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TSIA Mathematics - Diagnostic Test 1

**This test must be scored online;
there is no paper answer key.**

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Student Demo

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Mathematics

Instructions

The TSIA Mathematics tests focus on Mathematics skills that have been identified as essential for college and career readiness. Answer each question to the best of your ability.

1.

The height of the Eiffel Tower is 300 meters. What is the height of the Eiffel Tower in feet?

(1 meter = 3.28 feet)

A	91.5
B	328
C	562
D	984

2.

What is $4.02 + 1.157$?

A	1.559
B	5.177
C	5.357
D	14.159

3.

What is 1.4726 rounded to the nearest thousandth?

A	1.473
B	1.472
C	1.47
D	1.48

4.

If $p = \frac{7}{5}$ and $x = 5p - 3$, what is the value of x?

A	$\frac{4}{5}$
B	$\frac{5}{4}$
C	4
D	10

5.

A theatre class is made up of 16 girls and 8 boys. The girls averaged 91 on the final and the boys averaged 79 on the final. What was the average grade on the final for the entire class?

A	85
B	86
C	87
D	88

6.

Which of the following is equal to 0.13?

A	$\frac{1}{13}$
B	$\frac{10}{13}$
C	$\frac{13}{10}$
D	$\frac{13}{100}$

7.

Three friends are deciding where to eat dinner. At one restaurant, 2 orders of chips and 4 orders of salsa cost $15. At a second restaurant, each order of chips costs $1 more but each order of salsa costs $0.50 less. If the friends order the same amount of food, how much will the same order cost at the second restaurant?

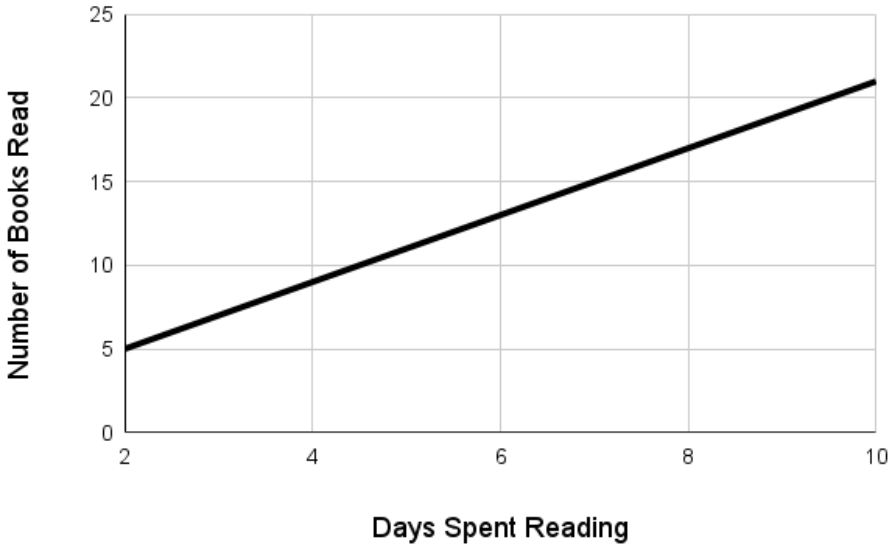
A	$13
B	$15
C	$16
D	$17

8.

If Percy spends 50% of his $160 on a new headset, how expensive was the headset?

A	$50
B	$60
C	$80
D	$100

9.



Based on the pattern established in the graph above, how many books did Mario read after 7 days?

A	5
B	9
C	15
D	21

10.

What is $7,045 - 4,963 + 1,221$?

A	2,082
B	3,171
C	3,303
D	4,392

11.

Last year, a deli sold 25 wraps and 10 sandwiches at $3.50 and $7 respectively. If this year the deli plans on selling 30 wraps and 14 sandwiches, how much more money will the deli make this year than last?

A	$45.50
B	$157.50
C	$203.00
D	$360.50

12.

A circle has a radius of 13 centimeters. What is the area, in square centimeters, of this circle?

(The area of a circle with a radius of *r* is equal to πr^2.)

A	13π
B	26π
C	169π
D	200π

13.

