

Which jar gives Dave the best chance of picking a yellow skittle at random?

- A. jar A
- B. jar B
- C. jar C
- D. jar D

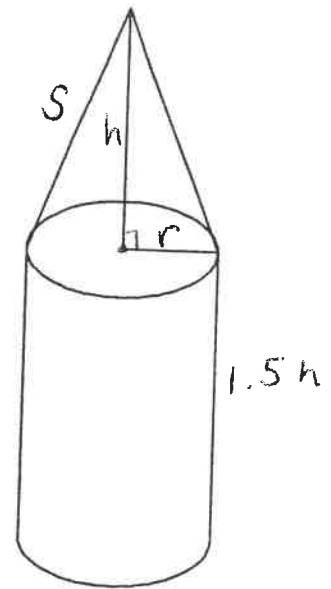
17. Use the given information in the in the diagram at the right to find the value of x.

- A. 23
- B. 67
- C. 134
- D. 45



18. Find the surface area of the figure if $r = 3\sqrt{8}$, $s = 5\sqrt{2}$, $h = \sqrt{12}$

- A. $(224 + 42\sqrt{8})\pi$
- B. $(204 + 24\sqrt{6})\pi$
- C. $(224 + 42\sqrt{6})\pi$
- D. $(204 + 24\sqrt{8})\pi$

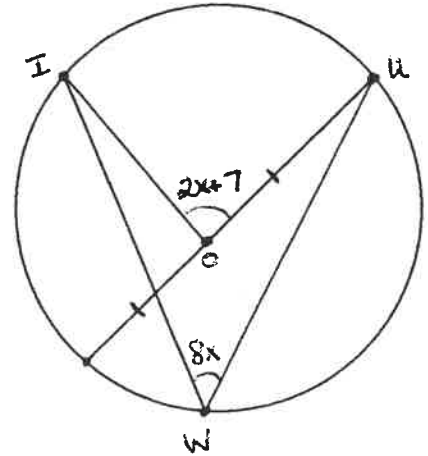


19. Mary is three inches shorter than Tom.
 Tom is seven inches taller than George.
 Vince is nine inches taller than Mary.
 If Vince is 6'4", how tall is George?

- A. 5'4"
- B. 5'7"
- C. 5'3"
- D. 5'5"

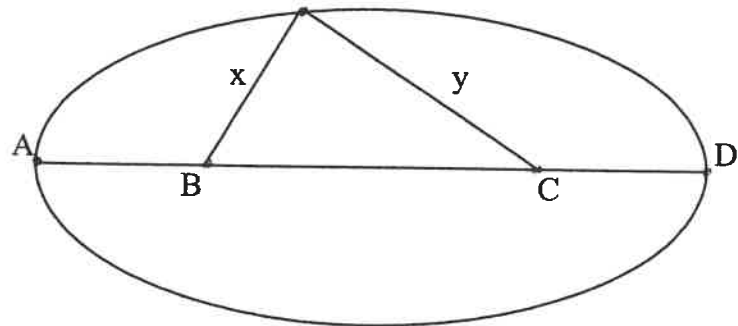
20. In the diagram at the right, find the measure of angle IOU.

- A. $\frac{17}{2}$
- B. $\frac{49}{6}$
- C. $\frac{1}{2}$
- D. 4



21. If B and C are the foci of the ellipse at the right, the minor axis is 10 cm, and $BC = 12$ cm, then find the value of $x + y$.

- A. 22
- B. $2\sqrt{61}$
- C. $12\sqrt{10}$
- D. $3\sqrt{43}$



22. $(100 - 1)(100 - 2)(100 - 3) \dots (100 - 1000) =$

- A. -6.8×10^{15}
- B. 0
- C. -100
- D. $1 + 2 + 3 + \dots + 1000$

23. A fly is flying 7 feet off the ground, and a frog 12 inches away from the fly can jump 5.5 feet in the air. How long does the frog's tongue have to be to reach the fly?

- A. $6\sqrt{13}$ inches
- B. $6\sqrt{15}$ inches
- C. $5\sqrt{13}$ inches
- D. $5\sqrt{15}$ inches

24. What is the 10th term in the Fibonacci sequence?

- A. 21
- B. 34
- C. 53
- D. 55

25. A bouncy ball is dropped from a height of 32 feet. Each time it hits the floor, it bounces back up to $\frac{3}{4}$ of its previous height. How far has the ball traveled when it hits the floor for the 4th time?

- A. 112 feet
- B. 200 feet
- C. 143 feet
- D. 168 feet