CANDIDATE'S EXAMINATION NUMBER _____

G.325

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BRAINSE NA SCRÚDUITHE

DAY VOCATIONAL CERTIFICATE EXAMINATIONS 1976

MATHEMATICS – PAPER II

THURSDAY, 10 JUNE – 2 – 4 p.m.

INSTRUCTIONS

(a) Before attempting to answer any question you should write your examination number in the space provided on top of this page.

(b) This booklet is to be returned to the Supervisor at the end of this examination period.

(c) The total time allowed for this paper is 2 hours. You are allowed five minutes to read these instructions and to write your examination number on top of this page. You will then get 10 minutes to look through the questions but may not write down any answers during this time. You will then have 100 minutes in which to answer the questions and the remaining five minutes is for final checking.

(d) You will be given one mark for each question answered correctly in Section One and two marks for each question answered correctly in Section Two.

(e) Four suggested answers, A, B, C and D, are given for each question and only one of these is correct. You are required to select the correct response and to record it by encircling the letter opposite the right answer as shown in the following item:
If you add 3 and 4 the answer is:

    A.   −1
    B.    1
    Ⓒ    7
    D.   12

You will not get credit for any answer unless it is marked in this way. No credit will be given if more than one response is thus marked. However if you make a mistake you may cancel the wrong answer by putting an X across it thus ⊠.

(f) Answer as many questions as you can. If you find a question too difficult go on to the next, but go back and attempt it later if you have sufficient time and then choose the response which you judge most likely to be correct.

(g) If you wish to do any calculations or other work you may do it in this booklet but do not do it on the left hand side where the letters A, B, C and D appear.

(h) The official Mathematical Table book may be used in answering this paper. Ask the Supervisor for the tables when you need them.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

1. The sum of 846 and 179 is
   A. 915
   B. 925
   C. 1025
   D. 1027

2. When −3 is multiplied by −4 the answer is
   A. 12
   B. 7
   C. −7
   D. −12

3. $\frac{3}{8}$ of $\frac{16}{3}$ is
   A. $\frac{9}{128}$
   B. $\frac{15}{24}$
   C. 2
   D. $5\frac{1}{8}$

4. 1.2 x 0.4 equals
   A. 0.48
   B. 1.6
   C. 4.8
   D. 48

5. 8% of £150 is
   A. £0.87$\frac{1}{2}$
   B. £5.33
   C. £12.00
   D. £23.00

6. Using the usual calculation conventions the value of
   17 − 2 x 9 + 15 ÷ 3 is
   A. − 11
   B. 4
   C. 50
   D. 120

7. $2^6$ is the same number as
   A. 3
   B. 12
   C. 36
   D. 64

8. The value of log 103 is
   A. 2.0128
   B. 2.1139
   C. 12.80
   D. 1280

9. The sum of the binary numbers 101 and 10101 in binary form is

  A. 10101

  B. 11010

  C. 11111

  D. 101001

10. How is the number 1101 in the base two system written in the base ten system ?

  A. 3

  B. 7

  C. 11

  D. 13

11. A teacher has 30 pupils in his class. He bought a pencil, a biro and a rubber for each pupil in the class. The pencils cost 4p each, the biros 8p each and the rubbers 3p each. What was the total cost to the teacher ?

  A. £4.50

  B. £3.60

  C. £0.45

  D. £0.15

12. A prize of £550 is to be divided between Martin, Paul and Mary in the ratio 5 : 4 : 2. Paul gets

  A. £50

  B. £110

  C. £137.50

  D. £200

13. The Simple Interest on £600 for 3 years at 11% per annum is

  A. £66

  B. £198

  C. £1800

  D. £19 800

14. How many square centimetres are there in 3 square metres ?

  A. 300

  B. 900

  C. 30 000

  D. 90 000

15. During a shower 0.4 centimetres of rain falls on a flat roof 50 metres long and 7 metres wide. The volume of rainwater falling on the roof in cubic metres is

  A. 1.4

  B. 14

  C. 140

  D. 1400

16. Express a speed of 90 km/h in metres per second.

  A. 1.5

  B. 2.5

  C. 25

  D. 250

17. $\{x \mid 1 < x \leqslant 5, x \in N\}$ is the same set as
   A. $\{1,2,3,4,5\}$
   B. $\{1,2,3,4\}$
   C. $\{2,3,4,5\}$
   D. $\{2,3,4\}$

