F.5 Mathematics

MC Exercise

5B9 More About Graphs of Functions

1. Which of the following functions has / have the same domain as the function $y = \log(x - 10)$?

I. $y = \log(x-10)^2$

II. $y = \log(10 - x)$

III. $y = -\log(x - 10)$

A. II only

B. III only

C. I and III only

D. None of the above

2. Find the domain of the function $y = \log(4 - x) + \sqrt{x + 9}$.

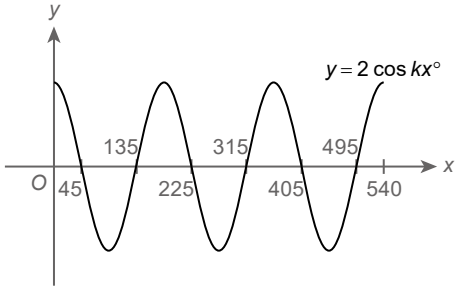
A. All real numbers greater than or equal to -9

B. All real numbers smaller than 4

C. All real numbers x with $-9 \le x < 4$

D. All real numbers except -9 and 4

3. The figure shows the graph of the function $y = 2\cos kx°$ where $0 \le x \le 540$ and k is a positive number. Find the value of k.



A. $\frac{1}{3}$

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

C. 2

D. 3

4. The maximum value of the function $(2\sin x° + 1)^2 - 1$ is

A. -2.

B. -1.

C. 0.

D. 8.

5. Which of the following functions has the maximum value greater than 3?

A. $y = -x^2 + 4x$

B. $y = \log[x(x-3)]$

C. $y = 2\cos 3x$

D. $y = 2\sin^2 x$

6. Find the minimum value of the function $y = \frac{-2}{x^2 + 4x + 6}$.

A. -4

B. -2

C. -1

D. 0

7. Which of the following functions has / have at least one axis of symmetry in its graph?

I. $y = x^2 - 2x + 4$

II. $y = \tan 2x$

III. $y = 3^x$

A. I only

B. I and II only

C. I and III only

D. II and III only

8. Consider the function $y = \sin\frac{x^\circ}{2} + 1$.

Which of the following are true?

I. The domain of the function is all real numbers.

II. The maximum and minimum values of the function differ by 2.

III. The period of the function is 180.

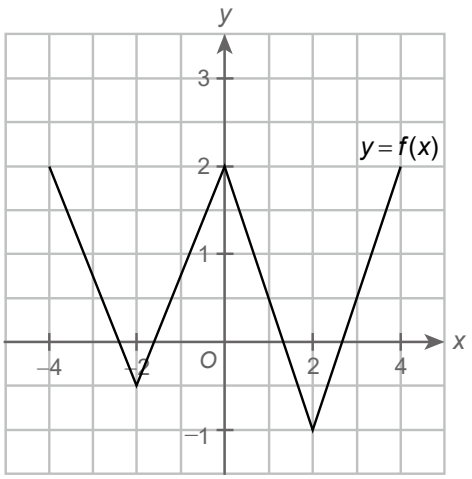
A. I and II only

B. I and III only

C. II and III only

D. I, II and III

9. The figure shows the graph of $y = f(x)$ where $-4 \le x \le 4$. How many real root(s) does the equation $2f(x) + 2 = 0$ have in the interval $-4 \le x \le 4$?



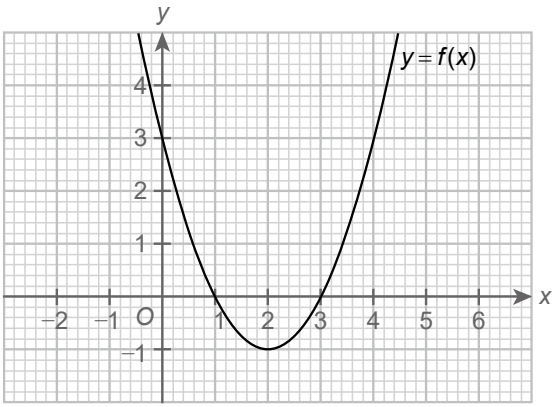
A. 0

B. 1

C. 3

D. 4

10. The figure shows the graph of $y = f(x)$.



Which of the following equations has no real roots?

