CollegeBoard

TEXAS SUCCESS INITIATIVE ASSESSMENT 2.0

Mathematics

Sample Questions

College Board

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Texas Success Initiative Assessment 2.0 (TSIA2) Mathematics Sample Questions

The TSIA2 Mathematics test covers four main categories:

- Quantitative Reasoning, which includes calculating ratios, proportions, and percents, as well as identifying, manipulating, and interpreting linear equations and expressions.
- Algebraic Reasoning, which includes solving equations (linear, quadratic, polynomial, exponential, rational, and radical), evaluating functions, and solving algebraic problems in context.
- Geometric and Spatial Reasoning, which includes converting units within measurement systems, solving geometric problems (perimeter, area, surface area, and volume), performing transformations, and applying right triangle trigonometry.
- Probabilistic and Statistical Reasoning, which includes classifying data, constructing appropriate representations of data, computing and interpreting probability, and describing measures of center and spread of data.

The Use of Calculators

When you take an actual mathematics test online, a basic, square root, or graphing calculator is allowed for some questions. If a question allows for the use of a calculator, a calculator icon will appear on the screen, along with the question. For each of the sample items in this packet, it is noted which calculator you can use—**[basic]**, **[square root]**, or **[graphing]**—to solve the problem.
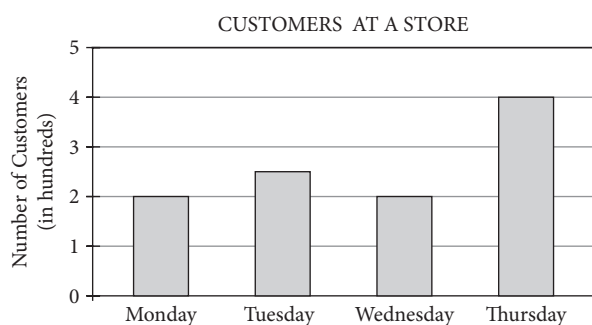
Sample Questions

Directions for questions 1–20

For each of the questions below, choose the best answer from the four choices given.

1. If there are 2.2 pounds in 1 kilogram, how many pounds are there in x kilograms? **[basic]**

    A. $\dfrac{x}{2.2}$

    B. $2.2x$

    C. $2.2 + x$

    D. $\dfrac{2.2}{x}$

2.

CUSTOMERS AT A STORE

The bar graph above shows the number of customers who shopped at a store Monday through Thursday of one week. If the number of customers on Friday was a one-fifth increase from the number of customers on Thursday, how many customers shopped at the store on Friday? **[basic]**

    A. 480
    B. 500
    C. 525
    D. 600

3. Last year, a bakery sold w loaves of bread. This year, the bakery sold three more than twice the number of loaves of bread sold last year. If next year the bakery plans on selling twice the number of loaves of bread sold this year, how many loaves of bread does the bakery expect to sell next year? **[basic]**

    A. $2w$
    B. $2w + 3$
    C. $4w + 3$
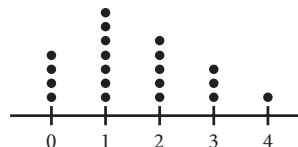   D. $4w + 6$

4. If $7p - 4 = 8$, what is the value of p? **[basic]**

    A. $\dfrac{4}{7}$

    B. $\dfrac{7}{12}$

    C. $\dfrac{12}{7}$

    D. $\dfrac{7}{4}$

5. Running at an average rate of 6 miles per hour, how many <u>minutes</u> would it take Kyle to run 3 miles? **[basic]**
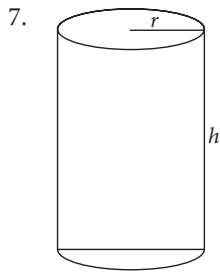
    A. 18
    B. 30
    C. 40
    D. 45

6.

The dot plot above identifies the number of pets living with each of 20 families in an apartment building. What fraction of the families have more than two pets? **[basic]**

    A. $\dfrac{3}{20}$

    B. $\dfrac{1}{5}$

    C. $\dfrac{1}{4}$

    D. $\dfrac{9}{20}$

7.

