

Math 3 NCFE Review #1 (Number) Name: \_\_\_\_\_

1. A rectangle has a length of 6 feet. Give a value for the width that results in an area of the following:
  - a. Whole number
  - b. Rational number
  - c. Irrational number
2. Given that  $(x+2i)(y-6i) = 40-10i$ , where  $x$  and  $y$  are positive integers, determine the value of  $x-y$ .
3. Simplify  $(4 + 5i) - (6 - 2i)$
4. Find the exact solution(s) to the quadratic function  $f(x)=x^2+4x+6$ .
5. Solve  $\frac{x^2}{5} = 5x - 17$
6. A quadratic equation  $ax^2+bx+c=0$  has a solution of  $(3+4i)$ . Find possible values for  $a$ ,  $b$ , and  $c$ .

Math 3 NCFE Review #2 (Algebra) Name: \_\_\_\_\_

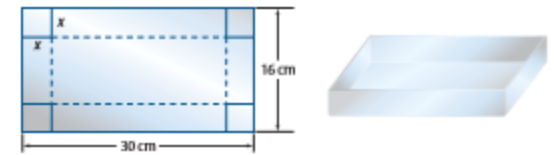
1. If  $x^2 + 4x - 9$  is written in the form  $(x + h)^2 + k$ , what is the value of  $h+k$ ?
2. What value of  $h$  is needed to make the expression  $x^2 - 9x - 15 = (x + h)^2 - 35.25$  true?
3. Factor  $x^3 - 2x^2 - 35x$
4. What is the approximate value of the sum of  $\frac{2}{3} + \frac{2}{9} + \frac{2}{27} + \dots + 2\left(\frac{1}{3}\right)^{3000}$   
(Note: You may use  $S_n = \frac{a_1(1-r^n)}{1-r}$ ).
5. Simplify
  - a.  $(6x^4 + 5x^3 - 7x + 5) - (6x^4 + 5x)$
  - b.  $(x + 5)^4$
  - c.  $(x^5 + 7x)(-2x^2 + 6x - 1)$
6. Rewrite the expression  $m^{2x} + m^x - 6$  in an equivalent form.
7. Rewrite each of the following numbers a power of 2, 10, and  $e$ .
  - a. 497
  - b. 75
  - c. -82

Math 3 NCFE Review #3 (Algebra) Name: \_\_\_\_\_

1. Consider the polynomial function:  $P(x) = x^4 - 3x^3 + ax^2 - 6x + 14$ , where  $a$  is an unknown real number. If  $(x-2)$  is a factor of this polynomial, what is the value of  $a$ ?
2. For a certain polynomial function,  $x=3$  is a zero with multiplicity two,  $x=1$  is a zero with multiplicity three, and  $x=-3$  is a zero with multiplicity one. Write a possible equation for this function and sketch its graph.
3. Let  $p(x) = x^4 - x^3 + 8x^2 - 9x + 30$ . What is the value of the remainder of  $\frac{p(x)}{(x+2)}$ ?
4. If some of the factors of a polynomial are  $(x+8)$ ,  $(x+3)$ , and  $(x-6)$ , what is the minimum number of roots the polynomial must have? Explain your reasoning.
5. Simplify  $\frac{x^3 + 7x^2 + 13x + 6}{x + 4}$
6. Simplify  $\frac{x^2 + x - 6}{x^2 - 1} \cdot \frac{x - 1}{x^2 + 8x + 15}$

Math 3 NCFE Review #4 (Algebra) Name: \_\_\_\_\_

1. The Beaufort Wind Scale was devised to measure wind speed. The Beaufort numbers  $B$ , which range from 0 to 12, can be modeled by the formula  $B = 1.69\sqrt{s} + 4.45 - 3.49$  where  $s$  is the speed in miles per hour of the wind. If a 12 on the scale is considered a hurricane force winds, what is the wind speed?
2. A company is manufacturing an open-top rectangular box. They have 30 cm by 16 cm sheets of material. The bins are made by cutting squares the same size from each corner of a sheet, bending up the sides, and sealing the corners. Create an equation relating the volume  $V$  of the box to the length of the corner cut out  $x$ . Graph the equation and identify the dimensions of the box that will have the maximum volume.
3. If the world population at the beginning of 2008 was 6.7 billion and growing exponentially at a rate of 1.16% each year, in what year will the population be double what it was in 2008?



