

AN ROINN OIDEACHAIS  
INTERMEDIATE CERTIFICATE EXAMINATION, 1978

M.45(a)

MATHEMATICS - LOWER COURSE - PAPER I (150 marks)

THURSDAY, 8 JUNE - MORNING - 9.45 to 12.15

SECTION A (45 marks)

Examination Number

Attempt all questions. You should not spend more than 45 minutes on this section. Answer each question by writing one of (a), (b), (c), (d) in the box under each question number. If you wish to change an answer, cross out your first choice and write your new answer near the box.

Mathematics tables may be obtained from the Superintendent.

**THIS PAPER MUST BE ENCLOSED IN YOUR ANSWER BOOK.**

1.  $\frac{1}{2} + \frac{1}{3} + \frac{1}{6}$  is equal to

- (a)  $\frac{3}{11}$  (b)  $\frac{5}{6}$  (c)  $\frac{11}{12}$  (d) 1

2.  $\frac{12}{13} \times 3\frac{1}{4}$  is equal to

- (a)  $4\frac{3}{13}$  (b) 4 (c)  $3\frac{2}{13}$  (d) 3

3. Taxes of  $12\frac{1}{2}\%$  are charged on an article valued at £180. The amount of tax charged is

- (a) £12.50 (b) £20.50 (c) £22.50 (d) £24.50

4. Taking  $\pi = \frac{22}{7}$ , the surface enclosed by a circle has an area of  $\frac{88}{7}$ . Then  $r^2$  is

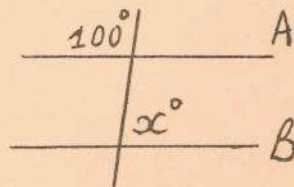
- (a) 16 (b) 4 (c)  $\frac{1}{4}$  (d)  $\frac{1}{16}$

5.  $pqrs$  is a parallelogram and  $(p, s)$  is the image of  $(q, r)$  under a parallel projection. This projection is parallel to

- (a)  $qr$  (b)  $pr$  (c)  $sq$  (d)  $rs$

6.  $A \parallel B$ . The value of  $x$  is

- (a) 60 (b) 80 (c) 100 (d) 90



7.  $K$  and  $L$  are two distinct lines which intersect at a point  $p$ .  $X$  is a line such that  $X \perp K$ . Which one of the following is impossible ?

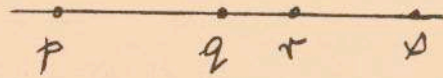
- (a)  $K, L, X$  form a triangle (b)  $X \parallel L$   
(c)  $X$  intersects  $L$  at  $p$  (d)  $X \perp L$

8.  $uvw$  is an isosceles triangle. Which one of the following could map the triangle onto itself ?

- (a) a translation (not the identity) (b) a central symmetry  
(c) an axial symmetry (d) a parallel projection

9.  $[pq] \cap [sr]$  is

- (a) null set (b)  $[ps]$   
 (c)  $[qr]$  (d) the line  $ps$



10.  $\cos 58^\circ 26'$  is

- (a) 0.5235 (b) 0.5245 (c) 0.8520 (d) 0.6276

11. Which one of the following has more than three axes of symmetry ?

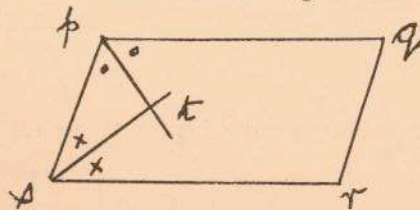
- (a) an equilateral triangle (b) a square  
 (c) a semi-circle (d) a parallelogram which is not a square

12. A parallel projection is a set of

- (a) lines (b) parallel lines (c) couples (d) equipollent couples

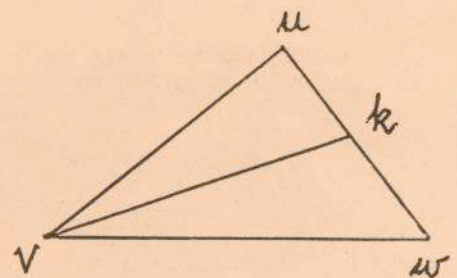
13.  $pqrs$  is a parallelogram in which  $|\angle qps| > |\angle psr|$  and two angles are bisected as shown in the diagram. Which one of the following is false ?

