SUMMATIVE ASSESSMENT – II

| Series RLH | SET-2 | **CBSE Board Paper 2015 All India** |

Code No. **30/2** **MATHEMATICS**

By: JSUNIL
www.jsuniltutorial.weebly.com

Time allowed : 3 hours   *Maximum Marks : 90*

Question numbers 1 to 4 carry 1 mark each.   **SECTION A**

1. In Figure 1, PQ is a chord of a circle with centre O and PT is a tangent. If $\angle QPT = 60°$, find $\angle PRQ$.
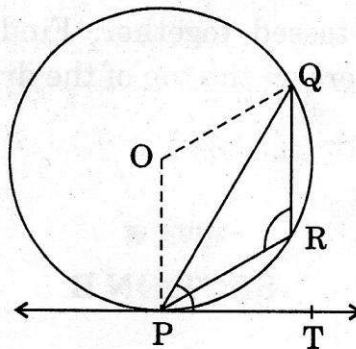

Figure 1

2. If the quadratic equation $px^2 - 2\sqrt{5}\,px + 15 = 0$ has two equal roots, then find the value of p.

3. In Figure 2, a tower AB is 20 m high and BC, its shadow on the ground, is $20\sqrt{3}$ m long. Find the Sun's altitude.
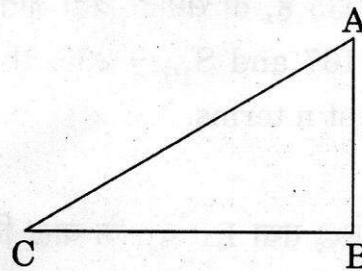

Figure 2

4. Two different dice are tossed together. Find the probability that the product of the two numbers on the top of the dice is 6.

SECTION B

Question numbers 5 to 10 carry 2 marks each.

5. Find the relation between x and y if the points A(x, y), B(– 5, 7) and C(– 4, 5) are collinear.

6. In an AP, if $S_5 + S_7 = 167$ and $S_{10} = 235$, then find the AP, where S_n denotes the sum of its first n terms.

7. In Figure 3, two tangents RQ and RP are drawn from an external point R to the circle with centre O. If ∠ PRQ = 120°, then prove that OR = PR + RQ.

Figure 3

7. In Figure 3, two tangents RQ and RP are drawn from an external point R to the circle with centre O. If ∠ PRQ = 120°, then prove that OR = PR + RQ.

Figure 3

Figure 4

3 cm

← 6 cm → ← 9 cm →
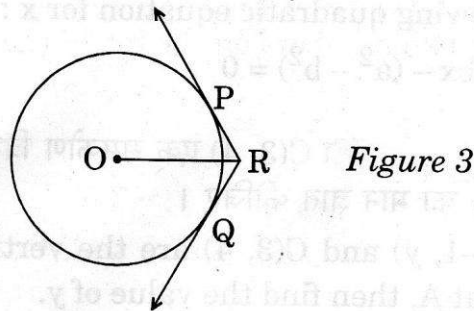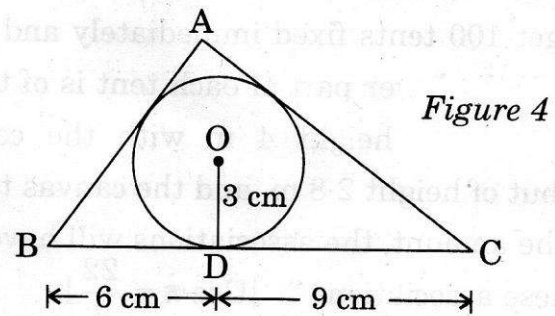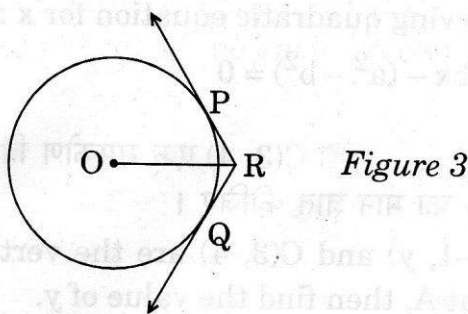
8. In Figure 4, a triangle ABC is drawn to circumscribe a circle of radius 3 cm, such that the segments BD and DC are respectively of lengths 6 cm and 9 cm. If the area of Δ ABC is 54 cm², then find the lengths of sides AB and AC.

9. Solve the following quadratic equation for x :

$$4x^2 + 4bx - (a^2 - b^2) = 0$$

10. If A(4, 3), B(−1, y) and C(3, 4) are the vertices of a right triangle ABC, right-angled at A, then find the value of y.

SECTION C

Question numbers 11 to 20 carry 3 marks each.