The formula for the volume of the right circular cylinder shown is $V = \pi r^2 h$.

If $r = 2b$ and $h = 5b + 3$, what is the volume of the cylinder in terms of b? **[basic]**

A. $10\pi b^2 + 6\pi b$

B. $20\pi b^3 + 12\pi b^2$

C. $20\pi^2 b^3 + 12\pi^2 b^2$

D. $50\pi b^3 + 20\pi b^2 + 90\pi b$

8. Richard bought 3 slices of cheese pizza and 2 sodas for $8.75. Jordan bought 2 slices of cheese pizza and 4 sodas for $8.50. How much would an order of 1 slice of cheese pizza and 3 sodas cost? **[basic]**

A. $3.25
B. $5.25
C. $7.75
D. $17.25

9. If $5c - 2 = 3c$, then $24c =$
[basic]

A. 6
B. 8
C. 16
D. 24

10. In the xy-plane, the slope of the line $y = mx - 4$ is less than the slope of the line $y = x - 4$. Which of the following must be true about m? **[basic]**

A. $m = -1$
B. $m = 1$
C. $m < 1$
D. $m > 1$

11. A history class is made up of 12 tenth graders and 9 eleventh graders. The tenth graders averaged 77 on the midterm exam, and the eleventh graders averaged 91 on the midterm exam. What was the average grade on the midterm exam for the entire class? **[basic]**

A. 82
B. 83
C. 84
D. 85

12. Which of the following is NOT equivalent to $(3x - 12)(x + 4)$? **[square root]**

A. $3(x^2 - 8x + 16)$
B. $3(x^2 - 16)$
C. $3x^2 - 48$
D. $3x(x + 4) - 12(x + 4)$

13. If the cost of carpeting a floor is $2.50 per square foot, how much will it cost to carpet a rectangular floor that is 10 feet by 12 feet? **[basic]**

A. $112.00
B. $120.00
C. $250.00
D. $300.00

14. If n is the least of two consecutive odd integers, which of the following represents the sum of the two integers? **[basic]**

A. $n + 1$
B. $n + 2$
C. $2n + 1$
D. $2n + 2$

15. $\left(\dfrac{x^{-5}y}{y^3} \right)^{-1} =$

[graphing]

A. $\dfrac{x^5}{y^2}$

B. $\dfrac{y^2}{x^5}$
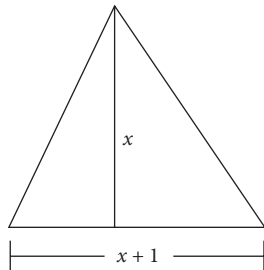
C. $x^5 y^2$

D. $x^5 y^{-3}$

16. Reyna has 5 coins worth 10 cents each and 4 coins worth 25 cents each. If she chooses two of these coins at random, what is the probability that the two coins combined will be worth at least 35 cents? **[basic]**

    A. $\dfrac{5}{18}$

    B. $\dfrac{5}{9}$

    C. $\dfrac{13}{18}$

    D. $\dfrac{71}{72}$

17. In the xy-plane, what is the y-intercept of the graph of the equation $y = 6\left(x - \dfrac{1}{2}\right)(x + 3)$? **[square root]**

    A. -9

    B. $-\dfrac{1}{2}$

    C. 3

    D. 9

18.

    The area of the triangle above is 21. What is the value of x? **[square root]**

    A. 3
    B. 6
    C. 7
    D. 11

19. For which of the following values of x is the function $f(x) = \sqrt{4 - x^2}$ NOT defined as a real number? **[square root]**

    A. -2
    B. 0
    C. 2
    D. 4

20. Under ideal conditions, the population of a certain species doubles every nine years. If the population started with 100 individuals, which of the following expressions gives the population of the species t years after the population started, assuming that the population has been living under ideal conditions? **[graphing]**

    A. 2×100^{9t}

    B. $2 \times 100^{\frac{t}{9}}$

    C. 100×2^{9t}

    D. $100 \times 2^{\frac{t}{9}}$

4

Answer Key

1. B
2. A
3. D
4. C
5. B
6. B
7. B
8. B
9. D
10. C
11. B
12. A
13. D
14. D
15. C
16. C
17. A
18. B
19. D
20. D

Rationales

1. **Choice B is the correct answer.** If there are 2.2 pounds in 1 kilogram, then there are $2.2x$ pounds in x kilograms.

