

SECTION A (100 marks)

1. $1\frac{1}{7} \times 5\frac{1}{4}$ is equal to:

$$\frac{8}{7} \times \frac{21}{4}$$

$$\frac{84}{108} = \frac{21}{27}$$

D

(a) $5\frac{1}{28}$

(b) $\frac{32}{147}$

(c) $\frac{147}{32}$

(d) 6

2. 8% of a number is x. Then 6% of the same number is:

$$x = \frac{8}{100}$$

D

(a) $\frac{3x}{400} = \frac{24}{400}$

(b) $\frac{400x}{3}$

(c) $\frac{4x}{3}$

(d) $\frac{3x}{4}$

3. 1 cm³ of a liquid has a mass of 6.25 grammes. Then 1 litre of the liquid has a mass in kilograms of



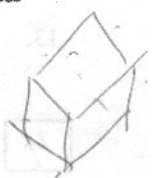
A

(a) 6250

(b) 6250000

(c) 625

(d) 6.25



4. The surface area of a cube is $\frac{27}{2} m^2$. The length of one edge of the cube in m is

$$6x^2$$

(a) $\frac{27}{18}$

(b) $\frac{27}{24}$

(c) $\frac{27}{4}$

(d) $\frac{27}{12}$

$$\frac{27}{12}$$

5. A person pays an average of 30p tax in the IR£ on his salary. If IR£x tax is paid, the salary in IR£ is

$$\frac{27}{2}$$

(a) 30x

(b) $\frac{30x}{100}$

(c) $\frac{x}{30}$

(d) $\frac{100x}{30}$

6. P and Q are squares of equal size. P is not the image of Q under

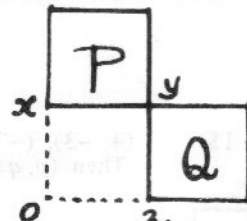
b

(a) rotation about o

(b) translation \vec{ox}

(c) central symmetry in y

(d) axial symmetry in oy



7. $|pq| = |pr|$ and $|qx| = |xr|$
Which one of the following maps the triangle onto itself?

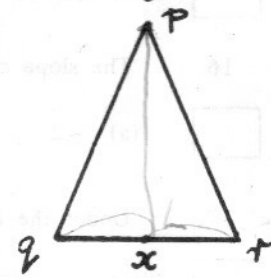
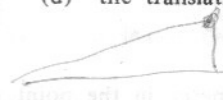
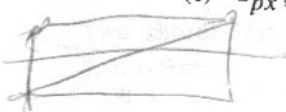
C

(a) S_x , the central symmetry in x

(b) $S_q \circ S_p$

(c) S_{px} , the axial symmetry in px

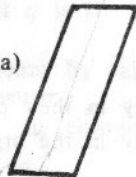
(d) the translation \vec{qx}



8. Which has the greatest number of axes of symmetry?

D

(a)



(b)



(c)



(d)



$$\frac{16}{25}$$

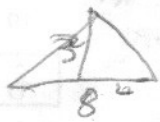
9. Which one of the following is a symmetric relation?

(a) $\{(p, p), (p, q), (p, r)\}$

(b) $\{(p, p), (p, q), (q, q)\}$

(c) $\{(p, p), (q, p), (r, p)\}$

(d) $\{(p, p), (p, q), (q, p)\}$



10. o is the centre of the circle and $|mn| = 8$ cm. If the area of the Δomn is 12 cm², then the radius of the circle in cm is

