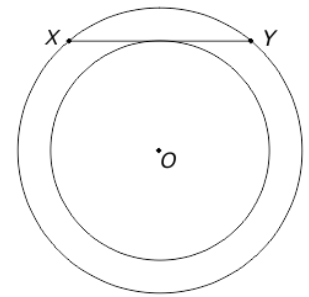# Math 3 Course Review

Student: _____

1. The figure below shows concentric circles, both centered at O.

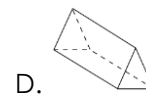   Chord *XY* is tangent to the smaller circle.
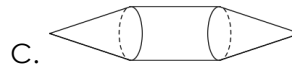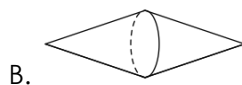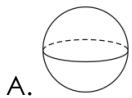
    - The radius of the larger circle is 15 cm.
    - The radius of the smaller circle is 12 cm.

    What is the length of chord *XY*?

    A. 27 cm   B. 24 cm   C. 18 cm   D. 10 cm

2. Kathleen rotated an isosceles trapezoid 360° around its longest base. Which choice could be the resulting solid?

    A.   B.   C.   D.

3. The volume of a sphere is 2,400 cubic centimeters. What is the **approximate** diameter of this sphere?

    (Volume of a sphere = $\frac{4}{3}\pi r^3$)

    A. 16.6 cm   B. 10.1 cm   C. 8.3 cm   D. 4.2 cm

4.
    A circle has a radius of 4 inches. A central angle forms an arc with a length of $\frac{4\pi}{3}$ inches. Which ratio models the measure of this central angle in radians?

    A. π:6   B. π:3   C. 2π:3   D. 4π:3

5. A security camera is set to record the activities in a 115° sector of a parking lot as represented by the shaded region of the circle below.

    Which measurement is closest to the area of the parking lot recorded by this security camera?
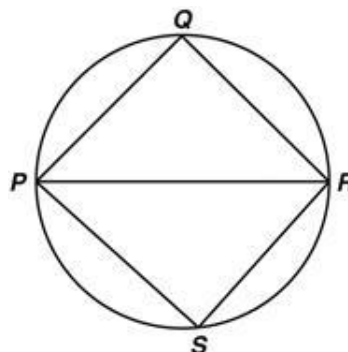
    A. 5645 square feet   B. 17,671 square feet

    C. 22,580 square feet   D. 70,686 square feet

    115°

    150 feet
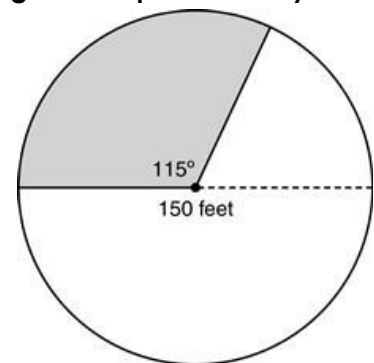
6. In the diagram below, $\overline{PR}$ is a diameter of the circle.
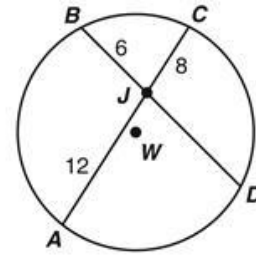
    Which of these angles must be a right angle?

    A. ∠PQR   B. ∠PRQ

    C. ∠QPR   D. ∠QPS

7. **In Circle W, chords** $\overline{AC}$ **and** $\overline{DB}$ **intersect at Point J as shown below.**

   If AJ = 12, JC = 8, and BJ = 6, what is JD?

   A. 4   B. 9
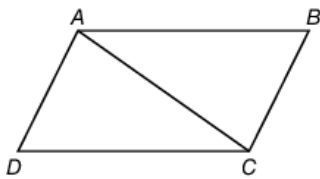
   C. 16   D. 24

   Note: The figure is not drawn to scale.

8. Find the center and the radius of the circle represented by the equation $x^2 + y^2 + 14x - 8y = 79$.

   A. Center: (-7,4) and   B. Center: (7,-4) and   C. Center: (-7,4) and   D. Center: (7,-4) and
      Radius = 12   Radius = 12   Radius = 144   Radius = 144

9. John wrote a proof for the congruency of the opposite sides of a parallelogram as shown below.

Statements	Reasons
1. $\overline{AB} \parallel \overline{CD}$	1. Given
2. $\overline{AD} \parallel \overline{BC}$	2. Given
3. $\angle BAC \cong \angle DCA$	3. Alternate interior angles
4. $\angle DAC \cong \angle BCA$	4. Alternate interior angles
5. $\overline{AC} \cong \overline{AC}$	5. Reflexive Property
6. $\triangle ABC \cong \triangle CDA$	6. AAS
7. $\overline{AB} \cong \overline{CD}$	7. CPCTC
8. $\overline{AD} \cong \overline{BC}$	8. CPCTC

   Which of these is **correct**?

