(22) The mass of object **A** is **438%** of the mass of object **B**, and the mass of object **A** is **0.073%** of the mass of object **C**. If the mass of object **C** is $P\%$ of the mass of object **B**, what is the value of $\frac{P}{1000}$?

600

$A = 4.38\,B$

$A = 0.00073\,C$

$0.00073\,C = \frac{4.38\,B}{0.00073}$

$C = 6000 \times 100\,B$

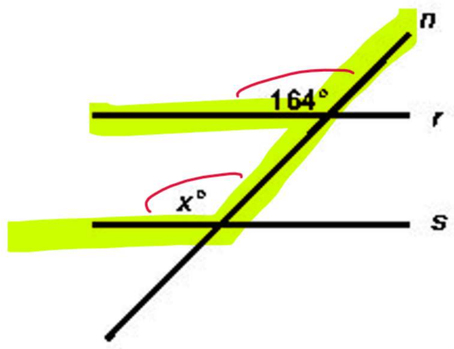
$C = 600\,000\,B$

$P = 600\,000$

$\frac{P}{1000} = \frac{600\,000}{1000}$

$= 600$

(1)



Note: Figure not drawn to scale.

In the figure, line n intersects lines r and s. Line r is parallel to line s. What is the value of X?

164

(2) During a portion of a flight, a small airplane's cruising speed varied between 175 miles per hour and 195 miles per hour. Which inequality best represents this situation, where s is the cruising speed, **in miles per hour**; during this portion of the flight?

(A) $s \leq 20$
(B) $s \leq 175$
(C) $s \leq 195$
(D) $175 \leq s \leq 195$

(3) If $5X = 9$, What is the value of $20X$?

(A) 5
(B) 13
(C) 36
(D) 49

(4) Which expression is equivalent to $(x^3 + 9x^2 - 8x) + 5(x^2 + 8)$?

(A) $x^3 + 14x^2 - 8x + 40$
(B) $x^3 + 9x^2 - 8x + 40$
(C) $x^3 + 5x^2 - 8x + 40$
(D) $x^3 + 8x^2 - 8x + 40$

(5) The function f is defined by $f(x) = x^3 + 9$. What is the value of $f(2)$?

17

(6) The function g is defined by $g(x)=\frac{x}{2}$

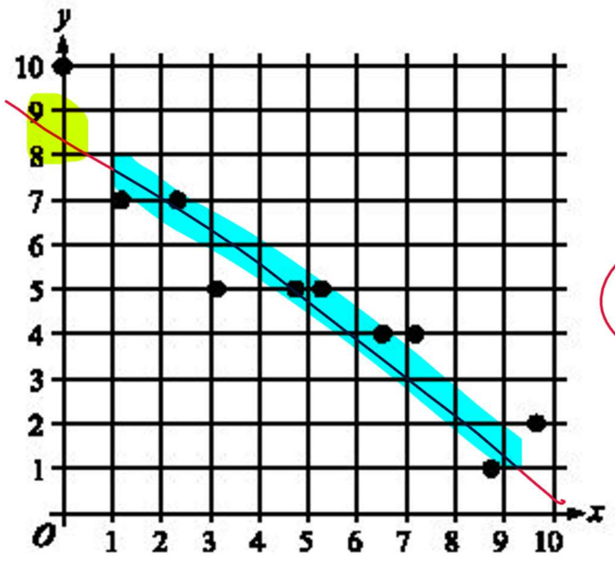
For what value of x does $g(x)=620$?

1240

(7) A chemist combines water and isopropanol to make a mixture with a volume of **41 milliliters** (mL). The volume of isopropanol in the mixture is **10 mL**. What is the volume of water, in mL, in the mixture? (Assume that the volume of the mixture is the sum of the volumes of water and isopropanol before they were mixed.)

31

(8) The scatterplot shows the relationship between two variables, X and y.



Which of the following equation is the most appropriate linear model for the data shown?