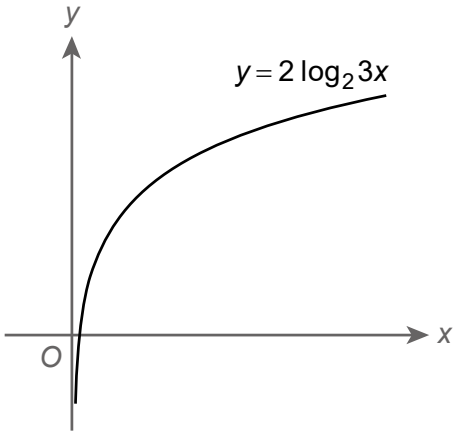
A. $f(x) = -1$

B. $f(x) = 1$

C. $\frac{1}{2}f(x) = -1$

D. $\frac{1}{2}f(x) = 1$

11. The figure shows the graph of $y = 2\log_2 3x$.



Which of the following lines can be drawn on the graph to help in solving the equation $\log_2 6x = -1$?

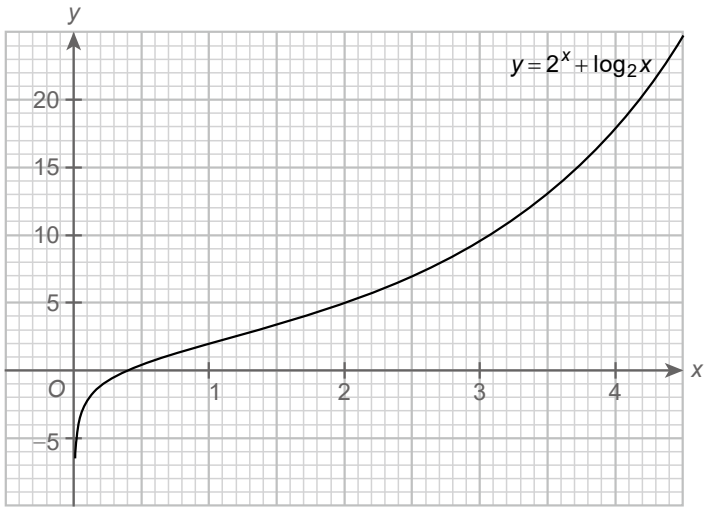
A. $y = -8$

B. $y = -4$

C. $y = -2$

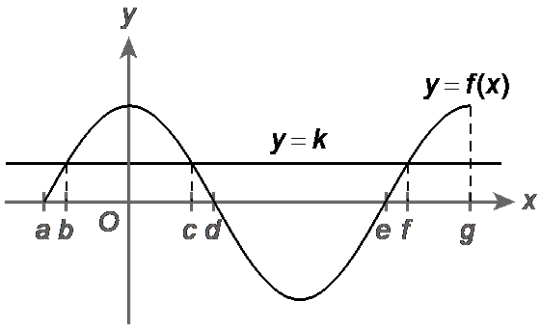
D. $y = -1$

12. The figure shows the graph of $y = 2^x + \log_2 x$ where $x > 0$. Solve the equation $2^x + \log_2 x - 3 = 10$ correct to 1 decimal place.



