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. $0.0035$ is equal to
   
   (a) 350 x $10^{-4}$    
   (b) 3.5 x $10^{-3}$    
   (c) 0.35 x $10^{-2}$   
   (d) 3.5 x $10^{2}$

2. The length of a side of a solid cube is 5 cm. The area of the surface of this cube in cm$^2$ is
   
   (a) 25    
   (b) 100    
   (c) 125    
   (d) 150

3. $3\frac{3}{4} \div 2 \frac{1}{4}$ is
   
   (a) $\frac{3}{5}$    
   (b) $\frac{4}{5}$    
   (c) $1\frac{1}{5}$    
   (d) $1 \frac{2}{5}$

4. Angela completes a journey of 25 km in 50 minutes. Her average speed in km per hour is
   
   (a) 2    
   (b) 30    
   (c) 35    
   (d) 120

5. Each diagonal of a square is 4 cm in length. One side of the square is of length
   
   (a) 2 cm    
   (b) $\sqrt{2}$ cm    
   (c) $\sqrt{8}$ cm    
   (d) 8 cm

6. The set of all couples such that each is equipollent to $(h,k)$ is
   
   (a) a projection    
   (b) a translation    
   (c) a central symmetry    
   (d) an axial symmetry

7. $\triangle pqr$ is the image of $\triangle xyt$ by
   
   (a) a projection    
   (b) a translation    
   (c) a central symmetry    
   (d) an axial symmetry
8. The value of $x$ is
   (a) 40° (b) 85° (c) 50° (d) 95°

9. $\triangle ghk$ is isosceles and $L \parallel hk$.
   $x^o$ is the measure of the angle as indicated.
   $x^o$ is equal to
   (a) 40° (b) 70° (c) 140° (d) 50°

10. $pqrs$ is a parallelogram. $|pq| \neq |qr|$. The diagonals intersect at $x$. Which one of the following statements is false?
   (a) $q$ is the image of $p$ by the translation $\sigma$
   (b) $x$ is the image of $q$ by the central symmetry in $x$
   (c) $r$ is the image of $p$ by the axial symmetry in $xq$
   (d) $p$ is the image of $x$ by the projection on $pq$ parallel to $rp$.

11. The area of the surface enclosed by the isosceles triangle is
    (a) 48 (b) 96 (c) 50 (d) 60

12. $k$ is the centre of the circle and $|pk| = |pr|$. Then
    $|Lpq|=|Lpr|$ is equal to
    (a) 45° (b) 30° (c) 15° (d) 60°

13. $pt$ is a tangent to the circle, centre $c$ and radius of length 5 cm. If $|pt| = 12$ cm, then $|pc| =$
    (a) $\sqrt{17}$ cm (b) 12 cm (c) 13 cm (d) 7 cm

14. A right angled triangle has sides of length 7, 24, 25. If $\cos X = \frac{7}{25}$, then
    $\sin X$ is equal to
    (a) $\frac{7}{24}$ (b) $\frac{25}{24}$ (c) $\frac{25}{7}$ (d) $\frac{24}{25}$

15. $\angle Lbca =$
    (a) 32° 41' (b) 57° 18' (c) 57° 17' (d) 57° 19'
1. Using your tables page 20 to page 27, or otherwise, find

(i) \((7.348)^2\)  
(ii) \(\sqrt{7.29}\)  
(iii) \(\frac{1}{43.47}\)

Simplify: \(\frac{(7.348)^2}{\sqrt{7.29} \times 43.47}\)

and give your answer correct to one significant figure.

(25 marks)

2. (i) An article which cost £80 is increased in price by 20%. What does the article cost now?

(ii) The volume of a cylinder is 308 cm\(^3\). If the area of the base is 38.5 cm\(^2\), find the height of the cylinder.

Find also the length of the radius of the base, taking \(\frac{22}{7}\) as an approximate value of \(\pi\).

(20 marks)

3. If two sides of a triangle are equal in length, prove that the measure of the angles opposite these sides are also equal.

Hence prove that in an equilateral triangle the three angles are equal in measure.

(20 marks)

4. Prove that a central symmetry maps a line onto a parallel line.

In the diagram \(c\) is the midpoint of \([bd]\) and \(ba\parallel de\).

Using the central symmetry \(S_\alpha\), or otherwise, prove that the \(\triangle abc\) is congruent to the \(\triangle ecd\).

(25 marks)

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5. Show, with proof, how to construct the bisector of a given angle. (Use of protractor not allowed).

L is the bisector of the \( \angle pqr \) and \( x \) is any point of \( L \). Prove that the distance of \( x \) from \( qp \) is equal to the distance of \( x \) from \( qr \).

(25 marks)

6. Prove that a circle is mapped onto itself by the axial symmetry on any line through its centre.

Two circles of centres \( c \) and \( k \), as in diagram, intersect in \( x \) and \( y \).

Prove that \( c k \parallel x y \).

(25 marks)

7. Use your tables to find the value of \( \sin 23^\circ 35' \).

An aeroplane taking off from the ground flies in a straight line making an angle measuring \( 23^\circ 35' \) with the horizontal level ground. If the aeroplane is flying at a speed of 3 km a minute, find its height above the ground after 2.5 minutes.

(30 marks)