1) Each car in a fleet of 32 rental cars is either blue or green. There are 4 more green cars than three times the number of blue cars. How many green cars are there?

A) 7 B) 14 C) 18 D) 25 E) 28

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2) The sides of a triangle have lengths 7, x, and $x + 1$. If the perimeter is 30, find the value of x.

A) 3.625 B) 11 C) 14.5 D) 18 E) 23

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3) The sum of three consecutive odd integers is 60 more than the smallest. What is the largest of the three integers?

A) 15 B) 19 C) 23 D) 27 E) 31

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4) Two cyclists, Mike and Sarah, started at noon 60 miles apart. They rode toward each other at constant speeds and met at 1:30 pm. If Sarah's speed was 4 miles/hour faster than Mike's speed, how fast was Mike traveling?

A) 18 mph B) 22 mph C) 24 mph D) 28 mph E) 32 mph

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5) A rectangular prism has a square base and a height of 7 cm. Find its volume if its surface area is 144 cm^2. Round to the nearest hundredth.

A) 80.50 cm^3 B) 82.29 cm^3 C) 112.00 cm^3 D) 168.14 cm^3 E) 343.00 cm^3

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6) A gear with 24 teeth revolves at 600 revolutions per minute (rpm) and meshes with a gear having 66 teeth. What is the speed of the second gear? Round to the nearest hundredth.

A) 2.64 rpm B) 218.18 rpm C) 600.00 rpm D) 642.00 rpm E) 1650.00 rpm

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7) Andy can do a job alone in 5 hours. If Maria helps him, they can do the job together in 3 hours. How long would Maria take working alone?

A) 2 hours B) 6 hours C) $7\frac{1}{2}$ hours D) 8 hours E) $8\frac{1}{3}$ hours

8) The measure of the supplement of Angle A is 12 more than twice the measure of the angle. Find the measure of Angle A.

A) 26° B) 39° C) 56° D) 64° E) 84°

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9) The shorter diagonal of a rhombus with a 50° angle is 98 inches long. To the nearest whole square inch, what is the area of the rhombus?

A) 464 in² B) 1120 in² C) 2239 in² D) 5149 in² E) 10298 in²

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10) The distance across a river at a certain point is 24 meters. A bridge over this river has the shape of a circular arc. The midpoint of the bridge is 4 meters higher than either end. What is the radius of the circle containing the arc of the bridge?

A) 12 m B) $4\sqrt{10}$ m C) 16 m D) 20 m E) 24 m

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11) A wooden fence 6 feet high and 220 feet long is to be painted on both sides. A gallon of a certain type of paint will cover only 200 square feet of area on the first coat, but can cover 300 square feet of area on the second coat. If the fence is to be given two coats of paint, how many gallons of paint will be needed?

A) 6 gal B) 7 gal C) 11 gal D) 14 gal E) 22 gal

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12) An office supply store sells two sizes of balls of heavy-duty rubber bands. The first has a diameter of 6 centimeters and costs $0.50. The second has a diameter of 15 centimeters. How much should it cost in order to have the same value?

A) $1.25 B) $2.50 C) $3.13 D) $7.81 E) $15.63

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13) The height y (in feet) of a cannonball is given by $y = -\frac{16}{2025}x^2 + \frac{9}{5}x + 1.5$, where x is the horizontal distance (in feet) from where the cannonball is launched. What is the maximum height of the cannonball?

A) 1.50 ft B) 104.02 ft C) 113.91 ft D) 228.64 ft E) 306.05 ft

14) An electrical conduit is to be formed by folding up the sides of a flat 16" sheet of aluminum which is 20 feet long. What is the maximum possible cross-sectional area of the conduit?

A) 4 in² B) 8 in² C) 16 in² D) 32 in² E) 64 in²

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15) A 1000-liter tank contains 50 liters of a 25% acid solution. You add x liters of a 75% acid solution to the tank. The concentration of acid in the final mixture is given by the function

$$C(x) = \frac{3x + 50}{4(x + 50)}$$

Which statement below provides the best interpretation of the meaning of the horizontal asymptote of the graph of C?

A) As the amount of new solution added increases, the concentration of acid in the mixture approaches 75%.

B) It would not make sense to remove 50 liters from the solution.

C) The maximum acid concentration is achieved when 75% of the mixture is made up of the new solution.

D) As the concentration of acid in the mixture increases, the amount of new solution added approaches 0.75 liters.

