

INTERMEDIATE CERTIFICATE EXAMINATION, 1976

MATHEMATICS - LOWER COURSE - PAPER I (150 marks)

THURSDAY, 10 JUNE - MORNING - 9.30 to 12

Examination Number

SECTION A (45 marks)

Attempt all questions. You should not spend more than 45 minutes on this section.
 Answer each question by writing either (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. 0.7×0.008 correct to one significant figure is

- (a) 0.06 (b) 0.006 (c) 0.6 (d) 0.0006

2. The base of a cylinder has a radius of length 7 cm. If the volume of the cylinder is 77 cm^3 , then the vertical height, taking $\pi = \frac{22}{7}$, is

- (a) $\frac{7}{2}$ cm (b) 2 cm (c) $\frac{1}{2}$ cm (d) $\frac{2}{7}$ cm

3. A and B are two distinct lines through a point p . B is parallel to a line K which does not contain p . Then

- (a) A does not cut K (b) A cuts K (c) $A \parallel B$ (d) $A \parallel K$

4. The four points p, q, k, t , are non-collinear and $(p, q) \uparrow (k, t)$. Then only one of the following figures is a parallelogram. Which one?

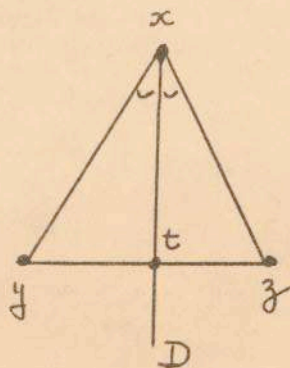
- (a) $pqkt$ (b) $ktpq$ (c) $qkpt$ (d) $tqpk$

5. A rotation is a set of

- (a) angles (b) points (c) lines (d) couples

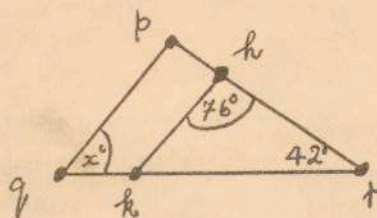
6. xyz is an isosceles triangle and D is the bisector of $\angle yxz$. Which one of the following statements is false?

- (a) Δxyx is the image of Δyxz by the axial symmetry in D
 (b) $[tz]$ is the image of $[yt]$ by the central symmetry in t
 (c) Δxyt is the image of Δxtz by the translation \vec{zt}
 (d) $[yt]$ is the image of $[xy]$ by the projection on yz parallel to D .

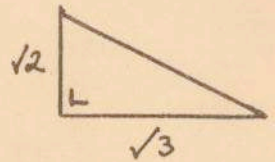


7. In Δpqr , $hk \parallel pq$. The value of x is

- (a) 76 (b) 118 (c) 62 (d) 42

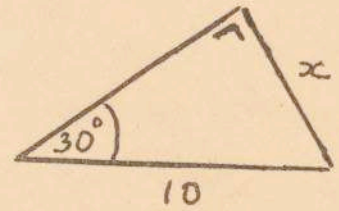


8. In the right-angled triangle, see diagram, the length of the hypotenuse is



- (a) $\sqrt{6}$ (b) $\sqrt{5}$ (c) $\sqrt{2} + \sqrt{3}$ (d) $\sqrt{10}$

9. x is the length of the side as indicated in the diagram. Then x is



- (a) $10 \cos 30^\circ$ (b) $10 \sin 30^\circ$
 (c) $\frac{\sin 30^\circ}{10}$ (d) $\frac{\cos 30^\circ}{10}$

10. 150% of 0.5 is

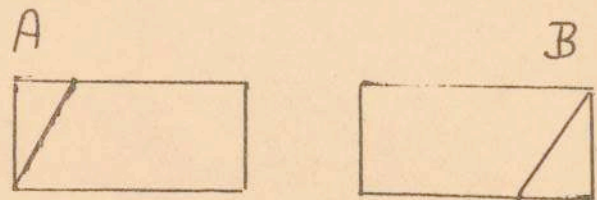
- (a) 75 (b) 125 (c) 1.25 (d) 0.75

11. When V.A.T. at the rate of 20% is added to the price of an article, the total cost of the article is £48. The amount of V.A.T. paid is

- (a) £8.00 (b) £9.60 (c) £40.00 (d) £57.60

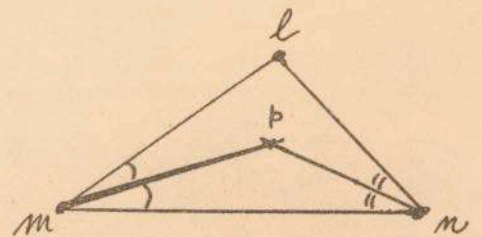
12. B is the image of A by

- (a) a translation
 (b) a central symmetry
 (c) an axial symmetry
 (d) a parallel projection



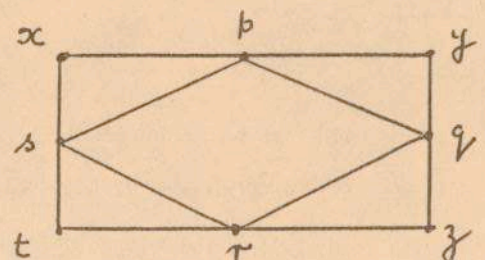
13. The bisectors of two angles of the triangle lmn meet in p , as in diagram. Which one of the following is true?

