

PRACTICE EXAM 14: TSIA2 CRC

MATH SIMULATION

QUANTITATIVE REASONING (Questions 1–5)

1. A jacket originally priced at \$75 is marked down 30%. What is the sale price?
 - A. \$45.00
 - B. \$48.00
 - C. \$50.00
 - D. \$52.50

2. A construction team lays 240 bricks in 5 hours. At that rate, how many bricks do they lay in 8 hours?
 - A. 350 bricks
 - B. 384 bricks
 - C. 400 bricks
 - D. 420 bricks

3. A trail mix contains nuts and raisins in a 4:3 ratio by weight. If there are 21 pounds of raisins, how many pounds of nuts are there?
 - A. 28 pounds
 - B. 24 pounds
 - C. 18 pounds

D. 36 pounds

4. A car is driven 285 miles using 15 gallons of gas. What is its fuel efficiency?

A. 16 mpg

B. 18 mpg

C. 19 mpg

D. 20 mpg

5. A family's monthly grocery bill rose from \$480 to \$540. What is the percent increase?

A. 10%

B. 12.5%

C. 15%

D. 20%

ALGEBRAIC REASONING (Questions 6–10)

6. Solve for x : $3x + 7 = 2x + 15$.

A. 6

B. 7

C. 9

D. 8

7. Factor completely: $x^2 + 8x + 15$.

A. $(x + 3)(x + 5)$

B. $(x - 3)(x - 5)$

C. $(x + 15)(x + 1)$

D. $(x + 2)(x + 6)$

8. If $f(x) = 4x - 3$ and $g(x) = x + 2$, what is $f(g(1))$?

A. 5

B. 7

C. 9

D. 11

9. Solve the inequality: $-3x + 8 \leq 2$.

A. $x \leq 2$

B. $x \geq 2$

C. $x \leq -2$

D. $x \geq -2$

10. The y-intercept of the line $4x - 5y = 20$ is:

A. 5

B. 4

C. -5

D. -4

GEOMETRIC AND SPATIAL REASONING (Questions 11–15)

11. A trapezoid has parallel sides of 10 and 14 cm and a height of 6 cm. Its area is:

- A. 48 cm^2
- B. 60 cm^2
- C. 72 cm^2
- D. 84 cm^2

12. A cylinder has a radius of 3 ft and a height of 10 ft. Its volume is:

- A. $90\pi \text{ ft}^3$
- B. $60\pi \text{ ft}^3$
- C. $30\pi \text{ ft}^3$
- D. $300\pi \text{ ft}^3$

13. How many feet are in 2.5 miles?

- A. 10,000 feet
- B. 12,000 feet
- C. 13,000 feet
- D. 13,200 feet

14. A right triangle has legs of 7 and 24. What is the hypotenuse?

- A. 23
- B. 25

- C. 31
- D. 17

15. A circle has an area of 49π . Its radius is:

- A. 7
- B. 14
- C. 49
- D. 24.5

PROBABILISTIC AND STATISTICAL REASONING (Questions 16–20)

