MATH 073 Readiness Check

In order to be successful in this course:

- You should have a strong and recent introductory algebra background
- You need to have a clear and realistic idea about the commitment of time and energy necessary.
- You should recognize and be able to do most of the exercises presented here. There is an answer key at the end of the worksheet.
    - If you get at least 25 questions correct and it takes you less than 3 hours to do the exercises, then you are probably ready for Math 073.
    - If you get less than 25 questions correct, or if it takes you longer than 3 hours to do the exercises, then you are probably not ready for Math 073 and should do one of the following:
        - Take Math 072. This is a self-paced, tuition-free, and continuous entry course so if there's room you can usually register at any time of the year; or
        - Take Math 135 which is a lecture-based course with tuition; or
        - Take an assessment to determine your best starting point.
- It is important for you to register in the appropriate math course in order for you to be successful.

Let's begin…

1. Given the following set of real numbers: $\left\{-3, 10, \frac{10}{2}, \frac{12}{12}, 0, 2.58\overline{58}, \pi, \sqrt{16}, -3\sqrt{7}, -4.060060006...\right\}$

   List the real numbers that are rational.

2. True or False: a) $(-6)\cdot(4+11) = (-6)\cdot 4 + (-6)\cdot 11$ b) $3\cdot(7\cdot 4) = (3\cdot 4)\cdot 7$

3. Without using a calculator, perform the indicated operations:

   a) $-9-(-7)$ b) $(-2.1)(5.3)$ c) $\frac{17}{4} - \left(-\frac{2}{3}\right)$ d) $-\frac{2}{5} \div \left(-\frac{14}{15}\right)$

4. Evaluate each of the following expressions: (Do not use a calculator)

   a) $11 - 18 \div (-3) + \sqrt{9+16}$ b) $\dfrac{(5-6)^2 - 2|3-7|}{89 - 3|-5^2|}$

5. Simplify each of the following and leave all answers with positive exponents. Do not use a calculator.

   a) $\left(-3a^{-5}b^{-3}\right)\left(-2a^2b^5\right)$ b) $\left(\dfrac{xy^{-3}}{x^4yz^{-1}}\right)^{-2}$

6. Translate the following word phrase to an algebraic expressions: Sixteen less than three times a number.

7. Evaluate the following algebraic expression for the indicated values.
   $5x^2 - 3xy - 2y^3$ for $x = -3, y = -2$

8. Perform the indicated operations and simplify.
   $-2\left\{x + 3\left[y - 5(x+y)\right]\right\}$

9. A triangular park in Vancouver has an altitude of 88 meters and a base of 52 meters. One other side has a length of 91.8 meters. Find the area of the triangular park.

10. Solve each of the following equations for *x* :

a) $4x+5=29$ b) $4(2x+1)-29=3(2x-5)$ c) $\frac{2x+5}{5}+\frac{x-7}{2}=\frac{3x+1}{2}$

11. Solve each of the following formulas for the indicated variable.

a) $z=\frac{x-u}{s}$, for x b) $F=I+Iat$, for I

12. In a triangle, the measure of the first angle is twice the measure of the second angle. The measure of the third angle is 8^0 less than the measure of the second angle. What are the measures of each angle?

13. Sonya is selling her house through a real estate agent whose commission is 6%. What should the selling price be so that Sonya can receive $345,000? (Answer to nearest thousand dollars)

14. Solve each of the following inequalities and give your solution in interval notation and graph your solution on the real number line.

a) $19 \le 5-4x$ b) $\frac{3-2x}{-4}>5$

15. Solve each compound inequality and write the solution set using interval notation and graph the solution on the real number line.

a) $2x-3 \le 5$ or $x-1>0$ b) $-3<\frac{2x-1}{-3} \le 5$

16. Write each union or intersection of intervals as a single interval if possible.

$[2,\infty) \cup (4,\infty)$ b) $[-4,\infty) \cap (-\infty,-6]$

17. Application: The equation $P=1+\frac{d}{10}$ gives the pressure P , in atmospheres (atm), at a depth of d meters in the sea. For what depths d is the pressure more than 2.5 atm, and at the most 10 atm?

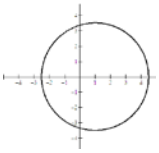
18. Solve each of the following absolute value equations.

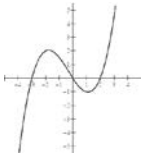
a) $|3x-5|=7$ b) $4-2|x+3|=-12$

19. Graph each of the following equation. For a line label at least 3 points, identify the slope, and all intercepts. For a nonlinear equation give at least 5 points.

