

TEST NAME: **Math 3 Practice EOC**  
TEST ID: **3135362**  
GRADE: **09 - Ninth Grade - 12 - Twelfth Grade**  
SUBJECT: **Mathematics**  
TEST CATEGORY: **School Assessment**

Answer Key

Student: Answer Key  
Class: \_\_\_\_\_  
Date: \_\_\_\_\_

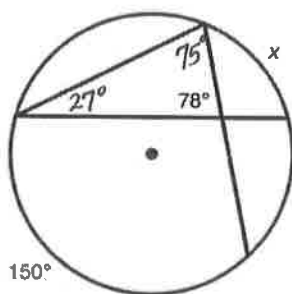
1. The diameter of a circle is 8 centimeters. A central angle of the circle intercepts an arc of 12 centimeters. What is the radian measure of the central angle?

- A. 1.5
- B. 3
- C. 4
- D.  $8\pi$

$$\begin{aligned} \text{diameter} &= 8 \text{ cm} \\ \text{radius} &= 4 \text{ cm} \end{aligned}$$

$$\frac{12}{4} = 3 \text{ radians}$$

2. Given the circle below



Inscribed angle is  $\frac{1}{2}$  the intercepted arc.

$$\frac{1}{2}(150^\circ) = 75^\circ$$

$$180^\circ - (78^\circ + 75^\circ) = 27^\circ$$

$$2(27^\circ) = 54^\circ$$

What is the value of x?

- A.  $54^\circ$
- B.  $75^\circ$
- C.  $78^\circ$
- D.  $102^\circ$

3. Drag into the column all of the expressions for which  $(x - 2)$  is a factor.

$3x^3 + 6x^2 - 6x - 36$ 0	$2x^3 + 5x^2 - x - 6$ 28	$x^4 + 3x^3 - 10x^2$ 0
$3x^4 + 2x^3 - 35x^2 - 18x + 72$ -40		

Use Remainder Theorem -  
Substitute  $x = 2$   
into each expression.  
If it equals 0 then  
 $x - 2$  is a factor.

Expressions that have a factor of  $(x - 2)$

$$3x^3 + 6x^2 - 6x - 36$$

$$x^4 + 3x^3 - 10x^2$$

4. Nancy can paint a fence in 3 hours. It takes Ben 4 hours to do the same job. If they were to work together to paint a fence, approximately how many hours should it take?

A. 1.7

B. 2.0

C. 3.2

D. 5.8

$$\frac{x}{3} + \frac{x}{4} = 1$$

} multiply both sides by 12

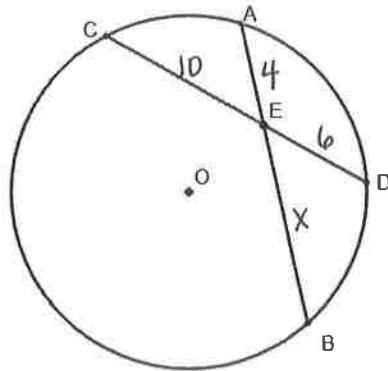
$$4x + 3x = 12$$

$$7x = 12$$

$$x = \frac{12}{7} \approx 1.71$$

5. In the diagram below of circle O, chords  $\overline{AB}$  and  $\overline{CD}$  intersect at E.

When chords intersect,  
the product of  
the two parts of  
the chords are  
equal.



$$10 \cdot 6 = 4 \cdot x$$

$$60 = 4x$$

$$15 = x$$

If  $CE = 10$ ,  $ED = 6$  and  $AE = 4$ , what is the length of  $\overline{EB}$ ?

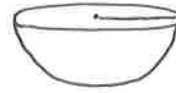
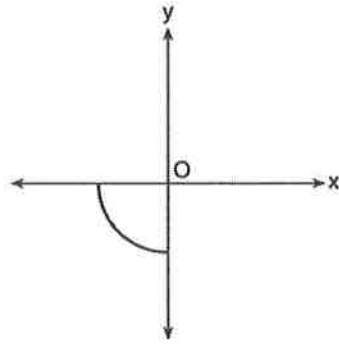
- A. 2.4  
B. 6.7  
C. 12  
D. 15

6. A polynomial equation with real coefficients has roots at  $x = \pm 1$  and  $x = 2i$ . What is the minimum degree of the polynomial equation?

- A. 3  
B. 4  
C. 5  
D. 6

Complex roots come in pairs  
So  $x = -2i$  is also a root.  
4 roots means a minimum of  
a 4th degree polynomial.

7. In the diagram below, a quarter of a circle centered at the origin is graphed.



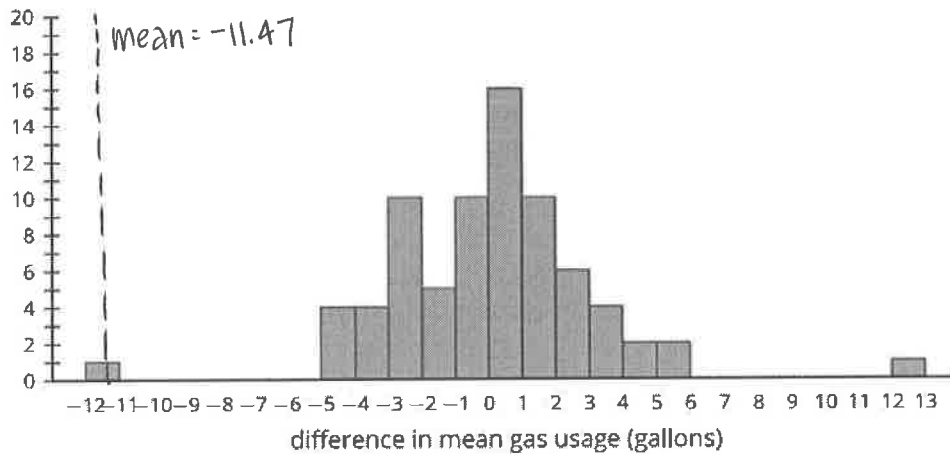
What three dimensional figure is generated when the quarter circle is continuously rotated about the  $y$ -axis?

