

Progress Assessment Test Solutions

Problems 1 – 10 are worth 9 points each. Problems 11 – 15 are worth 2 points each. This totals 100 points per student. The score of the alternate does not count in the team score, so the maximum team score for the PAT is 400 points. In the event that there are only three team members, the lowest team member score on the PAT is counted twice.

1. For all values of x , $(3x-4)(4x-3)=$

- (a) $7x+1$
- (b) $7x-12$
- (c) $12x^2-12$
- (d) $12x^2+25x-12$
- (e) $12x^2+7x-12$

ANSWER:

E

Use FOIL:

$$\begin{aligned}(3x+4)(4x-3) &= (3x+4x) + [3x \times (-3)] + (4 \times 4x) + [4 \times (-3)] \\ &= 12x^2 - 9x + 16x - 12 \\ &= 12x^2 + 7x - 12\end{aligned}$$

2. In a certain set of numbers, the ratio of integers is 2:3. What percent of the numbers in the set are integers?

- (a) 20%
- (b) $33\frac{1}{3}\%$
- (c) 40%
- (d) 60%
- (e) $66\frac{2}{3}\%$

ANSWER:

C

When you know that the given parts add up to the whole, then you can turn a part-to-part ratio into two part-to-whole ratios- put each term of the ratio over the sum of the terms. In this case, since all the numbers in the set must be either integers or nonintegers, the parts do add up to the whole. The sum of the terms in the ratio 2:3 is 5, so the two part-to-whole ratios are 2:5 and 3:5.

$$\frac{\text{integers}}{\text{numbers}} = \frac{2}{5} (100\%) = \frac{200\%}{5} = 40\%$$

3. What is the y-intercept of the line with the equation $2x - 3y = 18$?

- (a) -9
- (b) -6
- (c) -3
- (d) 6
- (e) 9

ANSWER:

B

To find the y-intercept of a line from its equation, put the equation in slope-interception form:

$$2x - 3y = 18$$

$$-3y = -2x + 18$$

$$y = \frac{2}{3}x - 6$$

3

In this form, the y-intercept is what comes after the x. In this case, its -6.

4. In the sequence 2, 6, 18, x, 162..., what is the most likely value of x?

- (a) 36
- (b) 48
- (c) 54
- (d) 81
- (e) 98

ANSWER:

C

When you see a question like this one on test day, look for patterns in the differences between terms, is each term a result of adding some number to the previous term? Is each term a result of multiplying the previous term by some number? In this case, each term is the result of multiplying the previous term by 3.

$$X = 18 (3) = 54$$

You can check this result by comparing it to later terms:

$$54 (3) = 162$$

5. There are 3 routes from Bay City to Riverville. There are 4 routes from Riverville to Straitstown. There are 3 routes from Straitstown to Frog Pond. If a driver must pass through Riverville and Straitstown exactly once, how many possible ways are there to go from Bay City to Frog Pond?

- (a) 6
- (b) 10
- (c) 12
- (d) 24
- (e) 36

ANSWER:

E

In order to find the number of possibilities, multiply the number of possibilities in each step. In other words, there are 3 routes from Bay City to Riverville and 4 routes from Riverville to Straitstown. There are 3 more routes from Straitstown to Frog Pond, so there are $12 \times 3 = 36$ total routes from Bay City to Frog Pond.

6. In a list of seven integers, 13 is the lowest member, 37 is the highest member, the mean is 23, the median is 24, and the mode is 18. If the numbers 8 and 43 are then included in the list, which of the following will change?

