Maharashtra Board
Class VII Mathematics
Board Paper – 1
Solution

Time: 2 hr 30 min **Total Marks: 60**

Q1.

1. For a cuboid,
   Length = l = 2.5 m
   Breadth = b = 2 m
   Height = h = 1 m
   Volume of cuboid = l × b × h = 2.5 × 2 × 1 = 5 cu. m.

2. S.P. of the calculators = Rs.1200
   Profit made on the sale = Rs. 500
   C.P. = S.P. – Profit = Rs. (1200 – 500) = Rs. 700
   Hence, the cost price of the calculators is Rs. 700.

3. Angles formed in the same segment are equal.
   Hence, ∠LNP = ∠ LQP = 75°

4. Length of a rectangular plot = 85 cm
   Breadth of a rectangular plot = 1 m = 100 cm
   Area of a rectangular plot = length × breadth = 85 × 100 = 8500 cm^2

5. Pairs of corresponding sides:
   Side DH and side BS
   Side HP and side SC
   Side DP and side BC

   Pairs of corresponding angles:
   ∠D and ∠B
   ∠H and ∠S
   ∠P and ∠C

6. Area of Rectangle = length × breadth = $(x + y)(x – y) = x^2 – y^2$

7. $12xy – 15x$
   $= 2 \times 2 \times 3 \times x \times y – 3 \times 5 \times x$
   $= 3 \times x(2 \times 2 \times y – 5)$
   $= 3x(4y – 5)$

8. A quadrilateral whose all angles measure 90° is rectangle/square.

9. XY is the diameter and XZY is a semicircular segment.
   Angle in a semicircular segment is a right angle.
   Hence, $\angle XZY = 90°$

10. For quadrilateral ABCD, AB = BC = CD = AD = 5 cm,
    i.e., all sides are equal.
    And, $\angle A = \angle C = 100°$ and $\angle B = \angle D = 80°$
    i.e., opposite angles are equal.

    Now, a rhombus has all its sides equal and its opposite angles are also equal.
    Hence, quadrilateral ABCD is a rhombus.

11. $0 + \frac{-12}{13} = \frac{-12}{13}$

12. To find $(2p + 3q)^2$
    We use the identity $(a + b)^2 = a^2 + 2ab + b^2$
    Taking a = 2p and b = 3q
    We get, $(2p + 3q)^2 = (2p)^2 + 2(2p)(3q) + (3q)^2 = 4p^2 + 12pq + 9q^2$

Q2.

1. Length of the pit, l = 2 m
   Breadth of the pit, b = 2 m
   Area of the pit = l × b = 2 × 2 = 4 sq. m

   Length of the plot, l = 12.4 m
   Breadth of the plot, b = 10.2 m
   Area of the plot = l × b = 12.4 × 10.2 = 126.48 sq. m

   Now, area of the plot after the pit is dug
   = Area of the plot – Area of the pit
   = 126.48 – 4
   = 122.48 sq. m
   Thus, the area of the plot after the pit is dug is 122.48 sq. m.

2. $\frac{r^2}{s^2} - \frac{81}{100} = \left(\frac{r}{s}\right)^2 - \left(\frac{9}{10}\right)^2$

   $= \left(\frac{r}{s} + \frac{9}{10}\right)\left(\frac{r}{s} - \frac{9}{10}\right)$

3. $(10 - 3p)^2$
   $= (10)^2 - 2(10)(3p) + (3p)^2$
   $= 100 - 2(30p) + 9p^2$
   $= 100 - 60p + 9p^2$

4. $\left(\frac{a}{2} - \frac{b}{3}\right)\left(\frac{a}{2} + \frac{b}{3}\right)$

   We use the identity: $(x - y)(x + y) = x^2 - y^2$

   Taking, $x = \frac{a}{2}$ and $y = \frac{b}{3}$

   We get, $\left(\frac{a}{2} - \frac{b}{3}\right)\left(\frac{a}{2} + \frac{b}{3}\right) = \left(\frac{a}{2}\right)^2 - \left(\frac{b}{3}\right)^2$

   $= \frac{a^2}{4} - \frac{b^2}{9}$

5. $\frac{-7}{6} - \frac{13}{8} = \frac{-7 \times 4}{6 \times 4} - \frac{-13 \times 3}{8 \times 3}$

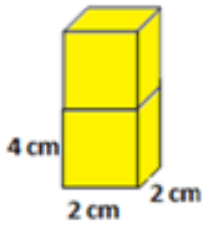
   $= \frac{-28}{24} - \frac{39}{24}$

   $= \frac{-28 - 39}{24}$

   $= \frac{-67}{24}$

6. For a trunk,
   Length = l = 1.5 m, breadth = b = 1.2 m and height = h = 1.3 m
   Total surface area of the trunk = 2(l × b + b × h + h × l)
   = 2(1.5 × 1.2 + 1.2 × 1.3 + 1.3 × 1.5)
   = 2(1.80 + 1.56 + 1.95)
   = 2 × 5.31
   = 10.62 sq. m

7. Two cubes of side 2 cm are joined to form a cuboid as shown.



   Now,
   Length of the cuboid = 2 cm
   Breadth of the cuboid = 2 cm
   Height of the cuboid = 4 cm

   Volume of cuboid = length × breadth × height
   = 2 cm × 2 cm × 4 cm
   = 16 cm^3

   So, the volume of the new cuboid is 16 cm^3.

