Test Examinations 1960 Mathematics Papers 1 and 2

PAPER I 2½hrs MATHEMATICS. TEST EXAMS. JAN. 1960.

Answer ALL questions in Section A and any THREE questions from Section B.

In each question necessary details of working, including rough work, must be shown with the answer.

Answer questions in Section A on separate paper from questions in Section B.

Section A.

A.1. (a). Solve $\frac{1}{7}(3x-4)+\frac{1}{4}=\frac{3}{8}x$

(b). ABCDE is a regular pentagon, calculate the angle CAD.

(c) A man spent $\frac{2}{7}$ of his income on rent and his other expenses amounted to $\frac{5}{8}$ of the remainder. What fraction of his income did he save?

A.2. (a) If $t=\frac{2br-c}{b+2a}$, express b in terms of a, c, t and r

(b) Taking the radius of the Earth to be 3,960 miles, calculate the radius of the circle of latitude 39° S.

(c) A grocer buys goods at 29s. 2d a cwt., out ¼ of them are spoiled. At what price per lb. must he sell the rest to make 4% profit on his outlay?

A.3. (a) Using ruler and compass only, construct a triangle ABC in which AC = 5.3 in., ∠A = 30°, ∠C = 45° Measure BC in inches (Show all construction lines)

(b) Find the L.C.M. of $2x^2+4x-6$, x^2-9 and $5x^2+20x+15$.

A4. O is any point inside triangle ABC, and parallelograms OBPC, OCQA and OARB are completed. Prove that (i). Δs OBC, ARQ are congruent.

(ii). Δs ABC, PQR are congruent.

In triangle ABC if AB = 2in., BC = 3in. and ∠ABC = 45°, calculate the area of triangle PQR in sq. ins. correct to two significant figures.

A5. A sphere of radius 2 ins. rests inside a

of water which must be poured into the cone so as to just cover the sphere is $\frac{4\pi}{11}$ cu ins.

A.6. (a). Differentiate $3x^2 + 2x$, from first principles.

(b). Find the equation of the curve which passes through the point (3, 1) and has a gradient of $3x^2 - 8x + 2$ at any point (x, y) on the curve.

Section B.

Answer THREE questions from Section B.

B.7. A man walks 3 miles N28°E., then 5 miles N 51°E., and then 4 miles N8°W. Find how far he is from his starting point, and in what direction.

B.8. Draw the graph of $y = x^3 - 3x + 1$ for values of x from -3 to $+3$. With same axes and to the same scales draw the graph of $2x - 3y + 6 = 0$. Show that the values of x where the graphs intersect are roots of the equation $3x^3 - 11x - 3 = 0$. Hence find approximate values of the three roots of this equation.

B.9. A body moves in a line so that, t sec. after a certain instant, its acceleration is $(2 - 2t)$ ft. per sec. per sec. Three secs. after this instant, it comes to rest at a point O. in the line. Express the velocity v ft. per sec. and the distance from O, s ft., in terms of t. What was the greatest velocity attained by the body after the certain instant and how far was it then from O.?

B.10. The cost of manufacturing a car is partly constant and partly varies inversely as the number of cars produced per day. When the daily output is 40 cars, the cost of each is £510; for 50 cars daily the cost of each is £480. Find the cost of each when the daily output is 80 cars

B.11. ABCD is a rectangle in which AB = 12in., BC = 4in.; the internal bisectors of ∠ABC, ∠DAB meet at P; the bisector of ∠ABP meets AP in G; the bisector of ∠PAD meets DC in

PAPER II 2½ hrs. MATHEMATICS. TEST EXAMS. JAN. 1960

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Answer questions in Section A on separate paper from questions in Section B.

Section A.

A.1. (a) Calculate the exact value of

$$(58.73)^2 - (41.27)^2$$

(b). Solve the simultaneous equations :-

$$\left.\begin{aligned} 3x - 4y &= 9 \\ 5x - 3y &= 26 \end{aligned}\right\}$$

(c) In triangle ABC, AC = BC and angle CAB = 64°. AB is produced to D so that BD = BC. Calculate angle ACD.

A2. (a) Simplify (i). $27^{\frac{1}{3}}$ (ii) $(0.4)^2$ (iii) $(0.04)^{-\frac{1}{2}}$

(iv) $\sqrt{5} \times \sqrt{50}$ (v) $2\sqrt{3} \times 3\sqrt{2}$ (vi) $(\sqrt{2}+1)^2$

(b) A chord of a circle is 10·6 cms. long and the radius of the circle is 6·5 cms. Calculate the distance of the chord from the centre of the circle, correct to 3 significant figures.

A3. (a) 160 equal elm planks, 8ft. long, 9ins. wide, weighs 27cwt. If one cu.ft of elm weighs 40 lb., find the thickness of the plank.

(b). Find the x-coordinate of the point on the curve $y = 2x^2 - 3x$ at which the gradient is 6.

(c). In the triangle ABC, AC = 6in., AB = 3in. and $\angle CAB = 30°$. Calculate the length of BC, correct to three significant figures.

A4. The cost of materials for a path 3ft. wide round the outside of a lawn of length 102 ft. and breadth 54 ft. is £22. 5s. 6d. Find the cost of materials required to increase the width of the path to 5ft without altering the dimensions of the lawn

A5. AOB, COD are two perpendicular diameters of a circle;

paper 9 boys obtained an average of 43 marks; 9 more boys obtained an average of 51 marks. The average of the whole class was 48. How many marks did the other boy obtain?

Section B.

Answer any THREE questions.

B7(a) A sum of money is invested at 4 per cent compound interest and an equal sum at $4\frac{1}{4}$ per cent simple interest. Determine which investment yields the greater total interest in three years.

(b) A salesman is paid a wage of £500 a year. In addition he is allowed a bonus of 5% on the value of all the goods he sells. If his sales for the first six months were £380, £510, £630, £295, £470, £390, find, correct to the nearest shilling, his average salary per month during that period.

B8. A piece of wire 20 ft. long is cut into two pieces of which the longer is x ft. The longer piece is bent into the shape of a rectangle so that its length is twice its width, and the shorter piece is bent into the shape of a square. Find, in terms of x, the sum of the areas of the rectangle and square. Hence calculate (i) the value of x which makes this sum 12 sq ft. (ii) the value of x which makes this sum 25 sq ft.

B9. A man, at a point A, sees a church spire due east of him, and observes the angle of elevation of its top to be 25°. He walks along a road to a point B which has a bearing of 039°, and presently finds the spire to be due south of him. Find the angle of elevation of the spire from B. If the height of the spire is 200 ft. find how far he has walked from A to B.

B10. ABC is any triangle, and D and E are points on BC such that $\angle BAD = \angle CAE$. The circle circumscribing the triangle ADE cuts AB at P and AC at Q., prove PQ is parallel to BC and that

$$\frac{BD \cdot BE}{CD \cdot CE} = \frac{AB^2}{AC^2}$$

B11. For the curve $y = x^2(2-x)$ calculate (i) the maximum and minimum values of y (ii) the area enclosed by the part of the curve from