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 car rental company offers two different ways of renting a car.

   <u>Method I</u>   A payment of £12 per day plus a charge of 5p per km.

   <u>Method 2</u>   A payment of £18 per day with no charge per km.

   (a) A person hires a car for 5 days and travels 800 km. How much does he pay using Method I ?

   (b) What is the cost of renting a car for 5 days using Method 2 ?

   (c) What distance must he travel during the 5 day period so that both methods cost the same ?

2. If $a = 175·47$ and $b = 37·384$ 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 or slide rule and give each answer correct to 2 places of decimals.

   (All the usual calculations should be clearly shown in your answer book.)
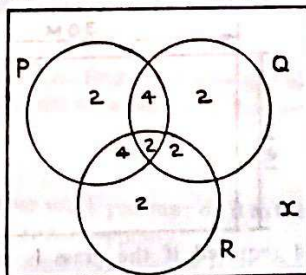
3. (i) The sets D, E, F, H, are given as follows :-

   $$D = \{ b, c, e, f \} \quad , \quad E = \{ 3, 4, 5 \} \quad , \quad F = \{ a, d, e, c, b \} \quad , \quad H = \{ 1, 3, 5, 9 \} \ .$$

   (a) List the elements of the following sets :-

   (i) $D \cup F$,
   (ii) $F \setminus D$,
   (iii) $D \cup E \cup H$,
   (iv) $E \cap H$.

   (b) Show whether the following is true or false. $F \setminus D \sim E \cap H$.

   (ii) The **Venn Diagram** shows the way a class of 21 pupils view 3 television programmes P, Q and R.

   (a) How many pupils watch programme P ?
   (b) How many pupils watch programmes Q and R ?
   (c) How many pupils watch at least two of the programmes, P, Q and R ?
   (d) How many pupils watch only one of the three programmes, P, Q and R ?
   (e) How many pupils watch none of these programmes ?   (i.e. x)
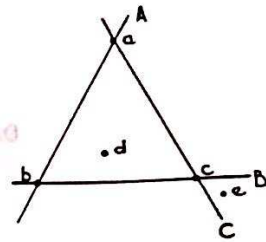
4. (a) Find the solution set of :-

   $$8 - 3(2x - 4) - 3x = 4(3x + 6) - 5(3x - 4)$$

   (b) Simplify the following :-

   $$(3x + 4)^2 + 7x - 2x(3x - 4) \ .$$

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5. (a) In the diagram A, B and C are lines and *a, b, c, d, e* are points. Draw a Venn Diagram to illustrate this.

    (b) Draw separate diagrams to illustrate the following:-

    (i) An arc.

   (ii) A closed curve.

    (iii) A simple closed curve.

6. In a survey carried out in a school of 720 students, each student was asked to name the sport he liked best. The results of the survey are as follows :-

Sport	Hurling	Gaelic Football	Athletics	Rugby	Soccer
Number	120	220	200	100	80

Represent the above information on a Pie-Chart.

7. A square *abcd* with diagonals intersecting at the point *o* is shown in the diagram.
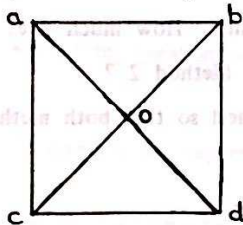
    (i) What is the image of the point *c* by the central symmetry S_o ?

    (ii) What is the image of the point *c* by the translation $\vec{co}$?

    (iii) What is the image of the point *d* by the clockwise rotation of 90° about *o* ?

    (iv) What is the image of the line segment [*bd*] by the translation $\vec{dc}$?

    (v) What is the image of the line segment [*ac*] by the axial symmetry in the line segment [*ad*] ?

    (vi) What is the image of the line segment [*cd*] by parallel projection on the line segment [*ad*] parallel to the line segment [*cb*] ?

    (vii) What is the image of the triangle *adc* by the axial symmetry, in the line segment [*ad*] ?

    (viii) What is the image of the triangle *odc* by the anti-clockwise rotation of 180° about *o* ?

    (ix) What is the image of the triangle *obd* by the central symmetry S_o ?

    (x) What is the image of the triangle *abc* by the parallel projection on the line segment [*cd*] parallel to the line segment [*ac*] ?

8. A garden 30 m long and 14 m wide in the shape of a rectangle with semi-circular end is sown with grass seed.
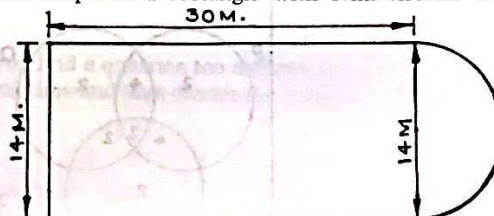
    (i) Calculate the area of the garden.

    (ii) Calculate the quantity of grass seed required if the grass is sown at the rate of 60 grams per square metre.

    (iii) If the seed costs £1·50 per kilogram, calculate the cost of sowing the garden.

    (Let $\pi = \frac{22}{7}$)