Use the functions, $f(x)=x^2+3x$ and $g(x)=\frac{1}{x}$ to answer questions #1 and 2:

1. Find and simplify $(f+g)(-4)$.

A. $-\frac{5}{4}$

B. $\frac{9}{4}$

C. $\frac{15}{4}$

D. $-\frac{17}{4}$

E. None of the above.

2. Find and simplify $(f\circ g)(x)$.

A. $x+3$

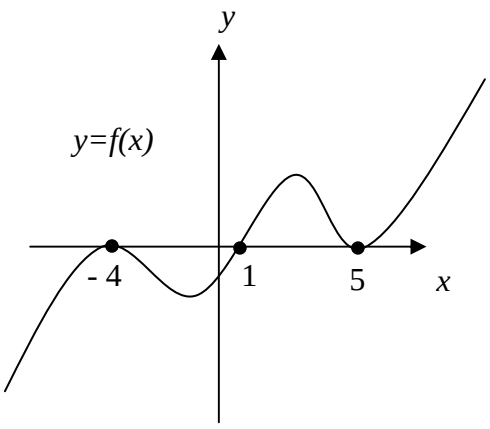
B. $\frac{1}{x^2+3x}$

C. $\frac{x}{x^2+3x}$

D. $\frac{1+3x}{x^2}$

E. $\frac{1}{x^3+3x^2}$

3. Given below is the graph of the function, *y=f(x)*. Find all values of *x* such that $f(x)>0$.



A. $(1,5)\cup(5,\infty)$

B. $(-\infty,-4)\cup(-4,1)$

C. $(-\infty,-4)\cup(5,\infty)$

D. $(-4,1)\cup(1,5)$

E. $(-4,1)\cup(5,\infty)$

4. Let y=f(x) be a function with domain, $D=[-2,5]$ and range, $R=[-6,3]$. Find the domain and range for $y=2f(x+3)$.

A. $D=[1,8]$; $R=\left[-3,\frac{3}{2}\right]$

B. $D=[-5,2]$; $R=[-12,6]$

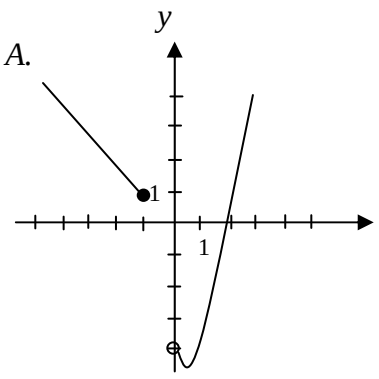
C. $D=[-5,2]$; $R=\left[-3,\frac{3}{2}\right]$

D. $D=[1,8]$; $R=[-12,6]$

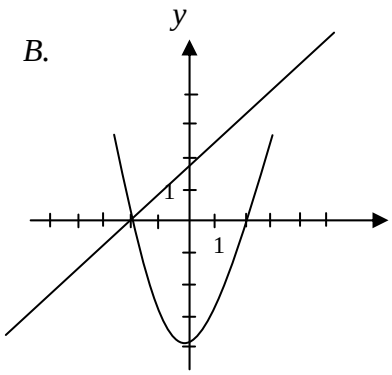
E. None of the above.

5. Choose the correct graph that depicts $f(x)=\begin{cases} x+2 & \text{if } x\le -1 \\ x^2-4 & \text{if } x>-1 \end{cases}$

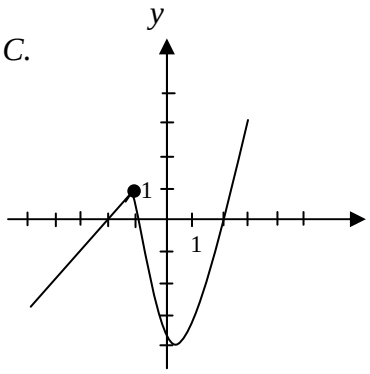
A.



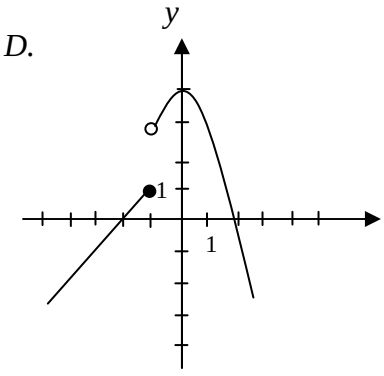
B.



