

Mathematics Placement Questionnaire

- 1) Please fill out the Questionnaire below.
- 2) Please take the appropriate Placement Exam and record your answers on the answer key.
- 3) Please return both sheets to:

The Office of the Registrar
Hamilton College
198 College Hill Road
Clinton, New York 13323

Name _____

High school _____

Mathematics Courses You Have Taken

Year of HS graduation _____

	Descriptive Math Course Title(s)	Course Grade(s)
9th grade	_____	_____
10th grade	_____	_____
11th grade	_____	_____
12th grade	_____	_____ (Expected)

Special Notes: _____

Calculus Information

Does your HS offer a full-year AP Calculus course? _____ Did you take it? _____

Does your HS offer a full-year non-AP Calculus course? _____ Did you take it? _____

~~~~~  
IF you took an AP Calculus course and the AP exam, what was your score?

AB Exam Score \_\_\_\_\_ BC Exam Score \_\_\_\_\_

(If you have not yet received your score, please put a "?" on the AB or the BC line  
and tell us your score, by letter or e-mail, as soon as you receive it.)

IF you took an AP course but not the exam, please state why \_\_\_\_\_

### Self-Assessment

How do YOU assess your mathematics preparation:

|                                      |                                           |
|--------------------------------------|-------------------------------------------|
| _____ Not prepared to start Calculus | _____ Prepared to start Calculus II       |
| _____ Prepared to start Calculus I   | _____ Prepared to start at a higher level |

How likely are you to take a math course during your first year at Hamilton

\_\_\_\_\_ Very Likely \_\_\_\_\_ Maybe \_\_\_\_\_ Unlikely

Career Interests (it's OK to be undecided) \_\_\_\_\_

Possible majors or areas of concentration \_\_\_\_\_

Name\_\_\_\_\_

Did you use a calculator? Y N

Exam I  
25 min. time limit

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Exam II  
40 min. time limit

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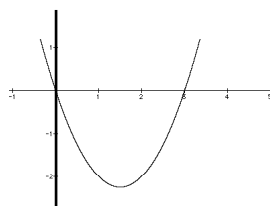
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1. The value(s) of  $x$  for which  $|x - 2| = 5$ .  
 (A) 7 only (B) 7 and -7 (C) -3 and 7 (D) -3 only

2. Which of the following is equivalent to  $2x + 4 < 5x - 1$ ?  
 (A)  $x > \frac{5}{3}$  (B)  $x < \frac{5}{3}$  (C)  $x < \frac{5}{3}$  (D)  $x > \frac{5}{3}$

3.  $(xy^{\square 2})^{\square 3} = ?$   
 (A)  $\frac{1}{x^3 y^6}$  (B)  $\frac{y^5}{x^3}$  (C)  $\frac{y^6}{x^3}$  (D)  $x y^6$

4. Which of the following could be the equation for the graph below?



- (A)  $y = x^2 + 3x$  (B)  $y = 3x - x^2$  (C)  $y = x^2 - 3x$  (D)  $y = -3x - x^2$

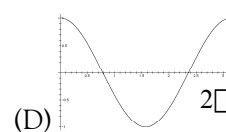
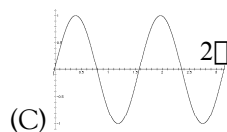
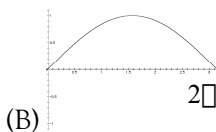