   A. The proof is correct as is.

   B. The postulate that proves the congruency of the triangles should be ASA instead of AAS.

   C. The reason for the congruency of the angles $\angle BAC \cong \angle DCA$ and $\angle BCA \cong \angle DAC$ should be vertical angles instead of alternate interior angles.

   D. The reason for the congruency of the angles $\angle BAC \cong \angle DCA$ and $\angle BCA \cong \angle DAC$ should be corresponding angles instead of alternate interior angles.

10. A reporter wants to know the percentage of voters in the state who support building a new highway. What is the reporter's population?

    A. the number of people who live in the state

    B. the people who were interviewed in the state

    C. all voters over 25 years old in the state

    D. all eligible voters in the state

11. **A student is curious about the average age of a penny in circulation. The student collects pennies for a few months and places them in a jar. Once the jar is full, the student mixes up the pennies, randomly selects 100 of them, records the age of each penny selected, and finds the average age. Which of the following best describes the way the average age of a penny in circulation was determined?**

    A. This is a sample survey.

    B. This is an observational study.

    C. This is an experiment that used a controlled group.

    D. This is an experiment that did not use randomization.

12. **The management of a restaurant with locations all over the country has developed a new hamburger that researchers believe will sell better than the hamburger that is currently sold. Which of the following is the best way to perform a randomized experiment with the goal of determining if this new hamburger will sell better than the hamburger that is currently sold?**

    A. Randomly select 40 regions from all regions throughout the country, have the restaurants in those regions stop selling the current hamburger, and start selling the new hamburger to see if sales increase.

    B. Have all the company's restaurants throughout the country stop selling the current hamburger and start selling the new hamburger to see if sales increase.

    C. Randomly select 40 restaurants, let each one decide if it wants to sell the new hamburger, and compare sales in those restaurants to sales in the restaurants that chose not to sell the new hamburger.

    D. Have all the restaurants in the western part of the country stop selling the current hamburger and start selling the new hamburger to see if these restaurants' sales are higher than the restaurants in the eastern part of the country that continue selling the current hamburger.

13. **The owners of a manufacturing company conducted a survey to determine the mean income of the customers who prefer the company's brand of clothing. From a random sample of 100 customers, it was determined that their mean income was $47,600. Which conclusion can be made based on this information?**

    A. The total population mean must be much greater than $47,600 because there are more people in the total population.

    B. The total population mean must be close to $47,600 based on statistical inference.

    C. The total population mean must be much less than $47,600 because, out of a sample of 100, a few people with a very high mean income would skew the data.

    D. The total population mean cannot be determined by such a small random sample.

14. **What is the value of t in the equation $0.65 = 0.5 \times 10^{-0.014t}$?**

    A. $\dfrac{\log 0.325}{0.014}$
    B. $\dfrac{\log 1.3}{-0.014}$
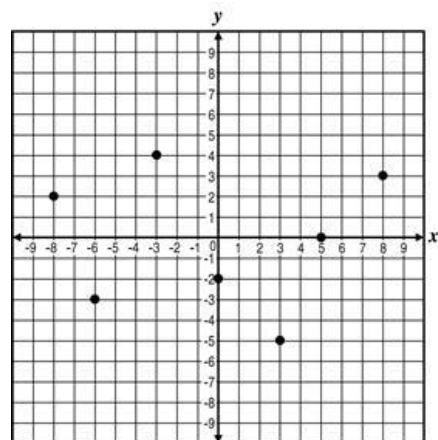   C. $\dfrac{\log 1.3}{0.014}$
    D. $\dfrac{\log 0.325}{-0.014}$

15. **The domain of the function $f(x) = (x + 2)^2 + 3$ is restricted to $(-\infty, -2]$ to produce an invertible function $g(x) = (x + 2)^2 + 3$. What is the domain of g^{-1}?**

    A. $(-\infty, \infty)$
    B. $(-\infty, -2]$
    C. $[-2, -\infty)$
    D. $[3, \infty)$

16. **The graph of the function $f(x)$ is shown on the coordinate plane.**

Which value is closest to $f^{-1}(-3)$?