- A. cone
- B. sphere
- C. cylinder

D. hemisphere

8. Forty volunteer drivers are separated into two groups of 20 drivers each at random. The first group is asked to pay particular attention to braking smoothly when approaching a red light or stop sign. The second group is given no special instructions. All drivers report the gallons of gasoline used at the end of a month.
- The mean for the first group is 43.16 gallons of gas.
  - The mean for the second group is 54.63 gallons of gas.
  - The difference in means for the two groups is -11.47 gallons of gas.

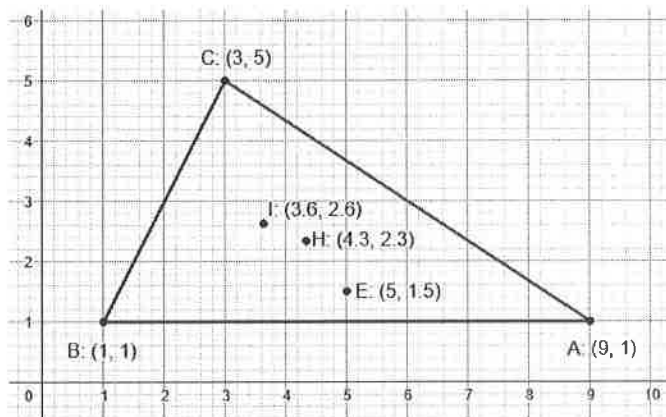
The data for both groups are combined and redistributed at random into two groups of 20. The means for each redistributed group are calculated, and the difference in means is recorded. The differences are represented in the histogram.



Which of these conclusions and justifications is the most reasonable?

- A. The difference in means for the two treatment groups is likely due to the random assignment since the difference is negative.
- B. The difference in means for the two treatment groups is likely due to the random assignment since there is at least one value in the histogram with a greater absolute difference than 11.47 gallons of gas.
- C. The randomization distribution does not give any evidence that the difference between the two treatment groups is due to the special instructions.
- D. The randomization distribution provides strong evidence that the difference in means for the two treatment groups is due to the treatment because the difference is highly unlikely based on random assignment alone.

9. In triangle ABC, point E (5, 1.5) is the circumcenter, point H (4.3, 2.3) is the incenter, and point I (3.6, 2.6) is the centroid.



Circumcenter is the center of the circle that circumscribes the triangle.

- distance from E (5, 1.5) to C (3, 5)  

$$\sqrt{(5-3)^2 + (1.5-5)^2} = \sqrt{16.25} \approx 4.03$$

What is the approximate length of the radius that circumscribes triangle ABC?

A. 4.03

B. 4.87

C. 5.03

D. 5.63

- distance from E (5, 1.5) to A (9, 1)  $\sqrt{16.25} \approx 4.03$

- distance from E (5, 1.5) to B (1, 1)  $\sqrt{16.25} \approx 4.03$

10. When a sample is randomly selected from a population, what is most likely to occur?

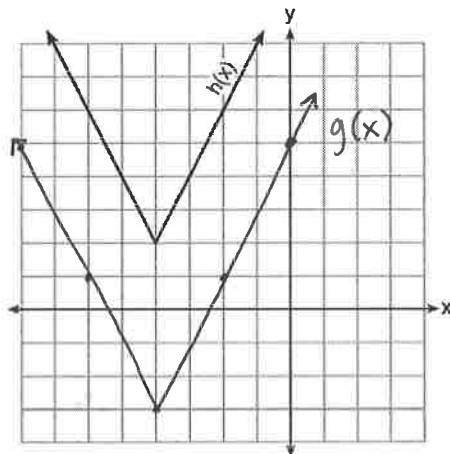
A. The sample distribution will be identical to the population distribution.

B. The sample distribution will be quite similar to the population distribution at first, but will become less similar as the sample gets larger.

C. The sample distribution will be quite different from the population distribution at first, but will become more similar as the sample gets larger.

D. The sample distribution will not be at all similar to the population distribution.

11. The function  $h(x)$ , which is graphed below and the function  $g(x) = 2|x + 4| - 3$  are given.



Drag all of the statements that are true to the container.

$g(x)$  has a lower minimum value than  $h(x)$

For all values of  $x$ ,  $h(x) < g(x)$ .

For any value of  $x$ ,  $g(x) \neq h(x)$ .

True Statements  
 $g(x)$  has a lower minimum value than  $h(x)$   
 for any value of  $x$ ,  $g(x) \neq h(x)$

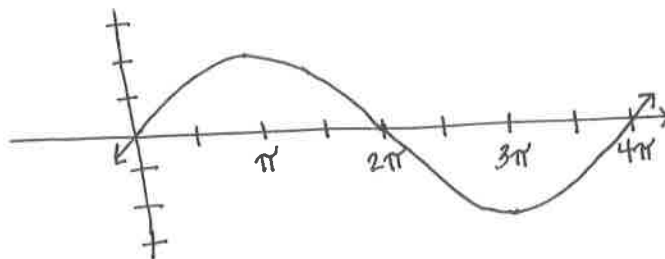
12. The graph of which function has an amplitude of 2 and a period of  $4\pi$ ?

