**24. Which choice completes the text with the most logical transition?**

The study of electromagnetism in the field of physics has not only revolutionized technology but has also deepened our understanding of the natural world. Electromagnetic waves, such as radio waves, microwaves, and visible light, serve as the foundation for various applications, including communication, energy transmission, and our exploration of the universe through telescopes. _____, the knowledge of these waves has paved the way for the development of numerous devices and technologies that harness different segments of the electromagnetic spectrum.

A) For example,
B) In conclusion,
C) As a result,
D) In other words,

**25. Which choice completes the text so that it conforms to the conventions of Standard English?**

The human brain is a complex organ, and its functions are still not fully understood. However, neuroscientists have made significant progress in recent years, and ongoing research is shedding light on the intricacies of brain function. These discoveries are crucial for advancing our knowledge of neuroscience _____ treatments for neurological disorders.

A) ; and developing
B) and for developing
C) , with developing
D) - developing

## Mathematics—Module 1

**1. An apple falls from a high branch. The height of the apple is modeled by the function $f(x) = -x^2 - 2x + 7$, where $f(x)$ represents the height of the apple and $x$ represents the number of seconds since the fall. After how many seconds will the apple reach the ground?**

A) 1.8
B) 2.1
C) 2.3
D) 2.6

**2. If $2x + 6 = -2$, what is the value of $10x + 11$?**

A) -4
B) -8
C) -29
D) -51

**3. Expand the following expression: $(x + 2)(x - 3)$**

A) $x^2 - 1$
B) $x^2 - 6$
C) $x^2 - x - 6$
D) $x^2 - 5x - 1$

*Refer to the following for question 4:*

**The table below represents the test scores on a chemistry final, as well as the lab grades for the semester.**

| **Final Exam** | 78 | 85 | 91 | 77 | 94 | 83 | 87 |
|---|---|---|---|---|---|---|---|
| **Lab Grade** | 84 | 86 | 98 | 90 | 97 | 85 | 90 |

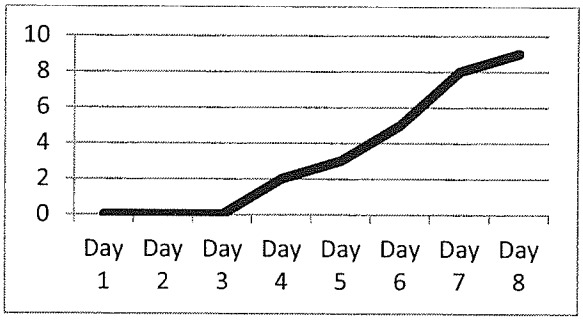
**4. What is the difference of the mean and median of the lab grades?**

A) 0
B) 1.5
C) 3
D) 4.5

**5. The graph of $y = 2x^2 + 3x$ intersects the graph of $y = -x$ at $(0, 0)$ and $(a, b)$. What is the value of $b$?**

**6. A population of bacteria tripled every day. After 5 days, there were 2,430 bacteria. How many were there originally?**

*Refer to the following for question 7:*




**Beth plants a number of sunflower seeds and checks daily to see if any have sprouted. The graph above shows how many seedlings are growing each day when she checks.**

**7. Which day did the first seedling appear?**

A) Day 1
B) Day 2
C) Day 3
D) Day 4

**8. Kasie is filling glasses with water. Each glass is cylindrical with a radius of 1.25 inches and a height of 6 inches. If she fills them to a height of 5 inches, how many glasses can she fill with 3 quarts of water (1 gallon = 231 cubic inches)? Use 3.14 for $\pi$.**

A) 3
B) 5
C) 7
D) 9

**9. Mandy can buy 4 containers of yogurt and 3 boxes of crackers for $9.55. She can buy 2 containers of yogurt and 2 boxes of crackers for $5.90. How much does one box of crackers cost?**

A) $1.75
B) $2.00
C) $2.25
D) $2.50

**10. A researcher surveyed 350 people at a grocery store, offering them a sample of a well-known juice along with a new brand of juice. 85% of those who tasted the two juices preferred the new brand. Which of the following inferences is a logical conclusion?**

A) 85% of shoppers will prefer the new brand of juice.
B) 15% of shoppers will prefer the new brand of juice.
C) Most shoppers will prefer the new brand of juice.
D) Most shoppers will prefer the well-known juice.

