PRACTICE EXAM 13: TSIA2 CRC MATH SIMULATION

QUANTITATIVE REASONING (Questions 1–5)

1. A population of 1,200 grew to 1,440 over one year. What is the percent increase?

A. 15%

B. 18%

C. 20%

D. 24%

2. A contractor uses 3 tons of gravel for every 5 tons of sand. If he has 25 tons of sand, how much gravel is needed?

A. 15 tons

B. 18 tons

C. 20 tons

D. 12 tons

3. What is 5/8 expressed as a percent?

A. 58%

B. 60%

C. 55%

D. 62.5%

4. A family of 5 shares a dinner bill of $87.50 evenly. How much does each person pay?

A. $16.50

B. $17.50

C. $18.00

D. $19.50

5. A worker earns $22.50 per hour. How much does she earn in 40 hours?

A. $900

B. $925

C. $950

D. $875

ALGEBRAIC REASONING (Questions 6–10)

6. Solve: $2(3x - 5) = 4x + 8$.

A. 3

B. 6

C. 8

D. 9

7. If $f(x) = x^2 + 2x - 3$, what is $f(-1)$?

A. 0

B. -2

C. -4

D. 4

8. Factor completely: $3x^2 + 12x$.

A. $3(x^2 + 12)$

B. $3x(x + 4)$

C. $3(x + 4)(x + 3)$

D. $x(3x + 12)$

9. Solve: $2x - 3 \leq 11$.

A. $x \leq 4$

B. $x \geq 4$

C. $x \geq 7$

D. $x \leq 7$

10. The equation of a line with slope 2 passing through (1, 5) is:

A. $y = 2x + 3$

B. $y = 2x - 3$

C. $y = 2x + 5$

D. $y = 2x - 5$

GEOMETRIC AND SPATIAL REASONING (Questions 11–15)

11. A triangle has a base of 14 and a height of 9. What is its area?

A. 23

B. 46

C. 126

D. 63

12. How many centimeters are in 3.5 meters?

A. 35 cm

B. 350 cm

C. 3,500 cm

D. 35,000 cm

13. A square has a perimeter of 36 cm. What is its area?

A. 81 cm^2

B. 144 cm^2

C. 36 cm^2

D. 324 cm^2

14. A right triangle has one leg of 9 and a hypotenuse of 15. What is the other leg?

A. 8

B. 10

C. 12

D. 6

15. The surface area of a cube with side length 4 is:

A. 16 square units

B. 32 square units

C. 64 square units

D. 96 square units

PROBABILISTIC AND STATISTICAL REASONING (Questions 16–20)

16. A spinner has 8 equal sections labeled 1–8. The probability of spinning an even number is:

A. 1/4

B. 1/2

C. 3/8

D. 5/8

17. The range of the data set {22, 15, 31, 8, 19, 26} is:

A. 23

B. 19

C. 26

D. 31

18. A bag contains 4 red, 6 blue, and 10 green marbles. The probability of drawing blue is:

A. 1/5

B. 2/5

C. 1/4

D. 3/10

19. The median of {3, 7, 11, 14, 18, 22, 25} is:

A. 7

B. 11

C. 14

D. 18

20. A card is drawn from a standard 52-card deck. The probability it is a face card (J, Q, K) is:

A. 1/13

B. 3/13

C. 4/13

D. ¼

PRACTICE EXAM 13: ANSWER KEY AND EXPLANATIONS

Quantitative Reasoning

1. C — 20%. The percent change formula is (new − original)/original × 100, so (1,440 − 1,200)/1,200 × 100 = 240/1,200 × 100 = 20%. Percent increase is always calculated using the original value as the denominator.

2. A — 15 tons. Setting up the proportion 3/5 = x/25 and cross-multiplying gives 5x = 75, so x = 15 tons of gravel. Proportion problems scale known ratios through cross-multiplication.

3. D — 62.5%. Dividing 5 by 8 gives 0.625, which converts to 62.5% by moving the decimal two places to the right. Fraction-to-percent conversions always pass through the decimal form first.

4. B — $17.50. Dividing the total bill by the number of people gives $87.50 ÷ 5 = $17.50 per person. Equal-split problems divide the total cost by the number of participants.

5. A — $900. Multiplying the hourly wage by hours worked gives $22.50 × 40 = $900. Wage problems are rate-times-time calculations producing total earnings.

Algebraic Reasoning

6. D — 9. Distributing gives 6x − 10 = 4x + 8, then subtracting 4x gives 2x − 10 = 8. Adding 10 and dividing by 2 gives x = 9. Linear equations are solved by isolating the variable through inverse operations.

7. C — −4. Substituting x = −1 into f(x) = x² + 2x − 3 gives (−1)² + 2(−1) − 3 = 1 − 2 − 3 = −4. Function evaluation replaces the variable carefully with negative inputs.

8. B — 3x(x + 4). The greatest common factor of 3x² and 12x is 3x, and factoring it out leaves (x + 4). The result is 3x(x + 4). Always pull out the GCF first when factoring.

9. D — x ≤ 7. Adding 3 to both sides gives 2x ≤ 14, then dividing by 2 gives x ≤ 7. The inequality sign does not flip because division is by a positive number.

10. A — y = 2x + 3. Using point-slope form y − 5 = 2(x − 1), distributing gives y − 5 = 2x − 2, and adding 5 gives y = 2x + 3. Point-slope form converts directly to slope-intercept form.

Geometric and Spatial Reasoning

11. D — 63. The triangle area formula A = ½bh gives A = ½(14)(9) = 63. Half the product of base and height always yields triangle area.

12. B — 350 cm. One meter equals 100 cm, so 3.5 meters equals $3.5 \times 100 = 350$ cm. Metric conversions move the decimal point based on the power of ten between units.

13. A — 81 cm^2. A square with perimeter 36 has side length $36 \div 4 = 9$ cm. The area is therefore $9^2 = 81$ cm^2. Square problems often require finding the side length first before calculating area.

14. C — 12. Using the Pythagorean theorem, $9^2 + b^2 = 15^2$ gives $81 + b^2 = 225$, so $b^2 = 144$ and $b = 12$. This is a scaled version of the 3-4-5 Pythagorean triple multiplied by 3.

15. D — 96 square units. The surface area of a cube is $6s^2$, so $SA = 6(4^2) = 6(16) = 96$. A cube has six identical square faces, and each face has area s^2.

Probabilistic and Statistical Reasoning

16. B — 1/2. Even numbers in {1, 2, 3, 4, 5, 6, 7, 8} are 2, 4, 6, and 8 — four out of eight outcomes. The probability is $4/8 = 1/2$.

17. A — 23. The range is the maximum minus the minimum: $31 - 8 = 23$. Range measures the total spread between the largest and smallest values in a data set.

18. D — 3/10. The bag contains $4 + 6 + 10 = 20$ marbles, and 6 are blue. The probability is $6/20 = 3/10$ when reduced to simplest form.

19. C — 14. For an odd number of values arranged in order, the median is the single middle value. With seven values, the fourth value is in the middle position, which is 14 in the set {3, 7, 11, 14, 18, 22, 25}.

20. B — 3/13. A standard deck has 12 face cards (4 jacks, 4 queens, 4 kings) out of 52 total cards. The probability is $12/52 = 3/13$ when reduced to simplest form.