Grade 11. Assessment test

Problem 1.

If the result of increasing k by 700% of k is q, then k is what percent of q?

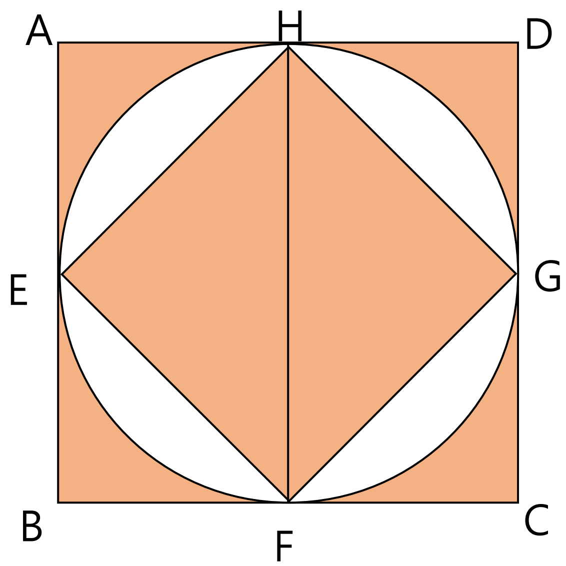
A) $12\frac{1}{4}\%$
B) $12\frac{1}{2}\%$
C) $12\frac{3}{4}\%$
D) $12\frac{3}{8}\%$
E) $12\frac{7}{8}\%$

Problem 2.

A discount of 15% on the price of a computer, followed by another discount of 8 % on the new price of the computer, is equivalent to a single discount of what percent of the original price?

A) 15.7 %
B) 18.5 %
C) 21.8 %
D) 22.5 %
E) 24.5 %

Problem 3.




In the figure above, ABCD is a square. A circle which is inscribed in ABCD has a square inside as same as inscribed itself. What is the area of the shaded regions if the area of circle is $\pi$?

A. $4-\pi$
B. $6+\pi$
C. $4+\pi$
D. $6-2\pi$
E. $6-\pi$

Problem 4

If $a > b > c > 0$, which of following statements must be true?

I. $\frac{a-c}{b-a} > \frac{b-c}{b-a}$
II. $ab > ac$
III. $\frac{b}{a} > \frac{b}{c}$

A. Ⅰ only
B. Ⅱ only
C. Ⅲ only
D. Ⅰ and Ⅱ
E. Ⅱ and Ⅲ

Problem 5.

Which of the following statements must be true when $a^2 < b^2$ and a and b are not 0 ?

I. $\frac{a^2}{a} < \frac{b^2}{a}$

II. $\frac{1}{a^2} > \frac{1}{b^2}$

III. $(a+b)(a-b) < 0$

A. Ⅰ only

B. Ⅱ only

C. Ⅰ and Ⅱ

D. Ⅱ and Ⅲ

E. Ⅲ only

Problem 6.

If $30x^{-1}y = 5xy^{-1}$, and x and y are positive, what is x in terms of y ?

A) $2\sqrt{3}\,y$

B) $\pm\sqrt{3}\,y$

C) $3y^2$

D) $6y^2$

E) $\sqrt{6}\,y$

Problem 7.

If $x, y \neq 0$, $x^{-1} + x^{-1} + x^{-1} = K$ and $y^{-1} + y^{-1} = Q$, then $\frac{Q}{K}$?

A) $\frac{x}{3y}$

B) $\frac{2x}{3y}$

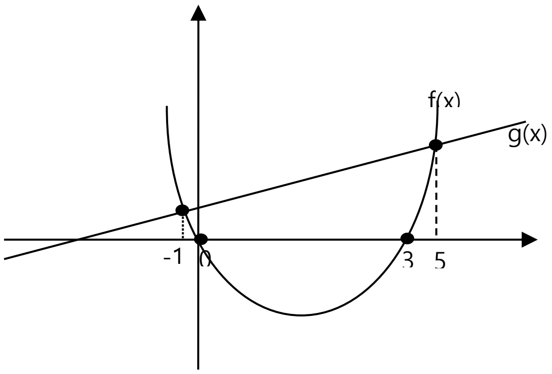
C) $\frac{3y}{2x}$

D) $\frac{y}{3x}$

E) $\frac{xy}{3y}$

Problem 8.

Based on the graph of function f(x) and g(x) shown in the accompanying figure, what are all values of $x \in R$ for which $f(x) \leq g(x)$ ?




i . $0 \leq x \leq 3$

ii. $x \leq -1$ and $x \geq 5$

iii. $-1 \leq x \leq 5$

A) i only

B) ii only

C) iii only

D) i and ii

E) i and iii

Problem 9.