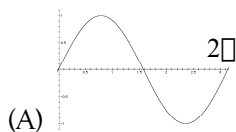
5. The length of the hypotenuse in a “30-60-90” right triangle is 12. How long is the longer leg of the triangle?

- (A) 6 (B)  $6\sqrt{3}$  (C)  $\frac{12}{\sqrt{3}}$  (D)  $6\sqrt{2}$

6. If  $f(x) = \frac{1}{x - 1}$  and  $g(x) = x^2$ , then  $g(f(3)) = ?$

- (A)  $\frac{1}{4}$  (B)  $\frac{1}{8}$  (C) 9 (D)  $\frac{1}{2}$

7. Which of the following best represents the graph for  $y = \sin(2x)$  on the interval  $[0, 2\pi]$ ?

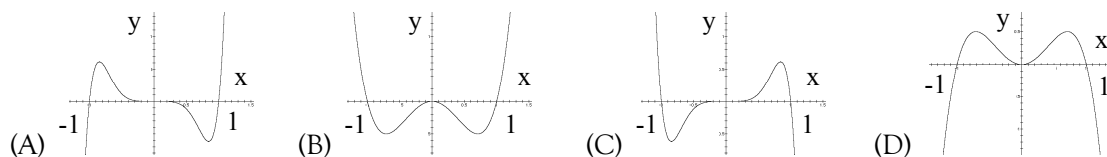


8.  $(2xy^2)^3 =$   
 (A)  $8x^3 y^5$  (B)  $2x^3 y^6$  (C)  $8x^3 y^6$  (D)  $2x^3 y^5$

9. The slope of the line  $2x + 3y = 5$  is

(A) 2 (B)  $\frac{2}{3}$  (C) 3 (D)  $-\frac{2}{3}$

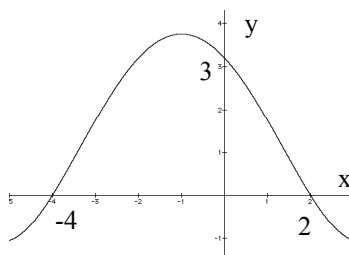
10. Which of the following best represents the graph of  $y = x^7 - x^5$ ?



11. Determine a value for A so both  $x = 2$  and  $x = -1$  are solutions of the equation  $\frac{x^3 - x}{x + 1} + 1 = A$ .

(A) 3 (B) -2 (C) 1 (D) Impossible

12. For the function  $y = f(x)$  graphed below,  $f(x) < 0$  whenever

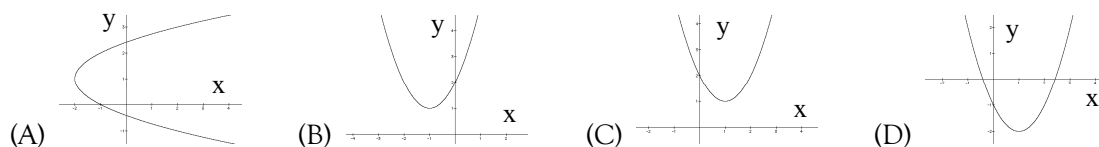


(A)  $x \leq 3$  (B)  $-4 < x < 2$  (C)  $x < 0$  (D)  $x < -4$  or  $x > 2$

13. The expression  $3a^2 - 2[1 - (a^2 + 3)]$  is equivalent to:

(A)  $a^2 - 8$  (B)  $a^2 + 4$  (C)  $5a^2 - 8$  (D)  $5a^2 + 4$

14. Which graph best represents  $y = x^2 - 2x + 2$ ?



15. The slope of the line which passes through the points  $(5, -2)$  and  $(1, 6)$  is:

(A)  $\frac{2}{3}$  (B) -2 (C) 2 (D)  $-\frac{1}{2}$

16. The vertices of a triangle in the  $xy$ -plane are  $(0, 0)$ ,  $(5, 0)$  and  $(4, 6)$ . The area of the triangle is:

(A) 10 (B) 15 (C) 20 (D) 30

17. For  $x > 0$ ,  $\log \frac{x+2}{x} = ?$

- (A)  $\frac{\log(x+2)}{\log(x)}$  (B)  $\log(2)$  (C)  $\log(1) + \log \frac{2}{x}$  (D)  $\log(x+2) - \log(x)$

18. The degree equivalent of  $\frac{2\pi}{3}$  radians is:

- (A)  $150^\circ$  (B)  $60^\circ$  (C)  $120^\circ$  (D)  $240^\circ$

19.  $1 + \tan^2(x) = ?$

- (A)  $\cot^2(x)$  (B)  $\frac{1 + \sin^2(x)}{\cos^2(x)}$  (C)  $\sec^2(x)$  (D)  $\csc^2(x)$

20. Mary sold a computer for \$273, thereby making a 30% profit on the cost of the computer. At what price would she have sold it if instead her profit had been 10%?

- (A) \$231 (B) \$221 (C) \$210 (D) \$218.40

21. A rectangular field is to be adjacent to a river and is to have fencing on three sides (the side on the river requires no fencing). If 200 meters of fencing is used and if the side parallel to the river is  $x$  meters long, what is a formula for the area  $A$  of the field?

- (A)  $A = x(200-x)$  (B)  $A = x^2 - 200$  (C)  $A = \frac{x}{2(200-x)}$  (D)  $A = \frac{x(200-x)}{2}$