(A) $y = 0.8 + 8.7x$
(B) $y = 0.8 - 8.7x$
(C) $y = 8.7 + 0.8x$
(D) $y = 8.7 - 0.8x$

(9) $3x - 2y = -18$

For the given equation, which table gives three values of x corresponding values of y?

(A)

x	0	2	4
y	9	12	15

(B)

x	0	2	4
y	15	12	9

(C)

x	9	12	15
y	0	2	4

(D)

x	9	12	15
y	4	2	0

(10) A clothing store buys shirts at a wholesale price of **4.00** dollars each and resells them each at a retail price that is **280%** of the wholesale price. At the end of the season, any remaining shirts are marked at a discounted price that is **80%** off the retail price. What is the discounted price of each remaining shirt, in dollars?

2.24

(11) $y = -\frac{1}{4}x$

$y = \frac{1}{6}x$

The solution to the given system of equations is (x, y). What is the value of X?

(A) -4
(B) 0
(C) 2
(D) 6

(12) $PC = N(18 - C)$

The given equation relates the variables P, N, and C. Which expression represents the value of C for distinct positive values of P and N?

(A) $\frac{C(N+P)}{N}$
(B) $\frac{PC}{18-C}$
(C) $\frac{18N}{N+P}$
(D) $\frac{18N}{P+1}$

(13) A company has a customer loyalty program. In January 2018, there were **200** customers enrolled in the loyalty program. For the next 24 months after January 2018, the total number of customers enrolled in the loyalty program each month was **4% greater** than the total number enrolled the previous month. Which equation gives the total number of customers, c, enrolled in the company's loyalty program m months after January 2018, where $m < 24$?

(A) $c = 200(0.04)^m$
(B) $c = 200(1.04)^m$
(C) $c = 200(1.4)^m$
(D) $c = 200(4)^m$

(14) The function $f(t) = 8{,}000\ (2)^{\frac{t}{300}}$ gives the number of bacteria in a population t minutes after an initial observation. How much time, in minutes, does it take for the number of bacteria in the population to double?

300

(15) $y = \frac{2}{9}x + 8$

One of two equations in a system of linear equations is given. The system has infinitely many solutions. What is the slope of the graph of the second equation?

(A) $-\frac{9}{2}$
(B) $-\frac{2}{9}$
(C) $\frac{2}{9}$
(D) $\frac{9}{2}$

(16) If $3x^2 - 6x - 30 = 0$, What is the value of $x^2 - 2x$?

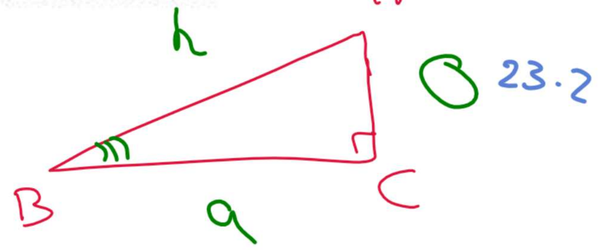
(A) 10
(B) 3
(C) 2
(D) 0

(17) The function f is defined by $f(x) = (x - 4)(x - 1)(x + k)$, where k is a constant. In the xy-plane, the graph of y = $f(x)$ passes through the point $(-2,0)$. What is the value of $f(0)$?