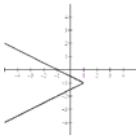
a) $2x+5y-10=0$ b) $y=-3-x^2$ c) $y=\frac{-3}{x}$

20. Which of the following graphs are functions?

a) 

b) 

c)

d) 

21. For $f(x)=2x+3$, find $f(-3)$.

22. For $f(x)=-3x-4$ find $f(a+h)$

23. Find the domain of each of the following functions.

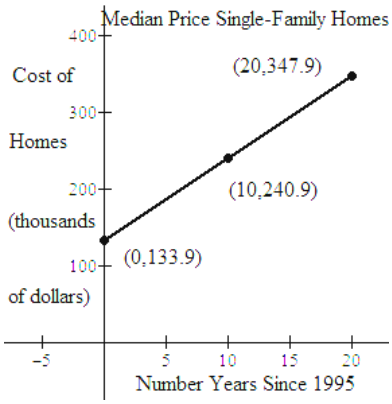
a) $f(x)=5-4x$ b) $f(x)=\dfrac{1-x}{2x+1}$

24. Find the equation of the lines defined by the following conditions. Write your answers in slope-intercept form.

a) The line which passes through the points (1,-3) and (-2,4).

b) The line passing through (2,-3) and perpendicular to the line whose equation is $x-5y=-30$.

25. The median sale of homes in the USA was steadily increasing as shown in the graph below. From the graph below, find a linear equation which models this data. From this equation find the median cost of a home in 2002.



26. Solve each of the following systems of equations by the indicated method.

a) Solve the system of equations by graphing:

$x+y=-1$

$4x-3y=-24$

b) Solve the system of equations by substitution:

$2x+y=4$

$7x-2y=3$

c) Solve the following system by elimination:

$7x=5-2y$

$2x+5y=9$

27. A truck carrying 3600 cubic feet of cargo consisting of washing machines and refrigerators was hijacked. The washing machines are worth $300 each and are shipped in 36-cubic-foot cartons. The refrigerators are worth $900 each and are shipped in 45-cubic-foot cartons. If the total value of the cargo was $51,000, then how many of each was there on the truck?

28. Graph the following inequalities in two variables in the *x*-y plane. Label at least three points on the boundary line and clearly indicate which region is the solution set.

$2x-3y<6$

29. In each of the exercises 1-10, match the item with the best example of that item from the column on the right.

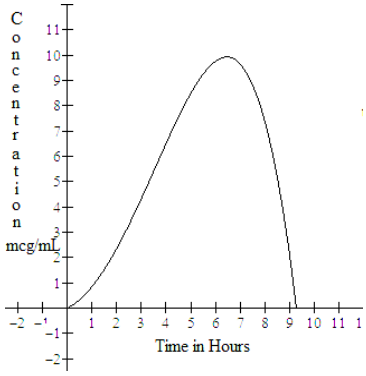
1. ____ A binomial
2. ____ A trinomial
3. ____ A monomial
4. ____ A third degree polynomial
5. ____ A polynomial written in ascending powers of t
6. ____ A term that is not a monomial
7. ____ A polynomial with a leading term of degree 5
8. ____ A polynomial with a leading coefficient of 5
9. ____ A polynomial with three variables
10. ____ A polynomial containing like terms

a) $9a^7$
b) $6s^2-2t+4st^2-st^3$
c) $4t^{-2}$
d) t^4-st+s^3
e) $7t^3-13+5t^4-2t$
f) $4x+6xy-3z+2y^2z^2$
g) $5+a$
h) $4t^3+7t-8t^2+5$
i) $8st^3-6s^2t+4st^3-2$
j) $7s^3t^2-4s^2t+3st^2+1$

30. Evaluate the following polynomial function for the given values of the variable. Sheila's annual bonus in dollars for selling n life insurance policies is given by the formula: $B(n)=0.1n^2+3n+50$. Find $B(50)$, her bonus for selling 50 policies.

31. Gentamicin is an antibiotic frequently used by veterinarians. The concentration, in micrograms per milliliter (mcg/mL), of Gentamicin in a horse's bloodstream t hours after injection can be approximated by the polynomial function: $C(t)=-0.005t^4+0.003t^3+0.35t^2+0.5t$. From the graph shown, estimate the concentration, in mcg/mL:

a) Two hours after the injection.
b) Four hours after the injection.
c)Use the formula and find $C(2)$ & $C(4)$ to compare your answers.



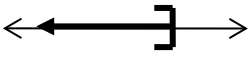
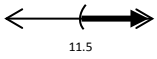
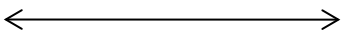
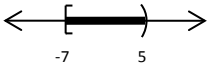
32. Perform the indicated operations and leave your answer in simple form.
a) $\left(w^2-7w-2\right)-\left(w-3w^2+5\right)$ b) $\left(3x^2-y^3\right)\left(3x^2+y^3\right)$ c) $\left(x+y-3\right)^2$

33. Factor completely each of the following polynomials.
a) $-3x^3+9x^2-15x$ b) $\left(x+3\right)w+\left(x+3\right)a$ c) $x^2+3x-10$ d) $2x^2+11x+12$
e) $4x^2-9y^2$ f) $8x^3+27$

34. Solve each of the following equations by the method of factoring.
a) $x^2+x-12=0$ b) $10x^2=5x$ c) $3x-6x^2=-9$

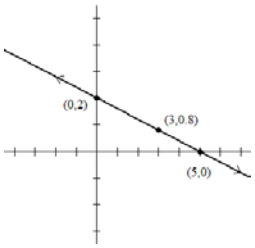
35. A 15-foot ladder is leaning against a wall. If the distance from the top of the ladder to the ground is 3 feet more than the distance from the bottom of the ladder to the wall, then what is the distance from top of ladder to the ground?

