RJ VISION PVT. LTD.
(MOST STABLE & INNOVATIVE INSTITUTE)

PFC

STD – 9TH (CBSE)

MATHS

SOLUTION

CT - 8M

Course Name : Samarth (9th) Date : 4th February 2019

Section 'A'

1. $\left(5+\sqrt{5}\right)\left(5-\sqrt{5}\right) = \left\{5^2-\left(\sqrt{5}\right)^2\right\}$ ½

$= \{25 - 5\}$

$= 20$ ½

[CBSE Marking Scheme, 2014]

2. $\frac{x}{4} - 3y = 7$

$\Rightarrow \frac{x}{4} - 3y - 7 = 0$ ½

$\Rightarrow x - 12y - 28 = 0$ ½

[CBSE Marking Scheme, 2017]

3. Since $P(a, b)$ lies in IV quadrant

$\therefore$ $a > 0$, and $b < 0$

$\therefore$ $a > b$ 1

[CBSE Marking Scheme, 2016]

ANSWERING TIP...

Students must be revised about the basic concept of quadrants and coordinates.

4. Let the angles of the quadrilateral be $2x°$, $3x°$, $6x°$, $7x°$.

$\therefore 2x° + 3x° + 6x° + 7x° = 360°$ ½

(Angle sum property of quadrilateral)

$\Rightarrow 18x = 360°$

$\Rightarrow x = 20°$

$\therefore$ Largest angle $= 7x° = 140°$ ½

5. Area of parallelogram

$= \text{base} \times \text{height}$

$108 = \text{base} \times 12$

$\Rightarrow \text{base} = \frac{108}{12}$

$= 9$ cm.

[CBSE Marking Scheme, 2015] 1

6. 9 1

[CBSE Marking Scheme, 2012]

Section 'B'

7. $8 - 27a^3 - 36a + 54a^2$

$= (2)^3 - (3a)^3 - 18a(2 - 3a)$ 1

$= (2)^3 - (3a)^3 - 3 \times 2 \times 3a(2 - 3a)$

$= (2 - 3a)^3$. 1

[CBSE Marking Scheme, 2013]

8. **Euclid's axiom :** If C be the mid-point of a line segment AB, then $AC = \frac{1}{2}AB$.

$AC = \frac{1}{2}AB$ ½

and $AD = \frac{1}{2}AC$ ½

$\Rightarrow AD = \frac{1}{2}\left(\frac{1}{2}AB\right)$ ½

$\Rightarrow AD = \frac{1}{4}AB$ ½

[CBSE Marking Scheme, 2012]

9. $OA = OB$

(O is the mid-point of AB)

$\angle AOC = \angle BOD$

(Vertically opposite angles) ½

$$OC = OD$$

(O is the mid-point of CD) ½

$\Delta AOC \cong \Delta BOD$ (By SAS) ½

$\Rightarrow AC = BD$ (By c.p.c.t.)

Proved ½

[CBSE Marking Scheme, 2011, 10]

10. Steps of Construction :

(i) Draw any line OP.

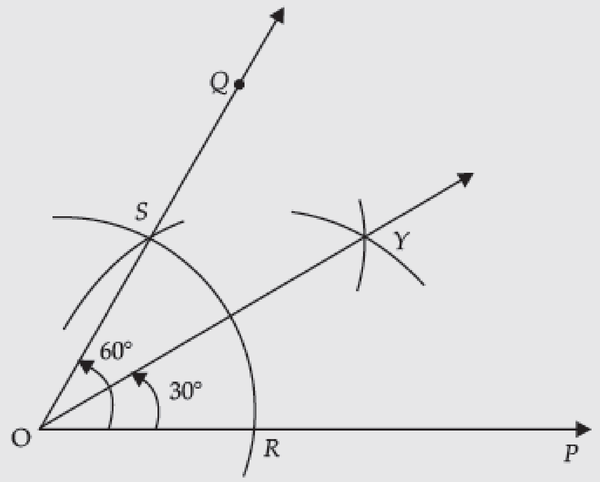
(ii) With O as centre and any suitable radius, draw an arc to meet OP at R.

