CANDIDATE'S EXAMINATION NUMBER _____

G.325

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DAY VOCATIONAL CERTIFICATE EXAMINATIONS 1975

MATHEMATICS - PAPER II

WEDNESDAY, 11 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
(C) 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 (B).

(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.

OVER →

SECTION ONE

1. The only prime number among the numbers 9, 10, 11 and 12 is
   A. 9
   B. 10
   C. 11
   D. 12

2. Only one of the numbers 41, 49, 91 and 94 is the square of an integer. Which one of the numbers is it ?
   A. 41
   B. 49
   C. 91
   D. 94

3. Using the usual arithmetical calculation conventions what is the value of $8 + 2 \times 6 - 12 \div 4$?
   A. -15
   B. 12
   C. 14
   D. 17

4. The fraction $\frac{4}{5}$ expressed as a decimal is
   A. 0·4
   B. 0·8
   C. 1·25
   D. 4·5

5. Written as a decimal $12\frac{1}{2}\%$ is
   A. 0·00125
   B. 0·125
   C. 1·25
   D. 12·5

6. 0·3 × 0·6 equals
   A. 0·0018
   B. 0·018
   C. 0·18
   D. 1·8

7. What is the value of $\frac{6{\cdot}4 \times 14{\cdot}6}{1{\cdot}6 \times 7{\cdot}3}$?
   A. 0·08
   B. 0·8
   C. 8
   D. 80

8. The sum $\frac{2}{5} + \frac{3}{7}$ is
   A. $\frac{6}{35}$
   B. $\frac{5}{12}$
   C. $\frac{29}{35}$
   D. $\frac{31}{35}$

9. If $I = \frac{PRT}{100}$ what is the value of I when P = 700, R = 12 and T = 5 ?

A. 42

B. 420

C. 440

D. 4200

10. What is the value of $x^2 - 2x + 3$ when $x = 5$?

A. 2

B. 3

C. 18

D. 38

11. The sum of the binary numbers 1010 and 1011 in binary form is

A. 10101

B. 10001

C. 1111

D. 1010

12. How is the number 86 in the ordinary base ten system written in the base five system ?

A. 43

B. 172

C. 301

D. 321

13. The value of log 807 is

A. 0·9069

B. 2·9069

C. 4·9069

D. 90·69

14. $\{x \mid 3 \leqslant x < 8,\ x \in \mathrm{N}\}$ is the same set as

A. $\{4, 5, 6\}$

B. $\{4, 5, 6, 7\}$

C. $\{3, 4, 5, 6, 7\}$

D. $\{3, 4, 5, 6, 7, 8\}$

15. If $U = \{a, b, c, d, e\}$, $K = \{a, c, d\}$, $H = \{b, c, e\}$ and $L = \{a\}$ then one of the following is the empty set. Which set is the empty set ?

A. $H \cap L$

B. $K \cup H$

C. $K \setminus L$

D. H'

16. If $R = \{3, 5, 7\}$, $S = \{2, 3, 4, 5, 7\}$ and $T = \{2, 3, 4, 5, 6\}$ then only one of the following statements is true - which is the true statement ?

A. $R \subset T$

B. $S = T$

C. $\#(R \cap S) = \#(R \cup T)$

D. $R \cap S = R$

OVER →

17. A rectangular block of wood is 3 metres long, 15 centimetres wide and 4 centimetres deep. What is the volume of this block in cubic centimetres ?

A. 180

B. 1800

C. 18 000

D. 180 000

18. The area of a square is 84 square metres. What is the length of one of its sides, in metres ?

A. 2·898

B. 9·165

C. 28·98

D. 91·65

19. The nth term of a sequence is $3n^2 + 1$. The third term of this sequence is

A. 7

B. 28

C. 37

D. 82

20. What is the total amount of simple interest collected in 4 years on £1500 at an interest rate of 11% per year ?

A. £66

B. £165

C. £660

D. £1815

21. If y years represents a boy's present age, which one of the following will represent his age in five years from now ?

A. $y + 5$

B. $y - 5$

C. $5 - y$

D. $5y$

22. The solution set of $3x - 5 = 15 + 2x$ where $x \in R$ is

A. {2}

B. {4}

C. {10}

D. {20}

23. When the expression $3(x + 4) - 5(2x + 3) + 2(5x - 6)$ is simplified it becomes

A. $3x - 15$

B. $3x - 5$

C. $3x + 15$

D. $23x + 39$

24. When $(5x + 4)(2x - 3)$ is multiplied out the answer is

A. $10x^2 - 7x - 12$

B. $10x^2 + 7x - 12$

C. $10x^2 + 23x - 12$

D. $10x^2 - 12$

25. The factors of $x^2 + 11x + 30$ are

A. $(x + 30)(x + 11)$

B. $(x + 30)(x + 1)$

C. $(x - 5)(x - 6)$

D. $(x + 5)(x + 6)$

26. The solution set of $(x + 5)(x - 3) = 0$ is

A. $\{5, 3\}$

B. $\{5, -3\}$

C. $\{-5, -3\}$

D. $\{-5, 3\}$

27. The lowest common multiple of 7, 21 and 24 is

A. 147

B. 168

C. 504

D. 3528

28. A man insures his house against fire at an annual premium of 9 pence per £100. How much will he pay each year in insurance if his house is valued at £7500 ?

A. £6.75

B. £67.50

C. £75

D. £90

29. abc is any triangle. What is the image of $[ab]$ under a projection on ac parallel to bc ?