11. Due to sudden floods, some welfare associations jointly requested the government to get 100 tents fixed immediately and offered to contribute 50% of the cost. If the lower part of each tent is of the form of a cylinder of diameter 4·2 m and height 4 m with the conical upper part of same diameter but of height 2·8 m, and the canvas to be used costs ₹ 100 per sq. m, find the amount, the associations will have to pay. What values are shown by these associations ? [Use π = $\frac{22}{7}$]

12. The angle of elevation of an aeroplane from a point A on the ground is 60°. After a flight of 15 seconds, the angle of elevation changes to 30°. If the aeroplane is flying at a constant height of $1500\sqrt{3}$ m, find the speed of the plane in km/hr.

13. A hemispherical bowl of internal diameter 36 cm contains liquid. This liquid is filled into 72 cylindrical bottles of diameter 6 cm. Find the height of the each bottle, if 10% liquid is wasted in this transfer.

16. If the coordinates of points A and B are (− 2, − 2) and (2, − 4) respectively, find the coordinates of P such that AP $= \dfrac{3}{7}$ AB, where P lies on the line segment AB.

17. 504 cones, each of diameter 3·5 cm and height 3 cm, are melted and recast into a metallic sphere. Find the diameter of the sphere and hence find its surface area. [Use $\pi = \dfrac{22}{7}$]

18. All the vertices of a rhombus lie on a circle. Find the area of the rhombus, if the area of the circle is 1256 cm^2. [Use $\pi = 3{\cdot}14$]

19. Solve for x : $2x^2 + 6\sqrt{3}\,x - 60 = 0$

20. The 16th term of an AP is five times its third term. If its 10th term is 41, then find the sum of its first fifteen terms.

SECTION D

Question numbers 21 to 31 carry 4 marks each.

21. Prove that the tangent drawn at the mid-point of an arc of a circle is parallel to the chord joining the end points of the arc.

22. At a point A, 20 metres above the level of water in a lake, the angle of elevation of a cloud is 30°. The angle of depression of the reflection of the cloud in the lake, at A is 60°. Find the distance of the cloud from A.

23. A card is drawn at random from a well-shuffled deck of playing cards. Find the probability that the card drawn is

   (i)   a card of spade or an ace.   (iii)   neither a jack nor a king.

   (ii)   a black king.   (iv)   either a king or a queen.

24. In Figure 5, PQRS is a square lawn with side PQ = 42 metres. Two circular flower beds are there on the sides PS and QR with centre at O, the intersection of its diagonals. Find the total area of the two flower beds (shaded parts).
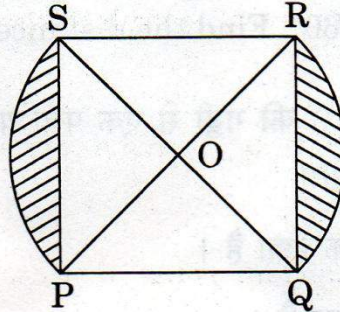
25. From each end of a solid metal cylinder, metal was scooped out in hemispherical form of same diameter. The height of the cylinder is 10 cm and its base is of radius 4·2 cm. The rest of the cylinder is melted and converted into a cylindrical wire of 1·4 cm thickness. Find the length of the wire. [Use $\pi = \dfrac{22}{7}$]

26. The diagonal of a rectangular field is 16 metres more than the shorter side. If the longer side is 14 metres more than the shorter side, then find the lengths of the sides of the field.

27. Find the 60th term of the AP 8, 10, 12, ..., if it has a total of 60 terms and hence find the sum of its last 10 terms.

28. A bus travels at a certain average speed for a distance of 75 km and then travels a distance of 90 km at an average speed of 10 km/h more than the first speed. If it takes 3 hours to complete the total journey, find its first speed.

29. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.

30. Construct a right triangle ABC with AB = 6 cm, BC = 8 cm and $\angle$ B = 90°. Draw BD, the perpendicular from B on AC. Draw the circle through B, C and D and construct the tangents from A to this circle.

