Directorate of Public Instructions M. P. Bhopal
National Achievement Survey – 2021
Practice Paper
Subject - Maths
Class – 10th

Instructions for Students:-

1. This Booklet has 60 questions.
2. Students have 2 hours to answer these items.
3. Each questions have four options 1,2,3,4. Only one of them is correct.
4. You may do rough work on this Booklet.

Q.1 The roots of the equation $ax^2 + bx + c = 0$ are

1. $\dfrac{b \pm \sqrt{b^2 - 4ac}}{2a}$

2. $\dfrac{b \pm \sqrt{b^2 - 4ac}}{2c}$

3. $\dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

4. $\dfrac{2a}{-b \pm \sqrt{b^2 - 4ac}}$

Q.2 The mean of $x - 2a$, $x - a$, x, $x + a$, $x + 2a$ is

1. x

2. $5x$

3. a

4. not possible to find unless value of a is given

Q.3 Which one of the following statements is true?

1. Every integer is a whole number

2. Every rational number is an integer

3. Every irrational number is a real number

4. Every real number is an irrational number

Q.4 The value $\cos 30^\circ . \cos 60^\circ - \sin 30^\circ . \sin 60^\circ$ is

1. 2

2. 1

3. 0

4. $\dfrac{3}{2}$

Q.5 If A $(-5, 7)$, B $(-4, -5)$, C $(-1, -6)$ and D $(4, 5)$ are the vertices of a quadrilateral, then the area of the quadrilateral ABCD is

1. 53 sq. units

2. 72 sq. units

3. 27 sq. units

4. 35 sq. units

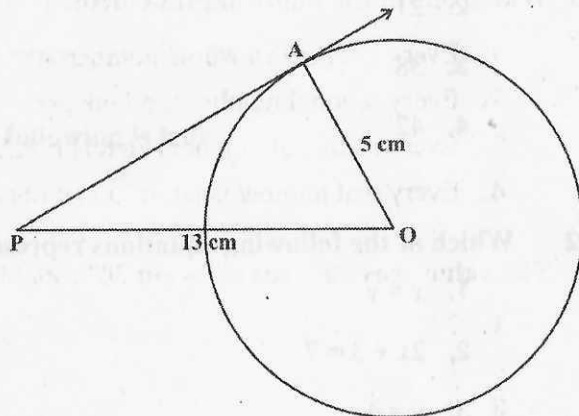**Q.6** If $\dfrac{6}{5}$, a, 4 are in A.P., then the value of a is

     1. 1

     2. 13

     3. $\dfrac{13}{5}$

     4. $\dfrac{26}{5}$

Q.7 Which term of the AP: 21, 42, 63, 84, … is 210?

     1. 9th

     2. 10th

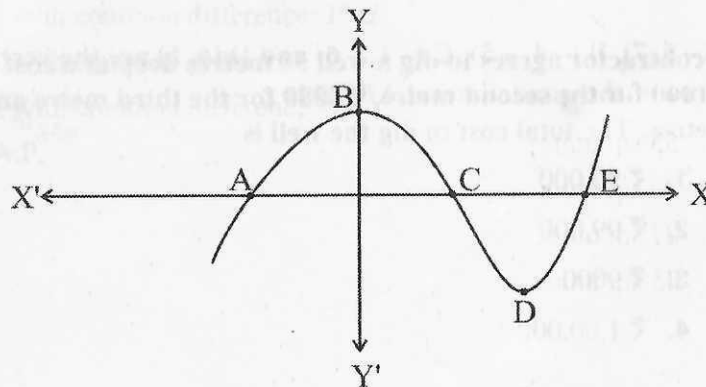   3. 11th

     4. 12th

Q.8 In the given figure, PA is a tangent to a circle with centre O and radius 5 cm. If OP = 13 cm, then PA is equal to

     1. 8 cm

     2. 12 cm

     3. 13 cm

     4. 18 cm

Q.9 The number of zeroes of the polynomial $p(x)$ represented by the graph is

     1. 1

     2. 2

     3. 3

     4. 4

Q.10 If the roots of the equation

$$3x^2 - 4x + c = 0$$

are equal, then the value of c is

     1. $\dfrac{3}{4}$

     2. $\dfrac{4}{3}$

     3. $\dfrac{9}{16}$

     4. $\dfrac{16}{9}$

Q.11 In an A.P., if $a_1 = 1$, $a_n = 20$ and $S_n = 399$, then n is equal to

     1. 19

     2. 21

     3. 38

     4. 42

Q.12 Which of the following equations represents a line parallel to x-axis?

