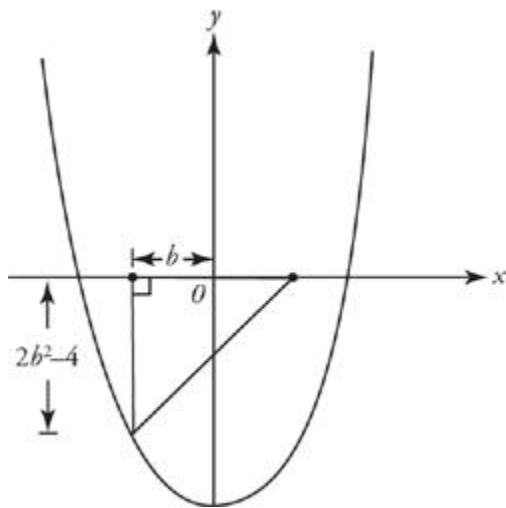


ACT Math Practice Paper 12
SET-1

1. In the standard (x,y) coordinate plane, what is the area of the circle $(x - 3)^2 + (y + 2)^2 = 25$?

- F. 5π
- G. 10π
- H. 25π
- J. 125π
- K. 225π

2. In the standard (x,y) coordinate plane below, the base of a right triangle lies along the x -axis and is bisected by the y -axis. The vertex of the angle opposite the base is on the graph of the parabolic function $f(x) = 2x^2 - 4$. Let b represent any value of x such that $-\sqrt{2} < x < 0$. Which of the following is an expression in terms of b for the area, in square coordinate units, of any such right triangle?



- A. $4b^4 - 16b^2 + 16$
- B. $4b^3 - 8b$
- C. $2b^3 - 4b$
- D. $2b^2 + b - 4$
- E. $b^2 - 4b + 4$

3. Which of the following expressions must be an even integer if x is an integer?

- F. $x + 5$

G. $\frac{x}{4}$

H. x^4

J. $4x$

K. 5^x

4. Which of the following ranges of consecutive integers contains the value of the expression $\log_9(9^{\frac{7}{3}})$?

A. 0 and 1

B. 1 and 2

C. 2 and 3

D. 5 and 6

E. 7 and 8

5. The employees at Belinda's Paint Store are having a competition to see who can create the most new accounts over a period from January to June in a certain year. Data is missing because one of the employees began to erase it from the white board, thinking that the competition was over. The numbers in the chart below have been confirmed with the assistant manager's personal records.

Month						
Employee	Jan.	Feb.	Mar.	Apr.	May	June
Don	64					
Maura	31	25		27	29	24
Cameron	23	19	22	17	20	22
Belinda	78	92	83	86		90

Which of the following is closest to the percent decrease in Cameron's new accounts from January to February?

F. 4.00%

G. 17.40%

H. 19.40%

J. 20.00%

K. 21.10%

6. The employees at Belinda's Paint Store are having a competition to see who can create the most new accounts over a period from January to June in a certain year. Data is missing because one of the

employees began to erase it from the white board, thinking that the competition was over. The numbers in the chart below have been confirmed with the assistant manager's personal records.

Month						
Employee	Jan.	Feb.	Mar.	Apr.	May	June
Don	64					
Maura	31	25		27	29	24
Cameron	23	19	22	17	20	22
Belinda	78	92	83	86		90

At the beginning of the year, Maura wanted to average 30 new accounts per month for the first four months of the year. How many new accounts did she need to create in March in order to reach this goal?

- A. 25
- B. 27
- C. 29
- D. 31
- E. 37

7. The employees at Belinda's Paint Store are having a competition to see who can create the most new accounts over a period from January to June in a certain year. Data is missing because one of the employees began to erase it from the white board, thinking that the competition was over. The numbers in the chart below have been confirmed with the assistant manager's personal records.