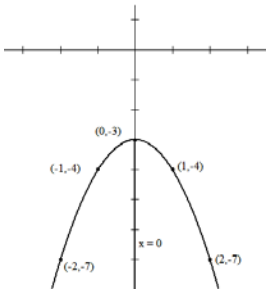
Answer Key

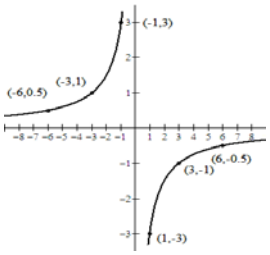
1. Rational: -3, 10, 10/2, 12/12, $0, 2.58\overline{58}, \sqrt{16}$
2. a)True b) True
3. a) -2 b) -11.13 c) $\frac{59}{12}$ d) $\frac{3}{7}$
4. a) 22 b) $-\frac{1}{2}$
5. a) $\frac{6b^2}{a^3}$ b) $\frac{x^6y^8}{z^2}$
6. $3x-16$
7. 43
8. $28x+24y$
9. $2288\ m^2$
10. a) $x=6$ b) 5 c) $x=-5$
11. a) $x=sz+u$ b) $I=\frac{F}{1+at}$
12. Angles are $39°, 47°,$ and $94°$.
13. Selling price is $367 000.00
14. a) $(-\infty,-5.5]$  b) $(11.5,\infty)$ 
15. a) $(-\infty,\infty)$  b) $[-7,5)$ 
16. a) $[2,\infty)$ b) $\varnothing$, empty set
17. For depths greater than 15 meters and up to and including 90 meters.
18. a) $x=4,-\frac{2}{3}$ b) $x=5,-11$

19. a) $m = \frac{-2}{5} = \frac{2}{-5},\ b = 2$ b) *parabola*

intercepts: $(0,2),(5,0)$







$y = -\frac{3}{x}$

c)

x	y	x	y
1	-3	-1	3
3	-1	-3	1
6	$-\frac{1}{2}$	-6	$\frac{1}{2}$

c)

20. a) Not a function, fails vertical line test. b) Yes, a function, passes vertical line test.
c) Yes, a function, passes vertical line test d) Not a function, fails vertical line test.

21. $f(-3) = -3$

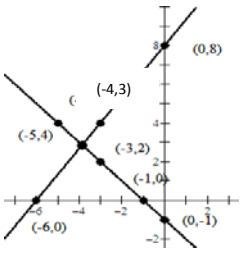
22. $f(a+h) = -3a - 3h - 4$

23. a) Domain: $\{x \mid x \in \text{Reals}\}$ b) Domain: $\left\{x \mid x \in \text{Reals}, x \neq -\frac{1}{2}\right\}$

24. a) $y = -\frac{7}{3}x - \frac{2}{3}$ b) $y = -5x + 7$

25. $y = 10.7x + 133.9$ In 2002, the medican cost was $208 000.00.

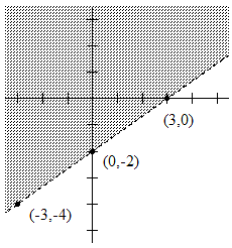
26.



a) Soln: (-4,3) b) $(1,2)$ c) $\left(\frac{7}{31}, \frac{53}{31}\right)$

27. 50 washing machines and 40 refrigerators

28.



29. 1. g 2. d 3. a 4. h 5. b 6. c 7. j 8. e 9. f 10. i

30. $450 bonus

31. From the graph the estimations for $t = 2$ is about 2.1,2.2 mcg/mL, for $t = 4$ about 6.4,6.5 mcg/mL, from the function equation: $\begin{cases} C(t) = -0.005t^4 + 0.003t^3 + 0.35t^2 + 0.5t \\ \boxed{C(2) = 2.344}, \quad \boxed{C(4) = 6.512} \end{cases}$, reasonably close.

32. a) $4w^2 - 8w - 7$ b) $9x^4 - y^6$ c) $x^2 + 2xy - 6x + y^2 - 6y + 9$

33. a) $-3x\left(x^2 - 3x + 5\right)$ b) $(x+3)(w+a)$ c) $(x+5)(x-2)$ d) $(x+4)(2x+3)$.
e) $(2x-3y)(2x+3y)$ f) $(2x+3)\left(4x^2 - 6x + 9\right)$

34. a) $x = -4, 3$ b) $x = 0, \frac{1}{2}$ c) $x = \frac{3}{2}, -1$

35. The distance to the ground is 12 ft.