4. What is the distance between the points of intersection of the system? 
$$\begin{cases} x^2 + y^2 = 10 \\ 2x + y = 1 \end{cases}$$

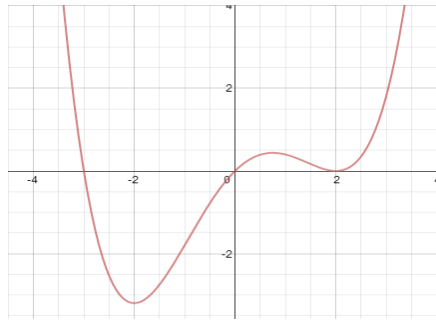
Math 3 NCFE Review #5 (Algebra) Name: \_\_\_\_\_

1. Motion can be described by the formula  $s=ut+\frac{1}{2}at^2$ , where  $t$ =time elapsed,  $u$ =initial velocity,  $a$ =acceleration, and  $s$ =distance traveled. Solve for  $a$ .
2. Solve  $x - 3 = \sqrt{30 - 2x}$
3. Solve  $-4(x - 2)^2 + 9 = 13$
4. Give at least three solutions to the equation  $y = 2x^2 + 7x - 2$

Math 3 NCFE Review #6 (Function) Name: \_\_\_\_\_

1. Radioactive iodine is a dangerous by-product of nuclear explosions, but it decays rather rapidly. Suppose that the function  $R(t) = 6(10^{-0.038})^t$  gives the amount in a test sample remaining  $t$  days after an experiment begins. Determine  $R(3)-R(2)$  and explain what it means in terms of the context.
2. Jumper horses on carousels move up and down as the carousel spins. Suppose that the back hooves of such a horse are six inches above the floor at their lowest point and two-and-one-half feet above the floor at their highest point. Sketch a graph that could represent the height of the back hooves of this carousel horse during a half-minute portion of a carousel ride.
3. The function  $p(x) = \frac{-25x^2 + 875x - 4750}{750 - 25x}$  is the profit per ticket as a function of the ticket price,  $x$ . Define a reasonable domain for the function. Explain your reasoning.
4. Graph  $y = 3 \cos(x) - 5$  and show the period, midline, and amplitude.
5. Graph  $g(x) = x^2 + 5x^2 + 2x - 8$ . Identify zeroes and discuss the end behavior.
6. If  $f(5)=0$  and  $f(-3)=0$ , write
  - a. a quadratic function
  - b. a polynomial function with degree  $> 2$

1. Let  $f(x) = -(x+7)^2(x-2)$ . Let  $g(x)$  be the graph shown to the right.

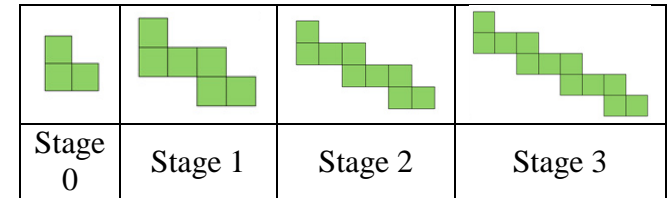


- What is the positive difference between smallest zero of  $f(x)$  and the smallest zero of  $g(x)$ ?
  - Which function,  $f(x)$  or  $g(x)$ , has the largest relative maximum?
2. Suppose you deposit \$100 in a savings account that pays 4% interest, compounded annually. At the end of each year you deposit an additional \$50. Write a recursive function for the amount of money in the account.
3. Given the sequence  $\{12, 20, 28, 36, 44, \dots\}$  write a recursive and explicit formula. Is this a geometric or arithmetic sequence? Explain?

4. The profit for a music CD for company A is a function of the price of the CD and can be modeled by the function  $f(x) = -20x^2 + 380x - 1200$  where  $x$  is the price of the CD. The profit for a music CD for company B is a function of the price of the CD and can be modeled by the function  $g(x)$ , described in the table. Compare the prices for which the profit is positive for Company A and Company B.

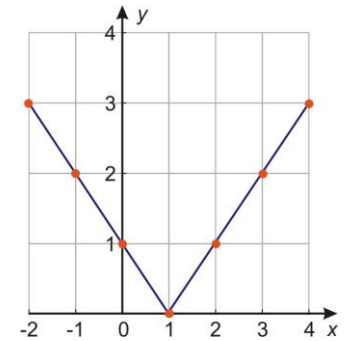
$x$	$g(x)$
3	-240
4	0
5	208
10	768
15	528
18	0
20	-512

1. Examine the pattern to the right. Write a recursive function to model



the number of squares at each state. How many squares will be in stage 35?