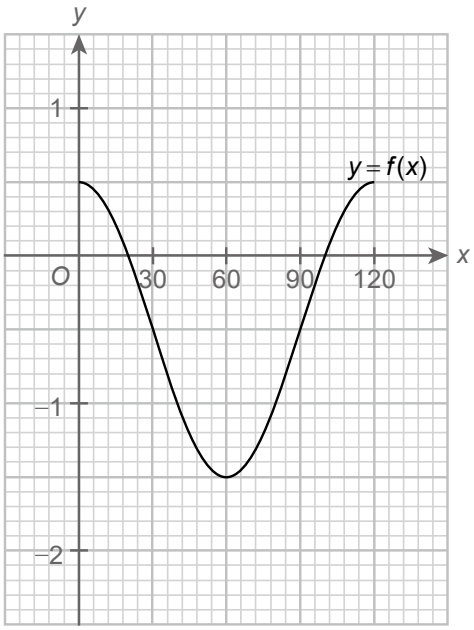
A. $x = 3.1$
B. $x = 3.2$
C. $x = 3.3$
D. $x = 3.5$

13. The figure shows the graphs of $y = f(x)$ and $y = k$, where $a \le x \le g$. The roots of the equation $f(x) = k$ are



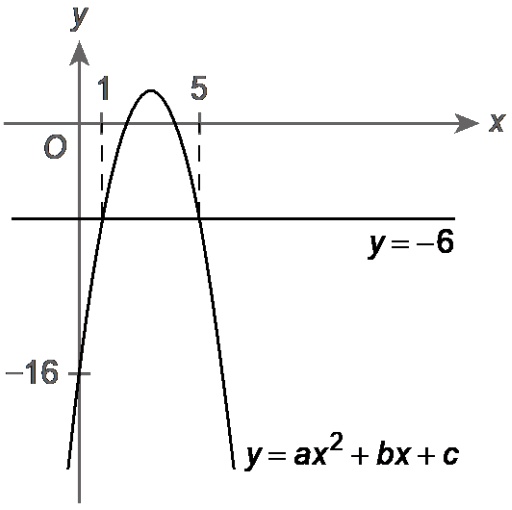
A. a, d, e.
B. b, c, f.
C. b, c, f, g.
D. a, b, c, d, e, f.

14. The figure shows the graph of $y = f(x)$ where $0 \le x \le 120$. If the equation $f(x) = k$ has only one real root, solve the equation $f(x) = k + 1$ correct to the nearest 6.



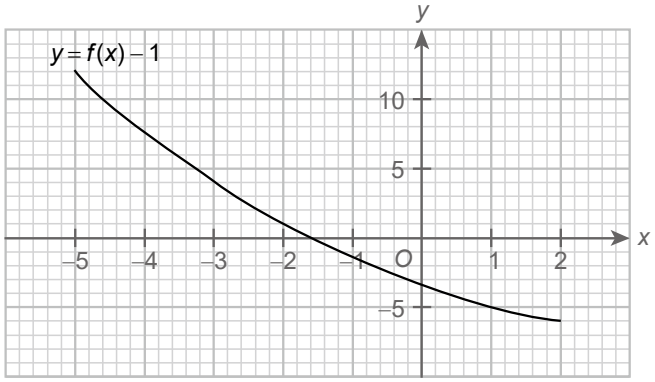
A. No real roots
B. $x = 60$
C. $x = 18$ or 102
D. $x = 30$ or 90

15. The figure shows the graphs of $y = ax^2 + bx + c$ and $y = -6$. Find the values of a and b.



A. $a = -4.4, b = 26.4$
B. $a = -3.2, b = 19.2$
C. $a = -2, b = 12$
D. $a = -1, b = 6$

16. The figure shows the graph of $y = f(x) - 1$ where $-5 \le x \le 2$.



Which of the following is the solutions of the inequality $f(x) > 5$ in the interval $-5 \le x \le 2$?