Which of the following is equivalent to $\frac{43}{125}$?

A	0.125
B	0.344
C	0.43
D	2.907

14.

$X = \{2,\ 3,\ 4\}$
$Y = \{3,\ 4,\ 5\}$
$Z = \{4,\ 5,\ 6\}$

Sets X, Y, and Z are shown above. Which of the following sets represents $X \cap Y \cap Z$ (the intersection of the three sets)?

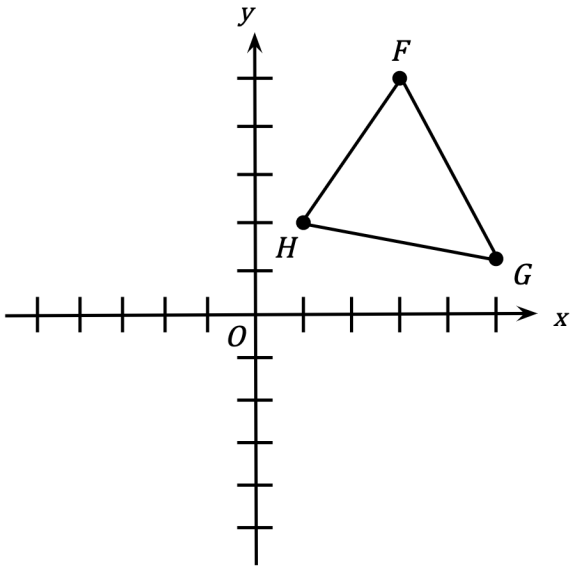
A	$\{2,\ 3,\ 4,\ 5,\ 6\}$
B	$\{2,\ 4,\ 6\}$
C	$\{4\}$
D	$\{\ \}$

15.

Which of the following is not equivalent to $5(x+3)^2$?

A	$5\left(x^2+9\right)$
B	$5x(x+3)+15(x+3)$
C	$(5x+15)(x+3)$
D	$5\left(x^2+6x+9\right)$

16.



Triangle FGH lies in the xy-plane, and the coordinates of vertex G are (5, 1). Triangle FGH is reflected across the y-axis and then translated three units down to produce triangle $F'G'H'$, where vertex G' corresponds to vertex G of triangle FGH. What are the coordinates of G'?

A	(–2, 5)
B	(–5, –2)
C	(–2, –5)
D	(–5, 2)

17.

$\left(5a^7b^{-3}c^4\right)^2 =$

A	$\frac{10a^{14}c^8}{b^6}$
B	$\frac{25a^{14}c^8}{b^6}$
C	$\frac{10a^9c^6}{b}$
D	$\frac{25a^9c^6}{b}$

18.

There are 32 animals on farm. 10 of them are cows, 12 of them are sheep, and the rest are dogs. 4 of the cows are calves, 7 of the sheep are adults, and half of the dogs are puppies. If a farm animal is chosen at random, what is the probability that it is a baby animal?

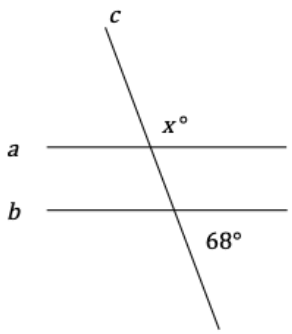
A	$\frac{1}{4}$
B	$\frac{7}{16}$
C	$\frac{1}{2}$
D	$\frac{9}{16}$

19.

Tobias recently moved to a new city and needs to organize his book collection. The shelf that he is looking to purchase can hold 8 books. If Tobias owns 108 books, what is the least amount of shelves he needs to purchase to organize his book collection?

A	13
B	14
C	100
D	108

20.



In the figure, line a is parallel to line b and both are intersected by line c. What is the value of x?

A	68
B	110
C	112
D	292

21.

At 11 a.m., the temperature in a city was 16.5 degrees Celsius (°C). At 4 p.m. on the same day, the temperature was 72 degrees Fahrenheit (°F). What was the difference in temperature, in degrees Celsius, from 11 a.m. to 4 p.m. in the city?