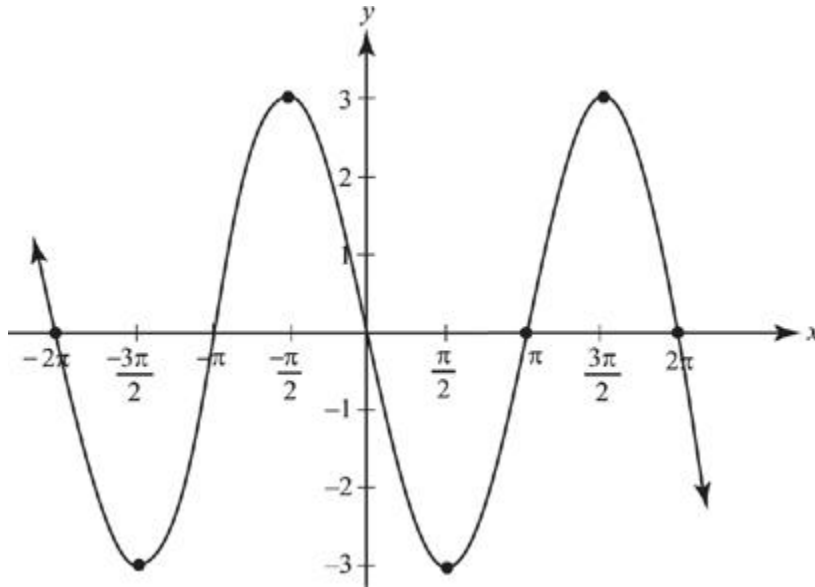
Month						
Employee	Jan.	Feb.	Mar.	Apr.	May	June
Don	64					
Maura	31	25		27	29	24
Cameron	23	19	22	17	20	22
Belinda	78	92	83	86		90

Additional records are uncovered that show that Don's sales decreased 5% each month from January to May because his responsibilities in the store mounted and he could not seek out new accounts as frequently. Which of the following is closest to the number of new accounts Don created in May?

- F. 44
- G. 52
- H. 56
- J. 72

K. 84

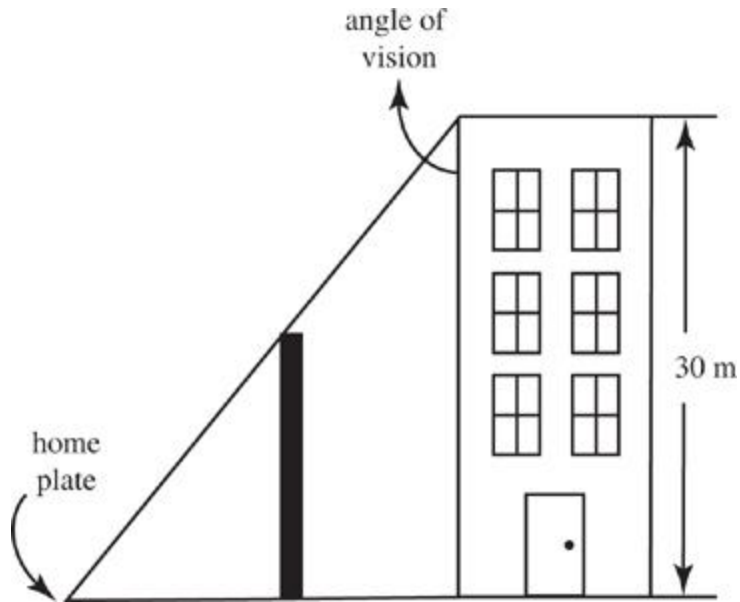
8. The amplitude of the trigonometric function shown below is defined as the average of the absolute values of the maximum value of $f(x)$ and the minimum value of $f(x)$. The trigonometric function graphed below can be described by the equation $f(x) = a \sin(bx + c)$, where a , b , and c are real numbers. Which of the following values describes the amplitude of this function?



- A. 1
- B. 2
- C. 3
- D. π
- E. 2π

9. A group of die-hard baseball fans has purchased a house that gives them a direct view of home plate, although their view of the rest of the field is largely impeded by the outfield wall. The house is 30 meters

tall, and their angle of vision from the top of the building to home plate has a tangent of $\frac{7}{6}$. What is the horizontal distance, in meters, from home plate to the closest wall of the fans' house?