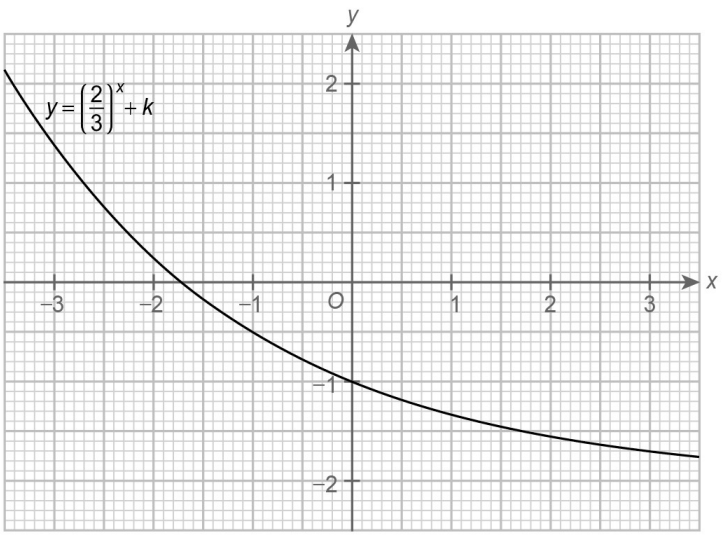
A. $-3.2 < x \le 2$ (corr. to the nearest 0.2)

B. $-3.0 < x \le 2$ (corr. to the nearest 0.2)

C. $-5 \le x < -3.0$ (corr. to the nearest 0.2)

D. $-5 \le x < -3.2$ (corr. to the nearest 0.2)

17. The figure shows the graph of $y = \left(\frac{2}{3}\right)^x + k$. Solve the inequality $\left(\frac{3}{2}\right)^x + k \ge 0$.



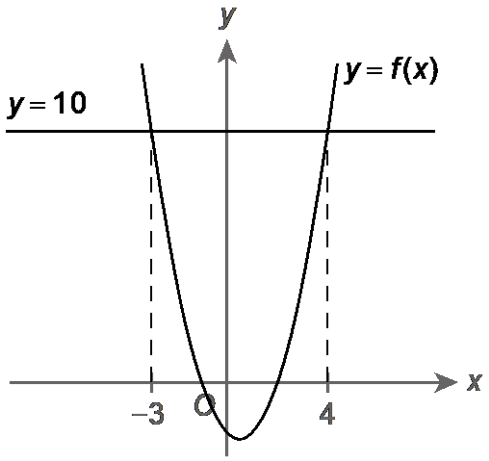
A. $x \le -1.7$ (corr. to 1 d.p.)

B. $x \le 1.7$ (corr. to 1 d.p.)

C. $x \ge -1.7$ (corr. to 1 d.p.)

D. $x \ge 1.7$ (corr. to 1 d.p.)

18. The figure shows the graphs of $y = f(x)$ and $y = 10$.



Which of the following inequalities has the solutions $x < -3$ or $x > 4$?

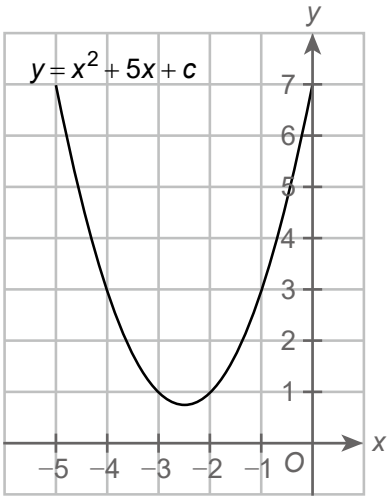
A. $f(x) > 10$

B. $f(x) < 10$

C. $f(x) > 0$

D. $f(x) < 0$

19. The figure shows the graph of $y = x^2 + 5x + c$ where $-5 \le x \le 0$.



Which of the following inequalities has the solutions $-5 \le x < -4$ or $-1 < x \le 0$ (corr. to the nearest integer)?