(iii) With R as centre and same radius (as in step (ii)) draw an arc meet previous arc at point S.

(iv) Join OS and produce it to Q, then $\angle POQ = 60°$.

(v) With R as centre and any suitable radius (not necessarily equal to radius of step 1 but $> \frac{1}{2}$ RS), draw an arc. Also, with S as centre and with the some radius draw another arc to meet the previous arc at Y.

(vi) Join OY and produced it, the OY is the required bisector of $\angle POQ$ (*i.e.*, $\angle POY = 30°$) **1**



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[CBSE Marking Scheme, 2016]

11. Given, Volume $= 880\text{ cm}^3$,

Area of its base $= 88\text{ cm}^2$.

Volume of cuboid $= l \times b \times h$

$= 880\text{ cm}^3$ ...(i)

Area $= l \times b = 88\text{ cm}^2$ ...(ii)

From (i) and (ii), **1**

$$88 \times h = 880$$

$\Rightarrow h = 10\text{ cm}$ **1**

[CBSE Marking Scheme, 2013]

12. (i) An Even prime number i.*e.*, 2.

$\therefore$ P(getting an even prime number) $= \frac{35}{200}$

$= \frac{7}{40}$ **1**

(ii) Multiple of 3 *i.e.*, 3 and 6

$\therefore$ P(getting multiple of 3) $= \frac{40+30}{200}$

$= \frac{70}{200}$

$= \frac{7}{20}$ **1**

[CBSE Marking Scheme, 2016]

Section 'C'

13.
$$5 = 4 + 1$$
$$5 = 2^2 + 1^2$$
$$OB^2 = OA^2 + AB^2$$

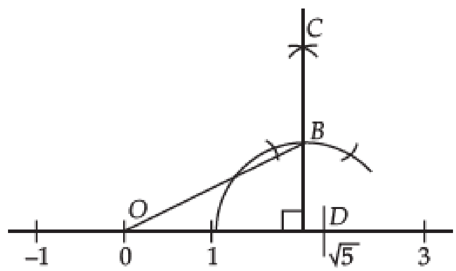
where $OA = 2$ unit

$AB = 1$ unit

$OB^2 = 5$ unit

$\therefore OB = \sqrt{5}$ unit

Point D represents $\sqrt{5}$ on number line



Steps of Construction :

On the number line, in figure, we have marked two points O and A representing numbers 0 and 2 respectively.

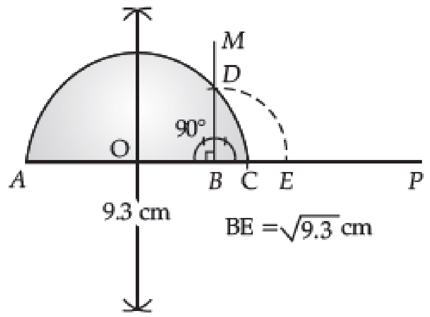
We draw $AB = 1$ unit and $AC \perp OA$.

Now Join OB

We draw an arc which taking centre as O and radius equal to OB which intersect the number line at the point D.

$\therefore$ Point D represents $\sqrt{5}$ on the number line. **3**

OR



Steps of construction :

(i) Draw the line segment $AB = 9.3$ cm.

(ii) Extend the line segment and mark the point C such that $BC = 1$ unit.

(iii) Draw perpendicular bisector of line segment AC.

(iv) Draw a semicircle taking OA a radius and centre O.

(v) Draw perpendicular at the point B which intersect semicircle at the point D.