F. 35

G. 32

H. 25.7

J. 5

K. 4.3

10. Given the equation $|y^2 - 11| - 2 = 0$, which of the following is a solution but NOT a rational number?

A. $11\sqrt{13}$

B. $4\sqrt{13}$

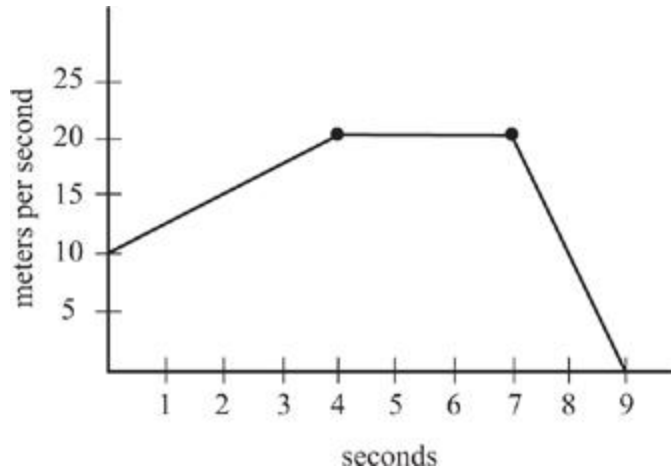
C. $2\sqrt{13}$

D. $\sqrt{13}$

E. 3

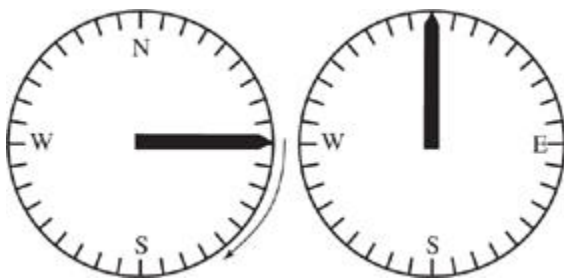
11. Below is the graph that a specialty automobile manufacturer uses to plot the speed tests done on his

new cars. The speed is recorded in units of $\frac{m}{s}$ and is conducted for a period of 9 seconds. A certain order of 3 of the following 6 actions describes the results of the speed test depicted in the graph below. Which order is it?



- I. Constant speed for 1 second
 - II. Constant speed for 3 seconds
 - III. Speed increase for 4 seconds
 - IV. Speed increase for 9 seconds
 - V. Speed decrease for 2 seconds
 - VI. Speed decrease for 7 seconds
- F. IV, II, VI
- G. III, II, V
- H. I, III, V
- J. III, I, VI
- K. V, I, II

12. As shown in the figure below, a compass has marks for every 10° and "North" and "South" are the endpoints of a line segment. If the point of the needle of this compass travels 42 mm as it moves in a clockwise direction from "East" to "North," how long is the needle to the nearest tenth of a millimeter?



- A. 6.7
- B. 8.9

- C. 13.4
- D. 14
- E. 17.8

13. For θ , an angle whose measure is between 270° and 360° , $\cos \theta = \frac{5}{13}$. Which of the following equals $\tan \theta$?

F. $-\frac{5}{12}$

G. $-\frac{5}{13}$

H. $\frac{5}{13}$

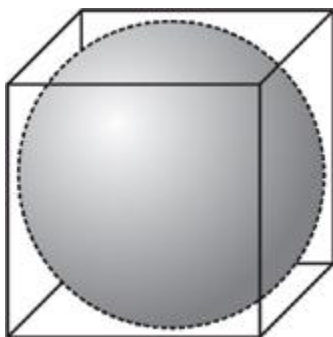
J. $\frac{5}{12}$

K. $\frac{12}{13}$

14. Consider all positive integer values a and b such that the product $ab = 8$. For how many values does there exist a positive integer c that satisfies both $2^a = c$ and $cb = 256$?

- A. Infinitely many
- B. 6
- C. 4
- D. 2
- E. 0

15. A sphere is inscribed in a cube with a diagonal of $3\sqrt{3}$ ft. In feet, what is the diameter of the sphere?



F. $3\sqrt{2}$

G. 2

H. $2\sqrt{2}$

J. 3

K. $3\sqrt{3}$

SET 2

1. The kinetic energy, KE , of an object travelling at v velocity can be modeled by the equation $KE = \frac{1}{2}mv^2$, where m is the mass of the object. If an object is moving at a velocity of 9, and it has a kinetic energy of 120, about how great is the object's mass?