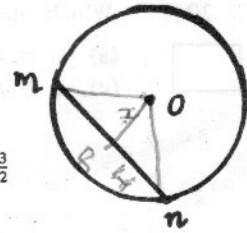
A

(a) 5

(b) 3

(c) $\frac{1}{2} \sqrt{73}$

(d) $\frac{3}{2}$



$$\frac{1}{2} \cdot 8 \cdot x = 12$$

$$4x = 12$$

$$\frac{x}{2} \cdot 8 =$$

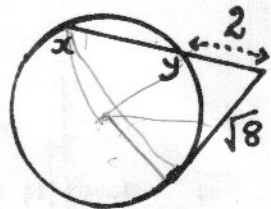
$$4x = 12$$

$$x = 3$$

$$\frac{64}{73}$$

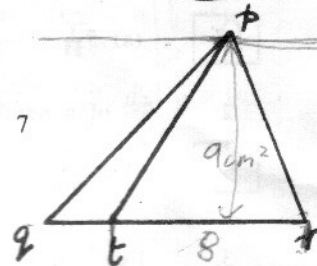
11. $|xy| =$

- (a) 4 (b) $\sqrt{2}$ (c) 2 (d) $\sqrt{6}$



12. The area of Δpqr is 12 cm^2 and the area of Δpqt is 3 cm^2 .
If $|qr| = 8 \text{ cm}$, then $|tr|$ is

- (a) 2 (b) 6 (c) $\frac{8}{3}$ (d) 7

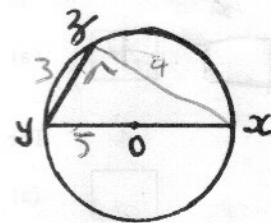


$8 \times x \times \frac{1}{2} = 9 \text{ cm}$ $4x = 9$

13. The radius of the circle of centre o is 5 cm and $|yz| = 3 \text{ cm}$.
Then $|zx|$ is

 4

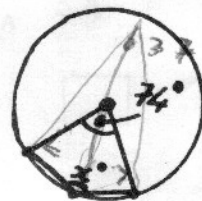
- (a) 4 (b) 9 (c) $\sqrt{34}$ (d) $\sqrt{91}$



14. The value of x is

B?

- (a) 106 (b) 143 (c) 164 (d) 127



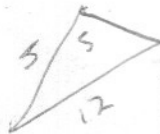
15. $(4, -3), (-7, -6), (-5, 1), (p, q)$ are the vertices taken in order of a parallelogram.
Then (p, q) is

- (a) $(6, 4)$ (b) $(3, 3)$ (c) $(2, -10)$ (d) $(11, 3)$

16. The slope of the line $4x + ty = 12$ is 2. Then t is

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

17. Under the central symmetry in the point $(2, 1)$ the image of the line $x - y = 1$ is



- (a) $x + y = 1$ (b) $2x + y = 1$ (c) $x + 2y = 1$ (d) $x - y = 1$

18. The line $x - 2y = 1$ is mapped onto the line $x + 2y = 1$ under

- (a) the axial symmetry in the x -axis (b) the central symmetry in their point of intersection
(c) the axial symmetry in the y -axis (d) the central symmetry in the origin.

19. If $A < 90^\circ$ and $\sin A = \frac{5}{12}$, then $\tan A$ is

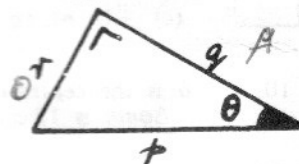
 B

- (a) $\frac{5}{13}$ (b) $\frac{5}{\sqrt{119}}$ (c) $\frac{12}{13}$ (d) $\frac{\sqrt{119}}{13}$

30
 44
 109
 144
 -25
 119

20. Which one of the following is correct ?

- (a) $p = q \sin \theta$ (b) $p = q \cos \theta$
(c) $q = p \cos \theta$ (d) $q = p \sin \theta$

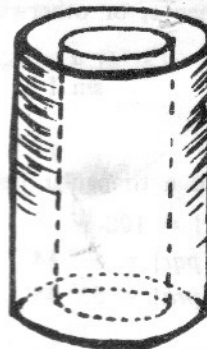


$\frac{O}{H} = \sin \theta$

SECTION B (200 marks)

1. (a) IR£1035 amounts to IR£1190.25 after one year. Find the rate per cent per annum. A sum of money invested at compound interest amounts to IR£1035 after one year and to IR£1190.25 after two years. Calculate the sum invested.

