AN ROINN OIDEACHAIS   M.45(a)

INTERMEDIATE CERTIFICATE EXAMINATION, 1980

MATHEMATICS - LOWER COURSE - PAPER I (150 marks)

FRIDAY, 13 JUNE - MORNING - 9.30 to 12.00

SECTION A (45 marks)   Examination Number

Attempt <u>all</u> questions.   You should not spend more than <u>45 minutes</u> 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. 56.2×0.5 is equal to

(a) 56.70 (b) 28.10 (c) 281.00 (d) 112.40

2. $2\frac{3}{4} \div \frac{3}{4} =$

(a) $3\frac{2}{3}$ (b) 2 (c) $2\frac{1}{16}$ (d) $3\frac{1}{2}$

3.   The volume of a cylinder is 24.   The radius of its base is equal to its height.   Taking $\pi = 3$, the radius is

(a) $\frac{8}{3}$ (b) 2 (c) 8 (d) 24

4.   V.A.T. at 25% is added to the price of an article valued at £25.   The final price of the article is

(a) £6.25   (b) £31.25   (c) £26   (d) £18.75

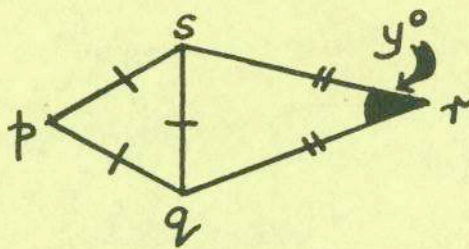5.   P,Q,R,S are lines such that $P \parallel Q$, $R \perp Q$, $S \perp R$.   The number of parallelograms formed is

(a) 1   (b) 2   (c) 4   (d) 0

6.   The set of all couples such that the point k is the centre of each is

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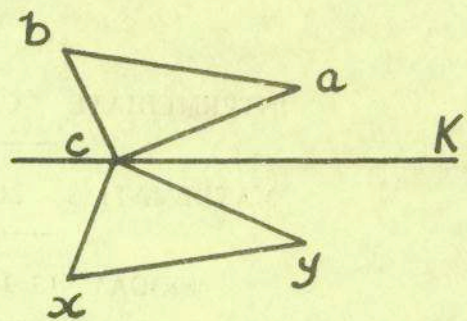(c)   translation   (d)   parallel projection

7. $|\angle pqr| = 130°$.   Then y is

(a) 40   (b) 60
(c) 30   (d) 20

OVER →

8. Δ *cxy* is the image of Δ *abc* under the axial symmetry in the line K.   Which one of the following is <u>false</u> ?

(a) K bisects ∠ *acy*

(b) area of Δ *abc* = area of Δ *cxy*

(c) | *ca* | = | *cy* |
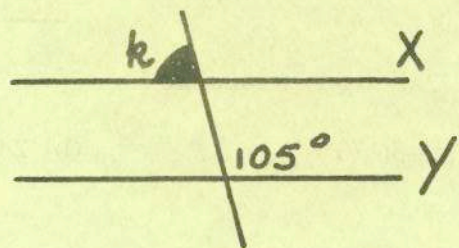
(d) *ba* ∥ *xy*.

9. The four angles of a parallelogram sum to

(a) 180°   (b) 360°   (c) 720°   (d) 270°

10. X ∥ Y.   Then *k* is

(a) 105°   (b) 75°
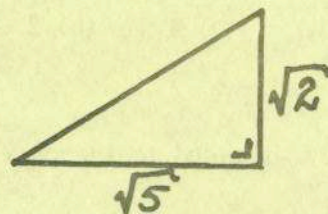
(c) 255°   (d) 210°

11. Which one of the following has only two axes of symmetry ?

(a) rectangle that is not a square   (b) square
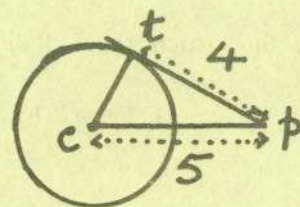
(c) equilateral triangle   (d) circle