8.

A. Trapeziums have only one pair of parallel opposite sides.
There are 6 trapeziums in the given picture.
They are AGHB, GHFE, EFJI, IJDC, ABJI and GHDC.

B. The opposite sides of a parallelogram are parallel and equal.
The opposite angles of a parallelogram are equal.
There are 4 parallelograms in the given figure.
They are AEFB, ECDF, GIJH and ACDB.

Q3.

1. Here since, $\Delta MNY \cong \Delta SGK$, we can write the corresponding parts without the help of a figure.
(a) $\angle M \leftrightarrow \angle S$
(b) YN $\leftrightarrow$ KG
(c) $\angle N \leftrightarrow \angle G$
(d) MY $\leftrightarrow$ SK
(e) $\angle Y \leftrightarrow \angle K$
(f) NM $\leftrightarrow$ GS

2. Volume of the room = 64 cu. m
Breadth of the room = b = 4 m and height of the room = h = 2 m
Volume of the room = l × b × h
$\therefore$ 64 = l × 4 × 2
$\therefore l = \frac{64}{4 \times 2} = 8$ m
Thus, the length of the room is 8 m.

3. Side of a square blackboard = 4 m
Area of the square blackboard = side × side = 4 m × 4 m = 16 m^2

Given, area of square blackboard = area of rectangular blackboard
$\therefore$ Area of rectangular blackboard = 16 m^2
Length of a rectangular blackboard = 8 m

Now, Area of rectangular blackboard = length × breadth
$\therefore$ Breadth = Area ÷ Length
$\therefore$ Breadth = 16 ÷ 8 = 2 m

Thus, the breadth of the rectangular blackboard is 2 m.

4. $16m^2 - 40mn + 25n^2$
$= (4m)^2 - 2 \times 4m \times 5n + (5n)^2$
$= (4m - 5n)^2$
$= (4m - 5n)(4m - 5n)$

5. The L.C.M. of the denominators 8 and 4 is 8.
Therefore make their denominators 8.

$\frac{-15}{8} = \frac{-15}{8}$

$\frac{-9}{4} = \frac{-9 \times 2}{4 \times 2} = \frac{-18}{8}$

Now, $-15 > -18$

$\therefore \frac{-15}{8} > \frac{-18}{8}$

$\therefore \frac{-15}{8} > \frac{-9}{4}$

6. Cost price of a TV set = Rs. 10000
Selling price of a TV set = Rs. 8000

Here, Selling price < Cost price.
Hence, there is a loss.
Loss = Cost price − Selling price = Rs. (10000 − 8000) = Rs. 2000

On cost price of Rs 10000, loss = Rs. 2000
On cost price of Rs. 100, loss = ?
Let the loss on a C.P. of Rs. 100 be x.

Then, $\frac{10000}{100} = \frac{2000}{x}$

$\therefore \frac{100}{1} = \frac{2000}{x}$

$\therefore x = 20$

$\therefore$ Loss percent = 20

Hence, Shriraj incurred a loss of 20%.

7. $4x^2 + \frac{1}{9x^2} - \frac{4}{3}$

$= (2x)^2 + \frac{1}{(3x)^2} - \frac{4}{3}$

$= (2x)^2 + \frac{1}{(3x)^2} - 2 \times (2x) \times \left(\frac{1}{3x}\right)$

Taking a = 2x and b = $\frac{1}{3x}$ in the identity $a^2 - 2ab + b^2 = (a-b)^2$, we get

$4x^2 + \frac{1}{9x^2} - \frac{4}{3} = \left(2x - \frac{1}{3x}\right)^2$

$= \left(2x - \frac{1}{3x}\right)\left(2x - \frac{1}{3x}\right)$

Q4.

1.

(i) In Marathi, Govinda scored 65 marks in the first term examination and 70 marks in the second term examination.

(ii) Govinda's marks fell in Hindi and Science in the second term exam.