     1. $x = y$

     2. $2x + 3 = 7$

     3. $y = 4$

     4. $x = 3$

Q.13 A contractor agrees to dig a well 50 metres deep at a cost of ₹ 1000 for the first metre, ₹ 1040 for the second metre, ₹ 1080 for the third metre and so on for the subsequent metres. The total cost to dig the well is

   1. ₹ 90,000

     2. ₹ 99,000

     3. ₹ 9000

     4. ₹ 1,00,000

Q.14   If $x = 1$ is a common root of the equations $ax^2 + ax + 3 = 0$ and $x^2 + x + b = 0$, then the value of ab is

1. 3
2. 3.5
3. 6
4. -3

Q.15   Which of the following is a zero of the polynomial $x^5 - x^3 + 2x - 2$?

1. 1
2. -1
3. 2
4. -2

Q.16   If the pair of equations $4x + 5y = 2$ and $12x + (p + 16)\, y = 6$ has infinitely many solutions, then the value of p is

1. 1
2. -1
3. 2
4. -2

Q.17   If $\triangle ABC \cong \triangle PQR$, then which of the following is true?

1. $B \leftrightarrow R$
2. $C \leftrightarrow Q$
3. $A \leftrightarrow R$
4. $A \leftrightarrow P$

Q.18   If $a_1, a_2, a_3 , \ldots$ upto a_{21} are in A.P. with common difference d , then a_1 , a_5 , a_9 , a_{13}

1. must be in A.P. with common difference $16\, d$
2. must be in A.P. with common difference d
3. must be in A.P. with common difference $4\, d$
4. may not be in A.P.

Q.19   The median of the numbers 4, 15, 19, 21, 6 is

        1. 19

        2. 15

        3. 15.5

        4. 17

Q.20   The product of a non-zero rational and an irrational number is

        1. always irrational

        2. always rational

        3. rational or irrational

        4. one

Q.21   AOB is a sector of a circle of radius 4 cm subtending an angle of 45° at the centre 'O' of the circle. Area of the sector, in cm^2, is

        1. π

        2. 2π

        3. 3π

        4. 4π

Q.22   The common difference of an A.P. in which $a_{18} - a_{14} = 32$ is

        1. 8

        2. -8

        3. -4

        4. 4

Q.23   Rationalised form of the number $\dfrac{1}{\sqrt{5}+\sqrt{2}}$ is

        1. $\dfrac{\sqrt{5}+\sqrt{2}}{7}$

        2. $\dfrac{\sqrt{5}-\sqrt{2}}{21}$

        3. $\dfrac{\sqrt{5}-\sqrt{2}}{3}$

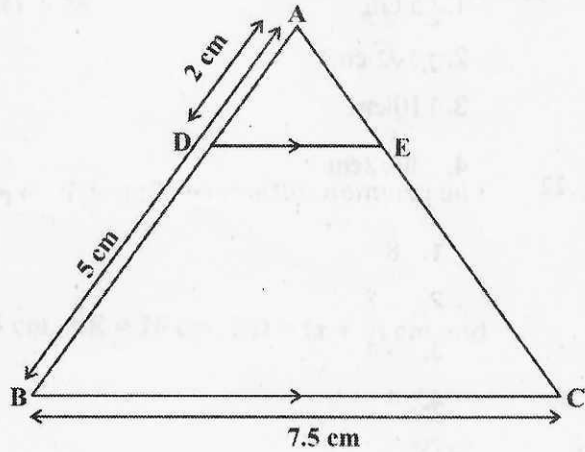   4. $\dfrac{\sqrt{5}-\sqrt{2}}{10}$

Q.24   In the given figure, PQRS is a quadrilateral which circumscribes a circle with centre O. If PD = 4 cm, QB = 3 cm, RC = 6 cm and SD = 5 cm, then PQ is equal to

1. 7 cm

2. 8 cm

3. 9 cm

4. 10 cm
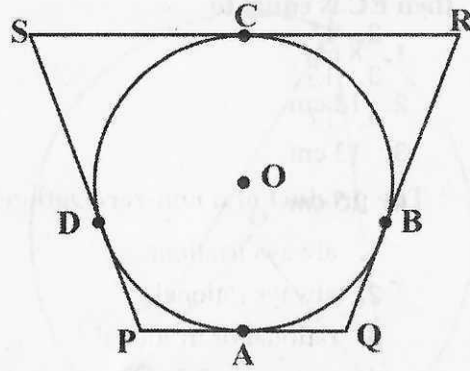
Q.25   In the given figure, DE ∥ BC. If AD = 2 cm, AB = 5 cm and BC = 7.5 cm, then DE is equal to