2. Describe the transformations that would take  $f(x) = |x+3|+2$  to the graph of  $g(x)$  shown at the right.



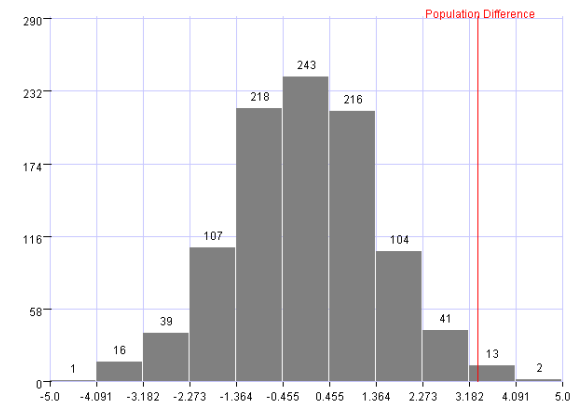
3. Determine if each of the functions  $f(x) = \sin x$  and  $g(x) = \cos x$  are even, odd, or neither. Justify your response.
4. Write the inverse function for each of the following:
- $f(x) = e^{3x}$
  - $g(x) = \frac{x^3}{5}$
  - $h(x) = \frac{4}{x}$
5. Compare  $f(x) = 0.2(5)^x$  and  $g(x) = x^5 - 20x$  and determine as  $x$  increases from  $x=0$  which approaches  $\infty$  faster.

Math 3 NCFE Review #9 (Function) Name: \_\_\_\_\_

- Solve  $e^{2x} - 5e^x + 6 = 0$
- Solve for x;  $4(2)^{cx} = 20$
- Solve  $e^{2x} + 3x = 15$
- A central angle in a circle with diameter 8 feet subtends an arc with length of 13 feet. What is the measure of the angle in radians?
- Find and sketch two coterminal angles to the angle  $\frac{\pi}{6}$ .
- Carla put her pencil on the outer edge of a graph of the unit circle at the point  $(-1,0)$ . She moved her pencil tip through an angle of  $\frac{7\pi}{4}$  radians counterclockwise along the edge of the unit circle. At what angle of the unit circle did Carla's pencil stop?
- The temperature of a chemical reaction oscillates between a low of  $20^\circ\text{C}$  and a high of  $120^\circ\text{C}$ . The temperature is at its lowest point when  $t = 0$  and completes one cycle over a 6-hour period. Write a function to model the temperature over time.

Math 3 NCFE Review #10 (Statistics) Name: \_\_\_\_\_

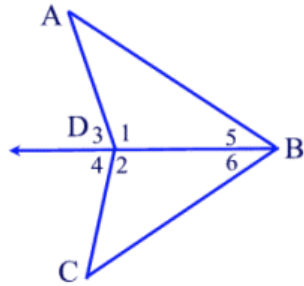
- Scores on a history test have a mean of 80 with standard deviation of 6. How many standard deviations from the mean is the student that scores a 90.
- From a class containing 12 girls and 10 boys, three students are to be selected to serve on a school advisory panel. Here are four different methods of making the selection.
  - Select the first three names on the class roll.
  - Select the first three students who volunteer.
  - Place the names of the 22 students in a hat, mix them thoroughly, and select three names from the mix.
  - Select the first three students who show up for class tomorrow.
 Which is the best sampling method, among these four, if you want the school panel to represent a fair and representative view of the opinions of your class? Explain the weaknesses of the three you did not select as the best.
- Students in a high school mathematics class decided that their term project would be a study of the strictness of the parents or guardians of students in the school. Their goal was to estimate the proportion of students in the school who thought of their parents or guardians as "strict". They do not have time to interview all 1000 students in the school, so they plan to obtain data from a sample of students. Is the best design for this study a sample survey, an experiment, or an observational study? Explain your reasoning
- An experiment was conducted that examined how supervised exercise versus non-supervised exercise effected weight loss. The randomization distribution to the right shows the *mean weight loss in supervised exercise - mean weight loss in non-supervised exercise* for 1000 runs. Determine if the data provides evidence that the supervised exercise treatment results in a significant greater mean weight loss than the treatment that has non-supervised treatment result.



