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BRAINSE AN GHAIRMOIDEACHAIS

CERTIFICATE EXAMINATION FOR DAY VOCATIONAL COURSES, 1967

MATHEMATICS

THURSDAY, 15th JUNE—10 a.m. to 1 p.m.

INSTRUCTIONS

(a) Attempt question 1 and six others.
(b) The marks allotted to each question are shown in brackets.
(c) Mathematical Tables and $\frac{1}{10}$ in., graph paper are supplied.
(d) Special credit will be given to candidates who display neatness and order in answering.
(e) All the work must be shown in the answer book.

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1. (a) Simplify (1) $(64)^{\frac{2}{3}}$; (2) 11^0 ; (3) $\frac{1}{2^{-3}}$.

(b) Four similar smaller castings are the same weight as three similar larger castings. Calculate the weight of a smaller casting if all 7 weigh 12 lbs.

(c) Simplify $(2a - b)^2 - a(3a + b) + 3ab$.

(d) Write the correct number in place of "n" in each of the following:—

(i) $225{,}000{,}000 = 2{\cdot}25 \times 10^n$.

(ii) $\cdot 0001 = 1{\cdot}0 \times 10^n$.

(e) The sum of two numbers is to be subtracted from their product. Using x and y for the numbers and A for the result, construct a formula for this operation. Find A when $x = 5$ and $y = 6$.

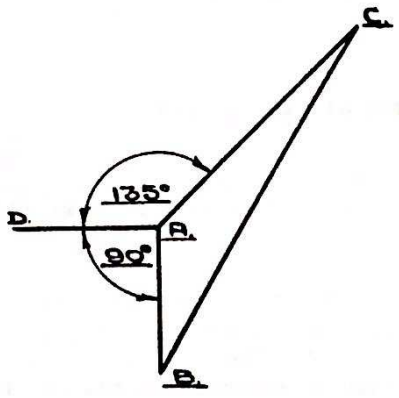
(20 marks)

2. (a) Simplify $\dfrac{4\frac{2}{7} - \frac{3}{8} \times 1\frac{3}{5}}{1\frac{5}{8} \div 8\frac{3}{4} + 2\frac{1}{2}} \times 5\frac{7}{8}$.

(b) Simplify $\dfrac{32(a^3 - x^3)}{a^2 + x^2} \times \dfrac{a + x}{a - x} \div \dfrac{8(a^2 + ax + x^2)}{a^2 + x^2}$.

(12 marks)

3. (a) Prove that the sum of the 3 angles of any triangle is equal to 180°.



(b) In the above figure the angle DÂB is a right angle and the angle AB̂C is twice as large as the angle AĈB. Calculate the number of degrees in the angle AĈB.

(12 marks)

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4. (a) Evaluate, using logarithms –

$$\sqrt{\frac{2{\cdot}568 \times 0{\cdot}5213}{31{\cdot}2}}$$

(b) If $a = b^2\sqrt{\frac{c^3}{d}}$ then $\log a =$ .....

(c) If $\log 3 = m$ and $\log 5 = n$ write down the logarithms of 15, ·6 and 75 in terms of m and n.

(12 marks)

5. There are 350 children enrolled in a school. Draw a graph which will enable you to express the number of children present as a percentage of the total enrolment.

Find from your graph –

(i) the percentage attendance when 275 children are present,

(ii) the number of children present on a day of 92% attendance,

and (iii) which corresponds to the better attendance, 325 children, or 96%.

(12 marks)

6. (a) If the volume of a right circular cylinder is 704 c.c. and the perpendicular height is 14 cm., what is the diameter of the base ? (Take $\pi = 3\frac{1}{7}$).

(b) Calculate the total surface area of the above cylinder.

(12 marks)

7. Solve the equations:–

(i) $(9x - 19)(x + 2) = (3x + 1)(3x - 2)$

(ii) $\left.\begin{array}{l} x + 2y + 8 = 0 \\ 3x - y + 3 = 0 \end{array}\right\}$

(iii) $3x^2 - 10x - 8 = 0$.

(14 marks)

8. (a) In the ΔABC the angles ABC and BAC are 90° and $\alpha°$ respectively. Show that:–

(i) $\sin^2\alpha + \cos^2\alpha = 1$,

(ii) $\frac{\sin\alpha}{\cos\alpha} = \tan\alpha$.

(b) If in the triangle ABC, the angle B = 90° and $\sin C = \frac{4}{5}$, find without using tables $\cos C$, $\tan C$ and the area of the triangle ABC.

(14 marks)

9. Factorize the following:–

(a) $4x^2 - 6xy$.

(b) $3ax + 3bx - 4ay - 4yb$.

(c) $6a^2 - 7ax - 3x^2$.

(d) $8x^3 + 27y^3$.

(e) $a^2 - 2ab + b^2 - c^2$.

(14 marks)

10. On $\frac{1}{10}$ inch graph paper, plot the four points A, B, C, D whose co-ordinates are A(2,3), B(8,12), C(0,9) and D(12,0). Join AB and CD.

Write down the co-ordinates of the point of intersection of AB and CD. Find the equations of the lines AB and CD in the form $y = mx + c$.

(14 marks)