(Note: $^\circ C = (^\circ F - 32) \times \frac{5}{9}$)

A	5.7
B	9.2
C	14.6
D	22.2

22.

What is the value of $\frac{6}{7} - \frac{13}{21}$?

A	$\frac{1}{3}$
B	$\frac{5}{7}$
C	$\frac{5}{21}$
D	$\frac{31}{21}$

23.

The population of a bacterial colony triples every 2 hours. If the starting population of the colony was 300, which of the following expressions gives the population of the colony h hours after the population started?

A	3×300^{2h}
B	$3 \times 300^{\frac{h}{2}}$
C	300×3^{2h}
D	$300 \times 3^{\frac{h}{2}}$

24.

If $x \neq -2$ and $x \neq 3$ what is the solution to $\frac{3x}{x+2} = \frac{3x-5}{x-3}$?

A	$x = -3$
B	$x = -1$
C	$x = 1$
D	$x = 3$

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25.

	Eats lunch	Doesn't eat lunch	Total
Eats breakfast	26	11	37
Doesn't eat breakfast	22	6	28
Total	48	17	

In a study, a team of nutritionists examining dietary habits surveyed a group of 65 people, asking if they ate breakfast and lunch. If a participant who doesn't eat breakfast is randomly selected, what is the approximate probability that they eat lunch?

A 0.21

B 0.43

C 0.72

D 0.79

26.

A group of 8 students went to a cafe. Each student ordered either a coffee or a tea. The cost of coffee is $2.25 and the cost of tea is $1.75. If the total cost was $17, how many students ordered coffee?

A 2

B 3

C 5

D 6

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27.

$Q = \{1, 2, 4, 8, 16\}$
$R = \{2, 3, 5, 7, 11\}$
$S = \{1, 3, 5, 7, 9\}$

Sets Q, R, and S are show above. Which of the following sets represents $Q \cup (R \cap S)$ (the union of Q with the intersection of sets R and S)?

A	$\{1, 2, 3, 4, 5, 7, 8, 11, 16\}$
B	$\{2, 3, 5, 7\}$
C	$\{1, 2\}$
D	$\{\ \}$

28.

Animal	Estimated Population
Deer	5,600,000
Coyote	859,000
Armadillo	1,100,000
Longhorn	250,000
Cougar	6,000

The table gives estimates of the populations of certain animals in the state of Texas. Which of the following is closest to the mean population of these animals?

A	150,000
B	850,000
C	1,500,000
D	3,500,000

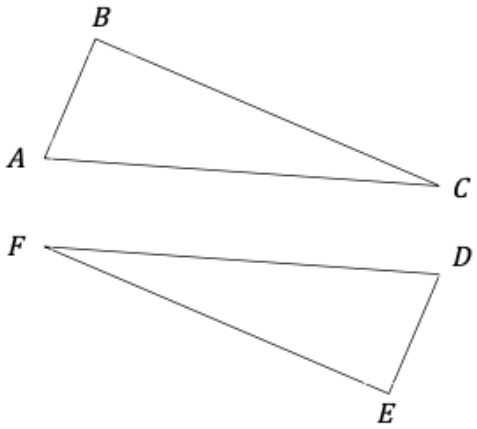
29.

$\frac{3}{4}$, $\frac{9}{3}$, 0.55, 2.97

What is the difference between the greatest and least values above?