A.  $y = 2\sin\frac{1}{2}x$

B.  $y = 2\sin 4x$

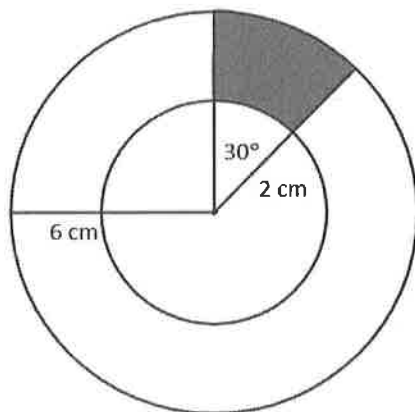
C.  $y = 4\sin\frac{1}{2}x$

D.  $y = 4\sin 2x$





13. In the figure below, the larger circle has a radius of 6 cm and the smaller circle has a radius of 2 cm.



Area of larger circle  
 $\pi (6)^2 = 36\pi$

Area of smaller circle  
 $\pi (2)^2 = 4\pi$

proportion for the sector  
 $\frac{30^\circ}{360^\circ} = \frac{1}{12}$

What is the *approximate* area of the shaded region?

- A. 2.1 cm<sup>2</sup>
- B. 3.4 cm<sup>2</sup>
- C. 4.2 cm<sup>2</sup>
- D. 8.4 cm<sup>2</sup>

Area of shaded region  
 $\frac{1}{12} (36\pi - 4\pi) \approx 8.4$

14. The expression  $\frac{-3x^2 - 5x + 2}{x^3 + 2x^2}$  can be rewritten as which of the following expressions?

A.  $\frac{-3x - 3}{x^2 + 2x}$

B.  $-3x^{-1} + 1$

C.  $\frac{-3x + 1}{x^2}$

D.  $-3x^{-1} + x^{-2}$

$$\frac{-3x^2 - 5x + 2}{x^3 + 2x^2} = \frac{(-3x + 1)(x + 2)}{x^2(x + 2)} = \frac{-3x + 1}{x^2} \quad x \neq -2$$

15. Factor the expression  $x^3 - 5x^2 + 3x - 15$ .

$$\begin{aligned} &(x^3 - 5x^2) + (3x - 15) \\ &x^2(x - 5) + 3(x - 5) \\ &(x^2 + 3)(x - 5) \end{aligned}$$

Place (click and drag) the values into the expression.

$$(x^2 + \boxed{3})(x + \boxed{-5})$$

16. A polynomial,  $p(x)$ , has three distinct zeros

- $x = -2$  is a zero of multiplicity one
- $x = 1$  is a zero of multiplicity two
- $x = 3$  is a zero of multiplicity one

It also passes through the point  $(0, -12)$

Which of the following shows  $p(x)$ ?

A.  $p(x) = -2x^3 + 4x^2 + 10x - 12$

B.  $p(x) = 2x^3 + 4x^2 - 10x - 12$

C.  $p(x) = 2x^4 - 6x^3 - 6x^2 + 22x - 12$

D.  $p(x) = 2x^4 + 6x^3 - 6x^2 - 22x - 12$

$$\begin{aligned} &(x-1)^2(x+2)(x-3) \\ &(x^2 - 2x + 1)(x^2 - x - 6) \end{aligned}$$

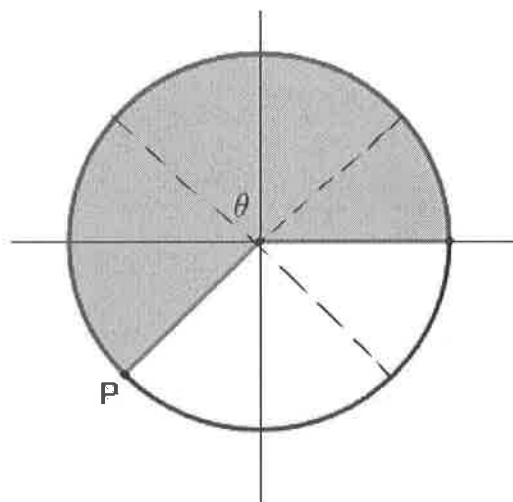
	$x^2$	$-x$	$-6$
$x^2$	$x^4$	$-x^3$	$-6x^2$
$-2x$	$-2x^3$	$+2x^2$	$+12x$
$+1$	$+x^2$	$-x$	$-6$

$$x^4 - 3x^3 - 3x^2 + 11x - 6$$

← The y intercept should be -12 so multiply by 2

$$2x^4 - 6x^3 - 6x^2 + 22x - 12$$

17. In the circle below, angle  $\theta$  is formed by rotating point P around the circle.



$$\frac{5}{8} (2\pi) = \frac{5\pi}{4}$$

What is the *approximate* measure of  $\theta$  in radians?