E) The maximum acid concentration would have been achieved by removing 50 liters of 75% acid solution from the mixture.

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16) A population of narwhals increases according to the law of exponential growth. At the beginning of 2005, there were 560 narwhals; at the start of 2010, there were 850. In what year would this model predict the population of narwhals would reach 2013?

A) 1092 B) 1657 C) 2015 D) 2020 E) 2025

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17) At what annual interest rate, compounded continuously, will an investment of $867.49 double in exactly 13 years?

A) 5.20% B) 5.33% C) 5.48% D) 5.54% E) 52.04%

18) A car travels at 50 miles per hour. Its tires have a diameter of 2.5 feet. At what angular speed, in revolutions per minute, are the tires rotating? Round to the nearest whole number.

A) 560 rpm B) 1760 rpm C) 3520 rpm D) 33614 rpm E) 105600 rpm

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19) When rock salt is stored in a cone-shaped pile 22 feet high, the diameter of the pile's base is about 67 feet. Which of these is closest to the angle at the base of this cone?

A) 9.32° B) 18.18° C) 33.29° D) 41.05° E) 48.95°

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20) A GPS satellite orbits 12000 miles above the earth. If the radius of Earth is 4000 miles, what is the angle formed by the satellite's view of the "top" and "bottom" of Earth with its vertex at the satellite?

A) 14.04° B) 14.48° C) 19.47° D) 28.96° E) 38.94°

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21) Three forces act on an object. The first has a magnitude of 30 N in a direction of 90°. The second has a magnitude of 10 N in a direction of 75°. The third has a magnitude of 20 N in a direction of 50°. What is the magnitude of the resultant force?

A) 15.44 N B) 52.77 N C) 54.98 N D) 57.11 N E) 60.00 N

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22) A total of $25000 is to be invested in two funds which pay annual simple interest at 5% and 7.5%. If the investor wants to have at least $1500 in returns, what is the minimum amount she must invest in the fund which pays 7.5%?

A) $5000 B) $10000 C) $15000 D) $20000 E) $25000

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23) A plane flying into a constant wind makes a 1500-mile journey in exactly 3 hours. Flying with the same wind on the return flight, the trip takes 3 hours and 25 minutes. What is the speed of the headwind?

A) 19.23 mph B) 30.49 mph C) 38.46 mph D) 60.98 mph E) 208.33 mph

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24) In your first year at a new job, you earn a salary of $30000. Each year, you expect a raise of 4%. How much money, in total, can you expect to make in a 40-year career at this rate? Round to the nearest thousand dollars.

A) $1200000 B) $1250000 C) $2136000 D) $2851000 E) $3370000

25) A shipment of 20 computers contains 2 malfunctioning units. What is the probability that in a shipment of 5 of these computers (selected randomly), all five work?

A) 0.549 B) 0.553 C) 0.590 D) 0.750 E) 0.900

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26) As the side length x of a cube changes, at what instantaneous rate does its volume change?

A) x B) $3x$ C) $6x$ D) $3x^2$ E) x^3

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27) Two positive numbers have a sum of 60. What is the maximum product of one number times the square of the second number?

A) 3481 B) 3600 C) 27000 D) 32000 E) 36000

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28) A particle is moving around the unit circle. At the point $(0.6,0.8)$ the particle has horizontal velocity $\frac{dx}{dt} = 3$. What is its vertical velocity $\frac{dy}{dt}$ at that point?

A) -3.875 B) -3.75 C) -2.25 D) 3.75 E) 3.875

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29) The rate at which customers arrive at a counter to be served is modeled by the function $F(t) = 12 + 6\cos\left(\frac{t}{\pi}\right)$ for $0 \le t \le 60$, where $F(t)$ is measured in customers per minute and t is measured in minutes. To the nearest whole number, how many customers arrive at the counter over the 60-minute period?

A) 720 B) 725 C) 732 D) 744 E) 756

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30) An object moving along a curve in the xy-plane has position $\big(x(t), y(t)\big)$ with $\frac{dx}{dt} = \cos(t^2)$ and $\frac{dy}{dt} = \sin(t^3)$. At time $t = 0$, the object is at position $(4,7)$. Where is the particle when $t = 2$?

A) $(-0.654,0.989)$ B) $(0.461,0.452)$ C) $(3.346,7.989)$

D) $(4.461,7.452)$ E) $(5.962,8.962)$