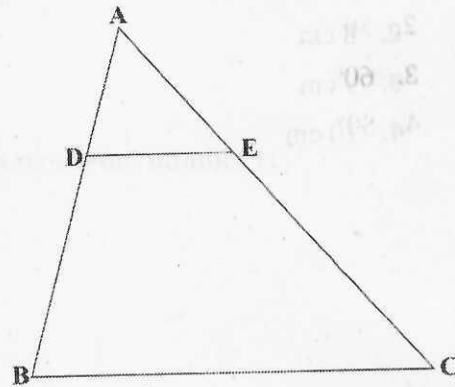1. 1.5 cm

2. 2.5 cm

3. 3 cm

4. 5 cm

Q.26   The angle between two tangents drawn from an external point to a circle with centre O is 50°. If the tangents meet the circle at P and Q, then ∠POQ is equal to
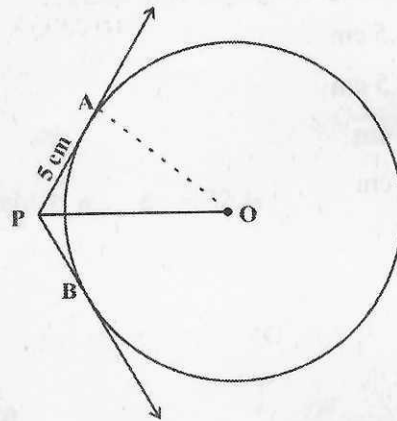
1. 90°

2. 100°

3. 120°

4. 130°

Q.27   In the given figure, DE ‖ BC.If AD = 5 cm, DB = 8 cm and AE = 7.5 cm, then EC is equal to

1. 8 cm
2. 12 cm
3. 13 cm
4. 15 cm

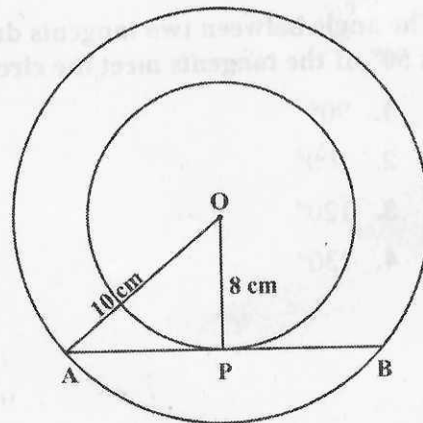**Q.28**   Two tangents PA and PB are drawn from an external point P to a circle with centre O such that ∠APB = 120°. If length of each tangent is 5 cm, then OP is equal to

1. 5 cm
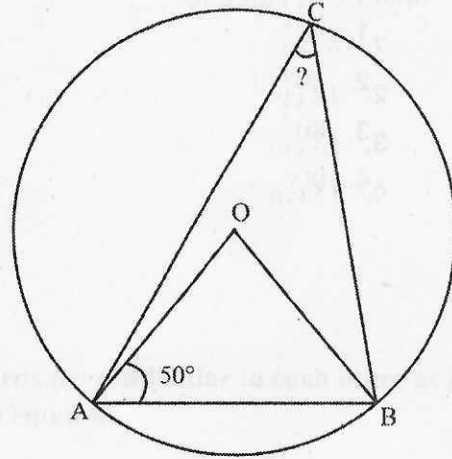2. $5\sqrt{2}$ cm
3. 10 cm
4. $10\sqrt{2}$ cm

Q.29   In the given figure, two circles of radii 10 cm and 8 cm have the same centre O. If AB is a tangent to the smaller circle at P, then length of AB is

1. 6 cm
2. 12 cm
3. 14 cm
4. 18 cm

Q.30   In the given figure, O is the centre of the circle. If ∠OAB = 50°, then ∠ACB is equal to

     1. 40°

     2. 50°

     3. 60°

     4. 80°

Q.31   Given that △ABC ~ △PQR and $\dfrac{ar(\triangle ABC)}{ar(\triangle PQR)} = \dfrac{16}{25}$. If AB = 20 cm, then PQ is equal to

