

## PLANE GEOMETRY

Monday, January 20, 1958 — 9:15 a.m. to 12:15 p.m., only

Name of pupil.....Name of school.....

Name and author of textbook used.....

## Part I

Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Unless otherwise specified, answers may be left in terms of  $\pi$  or in radical form.

- 1 Find the number of degrees in the sum of the interior angles of a polygon of seven sides. 1.....
- 2 In a circle, diameter  $AB$  bisects chord  $CD$  at  $E$ . If  $CD = 12$  and  $BE = 4$ , find  $EA$ . 2.....
- 3  $CD$  is the altitude to the hypotenuse of right triangle  $ABC$ . If  $AD = 9$  and  $BD = 16$ , find  $CD$ . 3.....
- 4 The area of a trapezoid is 55 square inches. If the bases of the trapezoid are 9 inches and 13 inches, find the number of inches in the altitude. 4.....
- 5 In triangle  $ABC$ , angle  $A$  is  $60^\circ$  and angle  $B$  is  $50^\circ$ . Which is the shortest side of triangle  $ABC$ ? 5.....
- 6 The sides of a triangle are 5, 6 and 9. Find the shortest side of a similar triangle whose perimeter is 60. 6.....
- 7 Point  $A$  is 10 inches from the center of a circle whose radius is 6 inches. Find the number of inches in the length of the tangent to the circle from point  $A$ . 7.....
- 8 A circle whose radius is  $r$  is inscribed in a square. Express the area of this square in terms of  $r$ . 8.....
- 9 Central angle  $AOB$  in circle  $O$  contains  $80^\circ$ , and  $X$  is any point on major arc  $AB$ . Find the number of degrees in angle  $AXB$ . 9.....
- 10 Equilateral triangle  $ABC$  is inscribed in a circle. Find the number of degrees in the acute angle formed by side  $AB$  and the tangent at  $B$ . 10.....
- 11 Find the area of the regular polygon whose perimeter is 40 and whose apothem is 5. 11.....
- 12 The diagonals of a rhombus are 4 and 6. Find a side of the rhombus. 12.....

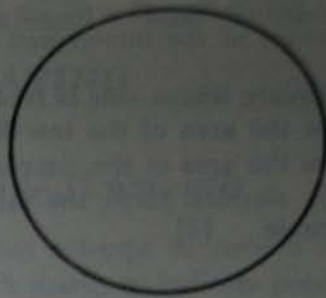
- 13 Find a side of an equilateral triangle whose area is  $36\sqrt{3}$ . 13.....
- 14 Two adjacent sides of a parallelogram are 6 and 18, and the included angle is  $30^\circ$ . Find the area of the parallelogram. 14.....
- 15 In triangle  $ABC$ , angle  $A = 48^\circ$ ,  $AB = 12$  and  $BD$  is the altitude to  $AC$ . Find  $BD$  to the nearest tenth. 15.....
- 16 If the number of degrees in angles  $A$  and  $B$  of parallelogram  $ABCD$  are represented by  $2x + 10$  and  $3x + 40$ , respectively, find the value of  $x$ . 16.....
- 17 The sides of a triangle are 6, 7 and 9. Find the perimeter of the triangle formed by joining the midpoints of these sides. 17.....
- 18 A 30-inch line is divided in two parts which have the ratio 2:3. Find the number of inches in the shorter part. 18.....

*Directions (19–23):* Indicate the correct completion for *each* of the following by writing on the line at the right the letter *a*, *b*, *c* or *d*.

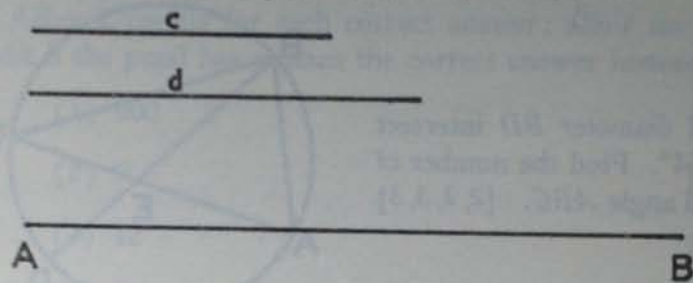
- 19 If the radius of a circle is increased by  $x$  inches, the circumference is increased by  
 (a)  $x$  in. (b) 2 in. (c)  $2\pi$  in. (d)  $2\pi x$  in. 19.....
- 20 A given point is 8 inches from a given straight line. The number of points which are 3 inches from this line and, also, 6 inches from this point is (a) 0  
 (b) 2 (c) 3 (d) 4 20.....
- 21 The ratio of the radii of two circles is 2:3. If the area of the smaller circle is 12 square inches, the number of square inches in the area of the larger circle is  
 (a) 8 (b) 18 (c) 27 (d) 216 21.....
- 22 Similar polygons are defined as polygons which have (a) corresponding angles equal (b) corresponding sides equal and corresponding angles equal (c) corresponding sides proportional and corresponding angles equal (d) corresponding sides proportional 22.....
- 23 Given the statements below:  
 (1) The sum of the angles of a triangle is a straight angle.  
 (2) When two parallel lines are cut by a transversal, the alternate interior angles are equal.  
 (3) The acute angles of a right triangle are complementary.  
 A logical sequence in which these statements can be proved is (a) 3, 1, 2  
 (b) 2, 3, 1 (c) 2, 1, 3 (d) 1, 3, 2 23.....

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- 24 Find by construction the center of the circle at the right.



- 25 Divide the line segment  $AB$  in the ratio  $c:d$ .