- A. Between 0 and 1
- B. Between 1 and 2
- C. Between 2 and 3
- D. 6
- E. 13

2. Let x , y , and z be distinct positive integers. What is the fourth term of the geometric sequence below?

$$2xz, 2x^2yz, 2x^3y^2z, \dots$$

F. $2x^2yz$

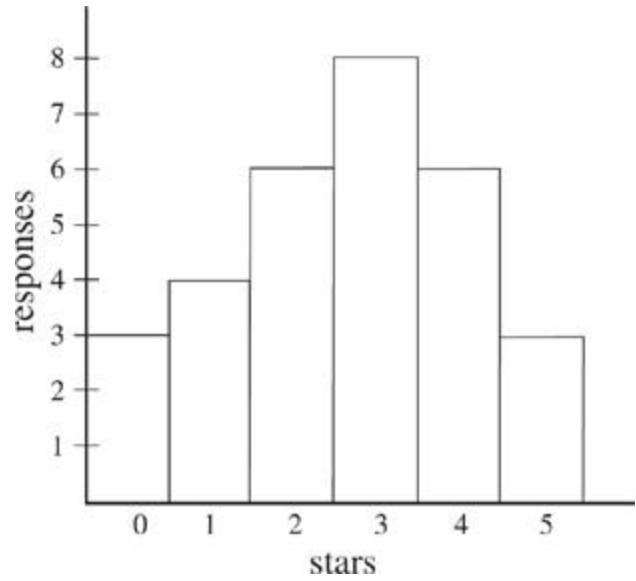
G. $2x^4y^3z$

H. $2x^3yz^2$

J. $4x^3y^2z$

K. $4x^4y^3z^2$

3. A recent survey of book critics asked 30 critics how many stars out of a possible 5 they gave to a recent novel from a popular author. The 30 critics' responses are summarized by the histogram below.



What fraction of the critics gave the book a one-star review?

A. $\frac{1}{2}$

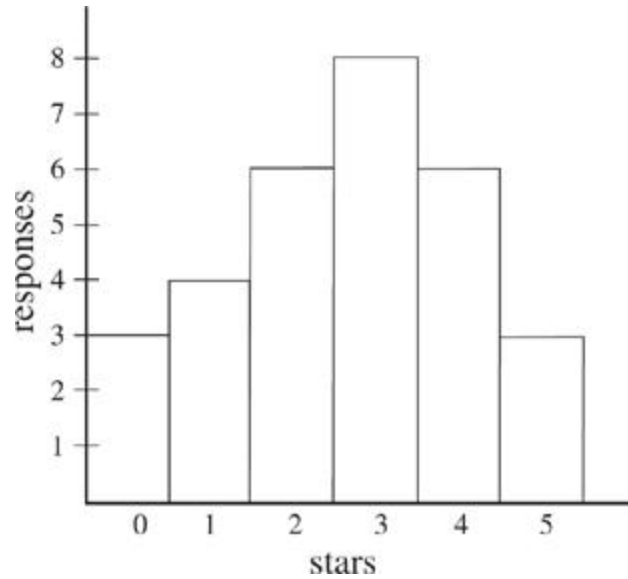
B. $\frac{3}{8}$

C. $\frac{17}{50}$

D. $\frac{3}{10}$

E. $\frac{2}{15}$

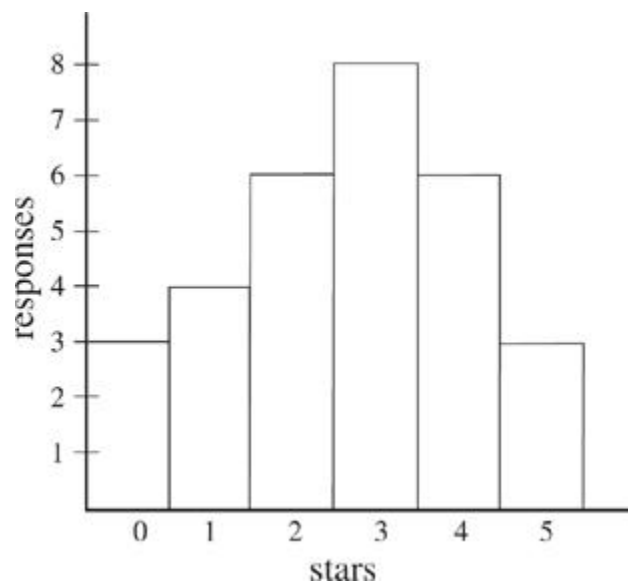
4. A recent survey of book critics asked 30 critics how many stars out of a possible 5 they gave to a recent novel from a popular author. The 30 critics' responses are summarized by the histogram below.