A	2.22
B	2.25
C	2.42
D	2.45

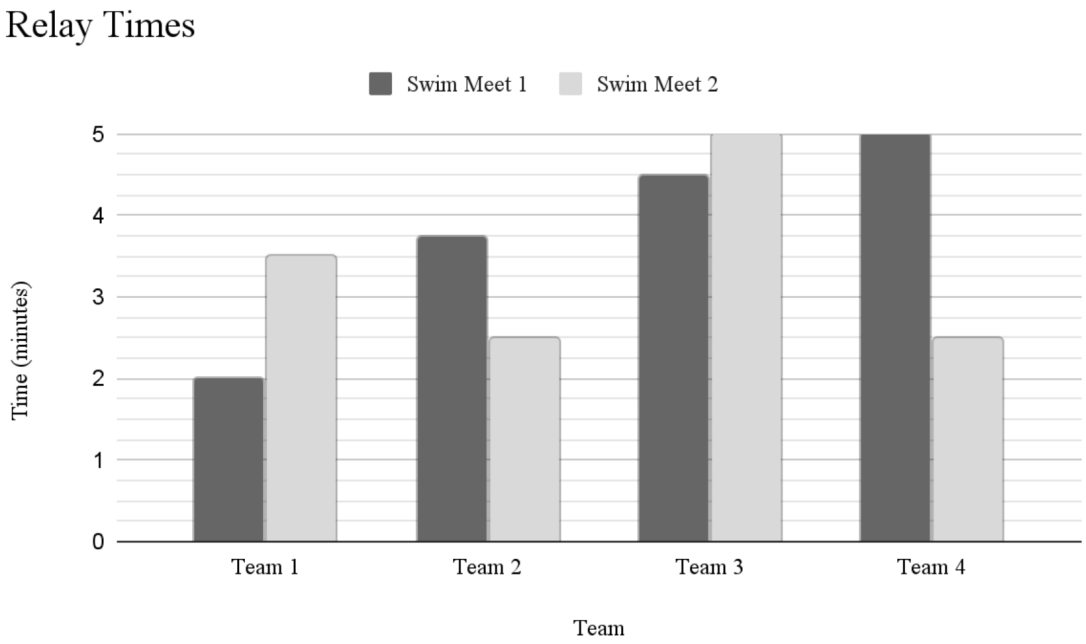
30.



Triangle ABC and triangle DEF are shown above. If $\angle B$ is congruent to is congruent to E, which of the following must be true in order to prove that triangles ABC and DEF are congruent?

A	$\angle A \cong \angle D$ and $AC \cong DF$
B	$\angle A \cong \angle D$ and $\angle C \cong \angle F$
C	$AB \cong DE$ and $AC \cong DF$
D	$\angle A \cong \angle D$ and $AB \cong DE$

31.



The swim teams of four different high schools all compete against one another in a relay event at two different swim meets. Which team saw the great decrease in the time it took to complete the relay from the first swim meet to the second swim meet?

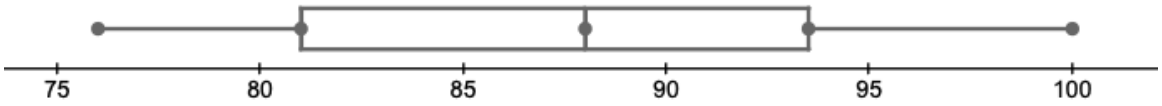
A Team 1

B Team 2

C Team 3

D Team 4

32.



The box plot above summarizes the speeds, in miles per hour, of a number of cars to whom a police officer issued speeding citations on a certain stretch of highway. Which of the following could be the speed limit, in miles per hour, of the stretch of highway?

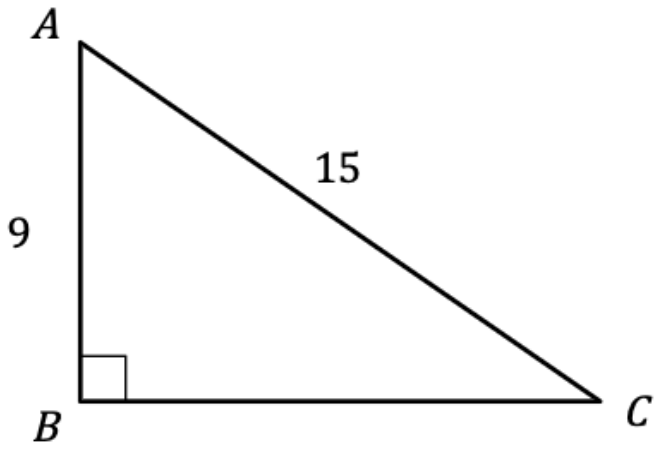
A	75
B	80
C	85
D	100

33.

A bottle rocket is is set off from a stand that is 6 feet above the ground. The rocket's height, in feet above the ground, t seconds after it launches is $h(t) = -2t^2 + 16t + 6$. What is the maximum height, in feet, of the bottle rocket after it was launched?

