Math Diagnostic 2.5

HighScores Logo

Math (SAT/PSAT)

1. A tree stands vertically on level ground. A wire is tied from the top of the tree to a point on the ground 21 feet from the base of the tree. The wire is 29 feet long. Let $y°$ be the angle between the wire and the tree. What is the value of $\tan(y)$? *[Moderate]*

A. $\frac{21}{29}$

B. $\frac{20}{21}$

C. $\frac{29}{21}$

D. $\frac{21}{20}$

2. Triangle PQR and triangle STU are similar equilateral triangles where PQ and ST are corresponding sides. If $ST = 3PQ$ and the perimeter of the triangle PQR is 30, what is the perimeter of the triangle STU? *[Easy]*

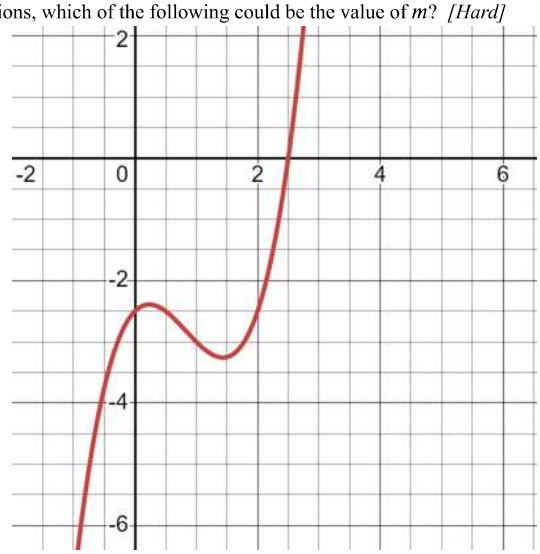
A. 10

B. 90

C. 60

D. 120

3. The function $f(x) = x^3 - \frac{5}{2}x^2 + x - \frac{5}{2}$ is graphed in the xy-plane below. If m is a constant such that the equation $f(x) = m$ has three real solutions, which of the following could be the value of m? *[Hard]*



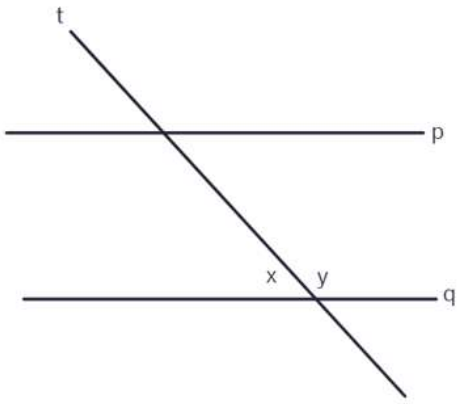
A. 1

B. 0

C. -3

D. -4

4. In the figure, line p is parallel to line q, and line t intersects both lines. If the angle marked $y°$ is $136°$, what is the value of $x + 136$?



(Note: Figure Not Drawn to Scale) *[Easy]*

A. 44

B. 180

C. 90

D. 136

5. Which expression is equivalent to $\frac{m^{12}n^8}{m^5n^{11}}$ where $m > 0$ and $n > 0$? *[Moderate]*

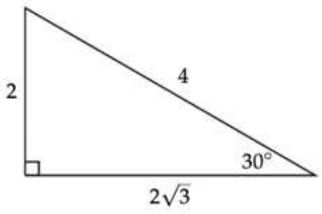
A. $\frac{m^7}{n^4}$

B. m^7n^{-3}

C. m^3n^7

D. $\frac{m^3}{n^7}$

6. In the given triangle, what is the value of $\sin 30°$? *[Easy]*



A. $\frac{\sqrt{3}}{2}$

B. $\frac{1}{2}$

C. 1

D. $\sqrt{3}$

7. What value of y is the solution to the given equation?

$9y = 81$ *[Easy]*

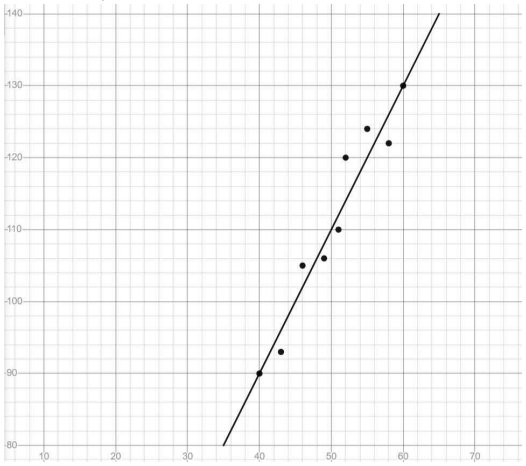
A. 9

B. 72

C. 90

D. 729

8. The scatterplot below shows the relationship between the number of customers (x) and total sales (y) in dollars for a bookstore on different days. The line of best fit for the data is also shown. According to the line of best fit, which of the following is closest to the predicted increase in total sales, in dollars, for every increase of 1 customer? *[Hard]*



A. $1.0

B. $2.0

C. $2.5

D. $3.0

9. For the linear equation g, the following table lists some values of x and their respective $g(x)$ outputs. The equation of g is given by $g(x) = cx + d$, where c and d are constants. Determine the value of $c - d$. *[Hard]*

x	$g(x)$
3	-98
5	0
7	98

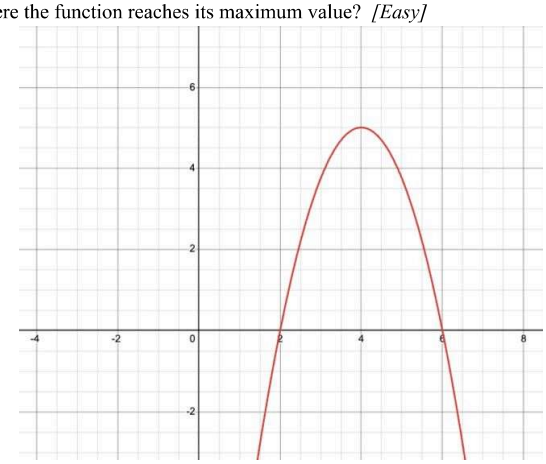
A. -196

B. 98

C. 290

D. 294

10. The graph of the function $y = f(x)$ is shown. What is the value of x where the function reaches its maximum value? *[Easy]*



A. $x = 1$

B. $x = 4$

C. $x = 6$

D. $x = 2$

11. Maria saves money each week. At the start of the year, she had $\$2,500$ in her savings account. She decides to save an additional $\$200$ at the end of each week. How much money will Maria have in her account at the end of the 8th week of the year? *[Moderate]*

A. $\$3,000$

B. $\$3,500$

C. $\$4,100$

D. $\$4,300$

12. A baker is planning to make 7 types of cookies for a bake sale. Each type will either be a Chocolate Chip variant or a Sugar Cookie variant, but not both. If a Chocolate Chip variant requires 3 cups of flour and a Sugar Cookie variant requires 5 cups of flour, and if y represents the number of types that will be Chocolate Chip, with the remaining types being Sugar Cookies, which of the following expressions represents the total number of cups of flour required? *[Hard]*

A. $-8y$

B. $14y$

C. $-2y + 35$

D. $3y + 35$

Answer Sheet

1.	2.	3.	4.	5.	6.	7.	8.	9.
D	**B**	**C**	**B**	**B**	**B**	**A**	**B**	**D**

10.	11.	12.
B	**C**	**C**