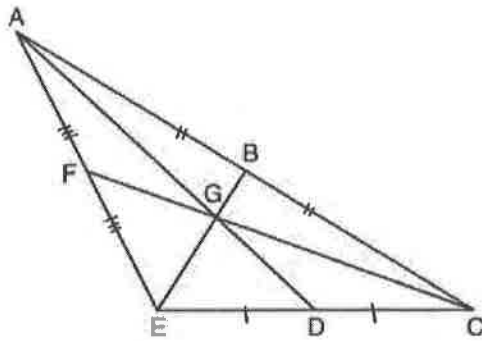
A.  $\frac{\pi}{2}$

B.  $\frac{3\pi}{4}$

C.  $\frac{5\pi}{4}$

D.  $\frac{3\pi}{2}$

18. In  $\triangle ACE$ , medians  $\overline{AD}$ ,  $\overline{EB}$ , and  $\overline{CF}$  intersect at point  $G$ . The length of  $\overline{FG}$  is 12 centimeters.



The centroid is located  $\frac{2}{3}$  of the length from the vertex and  $\frac{1}{3}$  from the side.

What is the length, in centimeters, of  $\overline{GC}$ ?

- A. 6
- B. 18
- C. 24
- D. 36

$$\frac{1}{3}(CF) = 12$$

$$CF = 36$$

$$\frac{2}{3}(36) = 24$$

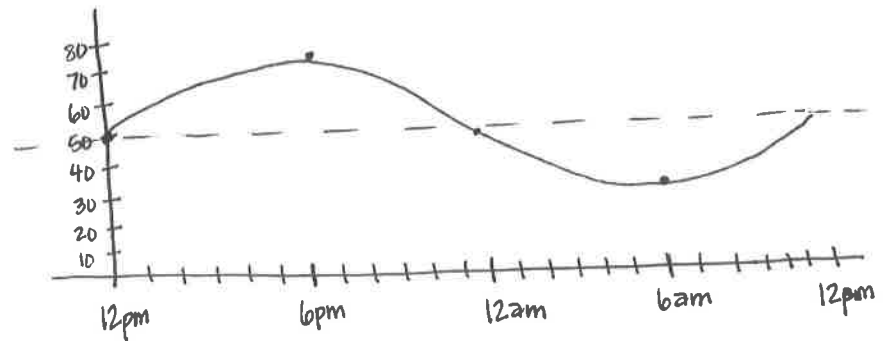
19. The temperature in degrees Fahrenheit at a given location goes through a similar cycle each day. The low is  $30^\circ\text{F}$  and occurs near 6:00 am. The high is  $70^\circ\text{F}$  and occurs near 6:00 pm. Which function best models the temperature as a function of the time in hours since noon?

A.  $t(x) = 20\sin\left(\frac{\pi}{6}x\right) + 50$

B.  $t(x) = 20\sin\left(\frac{\pi}{12}x\right) + 50$

C.  $t(x) = -20\sin\left(\frac{\pi}{6}x\right) + 50$

D.  $t(x) = -20\sin\left(\frac{\pi}{12}x\right) + 50$



20. Given the defined function  $f(x)$

$$f(x) = \begin{cases} 2x + 8, & x \leq -2 \\ x^2 - 3, & -2 < x \leq 3 \\ \sqrt{x + 3}, & x > 3 \end{cases}$$

$$-3 \leq -2 \rightarrow f(-3) = 2(-3) + 8 = 2$$

$$6 > 3 \rightarrow f(6) = \sqrt{6+3} = \sqrt{9} = 3$$

$$2f(-3) + f(6) = 2(2) + 3 = \boxed{7}$$

What is the value of  $2f(-3) + f(6)$ ?

21. Factor  $27x^3 + 125$

perfect cube  $(3x)^3$   $\rightarrow 27x^3 + 125$   $\leftarrow$  perfect cube  $5^3$

A.  $(3x+5)(9x^2+25)$

B.  $(3x-5)(9x^2+15x+25)$

C.  $(3x+5)(x^2-30x+25)$

D.  $(3x+5)(9x^2-15x+25)$

$$(3x+5)(9x^2-15x+25)$$

22. Divide the polynomial  $x^3 - 3x^2 - 6x + 15$  by  $x - 2$ .

A.  $x^3 - 5x^2 + 4x + 7$

B.  $x^2 - x - 8 - \frac{1}{x-2}$

C.  $x^2 - 5x + 4 + \frac{7}{x-2}$

D.  $x^2 + 3x + 6$

	$x^2$	$-1x$	$-8$	
$x$	$x^3$	$-x^2$	$-8x$	$\boxed{-\frac{1}{x-2}}$
$-2$	$-2x^2$	$2x$	$+16$	