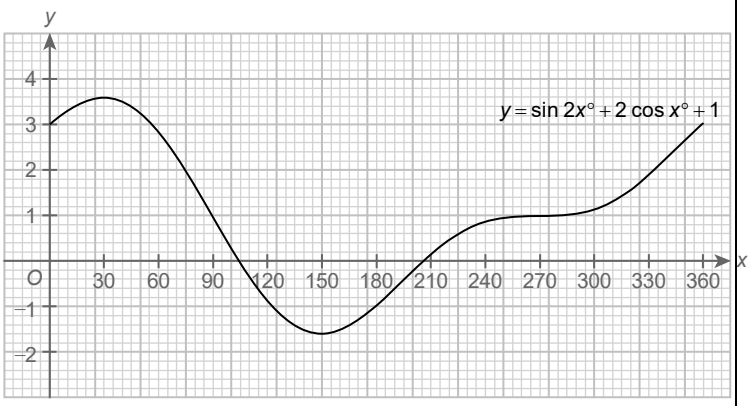
A. $x^2 + 5x + c < 3$

B. $x^2 + 5x + c \le 3$

C. $x^2 + 5x + c > 3$

D. $x^2 + 5x + c \ge 3$

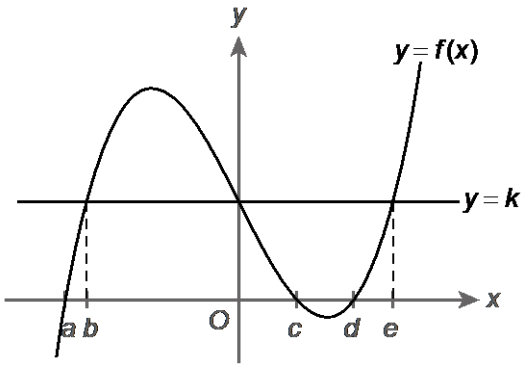
20. The figure shows the graph of $y = \sin 2x° + 2\cos x° + 1$ where $0 \le x \le 360$.



Which of the following inequalities has no solutions in the interval $0 \le x \le 360$?

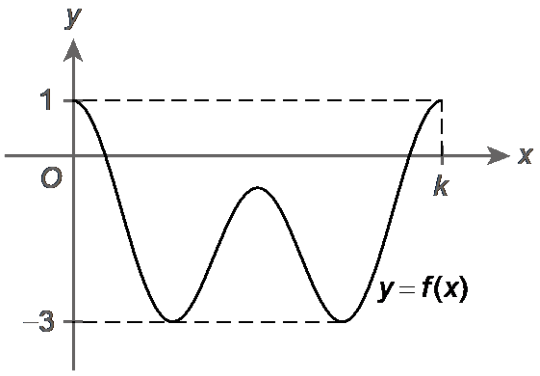
A. $\sin 2x° + 2\cos x° \ge 3$
B. $\sin 2x° + 2\cos x° \le 3$
C. $\sin 2x° + 2\cos x° \ge -2$
D. $\sin 2x° + 2\cos x° \le -2$

21. The figure shows the graphs of $y = f(x)$ and $y = k$. The solutions of $f(x) < k$ are



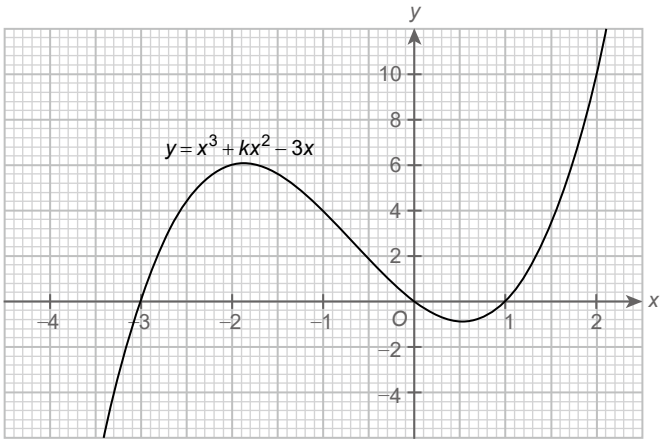
A. $b < x < e$.
B. $x < a$ or $c < x < d$.
C. $a < x < b$ or $0 < x < c$ or $d < x < e$.
D. $x < b$ or $0 < x < e$.

