

Final Review

Name: _____

Date: _____

1. Which expression is equivalent to $\left(\frac{16x^{\frac{1}{6}}y^{-2}}{x^{-\frac{1}{6}}y^6}\right)^{\frac{3}{2}}$
- A. $24x^{\frac{9}{2}}y^{\frac{9}{2}}$ B. $\frac{24x^{\frac{3}{4}}}{y^9}$
- C. $\frac{64}{x^{\frac{1}{2}}y^8}$ D. $\frac{64x^{\frac{1}{2}}}{y^{12}}$

2. Which expression is equivalent to $(216x^9)^{\frac{1}{3}}$?
- A. $6x^3$ B. $6x^6$ C. $72x^3$

3. What are the solutions to the equation $x^2 - 6x + 5 = -8$?
- A. 2 and 3
- B. $2i$ and $3i$
- C. $3 + 2 \cdot 3$ and $3 - 2 \cdot 3$
- D. $3 + 2i$ and $3 - 2i$

4. Which expression is the simplified version of $\log x + \log y - k \log r$?

- A. $\log\left(\frac{xy}{r^k}\right)$ B. $\frac{\log(x+y)}{r^k}$
- C. $\log(x+y-r^k)$ D. $\log(x+y) - k \log r$

5. What is the solution to the equation?

$$\log_2 8 + \log_2 32 = x$$

- A. 4 B. 8 C. 40 D. 256

6. Bacteria in a culture are growing exponentially with time, as shown in the table below.

Bacteria Growth

| Day | Bacteria |
|-----|----------|
| 0 | 100 |
| 1 | 200 |
| 2 | 400 |

Which of the following equations expresses the number of bacteria, y , present at any time, t ?

- A. $y = 100 + 2^t$ B. $y = (100) \cdot (2)^t$
- C. $y = 2^t$ D. $y = (200) \cdot (2)^t$

7. Isabella invested \$500 at 6% annual interest, compounded quarterly. The value, A , of an investment can be calculated using the equation $A = P \left(1 + \frac{r}{n}\right)^{nt}$ where P is the initial investment, r is the interest rate, n is the number of times the interest is compounded each year, and t is time in years. Exactly how long will it take for her investment to be worth four times as much (quadruple) in value?

A. $t = \frac{\log 500}{4 \log 1.06}$ B. $t = \frac{\log 500}{4 \log 0.265}$
 C. $t = \frac{4 \log 4}{\log 1.015}$ D. $t = \frac{\log 4}{4 \log 1.015}$

8. A \$2,000 bicycle depreciates at a rate of 10% per year.

After how many years will it be worth less than \$1,000?

- A. 5 years B. 7 years
 C. 10 years D. 100 years

9. The student population in the Greenville school system is increasing about 10% each year. This year there are 3120 students in the Greenville school system. If this trend continues, which of the following is closest to the number of students who will be in this school system 3 years from now?

- A. 3400 B. 4000 C. 4200 D. 9400

10. What is the n th term in the arithmetic series below?

$$3 + 7 + 11 + 15 + 19 \dots$$

- A. $4n$ B. $3 + 4n$
 C. $2n + 1$ D. $4n - 1$

11. Which function will generate the n th term of the sequence $-\frac{1}{2}, 1, \frac{7}{2}, 7, \dots$

A. $f(n) = \frac{1 - 2n^2}{2}$ B. $f(n) = \frac{n^2 - 2}{2}$
 C. $f(n) = \frac{n - 2}{2}$ D. $f(n) = \frac{n - 3}{4}$

12. Which recursive rule would be applied to the sequence 2, 3, 4.5, 6.75, ... ?

$$a_n = n^{\text{th}} \text{ term}$$

$$a_1 = \text{first term}$$

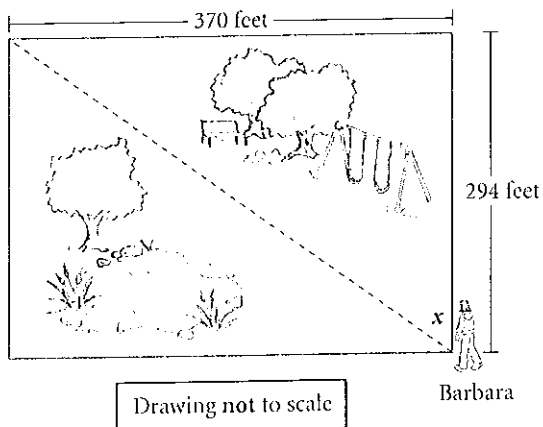
$$a_{n-1} = \text{previous term}$$

- A. $\begin{cases} a_1 = 2 \\ a_n = (a_{n-1})^2 \end{cases}$ B. $\begin{cases} a_1 = 2 \\ a_n = 1.5a_{n-1} \end{cases}$
 C. $\begin{cases} a_1 = 2 \\ a_n = 0.5a_{n-1} \end{cases}$ D. $\begin{cases} a_1 = 2 \\ a_n = 1.5a(n - 1) \end{cases}$

13. The short leg of a right triangle is 10 meters and the acute angles measure 25° and 65° . Use trigonometry and a calculator to find the measures of the longer leg of the right triangle.