A	6
B	16
C	38
D	52

34.



In triangle ABC, angle B is a right angle. Triangle DEF is similar to triangle ABC, where vertices D, E, and F correspond to vertices A, B, and C, respectively, and each side of triangle DEF is 3 times the length of the corresponding side of triangle ABC. What is the value of $\cos(F)$?

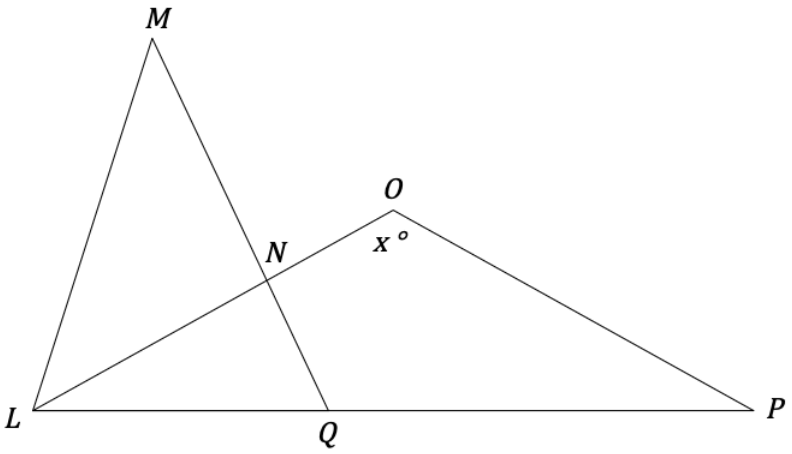
A	$\frac{4}{5}$
B	$\frac{3}{5}$
C	$\frac{3}{4}$
D	$\frac{1}{4}$

35.

A student is tasked with creating a new line. The prompt asks the student to create a line with the same y-intercept as $y = x + 3$ and a slope that is less than the slope of $y = -2x - 3$. Which choice is a possible line that meets the criteria?

A	$y = -3x + 3$
B	$y = -2x + 3$
C	$y = 2x - 3$
D	$y = 3x - 3$

36.



In the figure, $LO \cong OP$. The measure of $\angle LNM$ is 105° and the measure of $\angle LQN$ is 64°. What is the value of x?

A	92
B	98
C	105
D	112

37.

$A = \{0,\ 2,\ 4,\ 6,\ 8\}$
$B = \{3,\ 6,\ 9,\ 12,\ 15\}$
$C = \{4,\ 8,\ 12,\ 16,\ 20\}$

Sets A, B, and C are shown above. Which are the following represents $A \cap (B \cup C)$ (the intersection of A with the union of sets B and C)?

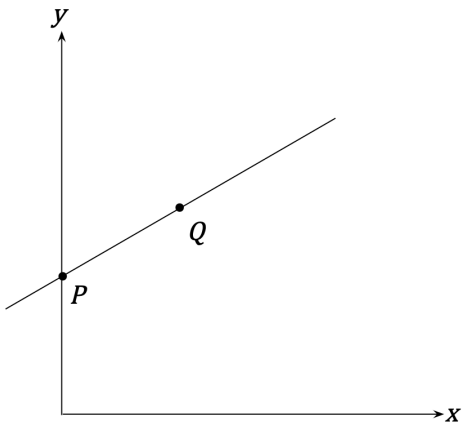
A	$\{0,\ 2,\ 4,\ 6,\ 8,\ 12,\ 16,\ 20\}$
B	$\{0,\ 2,\ 4,\ 6,\ 8,\ 12\}$
C	$\{4,\ 6,\ 8\}$
D	$\{12\}$

38.

A rectangular swimming pool has an areas of 48 square feet. If the length of the pool is 2 feet longer than the width. What is the perimeter of the pool?

A	16
B	28
C	32
D	49

39.



In the xy-plane above, point P has coordinates (0, 3). Which of following could be an equation for a line inverse to the line that includes points P and Q and that intersects the line that includes points P and Q at point Q?