22. The figure shows the graph of $y = f(x)$ where $0 \le x \le k$. Find the range of values of m such that $f(x) - m \ge 0$ has no solutions.



A. $m > 1$
B. $m \ge 1$
C. $m < -3$
D. $m \le -3$

23. The figure shows the graph of $y = x^3 + kx^2 - 3x$. Solve the inequality $x^3 + kx^2 - 3x \le -k$.



A. $x \ge -3.2$ (corr. to 1 d.p.)
B. $x \le -3.2$ (corr. to 1 d.p.)
C. $-2.7 \le x \le -0.8$ or $x \ge 1.5$ (corr. to 1 d.p.)
D. $x \le -2.7$ or $-0.8 \le x \le 1.5$ (corr. to 1 d.p.)

24. If the graph of $y = x^2 - 2x - 5$ is translated rightwards by 2 units and upwards by 5 units, find the function represented by the image.

A. $y = x^2 - 6x + 8$

B. $y = x^2 - 6x - 2$

C. $y = x^2 + 2x$

D. $y = x^2 + 2x - 10$

25. If the graph of $y = (x-2)^2 + 3$ is translated leftwards by 3 units and downwards by 1 unit, which of the following points must lie on the image?

I. $(-1, 2)$

II. $(2, 13)$

III. $(1, 6)$

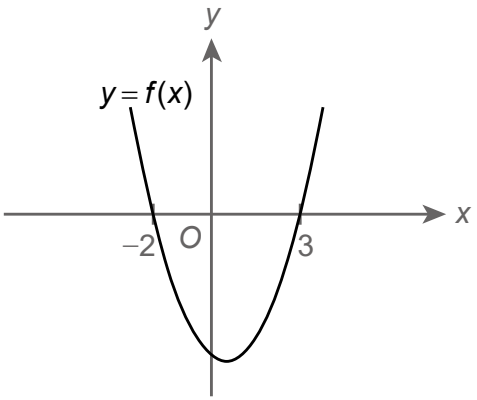
A. I only

B. II only

C. I and II only

D. I and III only

26. If the graph of $y = g(x)$ is obtained by translating the graph of $y = f(x)$ rightwards by 4 units, the roots of $g(x) = 0$ are



A. -6 and -1.

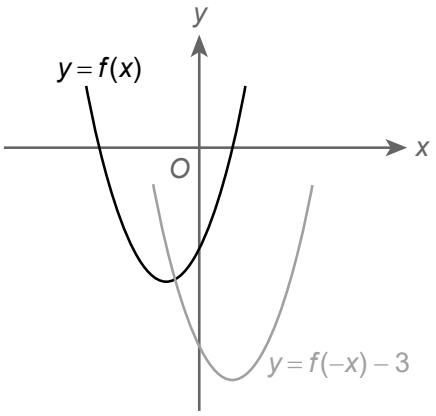
B. -1 and 2.

C. 2 and 7.

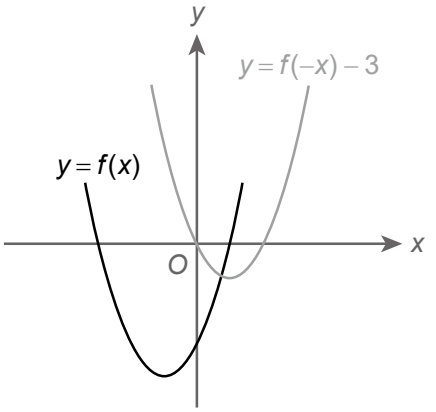
D. 4 and 9.

27. Which of the following may represent the graphs of $y = f(x)$ and $y = f(-x) - 3$ on the same rectangular coordinate system?