2. **Choice A is the correct answer**. According to the graph, 400 customers shopped at the store on Thursday. The number of customers at the store on Friday was a one-fifth increase from the number of customers on Thursday. Thus, the number of customers on Friday was $400 + \frac{1}{5}(400) = 400 + 80 = 480$.

3. **Choice D is the correct answer.** Last year, a bakery sold w loaves of bread. This year, the bakery sold three more than twice the number of loaves of bread sold last year, which is $2w + 3$. Next year, the bakery plans on selling twice the number of loaves of bread sold this year, which is $2(2w + 3) = 4w + 6$ loaves of bread.

4. **Choice C is the correct answer.** If $7p - 4 = 8$, then $7p = 12$, so $p = \frac{12}{7}$.

5. **Choice B is the correct answer.** There are 60 minutes in one hour, so a rate of 6 miles in one hour is equivalent to a rate of $\frac{6}{60} = \frac{1}{10}$ mile in one minute. Therefore, at this rate, Kyle runs one mile in 10 minutes. It follows that it would take Kyle $3 \times 10 = 30$ minutes to run 3 miles.

6. **Choice B is the correct answer.** According to the dot plot, families that have more than two pets have either three pets or four pets. Since 3 families have three pets and 1 family has four pets, a total of 4 families have more than two pets. Since there are a total of 20 families, the fraction of families with more than two pets is $\frac{4}{20}$, which is equivalent to $\frac{1}{5}$.

7. **Choice B is the correct answer.** Substituting the values $r = 2b$ and $h = 5b + 3$ into the formula for the volume of the cylinder gives
$V = \pi(2b)^2 (5b + 3) = 4\pi b^2 (5b + 3) = 20\pi b^3 + 12\pi b^2$.

8. **Choice B is the correct answer.** Let c dollars be the cost of a slice of cheese pizza and s dollars be the cost of a soda. From the information given, the system can be written as:

$3c + 2s = 8.75$

$2c + 4s = 8.5$

This is equivalent to:

$6c + 4s = 17.5$

$2c + 4s = 8.5$

Subtracting the second equation from the first equation gives $4c = 9$, so $c = 2.25$. Solving the equation $(2)(2.25) + 4s = 8.5$ for s gives $s = 1$. It follows that the cost of 1 soda is $1.00. Therefore, the cost of an order of 1 slice of cheese pizza and 3 sodas would be $2.25 + 3(\$1.00) = \$5.25$.

9. **Choice D is the correct answer.** If $5c - 2 = 3c$, then $2c = 2$, so $c = 1$. Therefore, $24c = (24)(1) = 24$.

10. **Choice C is the correct answer.** If an equation of a line in the xy-plane is in slope-intercept form, the slope is the coefficient of x, so the slope of the line $y = mx - 4$ is m, and the slope of the line $y = x - 4$ is 1. The slope of the line $y = mx - 4$ is less than the slope of the line $y = x - 4$, so it must be true that $m < 1$.

11. **Choice B is the correct answer.** Since the 12 tenth graders averaged 77 on the midterm exam, the sum of their scores was $12 \times 77 = 924$; since the 9 eleventh graders averaged 91 on the exam, the sum of their scores was $9 \times 91 = 819$. Therefore, the sum of the scores of all $12 + 9 = 21$ students in the class was $924 + 819 = 1{,}743$, and their average score on the midterm exam was $1{,}743 \div 21 = 83$.

12. **Choice A is the correct answer.** The expression $(3x - 12)(x + 4)$ can be rewritten as $3(x - 4)(x + 4) = 3(x^2 - 16)$, which after applying the distributive property becomes $3x^2 - 48$. Hence, $3(x^2 - 16)$ and $3x^2 - 48$ are equivalent to $(3x - 12)(x + 4)$. A direct application of the distributive property shows that the expression $3x(x + 4) - 12(x + 4)$ is also equivalent to $(3x - 12)(x + 4)$. By contrast, $3(x^2 - 8x + 16)$, which is equal to $3(x - 4)^2$, is not equivalent to $(3x - 12)(x + 4)$. For example, for $x = 0$, the value of $3(x - 4)^2$ is 48 and the value of $(3x - 12)(x + 4)$ is -48.