- (a)  $|\angle tps| > |\angle tsp|$   
 (b)  $|\angle tsr| < |\angle tpq|$   
 (c)  $|\angle pts| = 90^\circ$   
 (d)  $|ts| = |tp|$



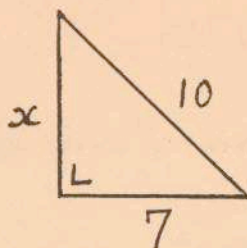
14.  $vk$  bisects the angle  $uvw$ . Under the axial symmetry in  $vk$

- (a)  $w \rightarrow u$  (b)  $v \rightarrow k$   
 (c)  $vw \rightarrow vu$  (d)  $wk \rightarrow uk$



15. The value of  $x$  is

- (a)  $\sqrt{51}$   
 (b) 51  
 (c) 3  
 (d)  $\sqrt{149}$



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## MATHEMATICS - LOWER COURSE - PAPER I (150 marks)

THURSDAY, 8 JUNE, MORNING - 9.45 to 12.15

## SECTION B (105 marks)

Attempt QUESTION 1 and THREE other questions

1. Use your tables, page 20 to page 27, or otherwise, to evaluate

(i)  $(2.49)^2$  and  $(2.49)^4$

(ii)  $\frac{1}{\sqrt{10}}$ , correct to two places of decimals.

If  $a = 136.9$  and  $b = 55.9$ , verify that

$$\frac{1}{a-b} \neq \frac{1}{a} - \frac{1}{b}$$

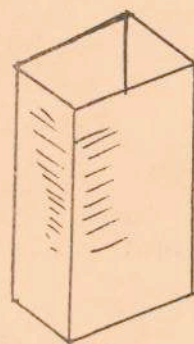
(25 marks)

2. The internal length, width and height of a rectangular box are in the ratio 2 : 3 : 5.

(i) If the length is 24 cm, find the width and the height.

(ii) Each edge of a cube is 3 cm long. Find how many of these cubes will fit into the above box so as to just fill it.

(iii) If larger cubes of side  $x$  cm long were used to fill the box, find the greatest value of  $x$ .



(20 marks)

3.  $phkt$  is a rectangle and its image under the axial symmetry in  $hk$  is the rectangle  $hxyk$ .

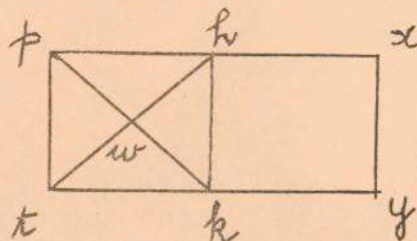
(a) Using the letters in the diagram, write down all the couples which are equipollent to  $(\vec{p}, \vec{h})$ .

(b) Name each of the following images:

(i) the image of  $\Delta pht$  under the central symmetry in  $w$

(ii) the image of  $[pk]$  under the translation  $\vec{ky}$

(iii) the image of  $[pw]$  under the projection on  $ht$  parallel to  $hk$ .



(c) Where is the centre of symmetry of the rectangle  $pxyt$ ?

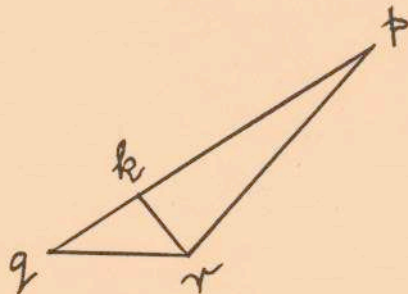
(20 marks)

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4. Prove that the measure of the exterior angle of a triangle equals the sum of the measures of the two interior opposite angles.

In the  $\Delta pqr$ ,  $|pk| = |pr|$

- (i) Prove  $|\angle pkr| > |\angle pqr|$   
 (ii) Prove  $|\angle prq| > |\angle pqr|$



(25 marks)

5. Construct the  $\Delta xyz$ , given that

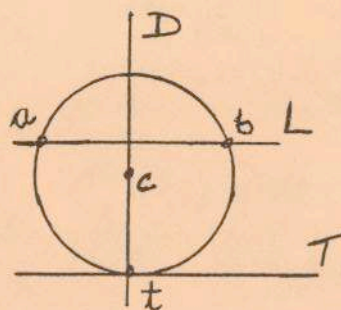
$|xy| = 12$  cm,  $|\angle zxy| = 70^\circ$ ,  $|yz| = 13$  cm.

Construct, without proof, the incircle of the  $\Delta xyz$ . All construction lines must be clearly shown.

(25 marks)

6. Prove that the diameter of a circle which is perpendicular to a tangent contains the point of contact.

$T$  is a tangent to a circle at  $t$ , and  $c$  is the centre of the circle.  $L$  is parallel to  $T$  and cuts the circle at  $a$  and  $b$ . Prove that the  $\Delta abt$  is isosceles.



(25 marks)

7. (a) Write  $\frac{7}{12}$  as a decimal and hence use the tables to find the measure of an angle  $A$  such that  $\sin A = \frac{7}{12}$ .

(b) A ship is sailing in the direction East  $36^\circ 52'$  North at a speed of 16 km per hour. At noon it is due West of a lighthouse,  $k$ , and is then 16 km from it. At what time will the ship be directly North of  $K$ ?

(30 marks)