     1. 10 cm

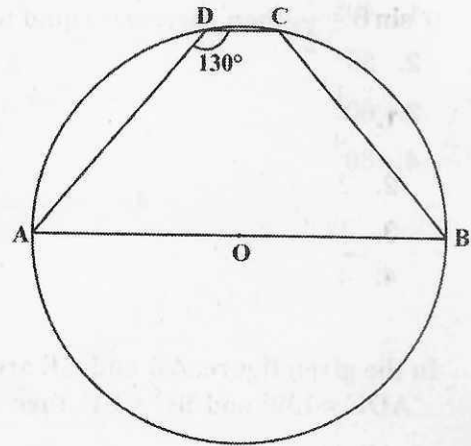   **2.** 15 cm

     3. 20 cm

     4. 25 cm

Q.32   In the given figure, DE || BC. If AD = 25 cm, AE = 10 cm, BD = (x + 3) cm and EC = x cm, then the value of x is

     1. 2 cm

     2. 3 cm

     3. 4 cm

     4. 5 cm
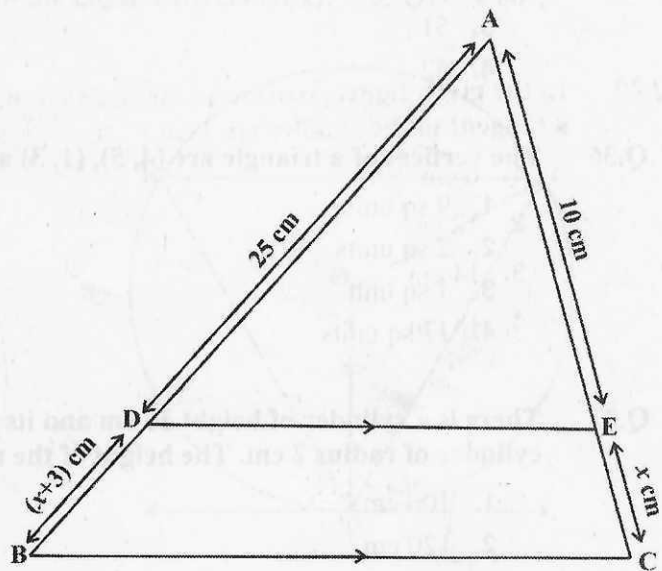
Q.33   In the given figure, ABCD is a cyclic quadrilateral. If $\angle ADC = 130°$, then $\angle CBA$ is equal to

        1. 40°

        2. 50°

        3. 80°

        4. 90°

Q.34   If angle between two radii of a circle is 140°, then the angle between tangents at the ends of the radii is

        1. 40°

        2. 70°

        3. 90°

        4. 140°

Q.35   Mean of 100 numbers was found to be 50. But later on, it was observed that one of the number 150 was wrongly taken as 50. The correct mean is

        1. 49

        2. 50

        3. 51

        4. 52

Q.36   The vertices of a triangle are (4, 5), (1, 3) and (6, 7). The area of the triangle is

        1. 9 sq units

        2. 2 sq units

        3. 1 sq unit

        4. 12 sq units

Q.37   There is a cylinder of height 30 cm and its radius is 14 cm. It is melted to form a new cylinder of radius 7 cm. The height of the new cylinder is

        1. 100 cm

        2. 120 cm
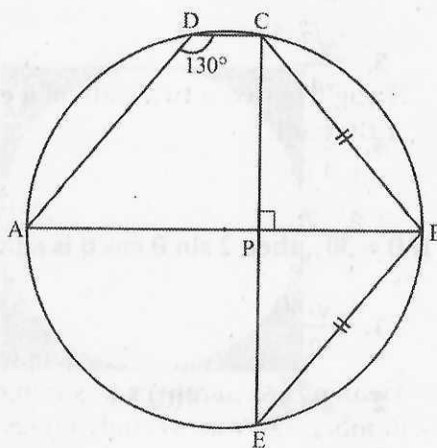
        3. 140 cm

        4. 150 cm

Q.38   If $\sin\theta = \dfrac{1}{2}$, then $\csc^2\theta$ is equal to

      1. $\dfrac{1}{4}$
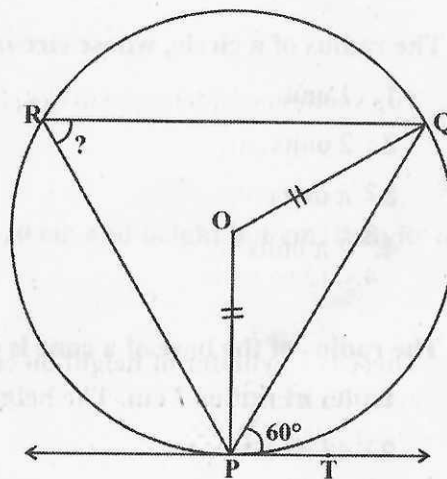
      2. 2

      3. 1

      4. 4

Q.39   In the given figure, AB and CE are two chords perpendicular to each other at P. If $\angle ADC = 130°$ and BC = BE, then $\angle CBE$ is equal to