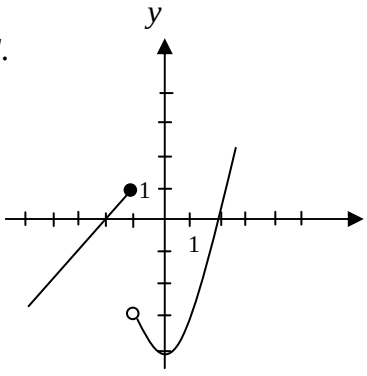
C.



D.



E.



Use the parabola, $f(x) = x^2 - 2x - 24$, to answer questions #6 and #7:

6. Express the parabola in standard form.

A. $f(x) = (x+1)^2 - 23$

B. $f(x) = (x-2)^2 - 23$

C. $f(x) = (x+1)^2 - 24$

D. $f(x) = (x-2)^2 - 24$

E. None of the above.

7. Find the zero(s) and the minimum value of the parabola.

A. zeros: $x = -4, 6$; min value $= -25$

B. zeros: $x = -6, 4$; min value $= -24$

C. zeros: $x = -4, 6$; min value $= -23$

D. zeros: $x = -6, 4$; min value $= -25$

E. None of the above.

8. Several values of two functions *F* and *G* are listed in the following tables:

x	8	5	3	1
F(x)	-2	6	4	9

x	2	4	5	6
G(x)	-5	7	1	-3

Find $(G \circ F)(5)$

A. 7

B. 6

C. 9

D. -3

E. -18

9. If $f(x) = x^3 - 2kx^2 + 3x - 8k$, find k such that the graph of f contains the point $(-1,16)$.

A. $k = 5$

B. $k = -2$

C. $k = -5$

D. $k = 2$

E. None of the above.

10. Solve the inequality. Express the answer in interval notation.

$$\frac{x+3}{x^2-25} < 0$$

A. $(-\infty,-5)\cup(5,\infty)$

B. $(-5,-3)\cup(-3,5)$

C. $(-\infty,-5)\cup(-3,5)$

D. $(-5,-3)\cup(5,\infty)$

E. None of the above.

11. Solve the following system of equations for x.

$$\begin{cases} 2x + y = 1 \\ x^2 + y^2 = 10 \end{cases}$$

A. $x = -1, \quad x = 3$

B. $x = -\frac{3}{\sqrt{5}}, \quad x = \frac{3}{\sqrt{5}}$

C. $x = 3, \quad x = 9$

D. $x = -1, \quad x = \frac{9}{5}$

E. None of the above.

12. Which of the following is true about the system of equations given by:

$$\begin{cases} 3x + y = 6 \\ 9x + 3y = 18 \end{cases}$$

A. The solution is in *QII*.

B. The solution is in *QIII*.

C. The solution is in *QIV*.

D. There is no solution.

E. There are infinitely many solutions.

13. The price of admission to a school play was \$4.00 for students and \$6.00 for nonstudents. If 625 tickets were sold for a total of \$2800.00, how many **student** tickets were purchased? Choose the answer that best describes the solution.

A. At least 200, but less than 300.

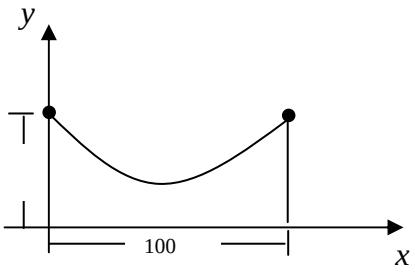
B. At least 300, but less than 400.

C. At least 400, but less than 500.

D. At least 500, but less than 600.

E. Not eoungh information given.

14. A section of a suspension bridge is in the shape of a parabola (shown below). The supports on either end are 100 yards apart and rise 40 yards off the ground. The lowest point of the suspension cable is 10 yards off the ground. Find the standard equation for this parabola.



A. $y = \frac{3}{250}(x-50)^2 + 10$

B. $y = \frac{3}{1000}(x-100)^2 + 10$

C. $y = \frac{1}{250}(x-50)^2 + 10$

D. $y = \frac{1}{1000}(x-100)^2 + 10$

E. $y = \frac{1}{10}(x-10)^2 + 50$

15. The ideal gas law states that the volume, V, that a gas occupies is directly proportional to the product of the number, n, of moles of gas and the temperature, T, and is inversely proportional to the pressure, P. If $n = 1.5$, $T = 400$, and $P = 202$, then $V = 25$. Find the constant of proportionality, k. Round your answer to the nearest tenth.

A. $k = 0.2$

B. $k = 8.4$

C. $k = 74.3$

D. $k = 12.6$

E. None of the above.