(vi) Draw arc taking B as centre and radius BD which intersect the number line at the point E.

$$BE = \sqrt{9.3} \text{ unit}$$

Point E represents $\sqrt{9.3}$ on the number line. **3**

14. $\left(\frac{8}{15}\right)^3 - \left(\frac{1}{3}\right)^3 - \left(\frac{1}{5}\right)^3 = \frac{x}{75}$ ...(i)

Let $\frac{8}{15} = a, \frac{-1}{3} = b, \frac{-1}{5} = c$ ½

$$a + b + c = \frac{8}{15} - \frac{1}{3} - \frac{1}{5}$$

$$= \frac{8-5-3}{15} = 0 \quad \textbf{1}$$

$\therefore$ $a^3 + b^3 + c^3 = 3abc$ ...(ii) ½

Using eqn. (i) and (ii), we get

$$3 \times \frac{8}{15} \times \frac{-1}{3} \times \frac{-1}{5} = \frac{x}{75}$$

$$\frac{8}{75} = \frac{x}{75}$$

$\Rightarrow$ $x = 8$ **1**

15. (i) When $y = 3$, then

$$2x + 3 = 7$$

$\Rightarrow$ $2x = 4$

$\Rightarrow$ $x = 2$ **1**

(ii) When $x = 4$, then

$$2(4) + y = 7$$

$\Rightarrow$ $y = 7 - 8 = -1$ **1**

(iii) When $x = 1$, then

$$2 + y = 7 \Rightarrow y = 5$$

$\therefore$ One more solution is (1, 5). **1**

[CBSE Marking Scheme, 2012]

16. The points $A(-3, 0)$, $B(5, 0)$ and $C(0, 4)$ can be plotted as shown below :

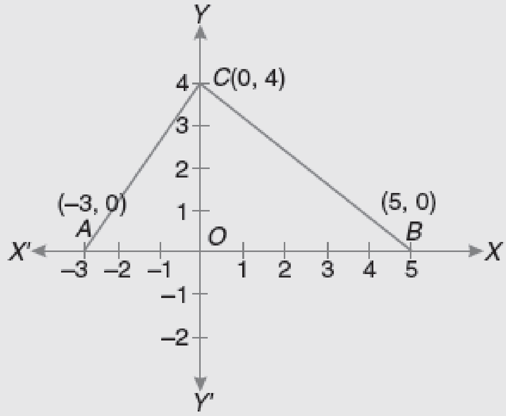


Figure formed is a triangle ABC.

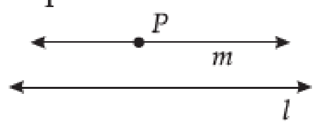
$$\text{Area of } \Delta ABC = \frac{1}{2} \times AB \times OC$$

$$\therefore \quad \text{Area} = \frac{1}{2} \times 8 \times 4 = 16 \text{ sq.units}$$

As, $AB = 8$ units and $OC = 4$ units **1 + 2**

[CBSE Marking Scheme, 2011]

17. Euclid's fifth postulate are



(i) For every line l and for every point P not lying on l, there exists a unique line passing through P and parallel to P or we can say that

(a) Two distinct intersecting lines cannot be parallel to the same line.

(b) Take any line l and a point P, not on l. Then we know that there is unique line m through P which is parallel to l. **3**

18. $\angle ACP = \angle ABP$ ...(i)

(angles in the same segment of a circle are equal) **1**

Similarly,

$\angle QCD = \angle QBD$ ...(ii) ½

But $\angle ABP = \angle QBD$

(vertically opposite angles) ...(iii) **1**

From (i), (ii) and (iii), we get

$\angle ACP = \angle QCD$ ½

[CBSE Marking Scheme, 2011]