A. $[ac]$

B. $[ab]$

C. $[bc]$

D. c

30. Apples cost x pence each and oranges cost y pence each. I bought 5 apples and a dozen oranges at a total cost of £1.00. This fact is represented mathematically by which one of the following statements ?

A. $5x + y = 1$

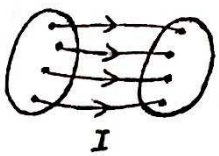
B. $5x + y = 100$

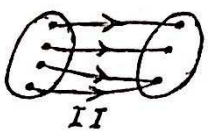
C. $5x + 12y = 1$

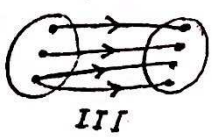
D. $5x + 12y = 100$

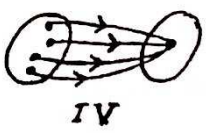
SECTION TWO

31. Which of the following arrow diagrams represent functions ?









A. Only I

B. Only II and III

C. Only I, II and IV

D. All four.

OVER →

32. Which of the following statements are true ?

I. $(3 \times 2) \times 5 = 3 \times (2 \times 5)$. II. $(3 \div 2) \div 5 = 3 \div (2 \div 5)$.

III. $3 \times (2 + 5) = (3 \times 2) + (3 \times 5)$. IV. $3 + (2 \times 5) = (3 + 2) \times (3 + 5)$.

A. Only I and II.

B. Only I and III.

C. Only I and IV.

D. Only II, III and IV.

33. If x and y are <u>any</u> two natural numbers i.e. {0, 1, 2, 3, ...}, then consider each of the following statements:

I. $(x + y)$ is always a natural number.
II. $(x - y)$ is always a natural number.
III. xy is always a natural number.
IV. $\frac{x}{y}$ is always a natural number.

A. Only I is a true statement.

B. Only I and II are true statements.

C. Only I and III are true statements.

D. All four are true statements.

34. $v = u + at$ is a formula used in mechanics. Which <u>two</u> of the following forms may be properly deduced from this formula ?

I. $u = v + at$. II. $at = v - u$. III. $at = u + v$. IV. $t = \frac{v - u}{a}$.

A. I and II.

B. I and IV.

C. II and IV.

D. II and III.

35. {6} is the solution set of which of the following ?

I. $3x + 8 = 5x - 4$. II. $x(x - 3) = (x + 3)(x - 4)$.

III. $\frac{x}{2} + \frac{x}{3} = \frac{x + 6}{2} - 1$. IV. $\frac{2}{x - 4} = \frac{1}{x - 5}$.

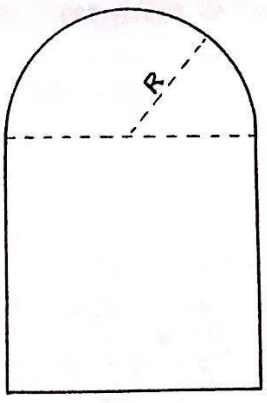
A. Only I.

B. Only I and II.

C. Only I, II and III.

D. All four.

36. The diagram shows a window frame.
The top part is a semi-circle of radius length R centimetres and the lower portion consists of three sides of a square. If L centimetres is the total length of the frame and A square centimetres is the area of glass required for the window, indicate which combination of the following gives the correct values for both L and A.



I. $L = 3R + \pi R$.

II. $L = 6R + \pi R$.

III. $L = 6R + 2\pi R$.

IV. $A = R^2 + \frac{1}{2}\pi R^2$.

V. $A = R^2 + \pi R^2$.

VI. $A = 4R^2 + \frac{1}{2}\pi R^2$.

A. I and V.

B. II and VI.

C. III and VI.

D. II and IV.

37. A piece of wire 168 centimetres long is bent into the shape of a rectangle. Which <u>two</u> of the following four statements are correct if the length of the rectangle is x centimetres, its width is y centimetres and the area it encloses is 1748 square centimetres ?

I. $x + y = 168$. II. $x + y = 84$. III. $xy = 437$. IV. $xy = 1748$.

A. I and III.

B. I and IV.

C. II and III.

D. II and IV.

38. $abcd$ is a square in the plane Π and o is the centre of (a, c). Under which of the following transformations of Π is d the image of b ?

I. Central symmetry with centre o.
II. Axial symmetry with ac as axis.
III. Translation $\vec{bd}$.
IV. Rotation of 180° about the point o.

A. Only I and II.

B. Only II and IV.

C. Only I, II and III.

D. All four.

39. abc is any triangle. The mid-point of $[ab]$ is x and the mid-point of $[ac]$ is y. Which of the following statements are true ?

I. $S_x(a) = b$. II. $(b, x) \uparrow (x, a)$. III. $f(y) = a$ where $f = \vec{cy}$.

IV. $f(x) = b$ where f is the projection on bc parallel to ac.

A. Only I, II and III.

B. Only I, II and IV.

C. Only II, III and IV.

D. All four.

40. R, S, T, U, V and W are six different lines of Π such that R $\parallel$ S, S $\parallel$ T, U $\parallel$ V, V $\parallel$ W and W $\perp$ R. Which of the following statements are then true ?

I. R $\parallel$ T. II. T $\parallel$ V. III. S $\perp$ W. IV. All the parallelograms formed by these lines are rectangles.

A. Only I and III.

B. Only I, III and IV.

C. Only I, II and III.

D. All four.

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

DO NOT TAKE THIS BOOKLET OUT OF THE EXAMINATION ROOM