31. Find the values of k so that the area of the triangle with vertices (k+1, 1), (4, – 3) and (7, – k) is 6 sq. units.

$Set - 02$

<u>Section-A</u>   <u>Section 'B'</u>

Q.1 $\rightarrow$ Set-3 Q4   Q.5. $\rightarrow$ Set 03 - Q.9

Q.2 $\rightarrow$ Set-03 Q3   Q.6 $\rightarrow$ Set 03 - Q.5

Q.3 $\rightarrow$ Set-03 Q.1   Q.7 $\rightarrow$ Set 03 - Q7

Q.4 $\rightarrow$ Set-03. Q2   Q.8 $\rightarrow$ Set-03 - Q8

Q.9. $4x^2 + 4bx - a^2 + b^2 = 0 \Rightarrow (2x+b)^2 - (a)^2 = 0$

$\Rightarrow (2x+b-a)(2x+b+a) = 0 \Rightarrow x = \frac{(a-b)}{2}, \frac{(a+b)}{-2}$
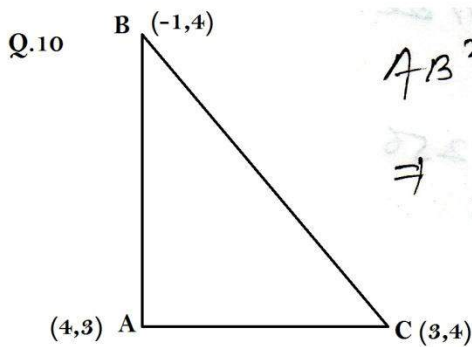
Q.10

B $(-1,4)$
$(4,3)$ A
C $(3,4)$

$AB^2 + AC^2 = BC^2$

$\Rightarrow (4+1)^2 + (3-y)^2 + (4-3)^2 + (3-4)^2$
$\qquad\qquad\qquad\qquad = (3+1)^2 + (4-y)^2$

$\Rightarrow 25 + 9 + y^2 - 6y + 1 + 1$
$\qquad\qquad = 16 + 16 + y^2 - 8y$

$36 + y^2 - 6y = 32 + y^2 - 8y, \quad \Rightarrow -6y + 8y = 32 - 36$

$\Rightarrow -2y = 4 \Rightarrow y = 4/-2 = -2.$

Page-01.

<u>Section - C'</u>

Q.11 — Set 03 - Q.11

Q.12 $\rightarrow$ Set-03 - Q.16

Q.13. $\rightarrow$ Set 03 - Q.12.

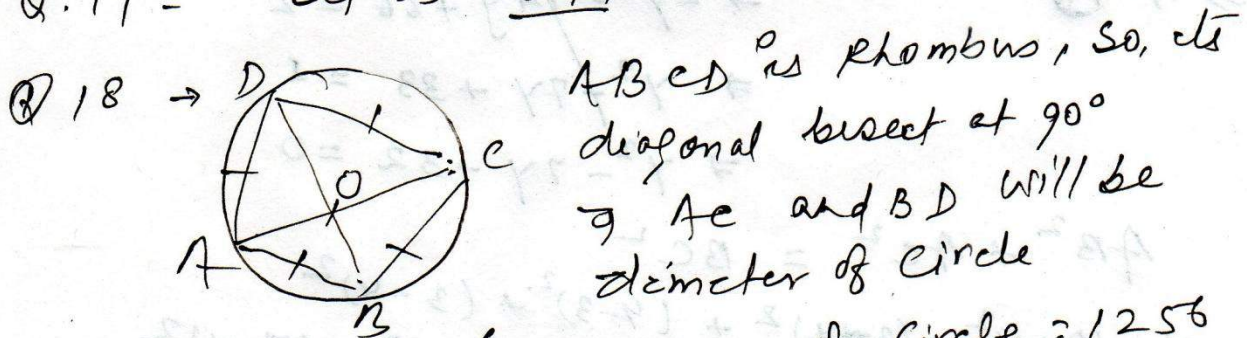Q.15 $\rightarrow$ Set 03 - Q.13

Q.14. $P(R) = \frac{1}{4}$; $P(B) = \frac{1}{3}$

$\Rightarrow P(\text{orange}) = 1 - [\frac{1}{4} + \frac{1}{3}]$

$\qquad\qquad = \frac{5}{12}$

$\frac{10}{x} = \frac{5}{12} \Rightarrow x = 24.$

Here $x = $ Total No of balls $= 24.$

Q.16.

$$\underset{(-2,-2)}{\overset{A}{|}} \quad \underset{P}{\overset{3 \quad (x,y) \quad 4}{\longrightarrow}} \quad \underset{(2,-4)}{\overset{B}{|}}$$

$m:n = 3:4$

$Ap = \frac{3}{7} AB$

$\Rightarrow PB = (1-\frac{3}{7}) AB = \frac{4}{7}$

$\Rightarrow Ap:PB = 3:4.$

$x = \dfrac{mx_2 + nx_1}{m+n} = \dfrac{(3\times2) + (4\times-2)}{3+4}$

$= -\frac{2}{7}$

$y = \dfrac{(my_2 + ny_1)}{(m+n)} = \dfrac{(3\times-4) + (4\times -2)}{3+4} = \left(\dfrac{-20}{7}\right)$