19. Steps of construction :

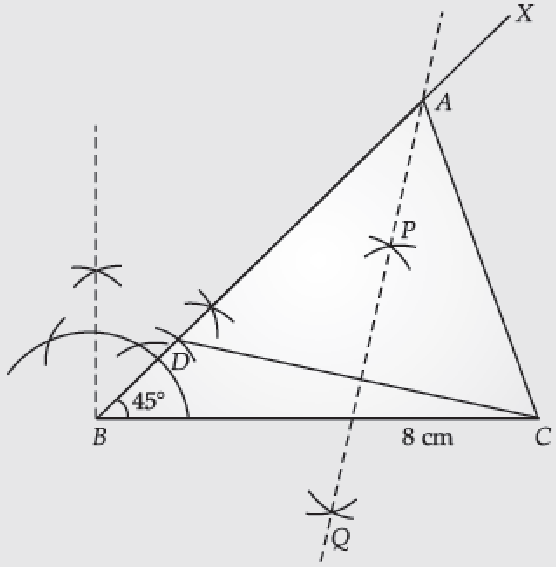
(i) Draw the line segment $BC = 8$ cm and at point B construct an angle of 45°, i.e., $\angle XBC = 45°$.

(ii) Cut the line segment $BD = 3.5$ cm (equal to $AB - AC$) on ray BX.

(iii) Join DC and draw the perpendicular bisector PQ of DC.

(iv) The perpendicular bisector intersects BX at point A.

Join AC. ΔABC is the required triangle. 1½



1½

[CBSE Marking Scheme, 2014]

COMMONLY MADE ERROR

Most of the students make mistakes for using incorrect measurements of AB, AC, AC to construct triangle ABC.

ANSWERING TIP...

Show all traces of construction and all given measurements must be correctly taken.

20. Area of cloth required = 10 × Area of cloth for one piece ½

Area of one piece of cloth is made by sides 60 cm, 60 cm and 20 cm is,

$$s = \frac{60+60+20}{2} = 70 \text{ cm} \quad ½$$

$$\therefore \quad \text{Area} = \sqrt{70(70-60)(70-60)(70-20)}$$

$$= \sqrt{70\times10\times10\times50}$$

$$= \sqrt{7\times10\times10\times10\times5\times10}$$

$$= 10 \times 10 \times \sqrt{35}$$

$$= 100\sqrt{35} \text{ cm}^2 \quad 1$$

Area of cloth required

$$= 10 \times 100 \times \sqrt{35}$$

$$= 1000\sqrt{35} \text{ cm}^2. \quad 1$$

[CBSE Marking Scheme, 2014]

21. Let $r_1 = 6$ m, $r_2 = 8$ m, $r_3 = 10$ m

Let the radius of resulting sphere be R then,

volume of resulting sphere = sum of volume of small spheres

i.e., $$\frac{4}{3}\pi R^3 = \frac{4}{3}\pi r_1^3 + \frac{4}{3}\pi r_2^3 + \frac{4}{3}\pi r_3^3 \quad 1$$

$$= \frac{4}{3}\pi(r_1^3 + r_2^3 + r_3^3) = \frac{4}{3}\pi(6^3 + 8^3 + 10^3) \quad 1$$

$$= \frac{4}{3}\pi(216 + 512 + 1000)$$

$$\Rightarrow \quad R^3 = 1728$$

$$R = \sqrt[3]{1728} = 12 \text{ m} \quad 1$$

[CBSE Marking Scheme, 2017]

22.(i) Total events $n(S) = 500$

Favourable events $n(E) = n(E) > 10$
$= 28 + 15$

$\therefore \quad n(E) = 43$

(ii) Probability of getting a sum more than 10

$$= \frac{127}{500}$$

$$= \frac{43}{500}$$

(ii) Favourable events $n(E) = 8 < n(E) < 12$

$\therefore \quad n(E) = 53 + 46 + 28 = 127$

Probability of getting a sum between 8 and 12

$$= \frac{127}{500}$$

Section 'D'

23. $$\text{LHS} = \frac{1}{\frac{y+xy+1}{y}} + \frac{1}{1+y+xy} + \frac{1}{1+\frac{1}{xy}+\frac{1}{x}} \quad 2$$

$$(\because xyz = 1 \Rightarrow \frac{1}{z} = xy) \quad ½$$

$$= \frac{y}{xy+y+1} + \frac{1}{xy+1+y} + \frac{xy}{xy+y+1} \quad 1$$

$$= \frac{y+1+xy}{xy+y+1} = 1 = \text{RHS} \quad ½$$

Hence proved.