- (b) A cylinder of height h having a base of radius $\sqrt{2}$ is placed inside another cylinder also of height h as in diagram. If the space between the two cylinders is to have a volume equal to the volume of the inner cylinder, calculate the radius of the base of the outer cylinder.



2. Construct the quadrilateral $abcd$ given that

$$|ab| = 8 \text{ cm} = |ac|$$

$$|bc| = 7 \text{ cm} = |ad|$$

$$|\angle adc| = 90^\circ$$

Calculate the area of the quadrilateral correct to two places of decimals.

(Note. All construction lines must be clearly shown.)

3. Draw a diagram to illustrate the following statement:

"[oa and [ob are two half lines. B is a line such that [ob is the image of [oa under the axial symmetry in B ".

abc is an isosceles triangle having $|ab| = |ac|$.

Prove

(i) $|\angle abc| = |\angle acb|$

(ii) the bisector of $\angle bac$ is perpendicular to bc .

In a Δpqr

$$|\angle qpr| = 90^\circ$$

and m is the midpoint of [qr].

Prove that the bisector of $\angle pmr$ is parallel to pq .

4. Two chords [pq] and [rs] of a circle intersect at x inside the circle.

Prove that

$$|px| \cdot |xq| = |rx| \cdot |xs|.$$

Let m be the midpoint of [px]. Another circle through r, m, s cuts [pq], produced, at y .

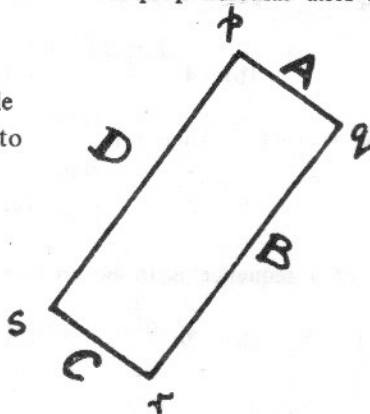
Prove that q is the midpoint of [xy].

5. What is meant by saying that equipollence is a transitive relation. Give an example to illustrate your answer.

Prove that the composition of two axial symmetries in perpendicular axes is a central symmetry.

The four lines A, B, C, D form the rectangle $pqrs$. What single transformation is equal to the composition of axial symmetries

$$S_D \circ S_C \circ S_B \circ S_A ?$$



6. $a(-2, -3)$, $b(7, 3)$, $c(3, 5)$ are the coordinates of the vertices of a triangle. Verify that m , the midpoint of $[ab]$, is on the x -axis. Find the slope of cm and hence find the equation of the line through b which is parallel to cm . Investigate if c is inside the circle drawn on $[ab]$ as diameter.

7. (a) Using the usual notation prove that

$$\text{area of } \Delta = \frac{1}{2} ab \sin C$$

and hence, or otherwise, deduce that

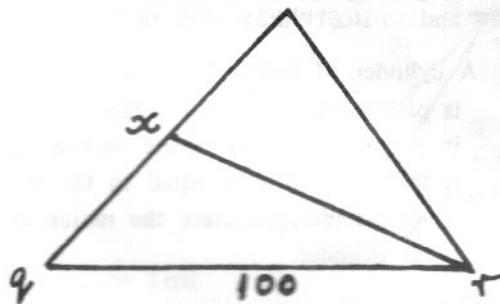
$$\frac{a}{\sin A} = \frac{c}{\sin C}$$

- (b) pqr is a triangular field in which

$$|qr| = 100 \text{ m}$$

$$|\angle pqr| = 47^\circ 44'$$

$$|\angle prq| = 53^\circ 45'$$



A farmer wishes to sow 2220 m^2 of wheat in the triangular piece qrx and potatoes in the remainder. Calculate the required distance of x from q .

Find, correct to two significant figures, the length $|pr|$ and hence calculate, as accurately as the tables allow, the area sown under potatoes.