The group that took the survey wants to show the data in a circle graph (pie chart). What should be the measure of the central angle of the portion for one-star reviews?

- F. 15°
- G. 24°
- H. 30°
- J. 48°
- K. 60°

5. A recent survey of book critics asked 30 critics how many stars out of a possible 5 they gave to a recent novel from a popular author. The 30 critics' responses are summarized by the histogram below.



To the nearest hundredth, what is the average star review for the 30 reviews?

- A. 2
- B. 2.33
- C. 2.5
- D. 2.63
- E. 3

6. For all $x > 8$, $\frac{(x^2 + 7x + 12)(x - 2)}{(x^2 + 2x - 8)(x + 3)} = ?$

F. $\frac{-3(x - 2)}{(x + 3)}$

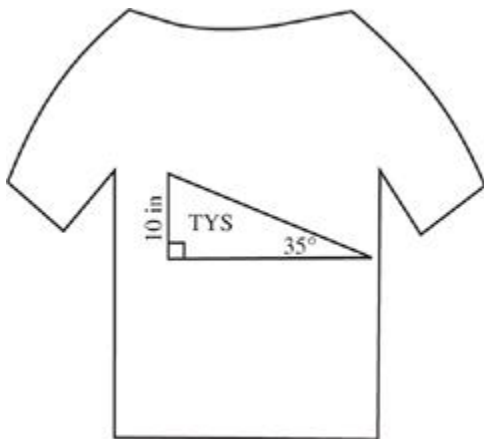
G. $\frac{-2(x - 2)}{(x + 3)}$

H. $\frac{(x - 2)}{(x + 2)}$

J. $\frac{11}{4}$

K. 1

7. A rock band, The Young Sohcahtoans, is trying to design a t-shirt logo. The measurements they have chosen are represented on the figure below. The angle to the right of the logo "TYS" has a degree measure of 35° , and the side of the figure has a measure of 10 in. Which of the following expressions gives the measure, in inches, of the diagonal top side of the figure?



- A. $10 \tan 35^\circ$
- B. $10 \cos 35^\circ$

C. $10 \sin 35^\circ$

D. $\frac{10}{\sin 35^\circ}$

E. $\frac{10}{\cos 35^\circ}$

8. The endpoints of the diameter of a circle O are A and C . In the standard (x,y) coordinate plane, A is at $(4,3)$ and C is at $(-9,-2)$. What is the y -coordinate of the center of the circle?

F. -5

G. $-\frac{5}{2}$

H. $\frac{1}{2}$

J. 1

K. 2

9. On a sonar map in the standard (x,y) coordinate plane, the Yellow Submarine and the Sandwich Submarine are located at the points $(-7,4)$ and $(-2,6)$, respectively. Each unit on the map represents an actual distance of 5 nautical miles. Which of the following is closest to the distance, in nautical miles, between the two submarines?

A. 5

B. 19

C. 27

D. 30

E. 67

10. All of the following statements about rational and/or irrational numbers must be true EXCEPT:

F. the sum of any two rational numbers is rational.

G. the product of any two rational numbers is rational.

H. the sum of any two irrational numbers is irrational.

J. the product of a rational and an irrational number may be rational or irrational.

K. the product of any two irrational numbers is irrational.

11. For the imaginary number i , which of the following is a possible value of i^n if n is an integer less than 5?

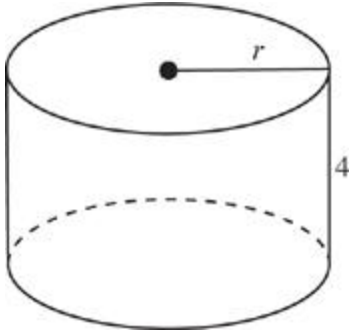
- A. 0
- B. -1
- C. -2
- D. -3
- E. -4

12. The table below gives the values of $f(x)$ for selected values of x in the function $f(x) = (x + 4)^2 - 1$, where x and y are both real numbers.