Q.17 - Set 03 - Q14

Q.18 →

ABCD is rhombus, So, its diagonal bisect at $90°$

$\Rightarrow$ AC and BD will be diameter of circle

Given Area of Circle = 1256

$\frac{22}{7} \times r^2 = 1256$

$r^2 = 400 \Rightarrow \underline{r = 20}$

$\Rightarrow \underline{AC = BD} = 20\times2 = \underline{40\,cm}.$

$\dfrac{Area\ of\ Rhombus = \frac{1}{2}(d)^2}{=\frac{1}{2}\times(40)^2 = \underline{800\,cm^2}}$

Q.19 $\quad 2x^2 + 6\sqrt3\,x - 60 = 0 \quad \Rightarrow x^2 + 3\sqrt3x - 30 = 0$

$D = b^2 - 4ac = (3\sqrt3)^2 - 4\times1\times-30 = 147$

$\sqrt D = 7\sqrt3 \quad / \quad x = -\dfrac{3\sqrt3 \pm 7\sqrt3}{2\times1} = 2\sqrt3, -5\sqrt3$

Page-02

20. $t_{16} = 5 \times t_3$

$\Rightarrow a + 15d = 5(a+2d) \Rightarrow a = \dfrac{5d}{4}$

Now $t_{10} = 41 \Rightarrow a + 9d = 41 \Rightarrow \dfrac{5d}{4} + 9d = 41$

$\Rightarrow d = 4$

$a = \dfrac{5 \times 4}{4} = 5$ $\qquad \therefore Ap = 5, 9, 13 \cdots$

$S_{15} = \dfrac{15}{2}(2 \times 5 + 14 \times 4) = 7.5 \times 66 = 495$

Section - D

Q. 21 $\rightarrow$ Set-03 - Q. 27

Q. 22 $\rightarrow$ Set 03 - Q - 21

Q. 23 $\rightarrow$ Set 03 - Q - 22

Q. 24 $\rightarrow$ Set - 03 - Q - 23.

Q. 25 - Set 03 - Q 24

Q. 26 - Set-03 - Q 25

Q. 27. $t_{60} = a + 59d.$

$= 8 + 59 \times 2$

$= 8 + 118$

$= \underline{126}$

$S_{10} = 5(2a + 9d)$
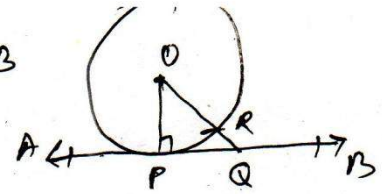
$= 5(2 \times 126 + 9 \times -2)$

$= 5(252 + (-18))$

$= \underline{1170}$

28. let first speed $= x \, km/h$

A/s $\dfrac{75}{x} + \dfrac{90}{x+10} = 3$

$25/x + \dfrac{30}{x+10} = 3$

$\Rightarrow 25x + 250 + 30x = x^2 + 10x$

$\Rightarrow x^2 - 45x - 250 = 0$

$\Rightarrow x^2 + 5x - 50x - 250 = 0 \Rightarrow x(x+5) - 50(x+5) = 0$

$\Rightarrow x = -5, 50$

So, speed $= 50 \, km/h.$
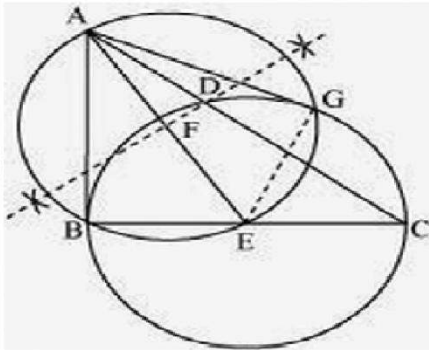
29. Take a point Q other than P on AB and join OQ.

Q is point outside the Circle

$\Rightarrow$ OQ > OR But OP = OR

$\Rightarrow$ OQ > OP. OP is the shortest of all line seg. drawn from O to AB $\Rightarrow$ OP$\perp$AB

Q.30

$x_1 = k+1,\ x_2 = 4,\ x_3 = 7,\quad y_1 = 1,\ y_2 = -3,\ y_3 = -k$

Q.31. Area of $\triangle = \frac{1}{2}\left| x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2) \right|$

$\Rightarrow 6 \times 2 = (k+1)(-3+k) + 4(-k-1) + 7(1+3)$

$\Rightarrow 12 = -3k + k^2 - 3 + k - 4k - 4 + 28$

$\Rightarrow 12 = k^2 - 6k + 21$

$\Rightarrow 0 = k^2 - 6k + 9 \Rightarrow 0 = (k-3)^2$

$\Rightarrow \boxed{K = 3}$