18. If $K \cup H = \{1,2,3,4,5\}$, $K \cap H = \{1,4\}$ and $H \setminus K = \{2\}$ then K is
   A. $\{1,4\}$
   B. $\{3,5\}$
   C. $\{1,2,4\}$
   D. $\{1,3,4,5\}$
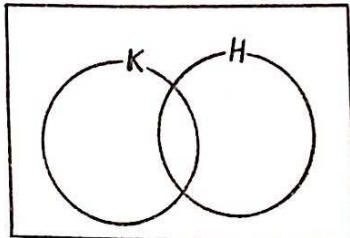
19. The thickness of a 600 page book consisting of 300 leaves is 22.5 millimetres (excluding the covers). The thickness of each leaf in millimetres is
   A. $7.5 \times 10^{-2}$
   B. $7.5 \times 10^{-1}$
   C. $7.5 \times 10^{2}$
   D. $6.75 \times 10^{3}$

20. The $n$th term of a sequence is $2n(n+1)$. The second term of this sequence is
   A. 4
   B. 7
   C. 9
   D. 12

21. A boy took a job for $n$ weeks during the summer holidays and he was paid at the rate of £$x$ per week. Each week during that time he spent £$a$ and put the rest into a savings account. The total amount of money he put into savings during that time was
   A. £$(x - a)$
   B. £$n(x - a)$
   C. £$n(a - x)$
   D. £$(nx - a)$

22. If $x = 2$ and $y = -3$, what is the value of $x^2 + y^2$ ?
   A. $-5$
   B. $-1$
   C. 1
   D. 13

23. When the expression $4(3x + 2) - 2(4x - 5)$ is simplified it becomes
   A. $4x + 18$
   B. $4x - 2$
   C. $20x + 18$
   D. $20x - 2$

24. The solution set of $17 - 2x = 5x - 4$, where $x \in Z$, is
   A. $\{-7\}$
   B. $\{-3\}$
   C. $\{3\}$
   D. $\{7\}$
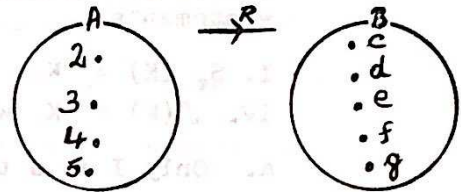
OVER→

25. When $(x + 2)(2x + 5)$ is multiplied out, the answer is
    A. $2x^2 + 9x + 10$
    B. $2x^2 + 4x + 10$
    C. $2x^2 - x + 10$
    D. $2x^2 - x - 10$

26. The factors of $x^2 - 13x + 42$ are
    A. $(x - 7)(x + 6)$
    B. $(x + 7)(x - 6)$
    C. $(x + 7)(x + 6)$
    D. $(x - 7)(x - 6)$

27. The solution set of $(x - 5)(x - 11) = 0$ is
    A. $\{5, 11\}$
    B. $\{5, -11\}$
    C. $\{-5, 11\}$
    D. $\{-5, -11\}$

28. If $A = \{2, 3, 4, 5\}$ and $B = \{c, d, e, f, g\}$, which one of the following relations from the set A to the set B is a function?
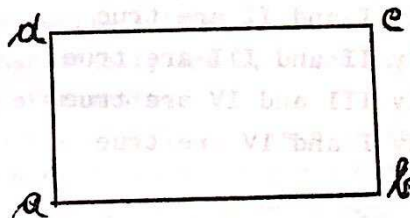    A. $\{(2,c), (3,d), (4,e), (4,f), (5,g)\}$
    B. $\{(2,g), (3,d), (4,c), (5,e), (5,f)\}$
    C. $\{(2,g), (2,f), (3,e), (4,d), (5,c)\}$
    D. $\{(2,c), (3,d), (4,e), (5,f)\}$



29. If $m, s, k$ and $x$ are four points of $\Pi$ such that $(m,s) \uparrow (k,x)$ then
    A. mskx is a parallelogram
    B. smkx is a parallelogram
    C. xskm is a parallelogram
    D. mksx is a parallelogram

30. abcd is a rectangle. The image of $[ac]$ under a projection on bc parallel to dc is
    A. $[ab]$
    B. $[dc]$
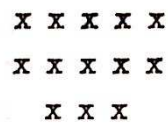    C. $[ad]$
    D. $[bc]$



## SECTION TWO

31. The value of the expression $\dfrac{(n + 3)(n + 2)}{12}$ is an integer when $n$
    is: I. 0, II. 1, III. 4, IV. 6.
    The only correct statements above are
    A. I and II
    B. II and III
    C. III and IV
    D. II and IV