13. **Choice D is the correct answer.** The floor is 10 feet by 12 feet, so the area of the floor is $(10)(12) = 120$ square feet. The cost of carpeting a floor is \$2.50 per square foot, so the cost of carpeting this floor is $\$2.50 \times 120 = \$300.00$.

14. **Choice D is the correct answer.** If n is the least of two consecutive odd integers, then the greater odd integer is $n + 2$. It then follows that the sum of the two consecutive odd integers is $n + (n + 2) = 2n + 2$.

15. **Choice C is the correct answer.** The expression inside the parentheses, $\left(\dfrac{x^{-5}y}{y^3} \right)$, can be rewritten as $x^{-5}y^{-2}$. Since the power of a product is distributed over each factor, it follows that $\left(x^{-5}y^{-2} \right)^{-1} = x^5 y^2$.

16. **Choice C is the correct answer.** The only way the two coins Reyna chooses could <u>not</u> be worth at least 35 cents combined is if both coins are worth 10 cents. For this to happen, the first coin Reyna chooses and the second coin she chooses must each be 10-cent coins. Since 5 of the 9 coins are worth 10 cents each, the probability that the first coin chosen is a 10-cent coin is $\dfrac{5}{9}$. If the first coin chosen is a 10-cent coin, there will remain 4 coins worth 10 cents each and 4 coins worth 25 cents each; so the probability that the second coin will also be a 10-cent coin is $\dfrac{4}{8}$, or $\dfrac{1}{2}$. Thus, the probability that both coins chosen will be 10-cent coins is $\dfrac{5}{9} \times \dfrac{1}{2} = \dfrac{5}{18}$. This is the probability that the two coins chosen will <u>not</u> be worth at least 35 cents combined. Therefore, the probability that the two coins combined will be worth at least 35 cents is $1 - \dfrac{5}{18} = \dfrac{13}{18}$.

17. **Choice A is the correct answer.** The y-intercept of a graph is the y-coordinate of the point where the graph intersects the y-axis. Setting $x = 0$ in the equation $y = 6\left(x - \dfrac{1}{2} \right)(x + 3)$ yields $y = 6\left(-\dfrac{1}{2} \right)(3) = -9$. Therefore, the y-intercept of the graph of the equation is -9.

18. Choice B is the correct answer. The area of a triangle can be calculated as half the product of its base and height, $A = \frac{1}{2}bh$. Hence, the area of the triangle shown is $\frac{1}{2}(x+1)x = \frac{x^2+x}{2}$. Since the area of the triangle is 21, it follows that $\frac{x^2+x}{2} = 21$, which is equivalent to $x^2 + x - 42 = 0$. Solving $x^2 + x - 42 = (x+7)(x-6) = 0$ for x gives $x = -7$, $x = 6$. Since the height of a triangle cannot be -7, the value of x must be 6.

19. Choice D is the correct answer. The function f is <u>not</u> defined as a real number if the expression under the radical is negative. For $x = 4$, $f(4) = \sqrt{4 - 4^2} = \sqrt{-12}$, which is not a real number. On the other hand, $f(-2) = f(2) = \sqrt{4 - 4} = 0$, and $f(0) = \sqrt{4 - 0^2} = 2$. Therefore, of the choices given, the function f is not defined as a real number for $x = 4$.

20. Choice D is the correct answer. At the start of the population, $t = 0$, the population of the species was 100. Under ideal conditions, after nine years, the population will be $100 \times 2 = 200$; after nine more years, the population will be $200 \times 2 = 400$; and so on. Hence, after $9p$ years, where p is a positive integer, the population of the species will be 100×2^p. Since the number of years elapsed, t, is equal to $9p$, it follows that $p = \frac{t}{9}$. Therefore, t years after the population started, the population of the species will be $100 \times 2^{\frac{t}{9}}$.