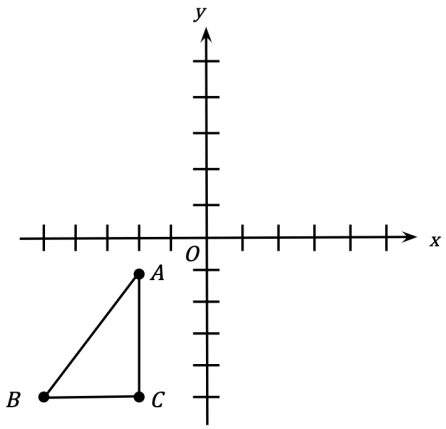
A	$y = -\frac{3}{2}x + 6$
B	$y = \frac{3}{2}x + 6$
C	$y = -\frac{3}{2}x - 6$
D	$y = \frac{3}{2}x - 6$

40.

Jude is making necessity bundles to pass out to the homeless. Each necessity bundle is made up of 2 water bottles and 3 sandwiches. If Jude has 32 bottles of water and 40 sandwiches, what is the greatest number of necessity bundles Jude could make?

A	8
B	13
C	14
D	16

41.



Triangle ABC lies in the xy-plane, and the coordinates of vertex C are (–2, –5). Triangle ABC is reflected across the origin (O) and then rotated 90° clockwise to produce triangle $A'B'C'$, where vertex C' corresponds to vertex C of triangle ABC. What are the coordinates of C'?

A	(2, –5)
B	(5, –2)
C	(–5, –2)
D	(2, 5)

42.

Data Set A consists of the heights of 23 tomato plants from garden plot A and has a mean height of 45.7 inches. Data set B consists of the heights of 40 tomato plants from garden plot B and has a mean height of 38.9 inches. What is the approximate mean height, in inches, of the combined data set of tomato plants from both garden plots?

A	40.56
B	41.38
C	42.80
D	43.13

43.

Chuck has a pair of dice and a bag of 10 coins: 5 of the coins are dimes and 5 of the coins are nickels. If he rolls the dice and chooses two of these coins at random, what is the probability that the sum of the pair of dice is at least 4 AND the combined value of the coins is no more than 10 cents?

A	$\frac{11}{108}$
B	$\frac{11}{54}$
C	$\frac{11}{24}$
D	$\frac{11}{12}$

44.

Two bodybuilders are competing with 2 sets of weights. One bodybuilder can do 3 repetitions with weight 1 and 4 repetitions with weight 2 for a total of 65 pounds lifted. The other bodybuilder can do 7 repetitions with weight 1 and 2 repetitions with weight 2 for a total of 93 pounds lifted. What is the value of weight 1, in pounds?

A	8
B	9
C	10
D	11

45.

A city draws its water from two cylindrical water tanks. Though these water tanks are not the same size, they are proportional to one another, with the measurements of the height and diameter of one tank being $\frac{3}{4}$ the measurements of the other one. The larger water tank has a diameter of 20 feet and a volume of $4,000\pi$ cubic feet. What is the volume, in cubic feet, of the smaller tank?

$(\text{Volume} = \pi \times \text{radius}^2 \times \text{height})$

A	$1,320.5\pi$
B	$1,687.5\pi$
C	$2,250\pi$
D	$3,000\pi$

46.

In triangle QRS, angle S is a right angle. If $\sin Q = \frac{7}{12}$, what is the value of $\sin R$?

A	$\frac{5}{7}$
B	$\frac{7}{12}$
C	$\frac{\sqrt{12}}{7}$
D	$\frac{\sqrt{95}}{12}$

47.

If $x \neq \frac{9}{2}$ or $x \neq 4$, what are the solutions to $\frac{x^2}{x-4} = \frac{2x^2+2}{2x-9}$?

A	$x = -2 \; and \; x = 4$
B	$x = -3 \; and \; x = 1$
C	$x = -1 \; and \; x = 3$
D	$x = -4 \; and \; x = 2$

48.

What is the smallest solution to $\sqrt{(x+2)^2} = \sqrt{-15x-44}$?

A	3
B	11
C	–16
D	–22