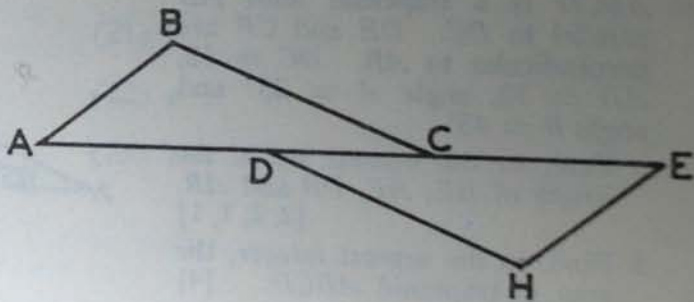
Part II

Answer three questions from this part.

- 26 Prove: The diagonals of a parallelogram bisect each other. [10]

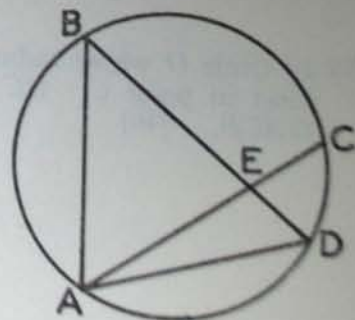
- 27 In the figure at the right,  $AE$  is a straight line,  $AD = CE$  and  $BC$  is equal and parallel to  $DH$ .

Prove:  $AB = EH$ . [10]



- 28 In the diagram at the right,  $B$  is the midpoint of major arc  $AC$ . Chords  $BD$  and  $AC$  intersect at  $E$ . Chords  $AD$  and  $AB$  are drawn.

Prove:  $BD \times BE = (AB)^2$ . [10]



[3]

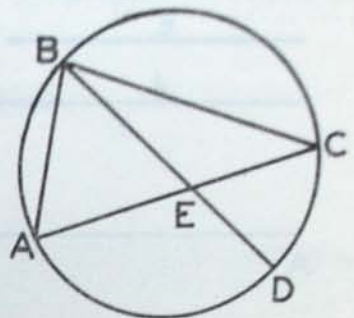
[OVER]

- 29 Prove: An angle formed by two secants intersecting outside the circle is measured by one-half the difference of the intercepted arcs. [10]
- 30 Given a square whose side is represented by  $s$ .
- Express the area of the inscribed circle in terms of  $\pi$  and  $s$ . [3]
  - Express the area of the circumscribed circle in terms of  $\pi$  and  $s$ . [5]
  - Find, in *simplest form*, the ratio of the area of the inscribed circle to the area of the circumscribed circle. [2]

### Part III

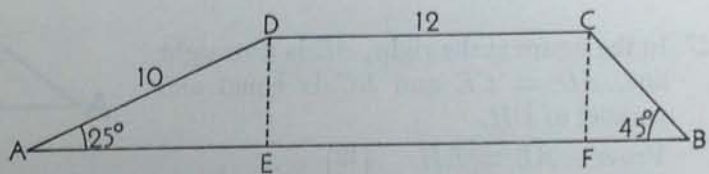
Answer two questions from this part. Show all work.

- 31 In the circle at the right, chord  $AC$  and diameter  $BD$  intersect at  $E$ . Arc  $AB = 68^\circ$  and angle  $BAC = 64^\circ$ . Find the number of degrees in arc  $AD$ , arc  $BC$ , angle  $BEC$  and angle  $ABC$ . [2, 2, 3, 3]



- 32 In rhombus  $ABCD$ , diagonals  $AC$  and  $BD$  intersect at  $E$ . The lengths of  $AC$  and  $BD$  are represented by  $2x$  and  $2x - 4$ , respectively. Side  $BC = 10$  and the perimeter of triangle  $BEC = 24$ . Find the area of the rhombus. [10]

- 33  $ABCD$  is a trapezoid with  $AB$  parallel to  $DC$ .  $DE$  and  $CF$  are perpendicular to  $AB$ .  $DC = 12$ ,  $AD = 10$ , angle  $A = 25^\circ$  and angle  $B = 45^\circ$ .



- Find, to the *nearest tenth*, the length of  $DE$ ,  $AE$ ,  $FB$  and  $AB$ . [2, 2, 1, 1]
- Find, to the *nearest integer*, the area of trapezoid  $ABCD$ . [4]

- 34 In circle  $O$  whose radius is 10,  $AB$  is an arc of  $60^\circ$ . The tangents to the circle at  $A$  and  $B$  meet in point  $C$ .  $OC$  is drawn. Find, to the *nearest integer*, the area of the quadrilateral  $OACB$ . [10]

# FOR TEACHERS ONLY

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## INSTRUCTIONS FOR RATING PLANE GEOMETRY

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Use only *red* ink or pencil in rating Regents papers. Do not attempt to *correct* the pupil's work by making insertions or changes of any kind. Use check marks to indicate pupil errors.

Unless otherwise specified, mathematically correct variations in the answers will be allowed. Units need not be given when the wording of the questions allows such omissions.

### Part I

Allow 2 credits for each correct answer; allow no partial credit. For questions 19–23, allow credit if the pupil has written the correct answer instead of the letter *a*, *b*, *c* or *d*.

- |                           |                 |
|---------------------------|-----------------|
| (1) 900                   | (13) 12         |
| (2) 9                     | (14) 54         |
| (3) 12                    | (15) 8.9        |
| (4) 5                     | (16) $26^\circ$ |
| (5) <i>AC</i> or <i>b</i> | (17) 11         |
| (6) 15                    | (18) 12         |
| (7) 8                     | (19) <i>d</i>   |
| (8) $4r^2$                | (20) <i>b</i>   |
| (9) 40                    | (21) <i>c</i>   |
| (10) 60                   | (22) <i>c</i>   |
| (11) 100                  | (23) <i>c</i>   |
| (12) $\sqrt{13}$ or 3.6   |                 |