



DELHI PUBLIC SCHOOL NEWTOWN
SESSION 2022–23
HALF TEARLY EXAMINATION

CLASS: IX

SUBJECT: MATHEMATICS [SET A]

FULL MARKS: 80

TIME: $2\frac{1}{2}$ HOURS

Answers to this Paper must be written on a paper provided separately.

You will not be allowed to write during the first 15minutes.

This time is to be spent in reading the question paper.

The time given at the head of this Paper is the time allowed for writing the answers.

Attempt all questions from Section A and any four questions from Section B.

The intended marks for questions or parts of questions are given in brackets [].

This paper contains 5 printed pages.

SECTION A

(Attempt all questions from this section)

Question1

Choose the correct answers to the questions from the given options. (Do not copy the question, Write the correct answer only.) [15]

(i) A rational number between $\sqrt{2}$ and $\sqrt{3}$

- (a) $(\sqrt{2} + \sqrt{3}) \div 2$ (b) $(\sqrt{2} \times \sqrt{3}) \div 2$ (c) 1.5 (d) 1.8

(ii) The compound interest on ₹ 2000 for two years at the rate of 5% p.a compounded annually is

- (a) ₹ 205 (b) ₹ 200 (c) ₹ 2205 (d) ₹ 2200

(iii) If $x^2 + y^2 = 13$ and $xy = 6$, find $x - y$

- (a) 1 (b) -1 (c) 0 (d) ± 1

(iv) Factorisation of $x(x - y) + 2(y - x)$ is

- (a) $(x - y)(x + 2)$ (b) $(x - y)(x - 2)$ (c) $(y - x)(x + 2)$ (d) None

(v) If $x = k$, $y = 5$ is a solution of the equation $2x + 3y = 1$, then the value of k is
a) 8 b) -8 c) 7 d) -7

(vi) The value of $\sqrt[3]{2} \cdot \sqrt[4]{2} \cdot \sqrt[12]{32}$ equals
a) $\sqrt{2}$ b) 2 c) $\sqrt[12]{2}$ d) $\sqrt[12]{32}$

(vii) If $\log(3x + 1) = 2$, then the value of x is

- a) 99 b) -99 c) 33 d) -33

(viii) Which of the following is not a criterion for congruency of triangle

- a) SSA b) ASA c) RHS d) SAS

(ix) In triangle ABC, BC = AB and angle B = 80° . then angle A is equal to

- a) 80° b) 20° c) 50° d) 100°

(x) In triangle ABC, angle C is greater than angle B , then

- a) $BC > AC$ b) $AB > AC$ c) $AB < AC$ d) $BC < AC$

(xi) The distance of the point (3, 4) from the x axis is,

- a) 3 units b) 4 units c) 1 unit d) 7 units

(xii) The value of $\sin 45^\circ + \cos 45^\circ$

- a) $\sqrt{2}$ b) $1 \div \sqrt{3}$ c) $\sqrt{3}$ d) 2

(xiii) If $\sin A = \frac{1}{2}$ and $\cos B = \frac{1}{2}$, then the value of A + B is
a) 0° b) 30° c) 60° d) 90°

(xiv) If d is the diameter of a circle, then its area is

- a) πd^2 b) $\pi d^2 \div 2$ c) $\pi d^2 \div 4$ d) $2 \pi d^2$

(xv) The number $(2 - \sqrt{3})^2$

- (a) A natural number (b) An integer (c) A rational number
(d) An irrational number

Question 2

(i) If $13\sin A = 5$; Evaluate $(5\sin A - 2\cos A) \div \tan A$ [4]

(ii) Camelia invested ₹ 12800 for three years at the rate of 10% p.a compound interest.
Find:

- a) Interest for first year
 - b) Interest for second year
 - c) The sum due at the end of second year
 - d) Interest for third year.
- [4]

(iii) If $3^{x+1} = 9^{x-2}$, find the value of 2^{1+x} [4]

Question 3

(i) Factorise the following:

- a) $6x^2 + 17x + 5$
 - b) $9x^2 - 1$
- [4]

(ii) Find the value of a , if the distance between the points $A(-3, -14)$ and $B(a, -5)$ is 9 units. [4]

(iii) Solve Graphically the equation $4x - 3y = 0$ and $2x + 3y - 18 = 0$. Also find the area of triangle formed by the two lines and x axis. [5]

SECTION B

(Attempt any four questions from this section)

Question 4

(i) $(2\cos 66^\circ \div \sin 24^\circ) - (\tan 20^\circ \div \cot 70^\circ) + \sin(90^\circ - x^\circ) \sec x^\circ$ [3]

