

QUESTIONNAIRE Mathematics Test 5. Population 3a, 3b and Intermediate Population

QUESTION 1

If $a = 20$, $b = 0$, $c = 10$, $x = 8$, $y = 12$, then the value of

$$2aby + 2cx \text{ is}$$

- A. 100 B. 160 C. 400 D. 640 E. none of these

QUESTION 2-5 / 4

For each of the following equations or pairs of equations, concerned with real numbers, mark on the answer sheet

- A. if there is no solution
- B. if there is one solution
- D. if there are three solutions
- E. if there are more than three solutions

2. $x + y = 12$, $x - y = 4$

3. $m + n = 2$, $3m + 3n = 9$

4. $xy - 5x + 6 = 0$

5. $3p + q = 16$

QUESTION 6

If $xy = 1$ and x is greater than 0, which of the following statements is true?

- A. When x is greater than 1, y is negative.
- B. When x is greater than 1, y is greater than 1.
- C. When x is less than one, y is less than 1.
- D. As x increases, y increases.
- E. As x increases, y decreases.

QUESTION 7

In the figure on the right,

$$KX = \frac{1}{3} KL \text{ and } KY = \frac{1}{3} KM.$$

Which of the following statements are true ?

- I. $XY = \frac{1}{3} LM$
 - II. Line XY is parallel to line LM
 - III. $\text{Area } KXY = \frac{1}{3} \text{ area } KLM$ [Picture]
 - IV. $\text{Area } KXY = \frac{1}{9} \text{ area } KLM$
- A. I and II only
 - B. II and III only
 - C. I and III only
 - D. I, II and III only
 - E. I, II and IV only

QUESTION 8

In the figure on the right, m represents a plane, and PQ is a straight line which is perpendicular to the plane at the point Q . Points A , B and C lie on the plane. If $QA = QB = QC$, then the triangles PQA , PQB , and PQC are

- A. congruent (two sides and included angle)
- B. congruent (two sides and angle not included) [Picture]
- C. congruent (two angles and corresponding side)
- D. similar but not congruent
- E. neither similar nor congruent

QUESTION 9

In the figure below, $PQ \perp OQ$, and $RS \perp OQ$. If the measure of $\angle POQ$ and of $\angle ORQ$ equal θ and ϕ is the measure of $\angle POQ$, then the measure of the intercept PQ is equal to

- [θ : the character θ denotes the character for an angle]
 [\perp : the character \perp denotes the character for a perpendicular line]

- A. $\sin \theta$
- B. $\cos \theta$
- C. $\tan \theta$
- D. $2 \sin \theta$
- E. $1 - \cos \theta$

[Picture]

QUESTION 10-11 / 2

[Picture]

Questions 10 and 11 are based upon the graph of a quadratic function which is shown in the figure above.

10. For what value of x is the quadratic function a minimum?

- A. -1
 - B. $-\frac{1}{2}$
 - C. $-\frac{1}{4}$
 - D. 1
 - E. $1 - \frac{1}{2}$
10. A B C D E

11. The range of values of x for which the function represented by the straight line MN exceeds the quadratic function is

- A. $-1 < x < 1$
 - B. $x < -1$ and $x > 1$
 - C. $-\frac{3}{4} < x < \frac{1}{4}$
 - D. $x > 0$
 - E. $x > y$
11. A B C D E

QUESTION 12

A square plate of the largest possible size is cut from a circular plate of 16 cm. diameter. The area of the square plate (in sq. cm.) will be

- A. 64
- B. 96
- C. 128
- D. 192
- E. 256

QUESTION 13

The locus of all mid-points of chords drawn from a point on the circumference of a circle is

- A. a semi-circle
- B. a circle
- C. a straight line
- D. a rectangle
- E. none of these

QUESTION 14

A piece of wire 52 inches long is cut into two parts and each part is bent to form a square. The total area of the two squares is 97 square inches. What is the length in inches of the side of the smaller square?

QUESTION 15

The complex number $(1 + i)^{\sqrt{2}}$ is equal to

- A. 0 B. 2 C. 2i D. 1 + i E. 2 + 2i

QUESTION 16

Given $\log_2 2 = \frac{1}{b}$, $\log_3 32$ is equal to

- A. 2 B. 5 C. $-\frac{3}{5}$ D. $-\frac{5}{3}$ E. $\frac{3}{\log_2 32}$

QUESTION 17

Below there are several definitions of new operations named * in terms of the usual operations on real numbers. For which of the definitions is the property $y * x = x * y$ valid for all positive real numbers x and y ?

- A. $x * y = \frac{x}{y}$ D. $x * y = \frac{xy}{x + y}$
- B. $x * y = x - y$
- C. $x * y = x(x + y)$ E. $x * y = x^2 + xy + y^2$

QUESTION 18

Solve the equation

$$\sqrt{x + 5} - \sqrt{x - 3} = \sqrt{x}$$

QUESTION 19

The graph on the right is the representation of one of the following equations. Which one does it represent?

[Picture]

- A. $y = (1 - x)(x - 2)$
- B. $y = (1 - x)(2 - x)$
- C. $y = (1 - x)(2 - x)^2$
- D. $y = (1 - x)^2(x - 2)$
- E. $y = (1 - x)^2(2 - x)$

QUESTION 20

The expression

$$\frac{2}{\sqrt{5}} + \frac{\sqrt{45}}{5} + \frac{1}{\sqrt{5} - 2}$$

is equal to

- A. $2\sqrt{5} + 2$
- B. $2\sqrt{5} - 2$
- C. 2
- D. $2\sqrt{5}$
- E. $2 - 2\sqrt{5}$

QUESTION 21

Chords of the same length are drawn in two circles of unequal radii. Which of the following is true?

- A. The chord in the larger circle could be equal to the radius of the smaller circle.
- B. The chord in the smaller circle could not be a diameter.
- C. The distance from the centre to the chord is less in the larger circle.
- D. The minor arc intercepted on the larger circle is longer.
- E. The minor arc intercepted on the larger circle subtends the greater angle at the centre.