For the equation above, which of the following values of x gives the greatest value of $f(x)$?

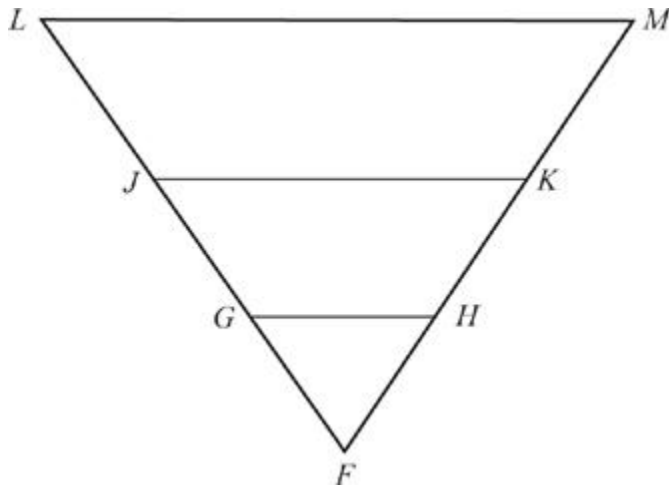
- F. -4
- G. -5
- H. -6
- J. -7
- K. -8

13. The volume of the right circular cylinder shown below is 64π cubic inches. If its height is 4 in., what is its radius in inches?



- A. 2
- B. 4
- C. 8
- D. 10
- E. 16

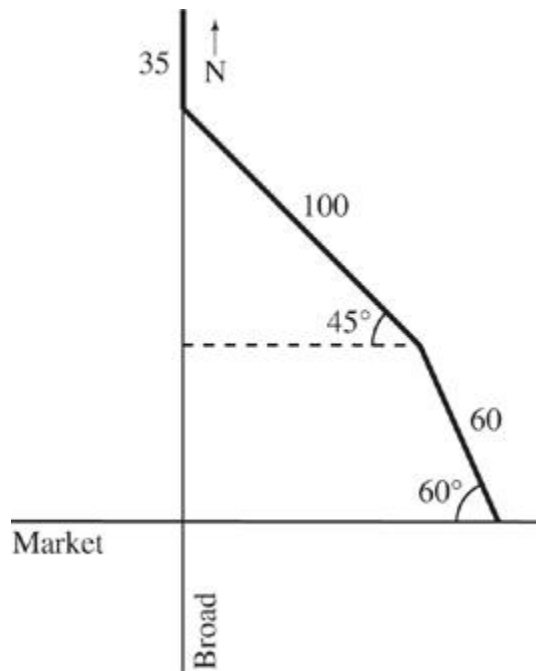
14. Line segments \overline{GH} , \overline{JK} , and \overline{LM} are parallel and intersect line segments \overline{FL} and \overline{FM} as shown in the figure below. The ratio of the perimeter of $\triangle FJK$ to the perimeter of $\triangle FLM$ is 3:5, and the ratio of \overline{FH} to \overline{FM} is 1:5. What is the ratio of \overline{GJ} to \overline{FG} ?



- F. 1:05
- G. 1:03
- H. 1:02
- J. 2:01
- K. 5:03

15. Avi is trying to draw a map of his most recent bike ride. He chose to place Market Street on the x-axis and Broad Street on the y-axis. He rode 60 m at an angle of 60° relative to Market Street, then rode 100

m at an angle of 45° relative to Market Street, and finally rode 35 m directly north on Broad Street. How many meters north of Market Street did Avi ride?



- A. 35
- B. 115
- C. 195
- D. $50\sqrt{2} + 30\sqrt{3}$
- E. $35 + 50\sqrt{2} + 30\sqrt{3}$