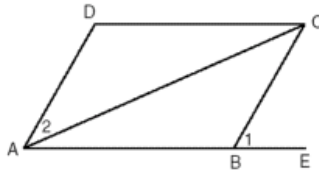
- Consider 500 one-gallon cans of dusty rose paint manufactured by a company. Suppose that a normal distribution has a mean of 5 ml and a standard deviation of 0.2 ml for the amount of red dye in the mixture. Approximately how many cans have more than 5.2 ml of red dye?

Math 3 NCFE Review #11 (Geometry) Name: \_\_\_\_\_

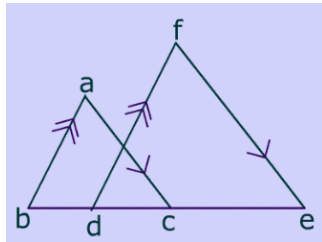
1. Given:  $\overline{AD} \cong \overline{CD}$  and  $\angle 3 \cong \angle 4$   
 Prove:  $\overline{DB}$  bisects  $\angle ABC$



2. Given: ABCD is a parallelogram  
 Prove:  $m\angle 1 > m\angle 2$

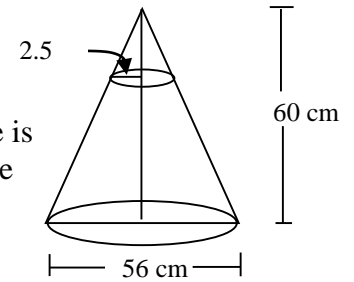


3. Prove  $\triangle abc \sim \triangle fde$

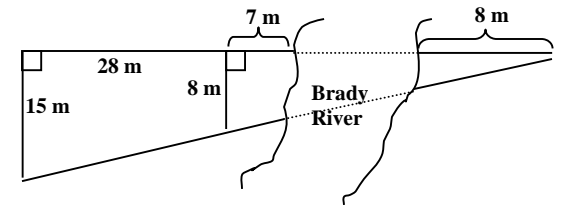


Math 3 NCFE Review #12 (Geometry) Name: \_\_\_\_\_

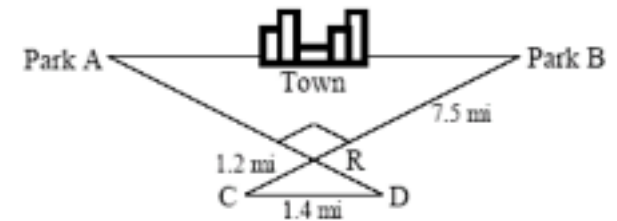
1. The cheerleaders at City High make their own megaphones by cutting off the small end of a cone made from heavy paper. If the small end of the megaphone is to have a radius of 2.5 cm, what should be the height of the cone that is cut off?



2. Find the width of Brandy River



3. Mason Construction wants to connect two parks on opposite sides of town with a road. Surveyors have laid out a map as shown. The road can be built through the town or around town through point R. The roads intersect at a right angle at point R. The line joining Park A to Park B is parallel to the line joining C and D.

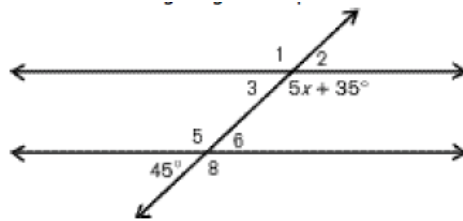


Note: The figure is not drawn to scale.

- a. What is the distance between the parks through town?

- b. What is the distance from Park A to Park B through point R?

1. Given the two lines are parallel in the figure to the right, find each of the following values.

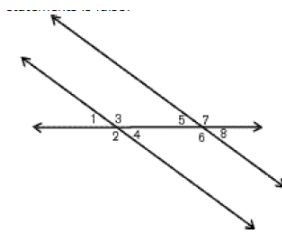


- $x$
- $m\angle 5$
- $m\angle 3$
- $m\angle 2$

2. (MC) Which of the following statements is ALWAYS TRUE when parallel lines are cut by a transversal?

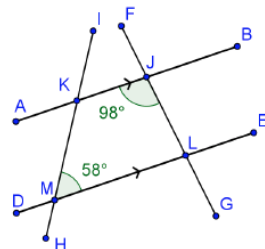
- The sum of the degree measure of corresponding angles is  $180^\circ$ .
- The sum of the degree measure of complementary angles is  $180^\circ$ .
- The angles in a vertical pair are acute.
- Corresponding angles are supplementary.
- Corresponding angles are congruent.