(ii) From a square cardboard, a circle of biggest area was cut out. If the area of the circle is 154 square cm, calculate the original area of the cardboard. [3]

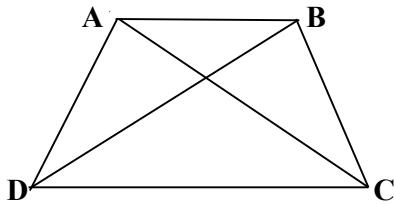
(iii) If $a^2 + b^2 = 7ab$,
Prove that $2 \log(a + b) = \log 9 + \log a + \log b$ [4]

Question 5

(i) If $a - b = 3$ and $ab = 4$, find $a^3 - b^3$ [3]

(ii) If $a = c^x$, $b = a^x$ and $c = b^y$, Prove that $xyz = 1$ [3]

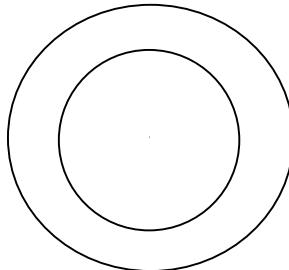
- (iii) In the adjoining figure, $AD = BC$ and $BD = AC$, prove that :
 Angle $ADB = \text{Angle } BCA$



[4]

Question 6

- (i) Factorize $x^6 - y^6$ [3]
 (ii) In the adjoining figure, the area enclosed between the concentric circles is 770 square cm. Find the radii of the two circles, given that their difference is 7 cm.



[3]

- (iii) In a triangle ABC, $AB = AC$, angle $A = (5x + 20)^\circ$ and each of the base angle is $2/5^{\text{th}}$ of angle A. Find the measure of angle A [4]

Question 7

- (i) Solve for x : $\log(5x - 4) - \log(x + 1) = \log 4$ [3]
 (ii) If $x + \frac{1}{x} = 6$, find $x - \frac{1}{x}$ [3]
 (iii) Solve the following pairs of equations

$$\frac{2}{x} + \frac{2}{3y} = \frac{1}{6}, \quad \frac{2}{x} - \frac{1}{y} = 1$$
 [4]

Question 8

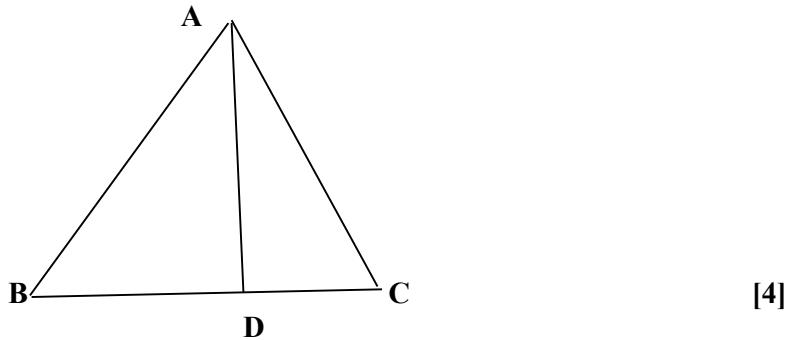
- (i) At what rate % per annum will a sum of ₹ 4000 yield ₹ 1324 as compound interest in 3 years? [3]
 (ii) Factorise $3 - 12(a - b)^2$ [3]
 (iii) If $x = 5 - 2\sqrt{6}$, find the value of $x^2 - 1/x^2$ [4]

Question 9

(i) Find 3 rational numbers between $\frac{3}{5}$ and $\frac{4}{5}$ [3]

(ii) The value of a machine, purchased two years ago, depreciates at the annual rate of 10%. If its present value is ₹ 97200, find its value when it was purchased. [3]

(iii) In the given figure D is any point on the side BC of triangle ABC. If $AB > AC$, show that $AB > AD$

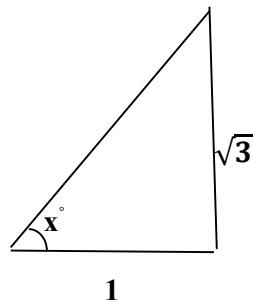


[4]

Question 10

(i) Name the type of triangle formed by the points A(-5, 6), B(-4, -2) and C(7, 5) [3]

(ii) From the adjoining figure, find (a) $\tan x^\circ$, (b) x and (c) $\cos x^\circ$ [3]



(iii) The sum of a two digit number and the number obtained by interchanging the digits is 132. If the two digits differ by 2, find the numbers. [4]