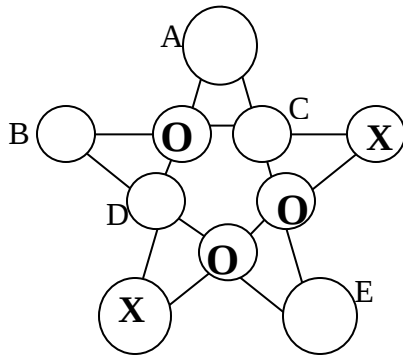
- I. The Mean
- II. The Median
- III. The Mode

- (A) I only
- (B) I and II only
- (C) I and III only
- (D) II and III only
- (E) I, II, and III

Answer: A

The median is the middle number in a list of numbers. Since 8 is lower than every other number, and 43 is higher, they won't change the value of the median. This means that option II is wrong, so we can eliminate choices b, d, and e. The mode is the number repeated most often. Well since 8 and 43 weren't included in the original list, they can't change the mode.

7. If the figure below is filled in so that each row of four circles contains two circles marked with an X and two circles marked with an O, which circle must be marked with an X?

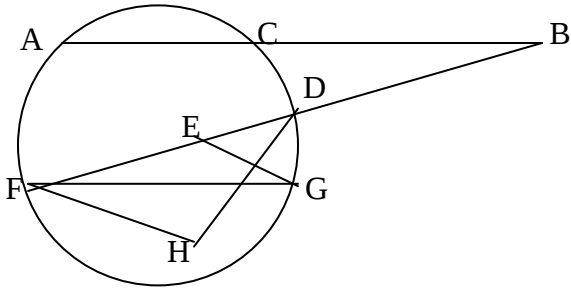


- (a) A
- (b) B
- (c) C
- (d) D
- (e) E

Answer: E

Rows BE and AE are identical. Circle A equals Circle B, and Circle D equals Circle C.

8. Which of the following is an inscribed angle in the diagram?

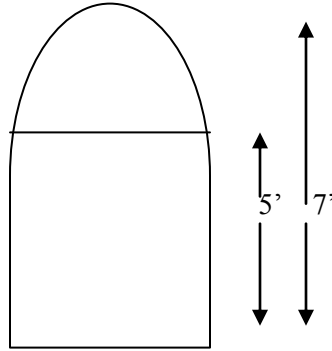


- (a) <ABF
- (b) <DFG
- (c) <FEG
- (d) <DEG
- (e) <FHD

Answer: B

<DFG has its vertex on the circle

9. Find the area of a window in the shape of a rectangle with a semicircle top.



- (a) 20 square feet
- (b) $20 + 2\pi$ square feet
- (c) $20 + 4\pi$ square feet
- (d) $10 + 2\pi$ square feet
- (e) $10 + 4\pi$ square feet

Answer: B

The radius of the semicircle is 2 feet, so the diameter, also the width of the window, is 4 feet. The area of the rectangular part is 20 square feet, and the area of half circle with a radius of 2 feet is $\frac{1}{2}\pi(2^2) = 2\pi$. Therefore, the entire area is $20 + 2\pi$ square feet.

10. What is equal to the product $\sqrt{54x^4y^5} \cdot \sqrt{2x^2y^4}$ of radicals in the simplest radical form? (Assume that x and y are nonnegative.)

- (a) $6x^3y^4\sqrt{3y}$
- (b) $3x^3y^2\sqrt{12y^5}$
- (c) $6x^3\sqrt{3y^9}$
- (d) $2y^3\sqrt{27x^6}$
- (e) None of these

Answer: A

$$\begin{aligned}
 &= \sqrt{108x^6y^9} \\
 &= \sqrt{(36x^6y^8)(3y)} \\
 &= \sqrt{36x^6y^8} \cdot \sqrt{3y} \\
 &= 6x^3y^4\sqrt{3y}
 \end{aligned}$$

- 11. What is the mission statement of the National Society of Black Engineers?**
To increase the number of culturally responsible Black engineers, who excel academically, succeed professionally, and positively impact the community.
- 12. What does the acronym LRP stand for? Long Range Plan**
- 13. What does the acronym CEB stand for? Chapter Executive Board**
- 14. What does the acronym NAB stand for? National Advisory Board**
- 15. Who was the first president of NSBE? John Carson**