23. Solve the equation  $\frac{x}{2x+2} = \frac{-2x}{4x+4} + \frac{2x-3}{x+1}$

A.  $x = \frac{-12}{5}$

B.  $x = \frac{3}{2}$

C.  $x = -3$

D.  $x = 3$

$$\frac{x}{2(x+1)} = \frac{-2x}{4(x+1)} + \frac{2x-3}{x+1}$$

$$\frac{2x}{4(x+1)} = \frac{-2x}{4(x+1)} + \frac{8x-12}{4(x+1)}$$

$$2x = -2x + 8x - 12$$

$$2x = 6x - 12$$

$$-4x = -12$$

$$x = 3$$

$x \neq -1$

24. Given the interval  $(4, 10]$ , list the following functions from least to greatest.

$$f(x) = 2^x$$

$$g(x) = 2x$$

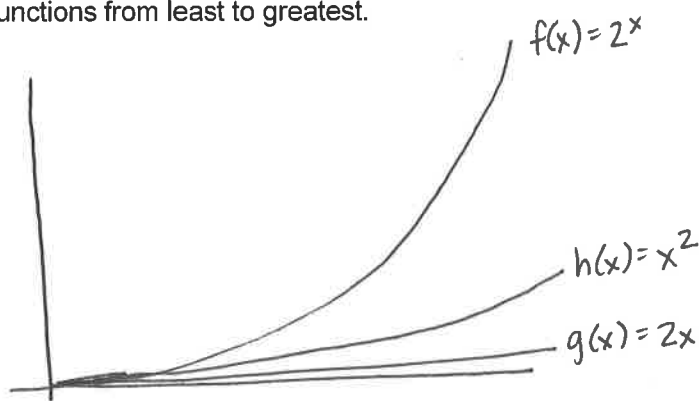
$$h(x) = x^2$$

A.  $g(x), f(x), h(x)$

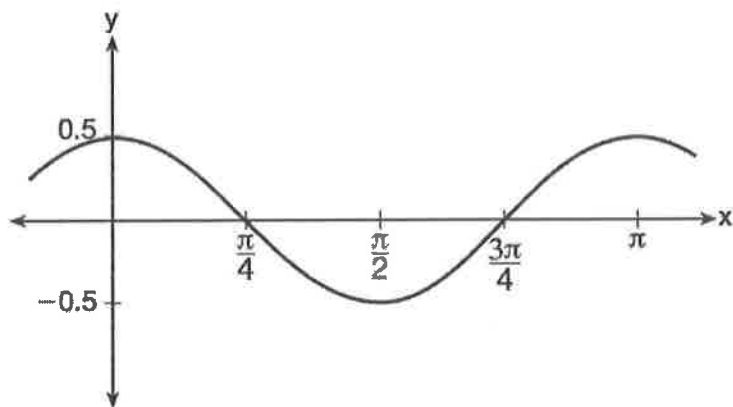
B.  $g(x), h(x), f(x)$

C.  $f(x), h(x), g(x)$

D.  $h(x), g(x), h(x)$



25. Which equation is represented by the graph shown below?



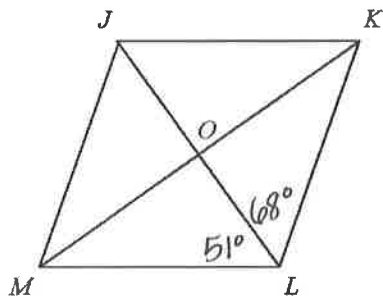
A.  $y = \frac{1}{2} \cos 2x$

B.  $y = \cos x$

C.  $y = \frac{1}{2} \cos x$

D.  $y = 2 \cos \frac{1}{2} x$

26. In the parallelogram,  $m\angle KLO = 68^\circ$  and  $m\angle MLO = 51^\circ$ .



Opposite angles in  
a parallelogram are  
congruent.

$$m\angle MLK = 51^\circ + 68^\circ = 119^\circ$$

$$m\angle MLK = m\angle KJM$$

Find  $\angle KJM$ .

- A.  $109^\circ$
- B.  $103^\circ$
- C.  $112^\circ$
- D.  $119^\circ$

27. Place (click and drag) the description of the study design to the type of study being conducted.

A

Does a certain multivitamin help people lose weight? Researchers randomly select 100 people to participate in the study. Half of them are given the multivitamin. Half of them are given a fake pill. The weights of all of them are recorded daily for the next three months.

Experiment

B

How do business customers feel about the level of support they receive? The business randomly selects 200 customers and asks them to share their opinions.

Survey

C

Do truck drivers get into more accidents than people who drive SUVs? Researchers use police records of automobile accidents over the past year and vehicle registrations to compare the percentage of drivers of vehicles of each type that get into accidents.

Observational study

The interface consists of a light gray background with three boxes for study types and three boxes for study descriptions. The boxes for study types are: 'Survey' (with 'B. Customers' written below it), 'Observational Study' (with 'C. Accidents' written below it), and 'Experimental Study' (with 'A. Multivitamin' written below it). The boxes for study descriptions are: 'A. Does a certain multivitamin help people lose weight?...', 'B. How do business customers feel about the level of support they receive?...', and 'C. Do truck drivers get into more accidents than people who drive SUVs?...'.



28. Place (click and drag) into the appropriate boxes the values of A, B, and C that will make the equation shown below true.

$$\frac{2x+1}{x-3} + \frac{4x+6}{2x-5} = \frac{Ax^2+Bx+C}{(x-3)(2x-5)}$$

A

6	<u>8</u>	16
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B

<u>-14</u>	6	10
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C

<u>-23</u>	-13	13
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A =  B =  C =

$$\frac{(2x+1)(2x-5) + (4x+6)(x-3)}{(x-3)(2x-5)}$$

$$\frac{4x^2 - 8x - 5 + 4x^2 - 6x - 18}{(x-3)(2x-5)}$$

$$\frac{8x^2 - 14x - 23}{(x-3)(2x-5)}$$

29. Cashews and peanuts are combined to make a nut mixture. At least  $\frac{1}{4}$  of the mixture, by weight, is cashews, and the total weight of the mixture cannot exceed 48 ounces. Which system of inequalities models this situation, where  $c$  represents the number of ounces of cashews and  $p$  represents the number of ounces of peanuts?

A.  $c \geq 0$   
 $p \geq 0$   
 $\frac{1}{4}c \geq c + p$   
 $c + p \leq 48$

$c + p \leq 48$  weight of mixture must be less than or equal to 48 oz.