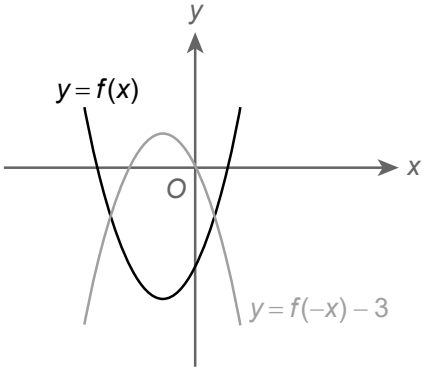
A.



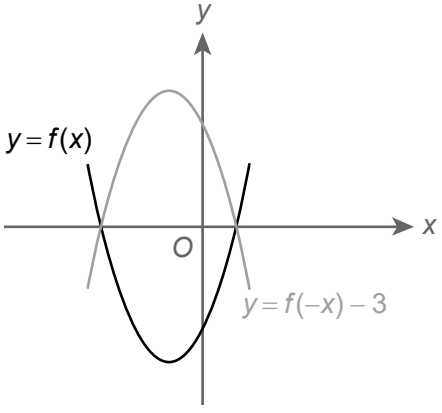
B.



C.



D.



28. If $(2, 3)$ is a point lying on the graph of $y = f(x)$, which of the following equations must have real root(s)?

A. $f(x-2)-2=0$

B. $f(x-2)+3=0$

C. $f(x-3)+2=0$

D. $f(x+3)-3=0$

29. Which of the following transformations may the graph of $y = 2x-1$ undergo to obtain an image the same as the graph itself?

I. Translating rightwards by 2 units and upwards by 2 units

II. Translating leftwards by 1 unit and downwards by 2 units

III. Translating leftwards by 2 units and downwards by 1 unit

A. I only

B. II only

C. III only

D. II and III only

30. If the graph of $y=(2x+4)^2-8$ is enlarged to 2 times the original along the x-axis and then translated downwards by 2 units, find the function represented by the image.

A. $y=(x+4)^2-10$

B. $y=16(x+1)^2-10$

C. $y=8(x+2)^2-18$

D. $y=2(x+2)^2-6$

31. The graph $C_1: y=f(x)$ undergoes a transformation to obtain the image $C_2: y=3f(-x)+8$. If $A(-3, -5)$ is a point on C_1, find the coordinates of the image of A.