**11. If the solution for the system of equations below is $(x, y)$, what is the value of $x^2 - 3y$?**

$$5x - 6y = 12$$
$$-2x + 3y = -5$$

A) -3
B) -1
C) 3
D) 5

**12. A colony of *Escherichia coli* is inoculated from a Petri dish into a test tube containing 50 mL of nutrient broth. The test tube is placed in a 37 °C incubator and agitator. After one hour, the number of bacteria in the test tube is determined to be $8 \times 10^6$. Given that the doubling time of *Escherichia coli* is 20 minutes with agitation at 37 °C, approximately how many bacteria should the test tube contain after eight hours of growth?**

A) $2.56 \times 10^8$
B) $2.05 \times 10^9$
C) $1.7 \times 10^{14}$
D) $1.7 \times 10^{13}$

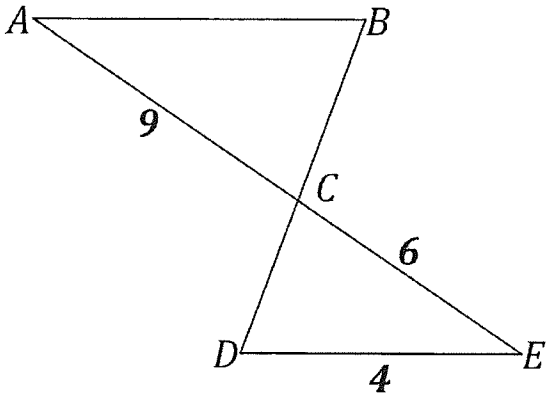
**13. If $3x - 4 = -1$, what is the value of $12x + 3$?**

A) 18
B) 15
C) 6
D) 1

**14. Evaluate the expression $4\sqrt{6} + 8\sqrt{6}$. Simplify your answer as much as possible.**

A) $12\sqrt{12}$
B) 72
C) $12\sqrt{6}$
D) $24\sqrt{3}$

**15. In the figure below (not drawn to scale), $\Delta ABC$ is similar to $\Delta EDC$. What is the length of $AB$?**




**16. The equation of a circle is shown below. What is the circle's diameter?**

$$x^2 + y^2 - 4x + 2y = 4$$

A) 2
B) 3
C) 5
D) 6

**17. If $4a + 3 \leq 1$, what is the greatest possible value of $6a - 2$?**

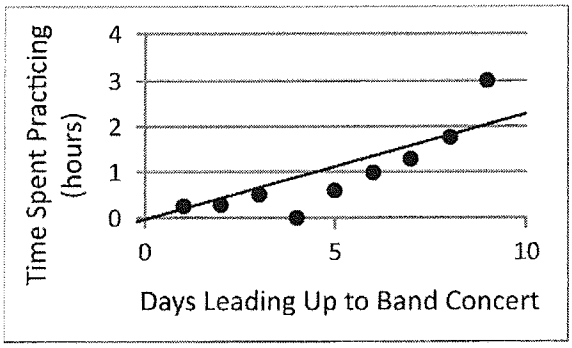
A) $-5$
B) $-3$
C) $-\frac{1}{2}$
D) 1

**18. In the equations below, $i$ refers to the amount of money (in dollars) invested in production of $x$ products and $p$ refers to the profits. What is the "break even" number of products, where investments are equal to profits?**

$$i = 15,200 + 0.75x$$
$$p = 5.5x$$

A) 2,432
B) 3,075
C) 3,200
D) 17,600

**19. The scatterplot below shows Julio's time (in hours) on the $y$-axis spent practicing his trumpet on the days ($x$-axis) leading up to a band concert. What is the difference in the amount of time he spent on the final day versus the amount predicted by the line of best fit?**




A) 0.5 hours
B) 1 hour
C) 2 hours
D) 3 hours

**20. The formula for finding the volume of a cone is $V = \frac{1}{3}\pi r^2 h$. Which of the following equations is correctly solved for $r$?**

A) $r = \frac{1}{3}\pi h$
B) $r = \sqrt{\frac{3V}{\pi h}}$
C) $r = \frac{3V}{\pi h}$
D) $r = V - \frac{1}{3}\pi h$

**21. Jan has six pairs of socks for every pair of shoes she owns. If she has 12 pairs of shoes and $s$ pairs of socks, which of the following equations is true?**

A) $12s = 6$
B) $6s = 12$
C) $\frac{s}{6} = 12$
D) $s + 6 = 12$

**22. If $x^{-\frac{1}{2}} = m$, what is $x$?**

A) $m^2$
B) $1 - m^2$
C) $\frac{1}{m^2}$
D) $\frac{1}{m}$