DAY VOCATIONAL CERTIFICATE EXAMINATIONS, 1976

MATHEMATICS - PAPER I

THURSDAY, 10 JUNE - 9.30 - 11.30 a.m.

INSTRUCTIONS

(a) Answer any <u>five</u> questions.
(b) All working must be clearly set out in your answer book.
(c) Mathematical Tables and squared paper are available from the Superintendent.
(d) All questions carry equal marks.

1. A kitchen floor 4 metres long and 3 metres wide is to be covered with tiles. The tiles are 15 centimetres long and 10 centimetres wide and cost 4 pence each. They are to be stuck to the floor with adhesive. One tin of adhesive is required for every 100 tiles and the adhesive costs 25 pence per tin.
   Find

   (i) the number of tiles required to cover the floor,

   (ii) the total cost of the tiles, and

   (iii) the total cost of the adhesive.

   If other charges, including labour, amount to an average of 1 penny per tile, calculate the total amount of these charges.
   What does it cost altogether to have the kitchen floor tiled ?

2. If $a = 246.32$ and $b = 34.217$ calculate the value of (i) $a + b$, (ii) $a - b$, (iii) $a \times b$, (iv) $a \div b$, <u>without</u> the use of logarithm tables, slide rule or calculator, and give each answer correct to 2 places of decimals.
   (All the usual calculations should be clearly shown in your answer book).

3. (a) Write on your answer book the next two numbers of each of the following in order to maintain the same sequence patterns:

   (i) 3, 7, 11, 15, 19,

   (ii) 1, 4, 9, 16, 25,

   (b) Simplify: $\dfrac{(2\frac{1}{4} \times \frac{2}{3}) + 4}{(8\frac{1}{4} \div 4\frac{5}{7}) - \frac{5}{6}}$.

   (c) Use logarithms or a slide rule to evaluate: $\dfrac{29.3 \times 5.31}{104}$.

4. There are 720 pupils in a school. A survey was carried out to ascertain how the pupils travelled to school. The following is the table showing the results of the survey:

School Bus	Ordinary Bus	Train	Car	Bicycle	Walked
240	180	60	50	110	80

Draw accurately a suitable <u>Pie chart</u> to represent this information and label the sections of this chart.

5. (a) Find the solution set of $3(3x - 5) - 15 = 5(x + 2) - 4(2x +1)$.

   (b) Divide $x^3 + 8x^2 + 17x + 10$ by $x + 5$ and show your work in your answer book.

6. A survey of 52 houses in an estate yielded the following information regarding the type of fuel used for heating purposes:

   2 used electricity only; 7 used oil only; 3 used coal only; 12 used both oil and electricity but not coal; 5 used both oil and coal but not electricity; 8 used both coal and electricity but not oil; 6 used none of these fuels.

Represent this information on a Venn Diagram and use the diagram to find the number of houses using all three fuels.
   What was the total number of houses that used (i) electricity, (ii) oil, (iii) coal, for heating purposes ?

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7. Sketch an accurate, clearly labelled diagram to represent the following situation:
L and M are perpendicular lines in the plane Π; a, p, q, x, y, z are distinct points of Π such that M∩L = {a}, p∈L, (p, a) ↑ (a, q), x∈M, y∈M, (x, a) ↑ (a, y), z∈M, (a, y) ↑ (y, z).

Hence answer each of the following questions:

(i) What is $S_L(x)$, i.e. the image of x by an axial symmetry in the line L ?

(ii) What is $S_a(p)$, i.e. the image of p by a central symmetry of centre a ?

(iii) What is $f(z)$, where f is the translation $\overrightarrow{ax}$?

(iv) What is the image of Δ pay by the central symmetry of centre a ?

(v) What operation maps Δ pax onto Δ pay ?

Use your ruler and set square to draw lines K and N such that K ∥ L, z∈K and N ⊥ L, p∈N. If K∩N = {b}, what operation maps b onto q ?

8. A building company is asked to take the contract of painting and repairing the houses in a large estate. The company estimates that the job will take 40 weeks to complete and that it will need: 1 foreman at £51 per week, 2 plasterers at £43 each per week, 12 painters at £42 each per week, 1 plumber at £41 per week and 7 general labourers at £32 each per week. A total of £44 per week is allowed for wages of part-time services of other people such as supervisors, order clerks, wages clerks, etc. What will be the total weekly wages bill ? What will be the total wages bill for the complete contract ?

The estimated cost of materials, transport and other incidental expenses is another £20 000. What will the entire contract cost the company ?

For what price should the company offer to take the contract if it wishes to make 5% profit on its total outlay ?