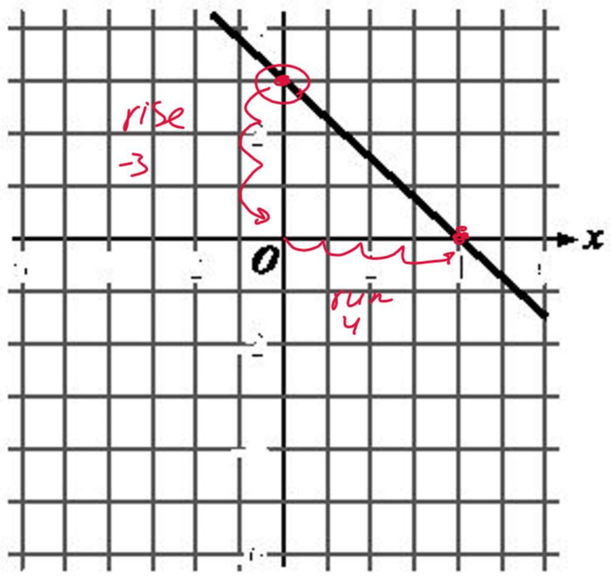
(A) -156
(B) -2
(C) 13
(D) 8

(18) In right triangle ABC, angles A and B are acute, side AC has a length of **23. 2**, and $\tan B = \frac{1}{7}$. What is the length of side BC, rounded to the nearest tenth?

(A) 538.2
(B) 162.4
(C) 4.8
(D) 3.3



(19)



Line k is shown in the xy-plane. Line j (not shown) is perpendicular to line k and passes through the point $(-15, -28)$. Which equation defines line j?

(A) $y = \frac{4}{3}x - 8$

(B) $y = \frac{4}{3}x - 48$

(C) $y = \frac{3}{4}x - 8$

(D) $y = \frac{3}{4}x - 48$

(20) A rectangular banner has an area of **3,500** square inches. A copy of the banner is made in which the length and width of the original banner are each increased by **40%**. What is the area of the copy, in square inches?

(A) 6,860

(B) 4,900

(C) 3,580

(D) 3,540

(21) $f(x) = (x - 1)^2 + 7$

What is the minimum value of the given function?

(A) 1

(B) 6

(C) 7

(D) 8

(22) Point F lies on a unit circle in the xy-plane and has coordinates $(1,0)$. Point G is the center of the circle and has coordinates $(0,0)$. Point H also lies on the circle and has coordinates $(-1, y)$, where y is a constant. Which of the following could be the positive measure of angle FGH, in radians?

(A) $\frac{13\pi}{2}$

(B) $\frac{15\pi}{2}$

(C) 10π

(D) 11π

(1) An object's average acceleration, in meters per second squared, is the change in the object's speed, in meters per second. Divided by the time during which the change occurred, in seconds. A certain object's speed changes by 45 meters per second in 6 seconds. What is this object's average acceleration, in meters per second squared, during this time period ?

$a = \frac{s}{t}$

(A) 0.13
(B) 7.5
(C) 39
(D) 51

$\frac{45}{6} = 7.5$

(2) $x + 26 = y$
$(x + 26)^2 = y$

A solution to the given system of equations is (x, y). What is a possible value of x ?

$x + 26 = (x + 26)^2$

TEE
$1 = 1$

(A) -25
(B) 0
(C) 1
(D) 26

(3) Lao walks at a speed of 2 miles per hour and runs at a speed of 6 miles per hour. He walks for w hours and runs for r hours for a combined total of 10 miles. Which equation represents this situation?

(A) $2w + 6r = 10$
(B) $\frac{1}{2}w + \frac{1}{6}r = 10$
(C) $2w + 6r = 80$
(D) $\frac{1}{2}w + \frac{1}{6}r = 80$

(4) $f(x) = 50x + 12$
The given function f estimates the distance a train has traveled, in kilometers, from a station in certain city x hours after crossing the city border. What is the best interpretation of 12 in this context?

$y = mx + b$
slope: Average rate, Y for x
y-int: initial starting at $x = 0$.

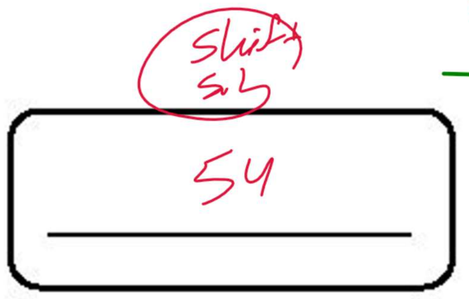
(A) Between the station and the city border, the train traveled an estimated total distance of 12 kilometers.
(B) After crossing the city border the train traveled at an estimated speed of 12 kilometers.
(C) After crossing the city border the train traveled an estimated total distance of 12 kilometers.
(D) Between in the station and the city border, the train traveled at an estimated speed of 12 kilometers per hour.