      1. 95°

      2. 100°

      3. 120°

      4. 130°

Q.40   In the given figure, PT is tangent to the circle with centre O. If $\angle QPT = 60°$, then $\angle PRQ$ is equal to

   **1.** 30°

      2. 45°

      3. 60°

      4. 80°

Q.41   Of the four points P(– 2, 2), Q(2, – 4), R(– 3, – 4) and S(– 5, – 5), the point that lies in second quadrant is

    1. P

    2. Q

    3. R

    4. S

Q.42   The value of sin 30° cos 60° is

    1. 1

    2. $\dfrac{1}{2}$

    3. $\dfrac{\sqrt{3}}{4}$

    4. $\dfrac{1}{4}$

Q.43   If θ = 30°, then 2 sin θ cos θ is equal to

    1. $\dfrac{\sqrt{3}}{2}$

    2. $2\sqrt{3}$

    3. $\sqrt{6}$

    4. $\dfrac{2}{\sqrt{3}}$

Q.44   The radius of a circle, whose circumference and area are numerically equal, is

    1. 1 unit

    2. 2 units

    3. π units

    4. 2 π units

Q.45   The radius of the base of a cone is 6 cm and its height is 8 cm. Its curved surface area is

    1. $36\,\pi\ cm^2$

    2. $48\,\pi\ cm^2$

    3. $60\,\pi\ cm^2$

    4. $72\,\pi\ cm^2$

Q.46   A cube of side 6 cm is cut into a number of cubes, each of side 2 cm. Then the number of cubes will be

     1. 9

     2. 18

     3. 27

     4. 36

Q.47   In the given figure, a circle is inscribed in a square with side 14 cm. The area of the shaded region is (Take $\pi = \dfrac{22}{7}$)

     1. 36 cm^2

     2. 42 cm^2

     3. 56 cm^2

     4. 84 cm^2
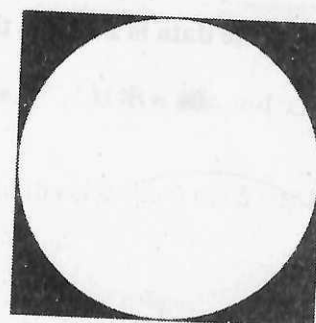
14 cm

Q.48   The radii of two cylinders are in the ratio 2 : 3 and their heights are in the ratio 5 : 3. The ratio of their volumes is

     1. 10 : 27

     2. 20 : 9

     3. 20 : 27

     4. 10 : 9

Q.49   If the diameter of a right circular cylinder is 10 cm and height is 4 cm, then its total surface area is

     1. $40 \, \pi \text{ cm}^2$

     2. $65 \, \pi \text{ cm}^2$

     3. $90 \, \pi \text{ cm}^2$

     4. $120 \, \pi \text{ cm}^2$

Q.50 The side of a solid metallic cube is 44 cm. It is melted to form small spherical solid balls of radius 2 cm. The number of balls is (Take $\pi = \dfrac{22}{7}$)

    1. 2500

    2. 2525

    3. 2541

    4. 2580

Q.51 The following numbers are written in an ascending order

        5, 13, 14, 16, 21, $2x - 13$, 30, 31, 35, 42

If the median of the data is 24, then the value of x is

    1. 18

    2. 19

    3. 20

    4. 21

Q.52 If the sum of first 20 even natural numbers is equal to k times the sum of first 20 odd natural numbers, then k is equal to
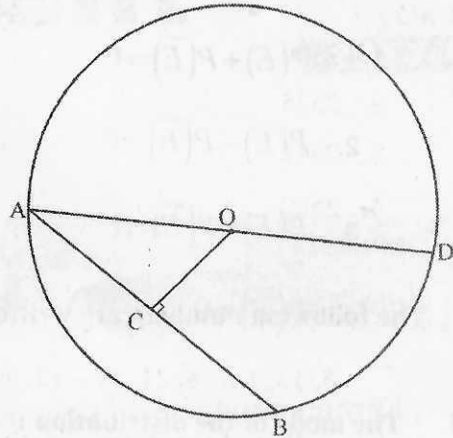
    1. $\dfrac{1}{20}$