    A. −6   **B.** -5
    C. 4   **D.** 8

17. What value of x satisfies the equation $1650 = 648e^{0.07x}$?

A. $x = \dfrac{\ln\left(\frac{1650}{648}\right)}{0.07}$

B. $x = \dfrac{\ln\left(\frac{1650}{0.07}\right)}{648}$

C. $x = \dfrac{\ln(1650 - 648)}{0.07}$

D. $x = \dfrac{\ln(1650 - 0.07)}{648}$

18. The interest equation $A = Pe^{rt}$ can be used to determine the final value, A, of a continuously compounded interest-bearing account for t years after an initial amount of money, P, was deposited. If \$1,830 is the initial deposit in an account that earns 3.4% interest, which expression can be used to determine the number of years required for the value of the account to triple?

A. $\dfrac{\log 3}{0.034}$

B. $\dfrac{\ln 3}{0.034}$

C. $\dfrac{\log 5490}{0.034(\ln 1830)}$

D. $\dfrac{\ln 5490}{0.034(\log 1830)}$

19. What is the inverse of $f(x) = x^3 + 5$?

A. $f^{-1}(x) = -x^3 - 5$

B. $f^{-1}(x) = \sqrt[3]{x} - 5$

C. $f^{-1}(x) = \sqrt[3]{x^3 - 5}$

D. $f^{-1}(x) = x - \sqrt[3]{5}$

20. Keisha wants to find $\log_5 37$ but her calculator only calculates logs to the base 10. Which formula can she use to find the correct value of $\log_5 37$?

A. $\log_5 37 = \frac{1}{2}\log_{10} 37$

B. $\log_5 37 = 2\log_{10} 37$

C. $\log_5 37 = \dfrac{\log_{10} 37}{\log_{10} 5}$

D. $\log_5 37 = \left(\log_{10} 5\right)\left(\log_{10} 37\right)$

21. What is the logarithmic form of $7^3 = 343$?

A. $\log_7 343 = 3$

B. $\log_3 343 = 7$

C. $\log_3 7 = 343$

D. $\log_7 3 = 343$

22. Which of the following is the inverse function of $y = \dfrac{\sqrt{3x - 2}}{2}$?
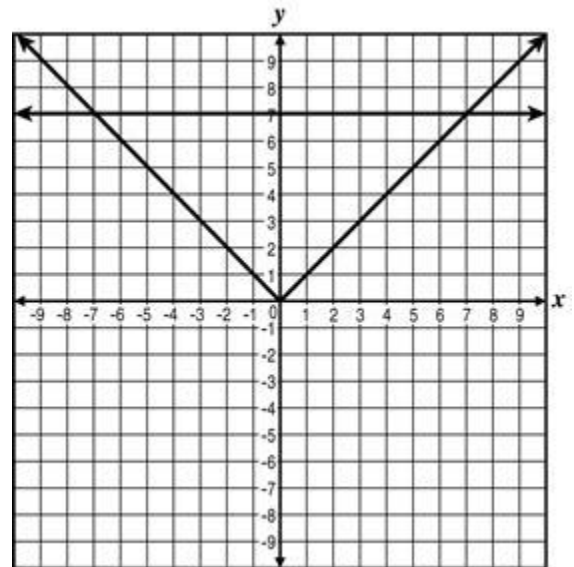
A. $y = \dfrac{x^2 + 2}{3}$

B. $y = \dfrac{2x^2 + 2}{3}$

C. $y = \dfrac{4x^2 + 2}{3}$

D. $y = \dfrac{x^2}{3}$

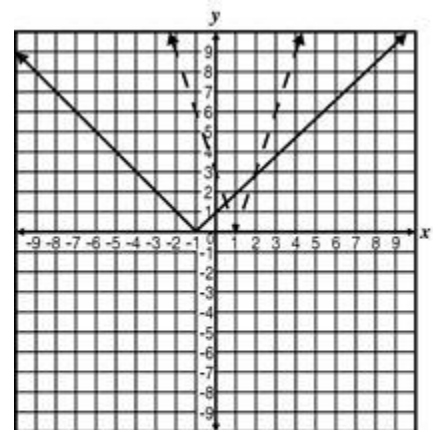**23.** The graphs of $f(x) = 7$ and $g(x) = |x|$ are shown below.

Which statement explains why 7 is an x-coordinate of a solution to the system of functions?

A. A solution to a system is where the functions have the same height. Since both functions reach a height of 7, a solution must be $x = 7$.