- (a) p is the incentre of the Δlmn
 (b) Δlmn is its own image under the central symmetry in p
 (c) p is the circumcentre of Δlmn
 (d) Δmpl is the image of Δmpn under the axial symmetry in pm .



14. $xyzt$ is a rectangle. The midpoints of the sides are joined to form the figure $pqrs$. Which one of the following statements is true?

- (a) perimeter of $pqrs =$ perimeter of $xyzt$
 (b) $|\angle pqr| + |\angle qrs| < 180^\circ$
 (c) area of $pqrs = \frac{1}{4}$ area of $xyzt$
 (d) area of $pqrs = \frac{1}{2}$ area of $xyzt$



15. $\cos 67^\circ 46'$ is

- (a) 0.9257 (b) 0.3784 (c) 0.3795 (d) 0.3778

AN ROINN OIDEACHAIS
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M.45

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SECTION B (105 marks)

Attempt QUESTION 1 and THREE other questions

1. Evaluate, correct to one place of decimals,

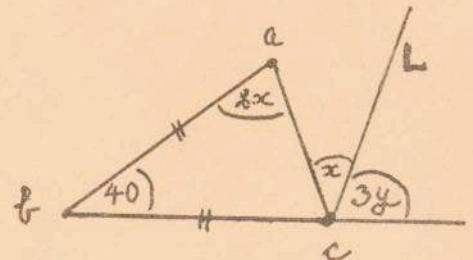
$$\frac{(17.3)^2 - (14.9)^2}{21.6}$$

(25 marks)

2. (a) A person has a yearly salary of £4300 of which £1800 is tax free. If the person pays income tax at the rate of $38\frac{1}{2}\%$ in the £, calculate how much tax the person pays in the year.
- (b) When a rectangular tank is $\frac{3}{4}$ full, it contains 600 m^3 of oil. If the area of the base of the tank is 25 m^2 , calculate the height of the tank.

(20 marks)

3. abc is an isosceles triangle having $|ba| = |bc|$, as in diagram. The side $[bc]$ is produced and L is a line as shown. Calculate the value of x and the value of y .



(20 marks)

4. Prove that the diagonals of a parallelogram bisect each other.
Show how to construct a parallelogram $abcd$ in which $|ab| = 6 \text{ cm}$ and the diagonals are 6 cm and 8 cm in length, respectively.

(20 marks)

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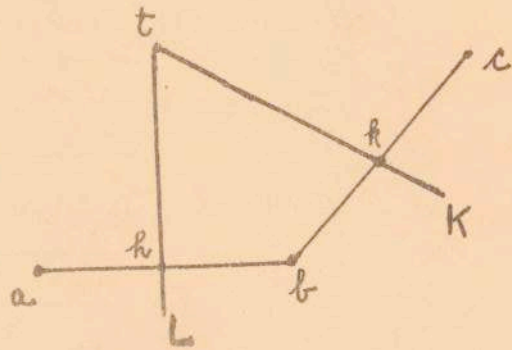
5. Say what is meant by an axial symmetry in a line.

If x is a point of the perpendicular bisector of a line segment $[pq]$, prove $|px| = |qx|$.

L and K are the perpendicular bisectors of the line segments $[ab]$ and $[bc]$, respectively (see diagram). If L and K intersect at t , prove that

(i) $|ta| = |tc|$.

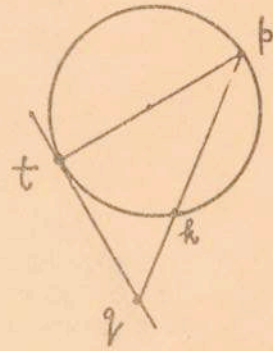
(ii) $|\angle htk| + |\angle hbk| = 180^\circ$.



(25 marks)

6. Prove that the angle at a point of a circle standing on a diameter is a right angle.

$[pt]$ is a diameter of a circle. (See diagram). q is any point of the tangent at t and pq cuts the circle at k . Prove $|\angle tqp| = |\angle ptk|$.

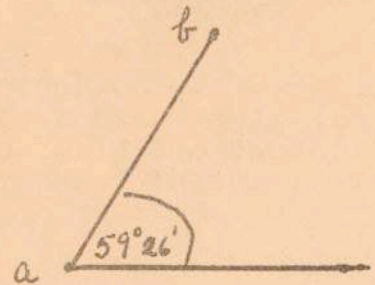


(25 marks)

7. Let $\sin 59^\circ 26' = x$. Use the Tables to find x .

If $\cos y = \frac{x}{3}$, use the Tables to find y , correct to the nearest minute.

A straight pier $[ab]$ makes an angle measuring $59^\circ 26'$ with a straight shore line, see diagram. If the pier is 27.3 m long, find the perpendicular distance from b to the shore line. Give your answer correct to three significant figures.



(30 marks)