    2. $\dfrac{19}{20}$

    3. $\dfrac{21}{40}$

    4. $\dfrac{21}{20}$

Q.53 Arcs of two congruent circles subtend angles of 60° and 20° at their respective centres. The ratio of lengths of corresponding arcs is

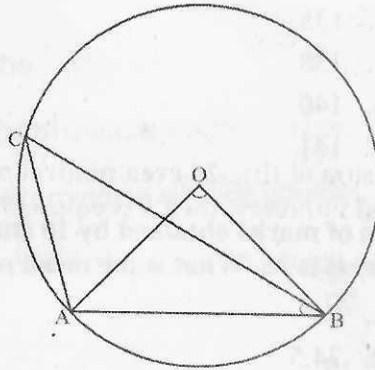   **1.** 2 : 1

    2. 1 : 3

    3. 3 : 1

    4. 1 : 2

Q.54 In the given figure, O is the centre of a circle of diameter AD = 34 cm. If AB = 30 cm and OC⊥AB, then OC =

1. 4 cm
2. 8 cm
3. 15 cm
4. 17 cm

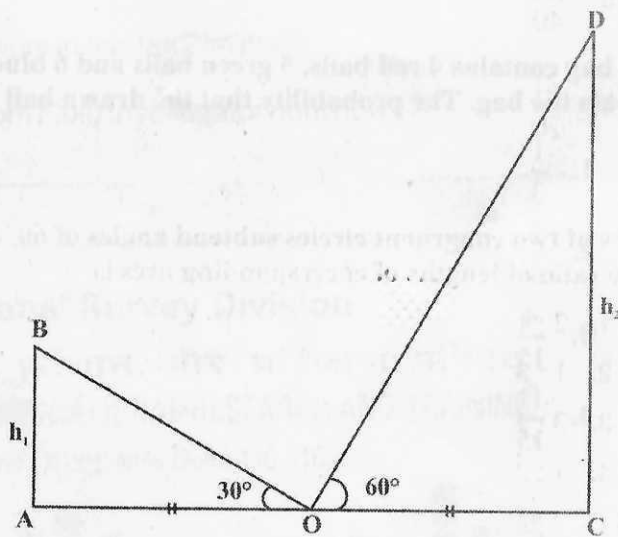**Q.55** In the given figure, O is the centre of the circle. If ∠AOB = 90° and ∠ABC = 30°, then ∠CAB is equal to

1. 90°
2. 105°
3. 120°
4. 130°

Q.56 In the given figure, AB and CD are towers of heights h_1 and h_2 respectively. O is the mid-point of AC. If AB and CD subtend angles 30° and 60° at O, then $h_1 : h_2 =$

1. 2 : 1
2. 2 : 3
3. 3 : 2
4. 1 : 3

15

Q.57 If $P(\overline{E})$ denotes the probability of the event 'not E', then

    1. $P(E) + P(\overline{E}) = 1$

    2. $P(E) - P(\overline{E}) = 0$

    3. $P(E) \times P(\overline{E}) = 1$

    4. $P(\overline{E}) = 0$

Q.58 The mode of the distribution :

Height (in cm)	130	132	135	138	140	141	150
No. of students	3	5	7	13	9	8	5

is

    1. 135

    2. 138

    3. 140

    4. 141

Q.59 Mean of marks obtained by 10 students is 32 and mean of marks obtained by another 5 students is 35. What is the mean of marks obtained by all the 15 students?

    1. 34

    2. 34.5

    3. 33

    4. 33.5

Q.60 A bag contains 4 red balls, 5 green balls and 6 blue balls. One ball is drawn at random from the bag. The probability that the drawn ball is not green is

    1. $\dfrac{1}{3}$

    2. $\dfrac{2}{3}$

    3. $\dfrac{4}{15}$

    4. $\dfrac{11}{15}$

ANSWER KEY OF MATHEMATICS

CLASS –X ENGLISH MEDIUM

1-3	11-3	21-2	31-4	41-1	51-3
2-1	12-3	22-1	32-1	42-4	52-4
3-3	13-2	23-3	33-2	43-1	53-3
4-3	14-1	24-1	34-1	44-2	54-2
5-2	15-1	25-3	35-1	45-3	55-2
6-3	16-2	26-4	36-3	46-3	56-4
7-2	17-4	27-2	37-2	47-2	57-1
8-2	18-3	28-3	38-4	48-3	58-2
9-3	19-2	29-2	39-2	49-3	59-3
10-2	20-1	30-1	40-3	50-3	60-2