B. A solution to a system is an x-coordinate where the graphs intersect. Since both graphs have the same height at $x = 7$, a solution must be $x = 7$.

C. There are always two solutions to absolute value functions. Since $x = -7$ is one solution, it follows that its opposite, $x = 7$, is the other solution.

D. There are always two solutions when a horizontal line intersects an absolute value function. Since the horizontal line has a height of 7, the x-coordinate of the solutions must be $x = -7$ and $x = 7$.

24. The graphs of $y = |x + 1|$ and $y = |3x - 3|$ are shown below.

What is the solution to the absolute value inequality $|x + 1| < |3x - 3|$?

A. $x < \dfrac{1}{2}$

B. $x > 2$

C. $\dfrac{1}{2} < x < 2$

D. $x < \dfrac{1}{2}$ or $x > 2$

Key

——	$= y = |x+1|$
- - - -	$= y = |3x-3|$

25. What are the complex solutions to the following equation? $-2x^2 + 2x - 3 = 0$

A. $\dfrac{-1 \pm i\sqrt{5}}{-2}$

B. $\dfrac{-1 \pm i\sqrt{5}}{2}$

C. $\dfrac{-1 \pm 2i\sqrt{5}}{-2}$

D. $\dfrac{-1 \pm \sqrt{5}}{-2}$

26. If the binomial $(x - 7)$ is a factor of the polynomial function $f(x)$, which statement must be true?

A. $f(7) = -7$

B. $f(7) = 0$

C. $f(-7) = 0$

D. $f(-7) = -7$

27. What are the complex solutions to the following equation? $x^2 - 2x + 3 = 0$

A. $1 \pm i\sqrt{2}$ B. $-1 \pm \sqrt{2}$ C. $1 \pm i\sqrt{3}$ D. $-1 \pm 2\sqrt{i}$

28. Given the function $P(x) = x^3 + 4x^2 + kx + 15$ for what value of k is $(x + 3)$ a factor of $P(x)$?

A. -26 B. -8 C. 8 D. 26

29. Which is equivalent to $(1 - 14i)(5 - 3i)$?

A. $-37 - 73i$ B. $47 + 3i$ C. $5 + 42i^2$ D. $50 - 70i + 42i^2$

30. Given that $p(-3) = 0, p(-1) = 0$, and $p(5) = 0$, which expression could be $p(x)$?

A. $x^3 - x^2 - 17x - 15$ B. $x^3 + x^2 - 17x + 15$ C. $x^3 - 3x^2 - 13x + 15$ D. $x^3 - 9x^2 + 23x - 15$

31. One solution of a quadratic equation with real coefficients is x = 3 + 4i, where $i = \sqrt{-1}$. What is the sum of the solutions of the quadratic equation?

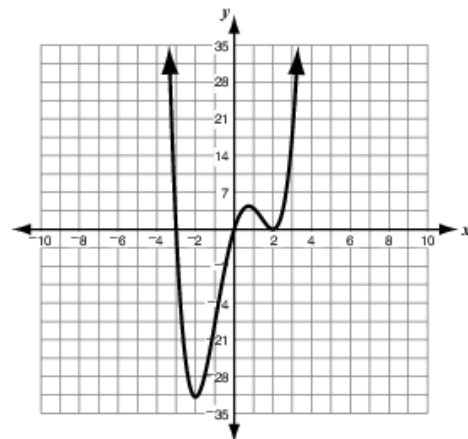A. 0   B. 6   C. 8i   D. 6 + 8i

32. Which function **best** represents the graph below?

A. $g(x) = x(x - 2)^2(x + 3)$

B. $g(x) = (x - 2)^2(x + 3)$

C. $g(x) = x(x - 2)(x + 3)$

D. $g(x) = (x - 2)(x + 3)$

33.

Which expression is equivalent to $\dfrac{x+7}{x^2+4x-21} \div \dfrac{x+5}{x^2+8x+15}$ when x is restricted so that the expressions are defined?