[CBSE Marking Scheme, 2012]

24. $$f(x) = x^4 - 2x^3 + 3x^2 - ax + b$$

Put, $x - 1 = 0$ or $x = 1$ in $f(x)$, we get

$$\Rightarrow \quad f(1) = (1)^4 - 2(1)^3 + 3(1)^2 - a \times 1 + b$$

$\Rightarrow \quad 5 = 1 - 2 + 3 - a + b$

$\Rightarrow \quad 5 = 2 - a + b$

$\Rightarrow \quad a - b = 2 - 5$ **1**

$\Rightarrow \quad a - b = -3$ ...(1)

Again put,

$x + 1 = 0$ or $x = -1$ in $f(x)$, we get

$f(-1) = (-1)^4 - 2(-1)^3 + 3(-1)^2 - a(-1) + b$

$\Rightarrow \quad 19 = 1 + 2 + 3 + a + b$

$\Rightarrow \quad 19 - 6 = a + b$

$\Rightarrow \quad a + b = 13$ ...(2) **1**

Adding equations (1) and (2),

$2a = 10$ ½

$a = 5$

By equation (2),

$5 + b = 13$

$\therefore \quad b = 8$ ½

$\therefore \quad f(x) = x^4 - 2x^3 + 3x^2 - 5x + 8$ ½

Again put, $x - 2 = 0$ or $x = 2$ in $f(x)$

$f(2) = (2)^4 - 2(2)^3 + 3(2)^2 - 5 \times 2 + 8$

$= 16 - 16 + 12 - 10 + 8$

$= 20 - 10 = 10$ ½

25. From the above information

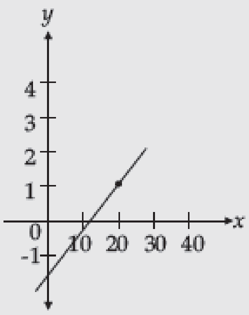
$x = 20 + (y - 1)8$

$x = 8y + 12$

x	12	20	4
y	0	1	-1

If fare is ₹ 100, then distance travelled $= \dfrac{100 - 12}{8}$

1



2

$= \dfrac{88}{8} = 11$ km **1**

[CBSE Marking Scheme, 2017]

COMMONLY MADE ERROR

Students make calculation errors and get confused with the values of x and y.

ANSWERING TIP...

Points should be properly plotted on the graph.

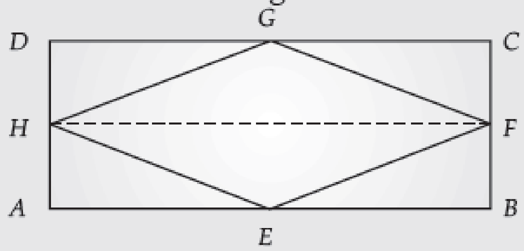
26. Construction : Join HF

H and F are the mid-points of AD and BC respectively

$\Rightarrow \quad HD = FC$

$\therefore \quad HD \parallel FC \quad (\because AD \parallel BC)$

$\Rightarrow$ $HDFC$ is a rectangle.