(iii) Maths marks in the 1^{st} term = 80

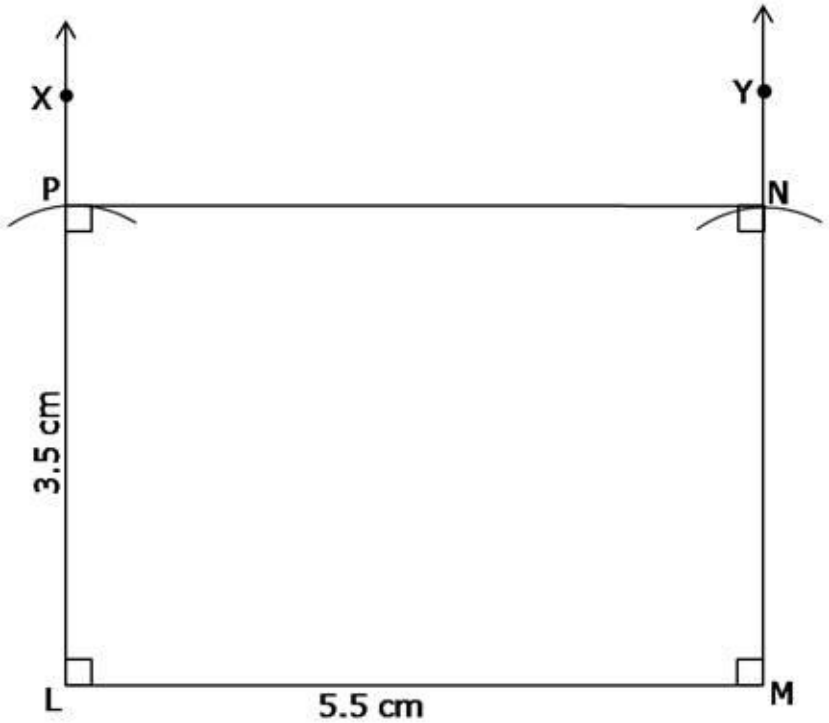
Maths marks in the 2^{nd} term = 85

Thus, increase in Maths marks in the second term = 85 – 80 = 5

(iv) Govinda's marks in Maths were more than 80 in the second term.

2. Steps of construction:
   1. Draw seg LM of length 5.5 cm.
   2. Using a protractor, draw a ray LX ⊥ LM at point L and a ray MY ⊥ LM at point M.
   3. Placing the point of the compass on point L and taking a radius of 3.5 cm, draw an arc of circle to cut LX at point P.
   4. Taking the same radius and placing the point of the compass on point M, draw an arc of circle to cut MY at point N.
   5. Join seg NP.

Thus a rectangle LMNP with LM = 5.5 cm and MN = 3.5 cm is constructed.



3.

(i) $y - 1 + y^3 - y^2$

$= \underline{y - 1} + \underline{y^3 - y^2}$

$= 1(y - 1) + y^2(y - 1)$

$= (y - 1)(1 + y^2)$

(ii) $m^3 + m^2 + m + 1$

$= \underline{m^3 + m^2} + \underline{m + 1}$

$= m^2(m + 1) + 1(m + 1)$

$= (m^2 + 1)(m + 1)$

4. (i) $\frac{-20}{9} \div \frac{-10}{3}$

$= \frac{-20}{9} \times \frac{-3}{10}$

$= \frac{(-2) \times 10 \times (-3)}{3 \times 3 \times 10}$

$= \frac{2}{3}$

(ii) $\frac{-15}{8} \times \frac{-16}{25}$

$= \frac{5 \times (-3)}{8} \times \frac{-2 \times 8}{5 \times 5}$

$= \frac{5 \times (-3) \times -2 \times 8}{8 \times 5 \times 5}$

$= \frac{(-3) \times (-2)}{5}$

$= \frac{6}{5}$

5.

(i) $\angle XYZ$ and $\angle XPZ$ are the angles in the same segment and angles in the same segment are congruent.
Hence $\angle XYZ$ and $\angle XPZ$ have equal measures.
$\therefore m\angle XYZ = m\angle XPZ = 100°$

(ii) Seg SK is the diameter of the given circle, and hence divides the circle into two semicircular regions.
Now, an angle in a semicircular region is a right angle.
Hence, $m\angle STK = 90°$
$\angle SMK$ also is an angle in the semicircular region.
Hence, $m\angle SMK = 90°$

Q5.

1. Length of a tank = l = 2.5 m
   Breadth of a tank = b = 2 m
   Height of a tank = h = 2.4 m

   Metal sheet required for the tank
   = Total surface area of the tank
   = $2(l \times b + b \times h + h \times l)$
   = $2(2.5 \times 2 + 2 \times 2.4 + 2.4 \times 2.5)$
   = $2(5 + 4.8 + 6)$
   = 2×15.8
   = 31.6 sq. m

   Cost of constructing 1 sq. m = Rs. 10
   $\therefore$ Cost of constructing 31.6 sq. m = Rs. (31.6×10) = Rs. 316

   Volume of the tank = $l \times b \times h$
   = $2.5 \times 2 \times 2.4$
   = 12 cu. m

2.
   (i) Nikhil's and Sagar's scores were same in match II.

   (ii) Sagar scored more in the third match.

   (iii) Number of runs Nikhil scored more than Sagar in the first match

   = Number of runs scored by Nikhil in the first match – Number of runs scored by Sagar in the first match

   = 35 – 25

   = 10 runs

   (iv) In matches II and IV, Sagar had equal scores.

   (v) In matches II and III, Nikhil had equal scores.