16. A survey of 50 students shows 20 prefer pizza. What percent prefer pizza?

- A. 20%
- B. 30%
- C. 40%
- D. 50%

17. The mode of $\{5, 8, 8, 11, 13, 13, 13, 15\}$ is:

- A. 5
- B. 8
- C. 11
- D. 13

18. A die is rolled. The probability of rolling a number greater than 4 is:

- A. $\frac{1}{3}$
- B. $\frac{1}{2}$
- C. $\frac{1}{4}$
- D. $\frac{1}{6}$

19. The mean of $\{14, 18, 22, 26, 30\}$ is:

- A. 20
- B. 22
- C. 24
- D. 26

20. Two dice are rolled. The probability of rolling a sum of 5 is:

- A. $\frac{1}{12}$
- B. $\frac{5}{36}$
- C. $\frac{1}{9}$
- D. $\frac{1}{6}$

PRACTICE EXAM 14: ANSWER KEY AND EXPLANATIONS

Quantitative Reasoning

1. D — \$52.50. A 30% markdown means paying 70% of the original price, so $0.70 \times \$75 = \52.50 . Discount problems multiply the original price by the remaining percentage rather than calculating the discount separately and then subtracting.
2. B — 384 bricks. The unit rate is $240 \div 5 = 48$ bricks per hour, and at that rate 8 hours produces $48 \times 8 = 384$ bricks. Rate problems first calculate the unit rate and then apply it to the new time period.
3. A — 28 pounds. The ratio of nuts to raisins is 4:3. Setting up the proportion $4/3 = x/21$ and cross-multiplying gives $3x = 84$, so $x = 28$ pounds of nuts. Ratio problems scale proportionally through cross-multiplication.
4. C — 19 mpg. Dividing total miles by total gallons gives $285 \div 15 = 19$ miles per gallon. Fuel efficiency is always calculated as distance divided by fuel consumed.
5. B — 12.5%. The percent change formula is $(\text{new} - \text{original})/\text{original} \times 100$, giving $(540 - 480)/480 \times 100 = 60/480 \times 100 = 12.5\%$. Percent change is always calculated using the original value as the denominator.

Algebraic Reasoning

6. D — 8. Subtracting $2x$ from both sides gives $x + 7 = 15$, then subtracting 7 gives $x = 8$. Linear equations with variables on both sides are solved by collecting variable terms on one side.
7. A — $(x + 3)(x + 5)$. Two numbers that multiply to 15 and add to 8 are 3 and 5. The factored form $(x + 3)(x + 5)$ expands back to $x^2 + 8x + 15$. Both numbers are positive because the constant and middle coefficient are both positive.
8. C — 9. First evaluate $g(1) = 1 + 2 = 3$. Then evaluate $f(3) = 4(3) - 3 = 12 - 3 = 9$. Function composition always evaluates the inner function first, then uses that output as the input for the outer function.
9. B — $x \geq 2$. Subtracting 8 from both sides gives $-3x \leq -6$. Dividing by -3 flips the inequality sign, producing $x \geq 2$. Dividing by a negative number always reverses the inequality direction.
10. D — -4 . Setting $x = 0$ in $4x - 5y = 20$ gives $-5y = 20$, so $y = -4$. The y-intercept is the value of y when x equals zero.

Geometric and Spatial Reasoning

11. C — 72 cm^2 . The trapezoid area formula is $A = \frac{1}{2}(b_1 + b_2)h$, so $A = \frac{1}{2}(10 + 14)(6) = \frac{1}{2}(24)(6) = 72 \text{ cm}^2$. The formula averages the two parallel sides and multiplies by the height.
12. A — $90\pi \text{ ft}^3$. The cylinder volume formula is $V = \pi r^2 h$, so $V = \pi(3^2)(10) = \pi(9)(10) = 90\pi \text{ ft}^3$. Cylinder volume multiplies the base area by the height.
13. D — 13,200 feet. One mile equals 5,280 feet, so 2.5 miles = $2.5 \times 5,280 = 13,200$ feet. Mile-to-foot conversions always use the factor of 5,280 feet per mile.
14. B — 25. Applying the Pythagorean theorem gives $7^2 + 24^2 = 49 + 576 = 625$, and the square root of 625 is 25. This is one of the standard Pythagorean triples worth memorizing (7-24-25).
15. A — 7. The area formula $A = \pi r^2$ gives $49\pi = \pi r^2$, and dividing both sides by π leaves $r^2 = 49$. Taking the square root gives $r = 7$.

Probabilistic and Statistical Reasoning

16. C — 40%. Dividing 20 by 50 gives 0.4, which converts to 40%. Percent problems divide the part by the whole and multiply by 100.
17. D — 13. The mode is the value that appears most frequently, and 13 appears three times while other values appear at most twice. The mode always captures the most common observation.
18. A — $\frac{1}{3}$. Numbers greater than 4 on a die are 5 and 6 — two out of six outcomes. The probability is $\frac{2}{6} = \frac{1}{3}$.
19. B — 22. Adding the five values gives $14 + 18 + 22 + 26 + 30 = 110$, and dividing by 5 gives 22. The mean is always the sum divided by the count of values.
20. C — $\frac{1}{9}$. A sum of 5 can occur with (1,4), (2,3), (3,2), or (4,1), giving 4 favorable outcomes out of 36 total outcomes. The probability is $\frac{4}{36} = \frac{1}{9}$ in simplest form.