A. $\dfrac{x+3}{x-3}$

B. $\dfrac{x-3}{x+3}$

C. 1

D. -1

34. Which expression is equivalent to $\dfrac{5}{x} + \dfrac{4}{x^2}$ if $x \neq 0$?

A. $\dfrac{9}{x^3}$

B. $\dfrac{5x+4}{x^2}$

C. $\dfrac{5x+4}{2x^2}$

D. $\dfrac{9}{x+x^2}$

35. Which value or values of x will make this algebraic equation true? $\dfrac{x}{x+2} - \dfrac{1-x}{2} = x - 1$

A. $x = 0$

B. $x = -1$

C. $x = -1,\ 2$

D. $x = \{\text{all real numbers}\}$

36. Which function has an asymptote at y = 1?

A. $y = x + 1$

B. $y = \dfrac{x}{x+1}$

C. $y = \dfrac{1}{x+1}$

D. $y = x(x+1)$

37. Which equation has the same zero(s) as the function $f(x) = \dfrac{3x+15}{2x-8}$?

A. $2x - 8 = 0$

B. $3x + 15 = 0$

C. $(3x+15)(2x-8) = 0$

D. $(3x+15) - (2x-8) = 0$

38. How many degrees are $\dfrac{\pi}{6}$ **radians?**

A. 30°

B. 90°
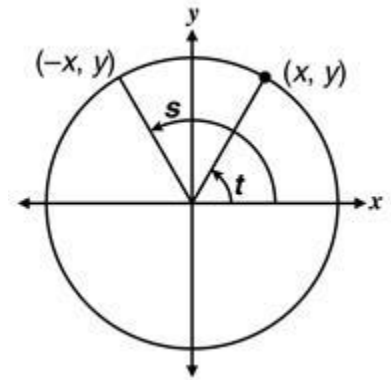
C. 360°

D. 1080°

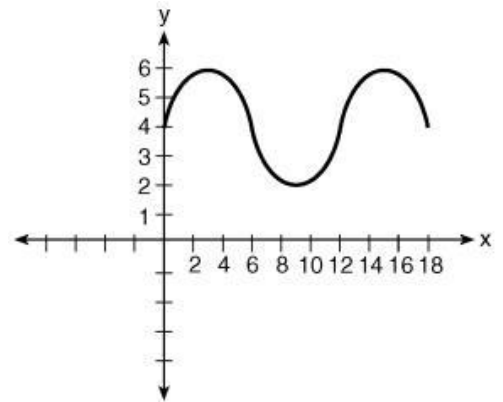**39. How many radians are 1800°?**

A. 10

B. 10π

C. 180

D. 180π

40. The figure below represents a unit circle.
Which statement best represents the relationship between Angles s and t?

    A. The angles are equal.

    B. The angles have equal sines.

    C. The angles have equal cosines.

    D. The angles are opposite of each other.

41. What is the amplitude of the function shown in the accompanying graph?

    A. 1.5

    B. 2

    C. 4

    D. 12

42. A circular clock has a minute hand that rotates from the center of the clock. This distance from the point on the minute hand from where it rotates to its end is 12 centimeters (cm). How far does the end of the minute hand move in 10 minutes?

    A. 4π cm   B. 8π cm   C. 24π cm   D. 48π cm

43. A television news editor would like to know how local registered voters would respond to the question, "Are you in favor of the school bond measure that will be voted on in an upcoming special election?" A television survey is conducted during a break in the evening news by listing two telephone numbers side by side on the screen, one for viewers to call if they approve of the bond measure, and another to call if they disapprove. This survey method could produce biased results for a number of reasons. Which one of the following is the most obvious reason?

    A. It uses a stratified sample rather than a simple random sample.
    B. People who feel strongly about the issue are more likely to respond.
    C. Viewers should be told about the issues before the survey is conducted.
    D. Some registered voters who call might not vote in the election.
    E. The wording of the question is biased.

44. A recent poll suggest that 47% of American citizens are going to vote for the Democratic candidate for president, with a margin of error of ±4.5%. Set up and solve an absolute value inequality to determine the range of possible percentages the candidate could earn. Based on your answer, can you determine if the democratic candidate will win the election?

A. $|\mu - 47| \leq 4.5$; yes because the population mean is greater than 50%.

B. $|\mu + 4.5| \leq 47$; no because the population mean is less than 42.5%.

C. $|\mu - 4.5| \geq 47$; yes because the population mean is greater than 51.5%.

D. $|\mu - 47| \leq 4.5$; no because the population mean could be less than 50%.

45. A box with an open top is to be constructed from a rectangular piece of cardboard with dimensions 11 inches by 27 inches by cutting out equal squares of side x at each corner and then folding up the sides as in the figure. Express the volume V of the box as a function of x.

A. $V(x) = (11 - x)(27 - x)$
B. $V(x) = x(11 - 2x)(27 - 2x)$
C. $V(x) = (11 - 2x)(27 - 2x)$
D. $V(x) = x(11 - x)(27 - x)$