B.  $c \geq 0$   
 $p \geq 0$   
 $\frac{1}{4}p \geq c$   
 $c + p \geq 48$

$c \geq \frac{1}{4}(c + p)$  weight of cashews must be more than or equal to a  $\frac{1}{4}$  of total weight

C.  $c \geq 0$   
 $p \geq 0$   
 $\frac{1}{4}(c + p) \geq c$   
 $c + p \geq 48$

$c \geq 0$   
 $p \geq 0$  } weight must be greater than or equal to 0

D.  $c \geq 0$   
 $p \geq 0$   
 $c \geq \frac{1}{4}(c + p)$   
 $c + p \leq 48$

30. The graph of the function  $f(x) = 2x + 5$  is stretched horizontally by a factor of 6. Which is the function that corresponds to the resulting graph?

A.  $g(x) = 2x + 11$

B.  $g(x) = 8x + 5$

C.  $g(x) = 12x + 5$

D.  $g(x) = 12x + 30$

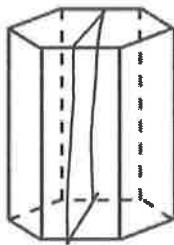
horizontal stretch  $f(kx); k > 1$

$f(6x) = 2(6x) + 5$

$g(x) = 12x + 5$

31. You want to survey twenty of the 150 ninth graders to get their opinion on the school's new schedule. Which of the following methods is most likely to lead to a sample that is the most representative of the 150 ninth graders?
- A. Choose 20 ninth graders from your first period class.
  - B. Choose the first 20 ninth graders from an alphabetical list.
  - C. Select 20 students at random from the ninth grade.
  - D. Select 5 students at random from each of ninth, tenth, eleventh and twelfth grade.

32. A right hexagonal prism is shown below. A two-dimensional cross section that is perpendicular to the base is taken from the prism.



Which figure describes the two-dimensional cross section?

- A. triangle
  - B. rectangle
  - C. pentagon
  - D. hexagon
33. Which is the inverse function of  $f(x) = 1.5^x + 4$ ?

A.  $f^{-1}(x) = \frac{x-4}{1.5}$

B.  $f^{-1}(x) = \frac{\log(x) - 4}{1.5}$

C.  $f^{-1}(x) = \frac{\log(x-4)}{\log(1.5)}$

D.  $f^{-1}(x) = \frac{4 - \log(x)}{\log(1.5)}$

$$y = 1.5^x + 4$$

$$x = 1.5^y + 4$$

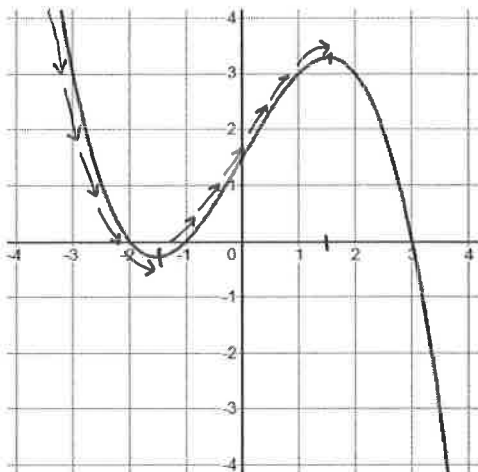
$$x - 4 = 1.5^y$$

$$10^{\log(x-4)} = 10^{y \log 1.5}$$

$$\log(x-4) = y \cdot \log(1.5)$$

$$\frac{\log(x-4)}{\log(1.5)} = y$$

34. The graph of a function is shown below.



Place (click and drag) each interval into the column that describes the function on that interval.

<p><i>decreasing</i></p> <p><math>(-\infty, -1.5)</math></p>	<p><i>negative</i></p> <p><math>(-2, -1)</math></p>	<p><i>positive</i></p> <p><math>(-1, 3)</math></p>
<p><math>(-1.5, 1.5)</math></p> <p><i>increasing</i></p>		

<p>Decreasing</p> <p><math>(-\infty, -1.5)</math></p>	<p>Increasing</p> <p><math>(-1.5, 1.5)</math></p>
<p>Positive</p> <p><math>(-1, 3)</math></p>	<p>Negative</p> <p><math>(-2, -1)</math></p>

35. Simplify  $\frac{x^2 - 9}{x^2 - 25} \div \frac{x^2 - 8x + 15}{x^2 + 7x + 10}$

$$\frac{(x+3)(x-3)}{(x+5)(x-5)} \cdot \frac{(x+5)(x+2)}{(x-5)(x-3)}$$

A.  $\frac{(x+3)(x+2)}{(x+5)^2}$

B.  $\frac{(x+3)(x+2)}{(x-5)^2}$

C.  $\frac{(x-3)(x+2)}{(x+5)^2}$

D.  $\frac{(x+3)(x+2)}{(x+5)}$

$$\frac{(x+3)(x+2)}{(x-5)^2}$$

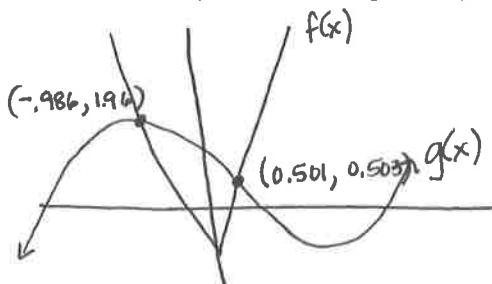
36. Given  $f(x) = 3|x| - 1$  and  $g(x) = 0.03x^3 - x + 1$  find when  $f(x) = g(x)$ .