3. (MC) In the diagram shown, parallel lines are cut by a transversal. Which of the following statements is FALSE?

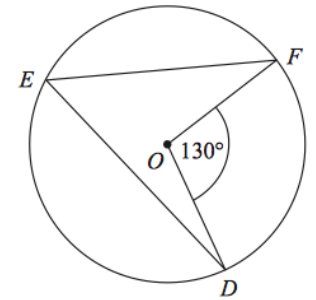


- $\angle 3$  and  $\angle 4$  are vertical angles
- $\angle 5$  and  $\angle 8$  are corresponding angles.
- $\angle 3$  and  $\angle 5$  are alternate interior angles.
- $\angle 2$  and  $\angle 8$  are alternate exterior angles.
- All of the above are false.

4. In the diagram, what is the  $m\angle MKJ$ ?



1. In Circle O,  $m\angle FOD = 130^\circ$  and  $FO=4$ in. Find the following:
- $m\angle FED$
  - $m\widehat{FED}$  (measure of arc FED)
  - Find the length of arc FD
  - Find the area of the sector enclosed by radii FO and OD.



2. In the diagram shown, the circle is centered at point O. Points A, B, and C are on the circumference. Points D, C, and O are collinear. DA is a tangent to circle O at point A. And  $m\angle ODA = 36^\circ$

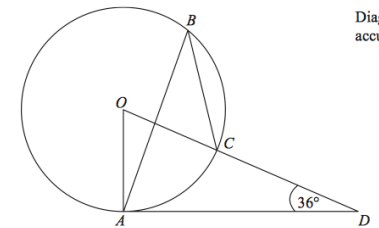
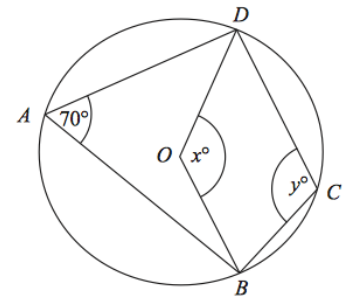


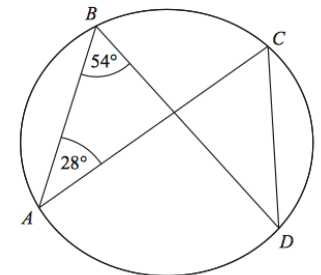
Diagram NOT accurately drawn

- Find  $m\angle AOD$
- Find  $m\angle ABC$

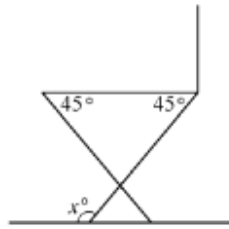
3. In the diagram, A, B, C and D are points on the circumference of the circle centered at point O. Find the values of x and y.



4. Find  $m\angle ACD$  and  $m\angle BDC$ . Is  $\triangle ABE \sim \triangle DCE$ ? Carefully explain.



1. Sarah is building a chair for her front porch. She cuts each leg so that they form a  $45^\circ$  angle with base of the seat of the chair as shown in the diagram below.

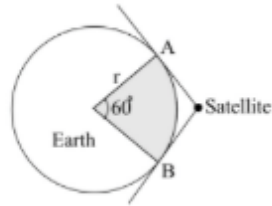


What angle does the front of each leg make with the ground,  $x$  in order to ensure the chair is parallel with the ground? Explain.

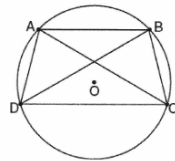
2. An athlete is running along a circular path that has a diameter of 250 yards. The arc traveled by the athlete is  $120^\circ$ . Using 3.14 for  $\pi$ , how many yards did the athlete run?



3. A satellite sends signals from space to the regions that lie within the shaded portion of the Earth, as shown below. If the radius of Earth is approximately 6000km, the part of Earth that receives signals from the satellite has an area of \_\_\_\_\_ square kilometers.



4. In the diagram, quadrilateral ABCD is inscribed in circle O.  $\overline{AB} \parallel \overline{DC}$ , and diagonals  $\overline{AC}$  and  $\overline{BD}$  are drawn. Prove that  $\triangle ACD \cong \triangle BDC$ .



5. In circle O, chords AB and CD are parallel. If  $m\widehat{AB}=104^\circ$  and  $m\widehat{CD}=168^\circ$  what is  $m\widehat{BD}$ ?