Let k(x) be the function defined k(x)= $2x^2+1$ and g(x) be the function defined by g(x)= $(x+1)^2$. which expression is equivalent to g(a-1)?

A) $k(a)+2$

B) $\frac{k(a)-1}{2}$

C) $k(a)+1$

D) $\frac{k(a)+1}{2}$

E) $2k(a)+1$

Problem 10.

If the function f is defined by f(x)= x+k. and the function g is defined by $g(x) = \frac{2x+5}{3}$, for what value of k is f(g(x))= g(f(x)) ?

A) 5

B) $-5$

C) 0

D) $-10$

E) 10

Problem 11.

A certain population of insect starts at 8 and doubles every 5 days. What is the population after 30 days?

A) $2^9$

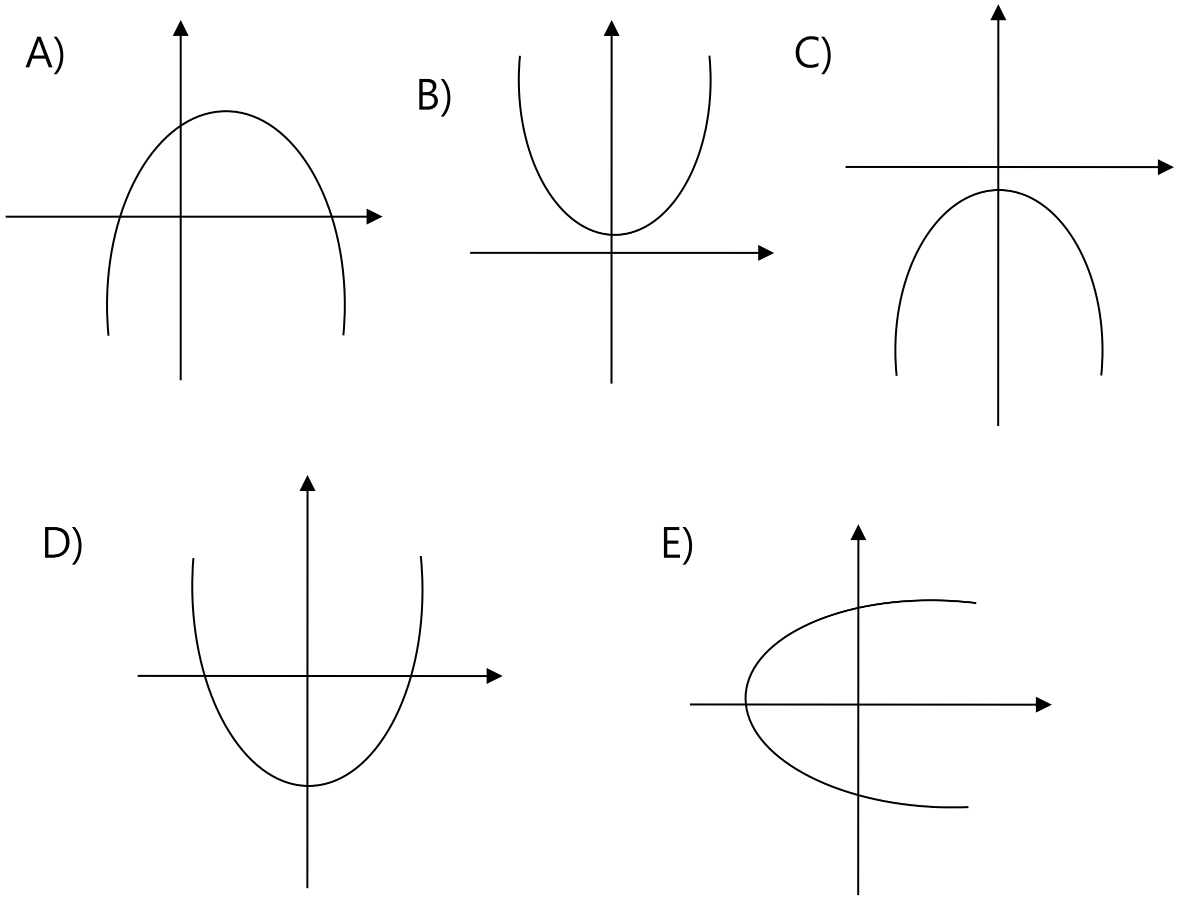
B) $2^8$

C) $2^{10}$

D) $2^{11}$

E) $2^7$

Problem 12.