A. -0.986 and 1.957

B. -0.986 and 0.501

C. 1.957 and 0.503

D. 0.501 and 0.503



← solutions to a one variable equation are the x coordinates of the points of intersection

37. A machinist creates a solid steel part for an engine. The part has a volume of 1015 cubic centimeters. Steel can be purchased for \$0.29 per kilogram, and has a density of 7.95 g/cm<sup>3</sup>. If the machinist makes 500 of these parts, what is the cost of the steel, to the nearest dollar?

A. \$80

B. \$294

C. \$1170

D. \$2340

$$(1015 \text{ cm}^3) \left( \frac{7.95 \text{ g}}{\text{cm}^3} \right) = 8069.25 \text{ g}$$

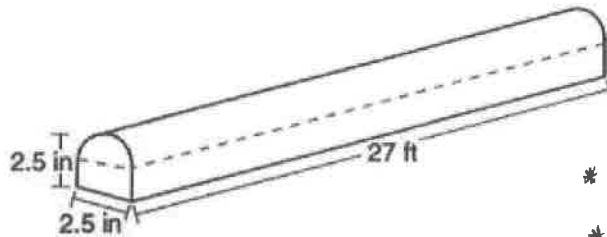
$$(8069.25 \text{ g}) \left( \frac{1 \text{ kg}}{1000 \text{ g}} \right) = 8.06925 \text{ kg}$$

$$(8.06925 \text{ kg}) \left( \frac{\$0.29}{\text{kg}} \right) \approx \$2.34$$

$$(500)(2.34) \approx \$1170$$

38. An advertisement makes the claim: "Lighter shoes make you run faster." Of the following, which is the best way to investigate this claim?
- A. Choose the records of the top twenty runners who are wearing the lighter shoes and compare their times to run 400 meters before and after they began wearing the shoes.
  - B. Choose twenty runners and select ten at random to wear lighter shoes and have the other ten wear heavier shoes to run 400 meters and compare their times.
  - C. Choose twenty runners at random and have the women wear the lighter shoes and the men wear the heavier shoes to run 400 meters and compare their times.
  - D. Choose to observe the results of 400-meter races for the next year and see how many winners are wearing the lighter shoes.

39. A fabricator is hired to make a 27-foot-long solid metal railing for the stairs at the local library. The railing is modeled by the diagram below. The railing is 2.5 inches high and 2.5 inches wide and is comprised of a rectangular prism and a half-cylinder.



\* radius of semicircle is 1.25 in.

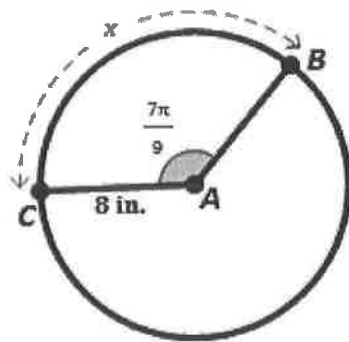
\* 27 ft = 324 in

How much metal, to the nearest cubic inch, will the railing contain?

- A. 151
- B. 795
- C. 1808
- D. 2025

$$\begin{aligned} \text{Volume of rectangular prism} &= (2.5)(1.25)(324) = 1012.5 \\ \text{Volume of half cylinder} &= \frac{1}{2} (\pi (1.25)^2)(324) = 795.22 \\ \text{Total Volume} &\approx 1012.5 + 795.22 \approx 1808 \end{aligned}$$

40. Given a circle centered at point A with radius 8 inches and  $m\angle CAB = \frac{7\pi}{9}$  (in radians).



$$\frac{x}{8} = \frac{7\pi}{9}$$

$$x = \frac{56\pi}{9} \approx 19.55$$

What is the approximately arc length of  $\widehat{BC}$ ?

- A. 19.55  
 B. 18.61  
 C. 39.10  
 D. 50.27
41. What is the solution to  $8(2^{x+3}) = 48$ ?

A.  $x = \frac{\log_2 6}{3}$

B.  $x = \log_2 3$

C.  $x = -3 + \log_2 6$

D.  $x = 3 - \log_2 6$

$$8(2^{x+3}) = 48$$

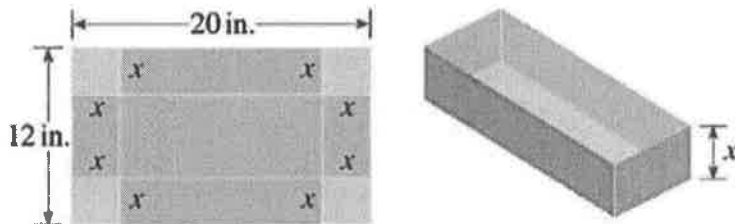
$$2^{x+3} = 6$$

$$2^{x+3} = 2^{\log_2 6}$$

$$x+3 = \log_2 6$$

$$x = -3 + \log_2 6$$

42. A company is creating open box made from a 12 in. x 20 in. piece of cardboard. They cut out squares of equal size from each corner to build the box.



Which of the following expresses the volume of the box as a function of  $x$ ?

A.  $v(x) = 4x^3 - 64x^2 + 240x$

B.  $v(x) = x^3 - 32x^2 + 240x$

C.  $v(x) = -4x^2 + 64x - 240$

D.  $v(x) = -4x^3 + 64x + 240$

$$x(20-2x)(12-2x)$$

$$x(240 - 64x + 4x^2)$$

$$4x^3 - 64x^2 + 240x$$

43. A cable news show displays the results of a poll for a two-candidate runoff election between candidate A and candidate B. The poll shows that candidate A is leading with 53% of the vote. In small print at the bottom of the graphic, it says  $\pm 4.9\%$ .

