INTERMEDIATE CERTIFICATE EXAMINATION, 1969

MATHEMATICS - LOWER COURSE - PAPER I

WEDNESDAY, 11th JUNE - Morning, 9.30 to 12

Six questions to be answered
All questions carry equal marks

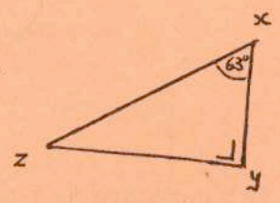
NOTE: In this paper $[xy]$ denotes a line segment whose end points are x and y.

1. Evaluate $\frac{5\sqrt{6 \cdot 15}}{3 \cdot 1}$ to one place of decimals.

2. A cylindrical water-barrel is 42 inches high. The radius of the base is 15 inches
   (i) Find the volume in cubic inches,
   (ii) Find to the nearest gallon how many gallons of water the barrel can contain given that a cubic foot of water is $6\frac{1}{4}$ gallons.
   [Take $\frac{22}{7}$ as an approximation for π]

3. (i) Prove that the sum of the angles in a triangle is two right angles.

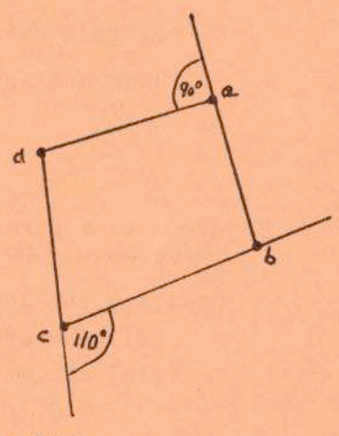
   (ii) In the diagram $[xy]$ and $[yz]$ are perpendicular to each other. How many degrees in $\angle yzx$?



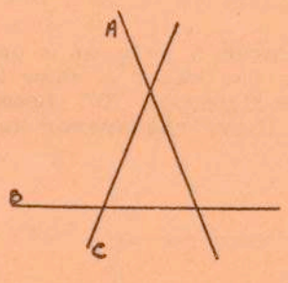
4. (a) Draw any angle $\angle aob$ and construct its bisector. Explain the construction.
   (b) (i) Construct a triangle abc given that
   length of $[ab]$ = 3 inches
   length of $[bc]$ = 5 inches
   length of $[ca]$ = 4 inches
   (ii) Prove $\angle bac$ is a right angle.

5. (a) A quadrilateral is inscribed in a circle. Prove the sum of the opposite angles is two right angles.

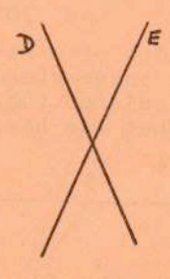
   (b) In the diagram could the points a,b,c,d belong to a circle ? Give a reason for your answer.



6. (a) Draw a Venn diagram of each of the following situations in (i) and (ii) (A, B, C, D, E are lines).



(i)



(ii)

[NOTE: see next page for rest of question 6].

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6. (continued).

(b) Copy diagram (ii) into your answer book and mark in clearly the locus of points equidistant from D and E.

(c) X, Y, Z and W are lines such that $X \perp Y$, $Z \parallel W$, $X \perp W$.

Say whether each of the following is true or false

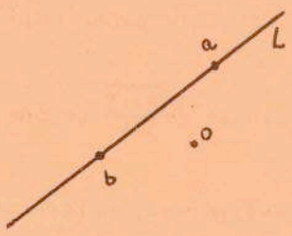
(i) $Y \parallel Z$

(ii) $X \parallel Z$

(iii) $Y \perp W$

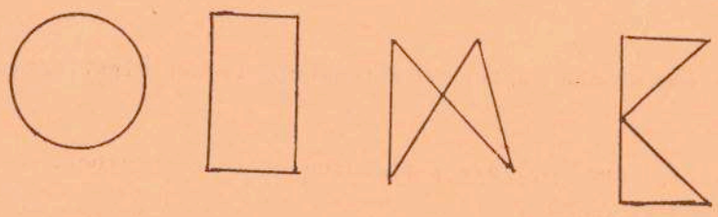
(Note: $\parallel$ means "is parallel to". $\perp$ means "is perpendicular to").

7. (a) (i) Copy this diagram and show clearly and name the image of a, b, L, and o under the central symmetry S_o.

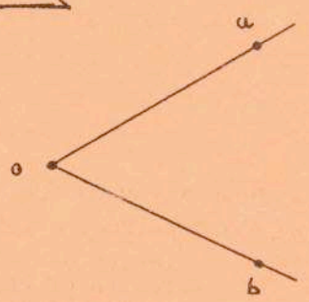


(ii) Mark a line X in the plane Π which is its own image under the central symmetry S_o.

(b) Some of these shapes have a centre of symmetry. Sketch each shape which <u>has</u> a centre of symmetry and mark clearly that centre of symmetry.



8. (a) Here are two half lines $[oa$ and $[ob$. Copy the diagram and find axes X and Y so that a reflection in X <u>followed by</u> a reflection in Y maps $[oa$ on $[ob$.



(b) A and B are lines in the plane Π which contain only one common point, and are not perpendicular.

S_A is a reflection in A.

S_B is a reflection in B.

Draw a diagram to illustrate that

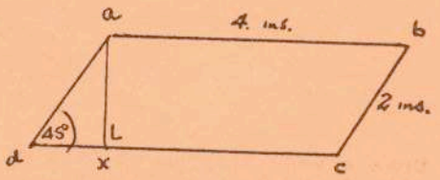
$$S_A \circ S_B \neq S_B \circ S_A$$ (Note: $\neq$ means "is not equal to")

9. $abcd$ is a parallelogram (see diagram). The lengths of the sides are shown in the diagram. $\angle adx$ measures 45°. $ax \perp cd$.

Find (i) the length of $[ax]$

(ii) the area of the triangle axd.

(iii) the area of the parallelogram $abcd$.



10. Use tables to evaluate

sin 65° ; cos 25°6′ ; tan 70°

A man wished to calculate the width of a river. He placed a pole at x on the water's edge directly across the river from a large stone y also at the water's edge (see diagram). At a point z 200 yards downstream he calculated that the angle $\angle yzx$ is 70°. From this he calculated the width of the river. What was his answer ? (Give the answer correct to one place of decimals).