

QUESTIONNAIRE Mathematics Test 4. Intermediate Population

QUESTION 1

In $\triangle PQR$ on the right, which of the following conditions is sufficient to prove that the altitude from P coincides with the bisector of angle P?

[Note: the character \triangle denotes the character for a triangle]

- A. $x = y$ D. $PR = RQ$ [Picture]
 B. $y = z$
 C. $x = z$ E. $PQ = QR$

QUESTION 2

Which of the following is equivalent to $x(x + a) - a(x - a)$?

- A. $(x + a)(x - a)$ D. $(x + a)$
 B. $(x + a)(x - a)$
 C. $(x + a)^3$ E. $x + a$

2. A B D C E

QUESTION 3

Which of the following is equal to a^{-3} ?

- A. $(-1)^3 a^3$ C. $\frac{1}{a^3}$
 B. $-\frac{1}{a^3}$ D. $-3a$ E. $a - 3$

QUESTION 4

Suppose that the symbol $*$ denotes an operation on the integers, and suppose that for all integers x and y , $x * y = y * x$. It follows from this that, for integers a , b , and c , where $+$ denotes the usual operation of addition,

- A. $(a + b) * (a + c) = (c + b) * (c + a)$
 B. $a * (b + c) = (a * b) + c$
 C. $(a + b) * (a + c) = (a + c) * (a + b)$
 D. $(a + b) * c = (a + c) * b$
 E. If $a * b = c$, then $a * c = b$

QUESTION 5

If the chord of a circle equals the radius, the angle subtended at the centre by the minor arc equals how many degrees ?

- A. 15
- B. 30
- C. 45
- D. 60
- E. It cannot be determined from the information given.

5. A B C D E

QUESTION 6

In the figure on the right, ABC is a triangle and BD = CE. Triangles BCD and CBE are

- A. congruent (three sides)
- B. congruent (two sides and included angle)
- C. congruent (two angles and corresponding side) [Picture]
- D. similar (two sides and included angle)
- E. not necessarily congruent or similar

QUESTION 7

The expression $(\frac{5}{-4}) (\frac{2}{3}) - (\frac{1}{2}) (-\frac{2}{3})$ is equal to

- A. $\frac{1}{2}$
- B. $\frac{1}{12}$
- C. $-\frac{1}{2}$
- D. $-\frac{7}{6}$
- E. None of these

QUESTION 8

Given: line PQ intersects line RS at O
Prove: x = z

Statement

- 1. $x + y = 180$
- 2. $z + y = 180$ [Picture]
- 3. $x + y = z + y$
- 4. $x = z$

In the proof above, what is the authority or reason for passing from statements 1 and 2 to statement 3 ?

- A. If two angles are equal, their supplements are equal.
- B. If for three numbers $a = b$ and $b = c$, then $a = c$.
- C. If equals are added to equals, the results are equal.
- D. If equals are subtracted from equals, the results are equal.
- E. If two lines intersect, the measures of the opposite angles are equal.

QUESTION 9

In the circle below, chord AB is 12 inches long and 8 inches from the centre O. What is the length, in inches, of the radius of the circle?

[Picture]

- A. $\sqrt{80}$
- B. 10
- C. $\sqrt{208}$
- D. 16
- E. 20

QUESTION 10

Which of the following illustrates the distributive property?

- A. $2 + 6 = 6 + 2$
- B. $(4 + 2) + 6 = 4 + (2 + 6)$
- C. $(4 \times 2) + 6 = (2 \times 4) + 6$
- D. $4 \times (2 \times 6) = (4 \times 2) \times 6$
- E. $4 \times (2 + 6) = (4 \times 2) + (4 \times 6)$

QUESTION 11

What value of k makes the following equations consistent?

$$\begin{array}{l} \text{---} \\ | \\ | \quad \quad \quad 2 \\ | \quad \quad \quad x = - \frac{2}{3} k \\ | \\ | \\ | \quad y - 6x = 6k \\ | \\ | \\ | \quad \quad \quad y = 6 - 2k \\ \text{---} \end{array}$$

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

QUESTION 12

For what real numbers x is $x^2 - 2x - 3 > 0$?

- A. $x < -1$
- B. $x > 3$
- C. $-1 < x < 3$
- D. $-3 < x < 3$
- E. $x < -1$ or $x > 3$

QUESTION 13

What is the least common multiple of the polynomials

$$s^2 + s - 12 \quad \text{and} \quad s^2 - 5s + 6 ?$$

- A. $(s - 2)(s - 3)(s + 4)$ D. $(s - 2)(s - 3)(s + 3)(s - 4)$
B. $(s - 2)(s - 3)(s + 4)$
C. $(s - 2)(s + 3)(s - 4)$ E. $(s + 2)(s - 3)(s + 3)(s - 4)$

QUESTION 14

What is (are) the solution(s), in real numbers, of the equation

$$x + 1 = \frac{1}{x + 7}$$

QUESTION 15

A motor boat can go 8 miles down-stream in 40 minutes. It takes one hour to travel the same distance up-stream. Find (a) the speed of the boat, and (b) the rate of the stream in miles per hour.

QUESTION 16

If $\log x = \log 1 + \log 2 + \log 3 + \log 4 + \log 5$, then x is

- A. 6 B. 15 C. 36 D. 55 E. 120

QUESTION 17

For what value of k will the roots of the equation

$$x^2 + 6x + k = 0$$

be equal? _____

QUESTION 18

To construct the bisector of an angle POQ, the first step is to mark off with compasses the intersections of a circle with centre at O and the two arms OP and OQ, as shown below.

[Picture]

For the simplest construction with ruler and compasses the next step is to

- A. draw the line RS
B. find the intersection of circles with equal radii and centres R and S
C. erect perpendiculars to OP and OQ at R and S
D. draw the median to the side RS of the triangle ORS
E. drop a perpendicular from R to OQ
18. A B C D E