OVER

32. When asked to write down the number of x's in this
    diagram in numerals in the four, five, six and
    seven base systems, a pupil gave the following
    answers:

    x x x x x

    x x x x x

    x x x

    I. $31_{four}$     II. $23_{five}$     III. $21_{six}$     IV. $16_{seven}$
    A. Only II is correct
    B. Only I and II are correct
    C. Only I, III and IV are correct
    D. All four answers are correct

33. H, K, R and S are four different lines of Π such that H⊥K,
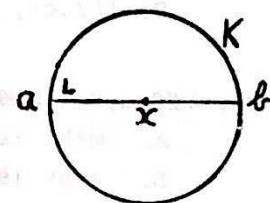    R⊥S, and K∥R.  Which of the following statements are then true ?
    I. S⊥K,  II. R⊥H,   III. K∥S,  IV. S∥S.
    A. Only I and II
    B. Only II and IV
    C. Only I, II and IV
    D. All four

34. K is a circle in the plane Π .  The point $x$ is the centre of the
    circle and L is the line $ab$ where $[ab]$ is a diameter of the
    circle K.  Consider the truth of each of the following
    statements:

    I. $S_x (K) = K$,   II. $S_L(K) = K$,   III. $S_x (L) = L$,
    IV. $f(K) = K$  where $f$ is the translation $\vec{ab}$.

    A. Only I is a true statement
    B. Only II and III are true statements
    C. Only I, II and III are true statements
    D. All four statements are true

35. Which of the following statements are true ?
    I. All rectangles are squares.  II. All squares are
       parallelograms.  III. All parallelograms are quadrilaterals.
       IV. All quadrilaterals are rectangles.
    A. Only I and II are true
    B. Only II and III are true
    C. Only III and IV are true
    D. Only I and IV are true

36. Which two of the following statements are true ?
    I.   There are more than ten prime numbers.
    II.  Every odd number is a prime number.
    III. There is only one even prime number.
    IV.  The product of any two prime numbers is always another
         prime number.
    A. Both I and III are true
    B. Both II and III are true
    C. Both II and IV are true
    D. Both I and IV are true

37. The solution set of three of the following is {8}:

   I. $2x + 7 = 4x - 9$      II. $x(2x - 7) = 2(x - 2)^2$

   III. $\dfrac{x + 2}{5} + \dfrac{x}{4} = \dfrac{x}{2} + 3$      IV. $\dfrac{4}{x + 4} = \dfrac{1}{x - 5}$

   A. The solution set of I, II and III is {8}

   B. The solution set of I, II and IV is {8}

   C. The solution set of I, III and IV is {8}

   D. The solution set of II, III and IV is {8}

38. The formula $p = 2\pi r + 4r$ is used in mensuration. Which three of the following forms may be properly deduced from this formula?

   I. $p = 2r(\pi + 2)$      II. $p - 2r = \pi + 2$

   III. $\dfrac{p}{\pi + 2} = 2r$      IV. $r = \dfrac{p}{2(\pi + 2)}$

   A. I, II and III

   B. I, III and IV

   C. II, III and IV

   D. I, II and IV

39. U is the set of all the pupils in a class. B is is the set of all the pupils in the class who own bicycles and W is the set of all the pupils in the class who own watches. Consider the following statements:
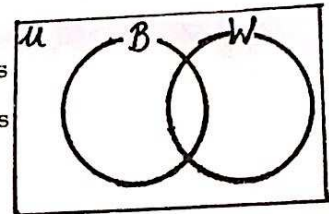


   I. B∩W is the set of all the pupils in the class who own both bicycles and watches;

   II. B∪W is the set of all the pupils who own either bicycles or watches or both.

   III. B' is the set of all the pupils in the class who do not own bicycles.

   IV. B\W is the set of all the pupils who own bicycles but not watches.

   A. Only I is a correct statement.

   B. Only I and II are correct statements.

   C. Only II, III and IV are correct statements.

   D. All four statements are correct.

40. An interesting set of numbers has been named the set of 'perfect numbers'. The members of this set are <u>natural numbers</u> each of which is exactly equal to the <u>sum of all of its own divisors other than itself</u>. The smallest 'perfect number' is 6, for the divisors of 6, other than itself, are 1, 2 and 3, and 1 + 2 + 3 = 6. Consider the following statements:

   I. 12 is a perfect number.      II. 28 is a perfect number.

   III. 0.6 is a perfect number since 0.1 + 0.2 + 0.3 = 0.6.

   IV. There is no number which is both a prime number and a perfect number.

   A. Only III is a true statement.

   B. Only II and III are true statements.

   C. Only II and IV are true statements.

   D. All four statements are true.

If you have time to do so, go back and check your work and correct any mistakes you have made.