DAY GROUP CERTIFICATE EXAMINATION, 1968

MATHEMATICS (OLD SYLLABUS)

PAPER II

WEDNESDAY, 12th JUNE — 10 to 12 noon

Answer four questions

(All questions carry equal marks)

1. (a) When an article is sold for £428 a profit of 7% is obtained.   What would the selling price be if sold at a loss of $3\frac{1}{2}\%$?

   (b) A car travels 112 Kilometres on 10 litres of petrol.   How many miles per gallon is this?   (1 litre = 1·76 pints.   1 Km. = $\frac{5}{8}$ mile).   Give answer correct to the nearest mile.

   (c) Calculate the simple interest on £333  6s.  8d. for 9 months at $4\frac{1}{2}\%$ per annum.

2. (a) A square has an area of 49 square inches.   Find the length of its diagonal to the nearest $\frac{1}{10}$ of an inch.

   (b) The area of a triangle is 0·0192 square metres and the base is 16 centimetres. Find the altitude of the triangle in centimetres.

   (c) Write down a formula for the shaded area in the given figure.
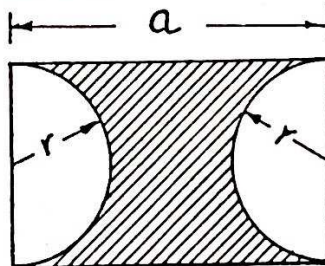


3. (a) Prove that the perpendicular from the centre of a circle to any chord of the circle, bisects the chord.

   (b) A chord of length 8 inches is drawn in a circle of diameter 10 inches.   Calculate the distance between the centre of the circle and the middle point of the chord.

4. (a) Simplify:

$$\frac{a^3 - b^3}{a^2 - b^2} \times \frac{a^2 + 2ab + b^2}{a^2 + ab + b^2} \div \frac{3(a - b)}{a^2 - 3ab + 2b^2}$$

   (b) Pipe A can fill a tank in 4 hours and pipe B can fill it in 6 hours.   How long will it take both pipes working together to fill the tank? A waste pipe C can empty the tank in 8 hours.   How long would it take to fill the tank if A, B and C are all working together.

5. The slant height of a right-circular cone is 15 centimetres and the diameter of the base is 18 centimetres.

   (i) Find the perpendicular height of the cone.

   (ii) Calculate the volume of the cone in cubic centimetres.

   (iii) Calculate the area of the curved surface of the cone.

6. (a) Re-arrange the formula $\frac{1}{U} = \frac{1}{V} + \frac{1}{F}$ to give an expression for the value of V in terms of U and F.

   (b) What must be added to $x^2 - 10x$ in order to give an expression which is a perfect square ?

   (c) Solve, by completing the square, $x^2 - 4x = 14$.  Give answer correct to two decimal places.

<div align="center">OR</div>

6. (a) Find the property in the right hand column which justifies each statement in the left-hand column.

   1. $(x + y) + z = x + (y + z)$        (A) distributive property.

   2. $x(y + z) = xy + xz$               (B) commutative property.

   3. $xy = yx.$                          (C) reflexive property.

                                          (D) associative property.

   (b) Graph the following sets on the number line.
   
   (i) $\{x \mid -3 < x \leqslant 4,\ x\ \text{Real}\}$
   
   (ii) $\{x \mid -2 \leqslant x < 5,\ x\ \text{an Integer}\}$
   
   (iii) $\{x \mid 2 < x < 8,\ x \in N\} \cap \{x \mid 4 \leqslant x < 10,\ x \in N\}$

7. Plot the points A(-2, 2) B(2, 4) C(1, -2) and join the points to form a triangle.

   (i) Find the area of the triangle ABC

   (ii) Write the equation of the line AB in the form $y = mx + c$

<div align="center">OR</div>

7. (a) Draw Venn diagrams to illustrate

   (i) A∩B   (ii) A∪B   (iii) A∩B'   (iv) A⊂B   (v) A\B.

   (b) A survey of all the families in a certain district showed that 100 families had a T.V set and 78 families had a motor car.  20 families had both a T.V. set and a motor car, 3 families had neither.  (i) How many families were there in the district.  (ii) How many families had a T.V. set but no motor car ?