12. The length of the hypotenuse is

(a) $\sqrt{7}$ (b) 7

(c) $\sqrt{\sqrt{2} + \sqrt{5}}$ (d) $\sqrt{29}$

13. *pt* is a tangent to the circle of centre *c*.   The radius of the circle is

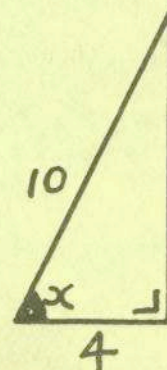(a) 1   (b) 2

(c) 3   (d) $\sqrt{41}$

14. Tan 63° 37′ is

(a) 2·0160   (b) 2·0145   (c) 1·0145   (d) 1·0160

15. The value of *x* is

(a) 21° 48′
(b) 66° 25′
(c) 66° 23′
(d) 23° 35′

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SECTION B (105 marks)

Attempt QUESTION 1 and THREE other questions

1. Use your tables, page 20 to page 27, or otherwise, to find the value of

$$p^2 + \sqrt{3p} + \frac{1}{p^2}$$

where $p = 13{\cdot}67$
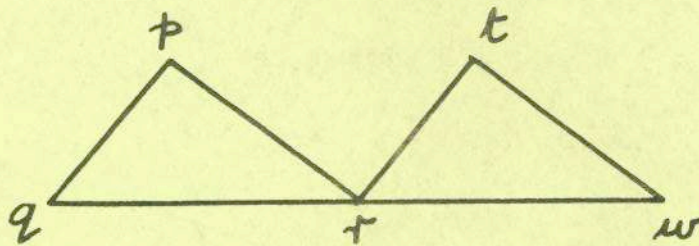
Express your answer correct to one place of decimals.

(25 marks)

2. The area of one face of a solid cube of lead is 64 cm². Calculate the volume of the cube.

The lead is melted down and made into a solid cylinder having a base 8 cm. in diameter. Calculate the height of the cylinder, taking π to be $\frac{22}{7}$ and give your answer correct to one place of decimals.

(20 marks)

3.

The $\Delta\,trw$ is the image of the $\Delta\,pqr$ under the translation $\overrightarrow{qr}$.

(a) Fill in the missing letters in your answer book

    (i) $(q, r)\ \uparrow\ (\ ,\ )$

    (ii) $(\ ,\ )\ \uparrow\ (w, t)$

    (iii) $(t,\ )\ \uparrow\ (\ , r)$

(b) $[r\,w]$ is the image of $[p\,t]$ under a certain parallel projection.

    What is the image of (i) $[p\,r]$, (ii) $\Delta\,pqr$ under the same parallel projection ?

(c) The lines qp and wt when produced meet at k. If the area of $\Delta\,pqr$ is 5, say what is the area of (i) $\Delta\,kpt$ (ii) $\Delta\,kqw$.

(20 marks)

OVER →

4. Prove that a diagonal of a parallelogram bisects the area of the parallelogram.

Prove that the area of a Δ abc is $\frac{1}{2}$ $|ab|$. h, where h is the distance of a from ab.

(25 marks)

5. Draw a circle of radius 5 cm.

Find two points q and r of the circle such that $|qr| = 6$ cm.

Using $[qr]$ as base construct the Δ pqr such that $|pq| = |pr|$ and p is a point of the circle.
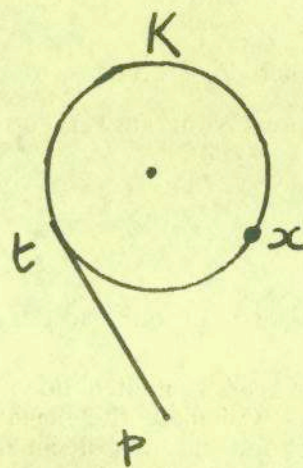
Measure $[pq]$ and $\angle pqr$.

(25 marks)

6. Show, with proof, how to construct a tangent to a given circle from a point outside the circle.
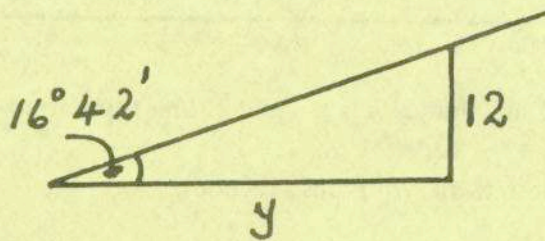
pt is a tangent to the circle K.

$x \in$ K such that $|pt| = |px|$.

Prove that px is also a tangent to K.

(25 marks)

7. If tan A = 0·3 and A < 90°, use your tables to find A.

When the angle of elevation of the sun is 16° 42', a shadow y metres in length is cast by a pole 12 m high.   Calculate y.

When the shadow is only half as long, is the angle of elevation doubled ? Give your reason.

(30 marks)