If in the quadratic function $f(x)= ax^2 + bx + c$, a and c are both negative constants, which of the following could be the graph of function f ?

Problem 13.

The population of a certain bacteria which is 2000, triples every half an hour. If function p represents the number of the bacteria population after m minutes have elapsed, which equation could represent p(m)?

A) $2000(\frac{1}{3})^{20m}$

B) $2000(60)^{m}$

C) $2000(3)^{\frac{20}{m}}$

D) $2000(30)^{m}$

E) $2000(3)^{\frac{m}{30}}$

Problem 14.

A radioactive substance has an initial mass of 500 grams and its mass halves every 15 years. After t years, the number of grams of radioactive substance remaining is

A) $500(30)^{\frac{t}{2}}$

B) $500(30)^{t}$

C)$500(2)^{\frac{t}{15}}$

D) $500(\frac{1}{2})^{\frac{t}{15}}$

E) $500(\frac{1}{2})^{15t}$

Problem 15.

A traveler drove a car at the average rate of speed of 50 miles per hour for the first 3 hours of 5-hour car trip. If the average rate of speed for the entire trip was 48 miles per hour, what was the average rate of speed in miles per hour for the remaining part of the trip?

A) 48

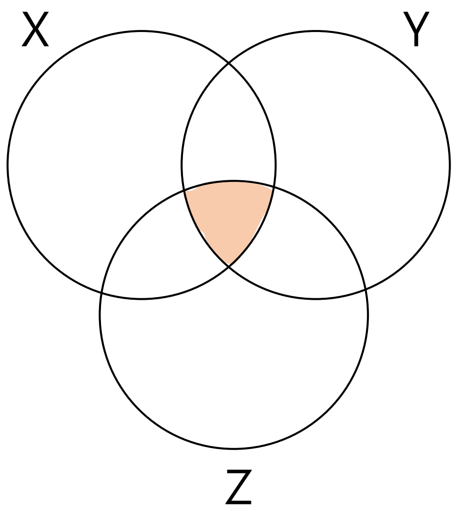
B) 46

C) 45

D) 50

E) 52

Problem 16.




In the figure above, circle X represents the set of all positive and odd integers, circle Y represents the set of all numbers whose square roots are integers, and circle Z represents the set of all positive multiples of 7. Which of the following numbers is a member of the set represented by the shaded region?

A) 16
B) 22
C) 25
D) 49
E) 63

Problem 17.

A quarter, a dime, a nickel, and a penny are placed in a box. One coin is drawn from the box and then second coin is drawn right after the first is drawn. In how many different ways can two coins be drawn so that the sum of the values of the two coins is at least 25 cent?

(A)2

(B)3

(C)4

(D)5

(E)6

Problem 18.

How many four-digit numbers greater than 1000 can be formed from the digit 0,1,3,5 and 7 if the same digit cannot be used more than once?

(A)96

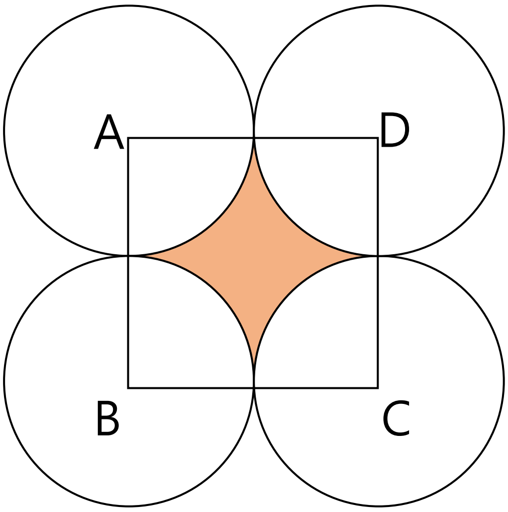
(B)625

(C)1024

(D)300

(E)360

Problem 19.




In the accompanying diagram, point A, B ,C and D are the center of four circles that each have a radius length of 2. The circles are tangent at the points shown. If a point is selected at random from the interior of square ABCD, what is the probability that the point will be chosen from the shaded region?

A) 1 - $\frac{3}{16}\pi$

B) 1- $\frac{3}{8}\pi$

C) 1- $\frac{1}{4}\pi$

D) 1- $\frac{3}{4}\pi$

E) 1- $\frac{1}{5}\pi$

Problem 20.

3, 5 , -5, …

The first term in the sequence of numbers shown above is 3. Each even-numbered term is 2 more than the previous term and each odd numbered term , after the first, is -1 times the previous term. For example, the second term is 3+2, and the third term is (-1)*5, What is the $55^{th}$ term of the sequence?

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