Which of these statements is true about this poll?

- A. Candidate A will win because the mean percentage for the poll is greater than 50%
- B. Candidate A cannot get more than 58% of the vote.
- C. The poll predicts that between 48.1% and 57.9% of voters will select candidate A in the election.
- D. The poll should not be trusted since it has a margin of error attached to it.

$$53\% + 4.9\% = 57.9\%$$

$$53\% - 4.9\% = 48.1\%$$

44. The equation of a circle is  $x^2 + y^2 - 6x + 2y = 6$ . What are the coordinates of the center and the length of the radius of the circle?

- A. center (-3, 1) and radius 4
- B. center (3, -1) and radius 4
- C. center (-3, 1) and radius 16
- D. center (3, 1) and radius 16

$$(x^2 - 6x + 9) + (y^2 + 2y + 1) = 6 + 9 + 1$$

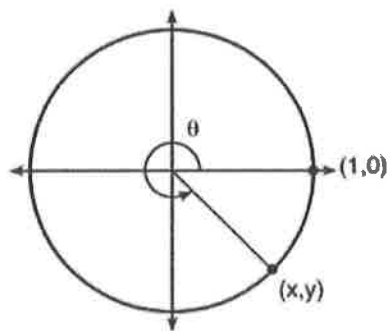
$$(x - 3)^2 + (y + 1)^2 = 16$$

center (3, -1)

radius 4



45. Given the circle below with a radius of one unit and the angle  $\theta$ , in radians, is  $\frac{5\pi}{3}$ .



What are the values for x and y?

A.  $(\frac{1}{2}, \frac{-1}{2})$

B.  $(\frac{1}{2}, \frac{-\sqrt{3}}{2})$

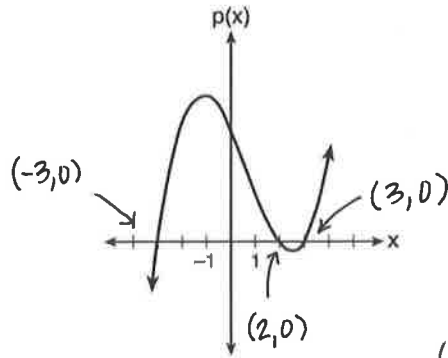
C.  $(\frac{\sqrt{3}}{2}, \frac{-1}{2})$

D.  $(\frac{\sqrt{3}}{2}, \frac{-\sqrt{3}}{2})$

$$x = \cos \theta \quad \cos \frac{5\pi}{3} = 0.5$$
$$y = \sin \theta \quad \sin \frac{5\pi}{3} \approx -0.866$$

\* note  $\frac{-\sqrt{3}}{2} \approx -0.866$

46. The graph of the function  $p(x)$  is sketched below.



$$(x+3)(x-3)(x-2)$$

$$(x^2-9)(x-2)$$

$$x^3 - 2x^2 - 9x + 18$$

Which equation could represent  $p(x)$ ?

A.  $p(x) = -(x^2 - 9)(x - 2)$

B.  $p(x) = x^3 - 2x^2 - 9x + 18$

C.  $p(x) = (x^2 + 9)(x - 2)$

D.  $p(x) = x^3 + 2x^2 - 9x + 18$

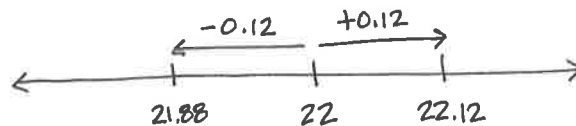
47. A furniture maker uses the specification  $21.88 \leq w \leq 22.12$  for the width  $w$  in inches of a desk drawer. Write the specification as an absolute value inequality.

A.  $|w - 0.24| \leq 22.12$

B.  $|w - 22| \leq 0.24$

C.  $|w - 0.12| \leq 22$

D.  $|w - 22| \leq 0.12$



48. The function  $f(x)$  has zeros at  $\{-1, 0, 2\}$ . Which of the following is **NOT** a possible factor of  $f(x)$ ?

A.  $(3x + 3)$        $3x + 3 = 0 \Rightarrow x = -1$

B.  $4x$        $4x = 0 \Rightarrow x = 0$

C.  $(2 - x)$        $2 - x = 0 \Rightarrow x = 2$

D.  $(x - 1)$        $x - 1 = 0 \Rightarrow x = 1$

49. What is the sum of the remainders when  $g(x) = x^4 + 2x^3 - 5x^2 - 7$  is divided by  $(x + 1)$  and  $(x - 2)$ ?

Use Remainder Theorem

$$\begin{aligned} g(-1) &= -13 \\ g(2) &= 5 \end{aligned} \quad -13 + 5 = \boxed{-8}$$

50. The function  $p(d) = 714(0.75)^d$  models the population of a town, in thousands, as a function of the number of decades since 2010. Which of the following functions can be used to predict the population as a function of the number of years since 2010?

A.  $p(x) = 714(0.6500)^x$

B.  $p(x) = 714(0.8500)^x$

C.  $p(x) = 714(0.9716)^x$

D.  $p(x) = 714(0.9750)^x$

There are 10 years in a decade.

$$\begin{aligned} 10d &= y \\ d &= \frac{1}{10} y \end{aligned}$$

$$\begin{aligned} 714(0.75)^d \\ 714(0.75)^{\frac{1}{10}y} \\ 714(.9716)^y \end{aligned}$$