KPMG

KPMG Numerical Aptitude Test 5

Question Booklet

Instructions

This Numerical reasoning test comprises 20 questions, and you will have 20 minutes in which to correctly answer as many as you can.

The test comprises of several sections which include:

1. Fractions And Decimals, Averages
2. Percents, Ratios And Proportions
3. Word Problems, Triangles, Circles
4. Probability, Geometry and Data Interpretation e.t.c

You will have to work quickly and accurately to perform well in this test. If you don't know the answer to a question, leave it and come back to it if you have time.

You may click Back and Next during the test to review or skip questions.

You can submit your test at any time. If the time limit is up before you click submit the test will automatically be submitted with the answers you have selected. It is recommended to keep working until the time limit is up.

Try to find a time and place where you will not be interrupted during the test.
When you are ready, begin the test.

1. A lacrosse team raised some money. The members used 74% of the money to buy uniform, 18% for equipment, and the remaining $216 for a team party. How much money did they raise?

(A) $2400 (B) $2450 (C) $2500 (D) $2600 (E) $2700

Solution

SINCE 74% + 18% = 92%, THE $216 spent on the party presents the other 8 % of the money raised. Then: $0.08m = 216 \Rightarrow m = 216 \div 0.08 = 2700$.
The answer is (E).

2. In the figure below what is the value of b?

(A) 30 (B) 36 (C) 45 (D) 60 (E) 72

Solution

Since vertical angles have the same measure, c = d, d = a, and $b = a - b \Rightarrow a = 2b$. Therefore, $c = d = a = 2b$. Also, the sum of the measures of all six angles is 360^o, so $a + b + c + d + a - b + d = 2a + c + 2d = 360$. Replacing c, d, and a by 2b yields $10b = 360 \Rightarrow b = 36$.
The answer is (B).

3. Last year Jose sold a painting for $2000. If he made 25% profit on the sale, how much had he paid for the painting?

(A) $1200 (B) $1500 (C) $1600 (D) $2400 (E) $2500

Solution

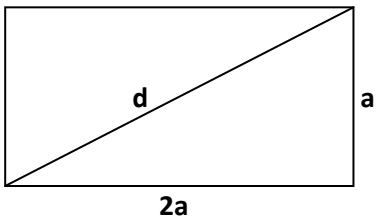
Jose made 25% profit, so if he bought the painting for x, he sold it for: $x + 0.25x = 1.25x = 2000 \Rightarrow x = 2000 \div 1.25 = 1600$.
The answer is (C).

4. A rectangle is twice as long as it is wide. If the width is a, what is the length of a diagonal?

(A) $a\sqrt{2}$ (B) $a\sqrt{3}$ (C) $a\sqrt{5}$ (D) $3a$ (E) $5a$

Solution

Draw a diagram and label it. Use the Pythagorean theorem to find d, the length of the diagonal: $a^2 + (2a)^2 = d^2 \Rightarrow a^2 + 4a^2 = d^2 \Rightarrow 5a^2 = d^2 \Rightarrow d =$ **a** $\sqrt{5}$**.**
The answer is (C).



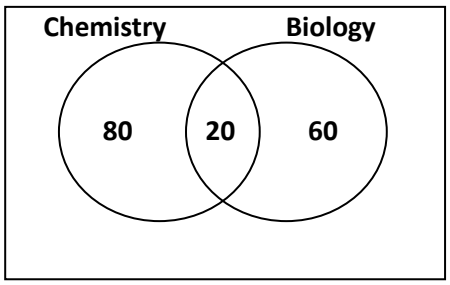
5. At Essex high school 100 students are taking chemistry and 80 students are taking biology. If 20 students are taking both chemistry and biology, what is the ratio of the number of students taking only chemistry to the number taking only biology?

(A) $\frac{3}{4}$ (B) $\frac{1}{1}$ (C) $\frac{5}{4}$ (D) $\frac{4}{3}$ (E) It cannot be determined from the information given.

Solution

Draw a Venn diagram. Of the 100 students taking chemistry, 20 take biology, and 80 don't; they take only chemistry. Similarly, of the 80 students taking biology, 20 also take chemistry, and 60 take only biology. The desired ratio is 80:60 = 4:3 = $\frac{4}{3}$.

The answer is (D).