- A. 10 meters B. 11.03 meters
 C. 18.66 meters D. 21.45 meters

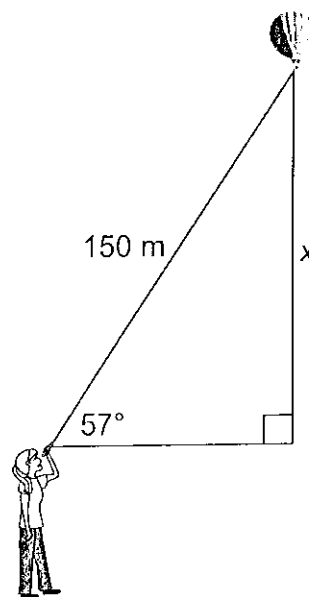
14. Barbara went for a walk in the city park. To cut across the rectangular park, she chose the path shown by the dotted line in the drawing below.



At what angle, x , did Barbara cut across the park? Round the answer to the nearest tenth of a degree.

- A. 37.4 B. 38.5 C. 51.5 D. 52.6

15. Use the diagram to answer the question.

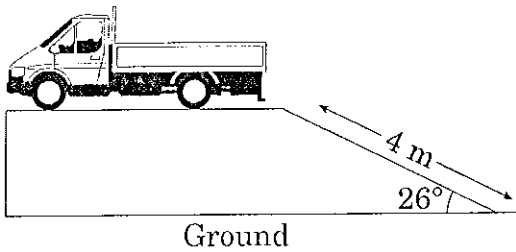


Note: Not to scale

Diana looks up at an angle of 57° and sees a hot air balloon 150 meters away. To the nearest meter, what is the value of x , the height of the hot air balloon above Diana's head?

- A. 82 meters B. 126 meters
 C. 179 meters D. 231 meters

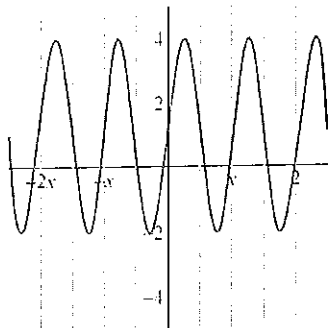
16. A truck is at the top of a ramp as shown below.



Approximately how high above the ground is the truck?

- A. 4.45 m B. 3.59 m
C. 1.95 m D. 1.75 m

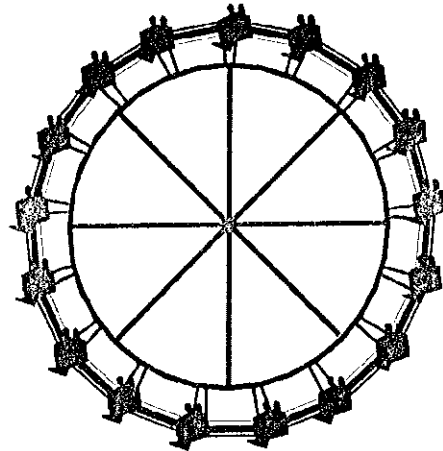
- 17.



Which of the following equations can be used to describe the graph shown above?

- A. $y = 4 \sin 2(x - 1)$ B. $y = 3 \sin(2x) + 1$
C. $y = 2 \sin(3x) + 1$ D. $y = 3 \sin\left(\frac{1}{2}x\right) + 1$

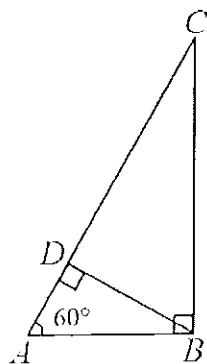
18. A Ferris wheel has a diameter of 80 feet. Riders enter the Ferris wheel at its lowest point, 5 feet above the ground, at time $t = 0$ seconds. One complete rotation takes 65 seconds.



Which function models a rider's vertical height, $h(t)$, at t seconds?

- A. $h(t) = -80 \cos\left(\frac{2\pi}{65}t\right) + 5$
B. $h(t) = -40 \cos\left(\frac{2\pi}{65}t\right) + 45$
C. $h(t) = -45 \cos\left(\frac{65}{2\pi}t\right) + 40$
D. $h(t) = -5 \cos\left(\frac{65}{2\pi}t\right) + 80$

19. In $\triangle ABC$ below, $AC = 12$. What is the length of segment BD .



- A. $3\sqrt{2}$ B. $3\sqrt{3}$ C. 6 D. $6\sqrt{2}$

20. What is $(x + y)^5$ in expanded form?

- A. $x^4 + 4x^2y^2 + 6x^2y + 4xy^2 + y^4$
 B. $x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + y^4$
 C. $x^5 + 5x^4y + 10x^2y^2 + 5xy^4 + y^5$
 D. $x^5 + 5x^4y + 10x^3y^2 + 10x^2y^3 + 5xy^4 + y^5$

21. What is the middle term for the expansion of $(x^2 + 3)^{12}$?

- A. $729x^{12}$ B. $924x^{12}$
 C. $673, 596x^{12}$ D. $665, 280x^{12}$

22. Divide.

$$(2x^3 + 9x^2 - 11x - 24) \div (x - 2)$$

What is the remainder?

- A. 0 B. 2 C. 6 D. 18

23. Divide:

$$(6x^3 - 11x^2 - 47x - 20) \div (2x + 1)$$

- A. $3x^2 - 7x - 20$ B. $3x^2 + 7x - 20$
 C. $3x^2 - 4x - 20$ D. $3x^2 + 4x - 20$

24. Which binomial is a factor of $(x^3 - x^2 + 3x - 3)$?

- A. $x - 3$ B. $x + 1$ C. $x^2 - 1$ D. $x^2 + 3$

25. Use the quadratic equation to solve the following:

$$3x^2 + 8x + 4 = 0$$