22. An apple orchard now has 30 trees, and the average yield is 400 apples per tree. For each additional tree planted, the average yield per tree is reduced by 10 apples. If  $y$  is the number of new trees planted, what is a formula for the total number of apples produced?

- (A)  $T = 400y - 10y^2$  (B)  $T = 12000 + 100y - 10y^2$   
 (C)  $T = 12000 - 10y$  (D)  $T = 300y + 10y^2$

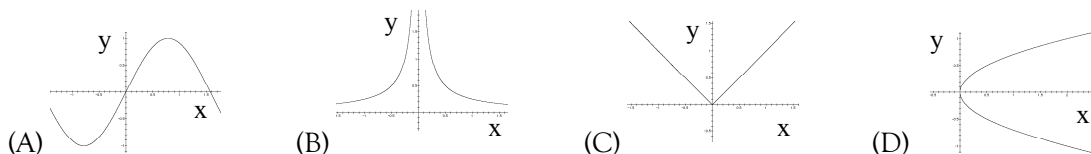
23.  $\frac{\frac{x}{y} - \frac{y}{x}}{\frac{x}{y} - \frac{y}{x}} = ?$

- (A)  $\frac{x^3 y^3}{xy^2}$  (B)  $\frac{1}{x}$  (C)  $\frac{x+y}{x}$  (D) None of these.

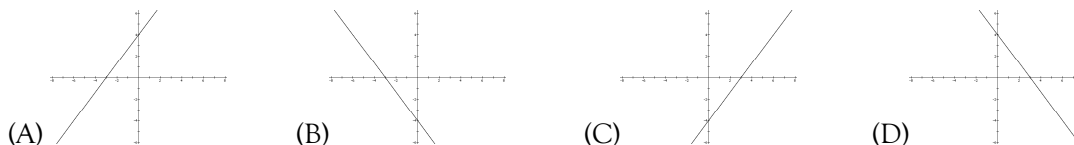
24. If  $x$  is an acute angle and  $\sin(x) = \frac{3}{5}$  then  $\cot(x) = ?$

- (A)  $\frac{3}{4}$  (B)  $\frac{4}{3}$  (C)  $\frac{4}{5}$  (D)  $\frac{5}{4}$

25. Which of the following is NOT the graph of a function  $y = f(x)$ ?



26. Which of the following best represents the graph of the line  $4x + 3y = 12$ ?



27. Which of the following is the equation of a line perpendicular to a line with slope  $3/4$ ?

(A)  $y = \frac{4}{3}x$  (B)  $y = \frac{3}{4}x$  (C)  $y = -\frac{4}{3}x$  (D)  $y = -\frac{3}{4}x$

28. The roots of  $3x^2 - 5x - 4 = 0$  are:

(A)  $\frac{5 \pm \sqrt{73}}{6}$  (B)  $\frac{5 \pm \sqrt{23}}{3}$  (C)  $\frac{5 \pm \sqrt{73}}{3}$  (D)  $\frac{5 \pm \sqrt{48}}{6}$

29. If  $f(x) = x^2$ , then  $f(x + h) =$

(A)  $x^2 + h$  (B)  $x^2 + h^2$  (C)  $x^2 + 2xh + h^2$  (D)  $x^2$

30. The midpoint of the line segment which joins the points  $(-3, 8)$  and  $(5, 2)$  is

(A)  $(1, -3)$  (B)  $(2, 4)$  (C)  $(1, 5)$  (D)  $(4, 5)$

31. A hitchhiker walks 4 miles per hour. After walking for a time he catches a ride on a truck which travels 24 miles per hour. In 10 hours of walking and riding he covers 170 miles. For how many hours did he walk?

(A) 4 hours (B)  $7/2$  hours (C)  $5/4$  hours (D) 2 hours

32. A square sheet of tin 12 inches on a side is to be used to make an open-top box by cutting a small square of tin from each corner and bending up the sides. If the small square cutouts are  $x$  inches on a side, what is a formula for the volume of the resulting box?

(A)  $V = x^2(12 - x)$  (B)  $V = x(12 - x)^2$   
(C)  $V = x(12 - 2x)^2$  (D)  $V = 2x(12 - x)^2$

33. Given that:

|               |   |                   |              |   |                   |
|---------------|---|-------------------|--------------|---|-------------------|
| 1 millisecond | = | $10^{-3}$ seconds | 1 centimeter | = | $10^{-2}$ meters  |
| 1 microsecond | = | $10^{-6}$ seconds | 1 micron     | = | $10^{-6}$ meters  |
| 1 nanosecond  | = | $10^{-9}$ seconds | 1 Angstrom   | = | $10^{-10}$ meters |

Which of the following represents the greatest speed?

(A) 1 meter/second (B) 1 micron/millisecond  
(C) 1 Angstrom/nanosecond (D) 1 micron/nanosecond