6. In rectangle ABCD below, diagonal AC makes a 30^0 angle with side AD. If AC = 10, what is the area of the rectangle?

(A) $25\sqrt{2}$ (B) $25\sqrt{3}$ (C) 48 (D) 50 (E) 100

Solution

Line AC is the hypotenuse of a 30-60-90 right triangle. The length of Line CD, the leg opposite the30^0 angle, is 5 (half the hypotenuse), and AD = $5\sqrt{3}$. Then the area of the rectangle is $5 \times 5\sqrt{3} = 25\sqrt{3}$. **The answer is (B).**

7. The distance between Ali's house and college is exactly 135 miles. If she drove $\frac{2}{3}$ of the distance in135 minutes, what was her average speed, in miles per hour?

(A) 40 (B) 45 (C) 60 (D) 67.5 (E) it cannot be determined from the information given.

Solution

To find the average speed, in miles per hour, divide the distance, in miles, by the time, in hours. Ali drove 90 miles $\left[\frac{2}{3} \text{ of } 135\right]$ in 2.25 hours (135 minutes = 2 hours and 15 minutes = $2\frac{1}{4}$ hours). Then 90 ÷ 2.25 = 40. **The answer is (A).**

8. Let the length of the sides of a triangle be represented by x + 3, 2x – 3, and 3x – 5. If the perimeter of the triangle is 25, what is the length of the shortest side?

(A) 5 (B) 7 (C) 8 (D) 10 (E) it cannot be determined from the information given.

Solution

First we need to set up the equation: (x + 3) + (2x – 3) + (3x – 5) = 25, then we collect like terms: 6x – 5 = 25. Then we add 5 to each side: 6x = 30, divide each side by 6: x = 5. Plugging in 5 for x in the equation, we get the length of the sides: 8, 7, and 10, so 7 is the shortest side.

The answer is (B).

9. If x + 2y = a and x – 2y = b, which of the following is an expression for *xy*?

(A) ab (B) $\frac{a+b}{2}$ (C) $\frac{a-b}{2}$ (D) $\frac{a^2-b^2}{4}$ (E) $\frac{a^2-b^2}{8}$

Solution

Let x = 2 and y = 1. Then xy = 2, a = 4, and b = 0. Now, plug in 4 for a and 0 for b, and see which of the five choices is equal to 2. Only E works: $\frac{a^2-b^2}{8} = \frac{4^2-0^2}{8} = \frac{16}{8} = 2$. Here is the correct algebraic solution.

Add the two equations: $x + 2y = a$

$$\underline{+\ x - 2y = b}$$

$$2x = a + b$$

Divide by 2: $x = \frac{a+b}{2}$

Multiply the second equation by -1, $x + 2y = a$

And add it to the first : $\underline{+\quad -x + 2y = -b}$

$$4y = a - b$$

Divide by 4: $y = \frac{a-b}{4}$. Then $xy = \frac{a+b}{2} \cdot \frac{a-b}{4} = \frac{a^2-b^2}{8}$.

The answer is (E).

10. In the square ABCD vertex A is at (-1, -1) and vertex C is at (4, 2). What is the area of square ABCD?

(A) 9 (B) 15 (C) 17 (D) 25 (E) 34

Solution

AC is a diagonal of square ABCD. By the distance formula, AC = $\sqrt{(-1-4)^2 + (-1-2)^2}$ = $\sqrt{(-5)^2 + (-3)^2} = \sqrt{25+9} = \sqrt{34}$. By using one of the formula for square, which is $\frac{d^2}{2}$, where d is the length of the diagonal. Then the area of ABCD is $\frac{\sqrt{(34)^2}}{2} = \frac{34}{2} = 17$.

The answer is (C).

11. If $f(x) = x + 5$, which of the following is a solution of $f(3a) + 2 = f(2a) = 3$?

(A) 1 (B) 2 (C) 5 (D) 6 (E) there are no solutions.

Solution

If $f(x) = x + 5$, then $f(3a) = 3a + 5$ and $f(2a) = 2a + 5$. Therefore , $f(3a) + 2 = f(2a) + 3 \Rightarrow 3a + 5 + 2 = 2a + 5 + 3 \Rightarrow 3a + 7 = 2a + 8 \Rightarrow a = 1$.

The answer is (A).

12. If the average (arithmetic mean) of *a, b, c, d, and e* is 95, and the average of *a, b, and e* is 100, what is the average of *c and d*?

(A) 87.5 (B) 88.5 (C) 89.5 (D) 99.5 (E) 99.7

Solution

If the average of 5 numbers (*a, b, c, d, e*) is 95, the sum of these numbers is $5 \times 95 = 475$. Similarly, the sum of the 3 numbers *a, b, and e* whose average is 100 is 300, leaving 175 (475 – 300) as the sum of the 2 remaining numbers, *c and*. The average of these 2 numbers is their sum divided by 2: average of *c and d* $= 175 \div 2 = 87.5$.

The answer is (87.5).