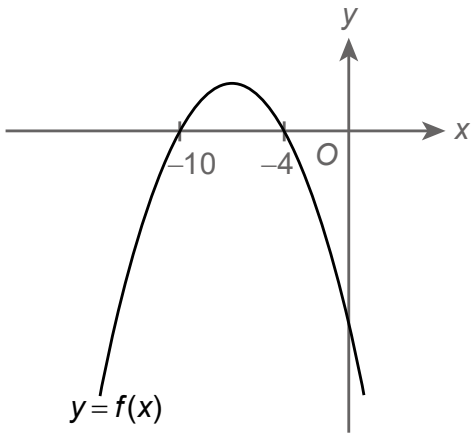
A. $(-3, 23)$

B. $(3, -23)$

C. $(3, -7)$

D. $(9, 3)$

32. The figure shows the graph of $y=f(x)$. Find the x-intercepts of the graph of $y=f(-2x)$.

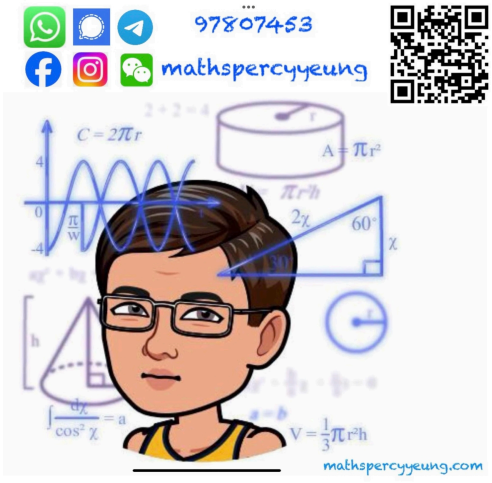


A. 8 and 20

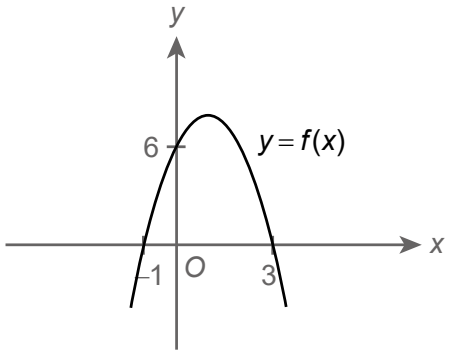
B. 2 and 5

C. -5 and -2

D. -20 and -8

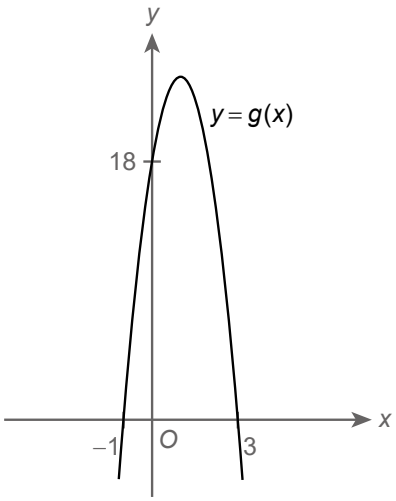


33. The figure shows the graph of $y = f(x)$.

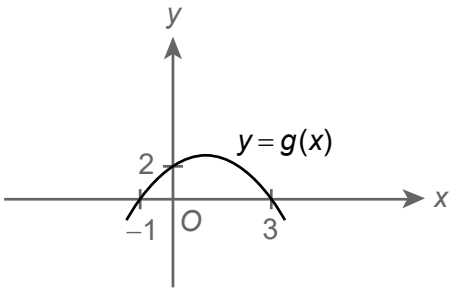


If $f(x) = 3g(x)$, which of the following may represent the graph of $y = g(x)$?

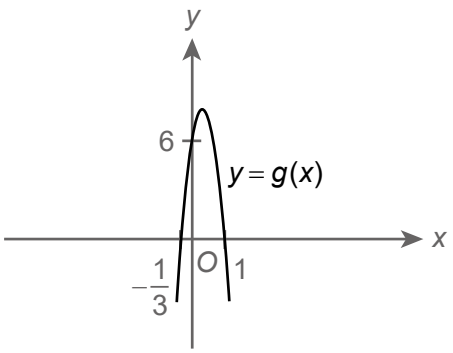
A.



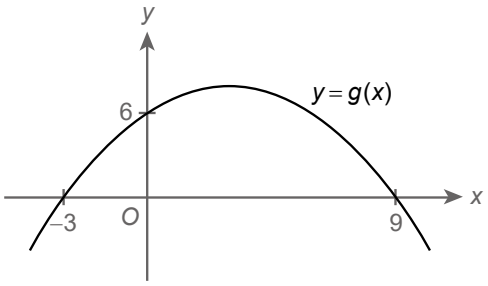
B.



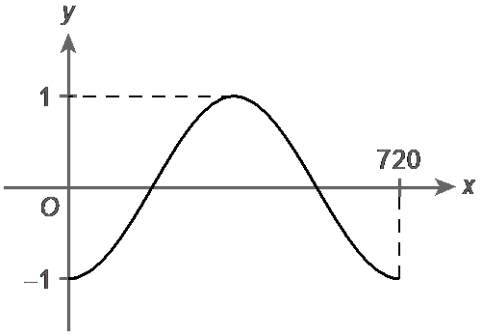
C.



D.



34. The figure shows the graph of the function



A. $y = \cos\left(\frac{-x}{2}\right)^\circ$.

B. $y = \cos(-2x)^\circ$.

C. $y = -\cos\frac{x^\circ}{2}$.

D. $y = -\cos 2x^\circ$.