(5) $\frac{1}{3}(x+7)-\frac{1}{2}(x+7)=-8$

What value of x is the solution to the given equation?

(A) -15
(B) -7
(C) 41
(D) 132

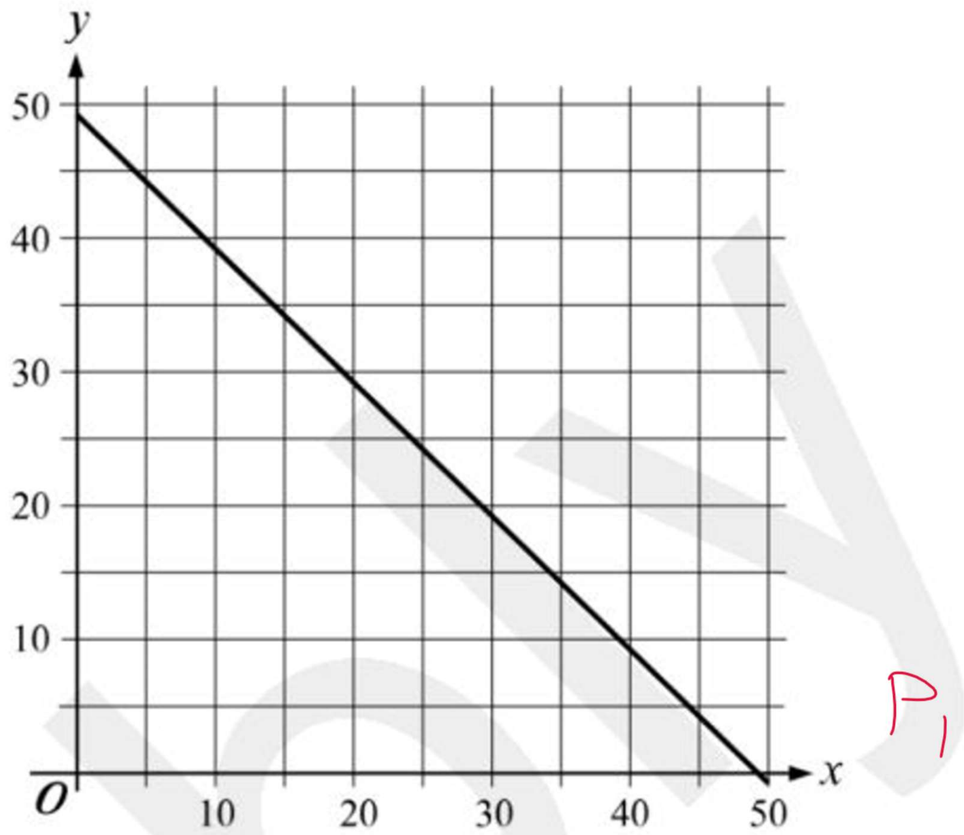
(6) The function g is defined by $g(x)=\frac{4}{9}x-24$. What is the x-coordinate of the x-intercept of the graph of $y=g(x)$ I the xy-plane?



(7) Which expression is a factor of $3x^2-5x+6x-10$?

(A) $x-2=0$
(B) $x+5=0$
(C) $3x-5=0$
(D) $3x+2$

(8)



Two students are playing a game. In the first round, Player 1 answers 49 questions. If an answer is correct, Player 1 earns 1 point. If an answer is incorrect, Player 2 will earn 1 point instead. The graph shows $y=f(x)$, where y is the number of points Player 2 will earn when x is the number of points Player 1 earns. Which of the following is the best interpretation of the point $(49, 0)$ in this context?

(A) When Player 1 earns 49 points, Player 2 will earn 49 points.
(B) When Player 1 earns 49 points, Player 2 will earn 0 points.
(C) When Player 1 earns 0 points, Player 2 will earn 49 points.
(D) When Player 1 earns 0 points, Player 2 will earn 0 points.