13. If $a = 2b$, $3b = 4c$, *and* $5c = 6d$, what is the ratio of *a* to *d*?

(A) 4.4 (B) 4.2 (C) 3.6 (D) 3.4 (E) 3.2

Solution

Since $a = 2b$, $b = \frac{4}{3}c$, and $c = \frac{6}{5}d$: $a = 2\ \frac{4}{3}c\ = \frac{8}{3}\ \frac{6}{5}d\ = \frac{16}{5}d \Rightarrow \frac{a}{d} = \frac{16}{5}$ or 3.2.

The answer is $\frac{16}{5}$ or 3.2.

14. If $x + y = 10$ and $x - y = 11$, what is the value of $x^2 - y^2$?

(A) 100 (B) 105 (C) 110 (D) 115 (E) 120

Solution

Here, $x^2 - y^2 = (x + y)(x - y) = 10 \times 11 = 110$. Add the two equations: $2x = 21$, so $x = 10.5$. Since $10.5 + y = 10$, then $y = -0.5$. Using your calculator, you get: $x^2 - y^2 = (10.5)^2 = 110.25 - 0.25 = 110$. **The answer is (110).**

15. The average (arithmetic mean) of a set of 9 numbers is 99. After one of the numbers is deleted from the set, the average of the remaining numbers is 89. What number was deleted?

Solution

If the average of a set of 9 numbers is 99, their sum is $9 \times 99 = 891$. If deleting 1 number reduces the average of the remaining 8 numbers to 89, the sum of those 8 numbers must be $8 \times 89 = 712$. The deleted number was $891 - 712 = 179$.

The answer is (179).

16. Two circular tables have diameters of 35 inches and 25 inches, respectively. The area of the larger table is what percent more than the area of the smaller table? (Gird your answer without a percent sign.)

(A) 96 (B) 95 (C) 94 (D) 92 (E) 90

Solution

Since the diameters of the tables are in the ratio of 35:25 or 7:5, the ratio of their areas is $7^2:5^2 = 49:25$. Convert the ratio to a percent: $49:25 = \frac{49}{25} = \frac{196}{100} = 196\%$. The area of the larger table is 196% of the area of the small one, or is 96% more than the area of the small one.

The answer is (96).

17. Hoover High School has 840 students, and the ratio of the number of students taking Spanish to the number not taking Spanish is 4:3. How many of the students take Spanish?

(A) 280 (B) 360 (C) 480 (D) 560 (E) 630

Solution

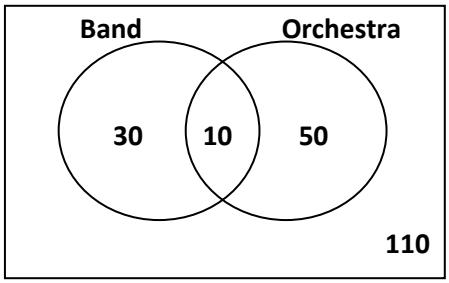
Let $4x$ and $3x$ be the number of students taking and not taking Spanish, respectively. Then $4x + 3x = 840 \Rightarrow x = 120$. The number taking Spanish is $4(120) = 480$. **The answer is (C).**

18. Of the 200 seniors at Monroe High School, exactly 40 are in the band, 60 are in the orchestra, and 10 are in both. How many students are in neither the band nor the orchestra?

(A) 80 (B) 90 (C) 100 (D) 110 (E) 120

Solution

Draw a Venn diagram. Since 10 seniors are both in band and orchestra, 30 are in band only and 50 are in orchestra only. Therefore, 10 + 30 + 50 = 90 seniors are in at least one group, and the remaining 110 are in neither. **The answer is (C).**



19. Consider the sequence 1, 2, 3, 1, 2, 3, 1, 2, 3,…. What is the sum of the first 100 terms?

(A) 100 (B) 180 (C) 198 (D) 199 (E) 200

Solution

This is a repeating sequence with 3 terms (1, 2, 3)in the set that repeats. Since the sum of the 3 numbers in each set is 6, the sum of the first 33 set or 99 terms is 6 × 33 = 198. Since the next term is 1, the sum of the first 100 terms is 199. **The answer is (C).**

20. If $x = \frac{2}{3}(x + y)$, which of the following is an expression for x in terms of y?

(A) $\frac{2}{3}y$ (B) y (C) $\frac{3}{2}y$ (D) 2y (E)

Solution

To get rid of the fraction, multiply both sides of the equation by 3: $3x = 2(x + y)$. use the distributive law to get rid of the parentheses: $3x = 2x + 2y$. Subtract 2x from each side: $x = 2y$. **The answer is (D).**