1

Now, ΔHFG and rectangle $HFCD$ are on the same base HF and lie between the same parallels HF and DC

$\therefore \quad ar(\Delta HFG) = \frac{1}{2} ar(\square HFCD)$ ...(i)

Similarly, $ar(\Delta EHF) = \frac{1}{2} ar(\square ABFH)$ ...(ii) **1**

Adding (i) and (ii), we get

$ar(\Delta HFG) + ar(\Delta EHF)$

$= \frac{1}{2} ar(\square HFCD) + ar(\square ABFH)$

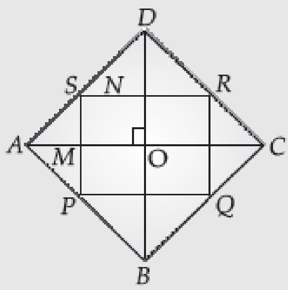
$\Rightarrow \quad ar(\square EFGH) = \frac{1}{2} ar(\square ABCD)$

$16 = \frac{1}{2} ar(\square ABCD)$

$\therefore \quad ar(\square ABCD) = 32 \text{ cm}^2$ **2**

[CBSE Marking Scheme, 2016]

27.



Join AC and BD.

In ΔDAC, S and R are the mid-points of AD and DC.

$\therefore \quad SR = \frac{1}{2} AC$ and $SR \parallel AC$ ...(i) **1**

Also, in ΔBAC, P and Q are the mid-points of AB and BC.

$\therefore \quad PQ = \frac{1}{2} AC$ and $PQ \parallel AC$ ..(ii) **1**

From (i) and (ii), $PQRS$ is a parallelogram.

From (i), we get

$SM \parallel NO$ ...(iii)

and $SP \parallel BD$

$\Rightarrow$ $SN \parallel MO$ ...(iv)1

From (iii) and (iv), we get $MSNO$, is a parallelogram.

Since $ABCD$ is a rhombus, so

$\angle DOA = 90°$

$\Rightarrow$ $\angle MSN = 90°$

Hence, $PQRS$ is a rectangle. **Proved. 1**

[CBSE Marking Scheme, 2012]

28. Construction : Join OC, OD and BC.

CD = Radius of the circle (Given)

$\therefore$ $CD = OD = OC$ **1**

$\therefore$ ΔODC is an equilateral triangle.

$\therefore$ $\angle COD = 60°$

Now, $\angle CBD = \frac{1}{2}\angle COD$

$\therefore$ $\angle CBD = 30°$ ½

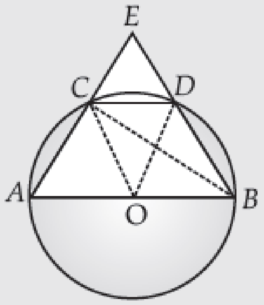
Also, $\angle ACB = 90°$

(angle in a semi-circle is 90°)

$\therefore$ $\angle BCE = 180° - \angle ACB$

$= 180° - 90°$

$= 90°$ ½



Now, in ΔBCE,

$\angle CBE + \angle BCE + \angle CEB = 180°$ ½

$\Rightarrow$ $30° + 90° + \angle CEB = 180°$

$\therefore$ $\angle CEB = 60°$ ½

$\therefore$ $\angle AEB = 60°$ **1**

[CBSE Marking Scheme, 2011, 12]

29. Area of walls $= 2(l + b)h = \frac{340.20}{1.35}$

$\Rightarrow$ $2(12 + b)h = 252$ sq. m ...(i)

Area of floor $= l \times b$

$= \frac{91.50}{\left(\frac{85}{100}\right)} = 108$ sq. m **2**

$12 \times b = 108$

$b = 9$ m

From (i), $2(12 + 9)h = 252$

$h = \frac{252}{2 \times 21} = 6$m **2**

[CBSE Marking Scheme, 2017]

ANSWERING TIPS...

It is necessary to learn the formulae related to Area and Volume.

30.

Age	No. of teachers
18-29	11
30-39	32
40-49	30
50-59	7

(a) Probability of teachers of 18 years of more

$= \frac{\text{Favourable No. of Outcomes}}{\text{Total No. of Outcomes}}$

$= \frac{11+32+30+7}{80} = \frac{80}{80} = 1$ **1**

(b) Probability of teachers of 30-39 years age

$= \frac{\text{Favourable No. of Outcomes}}{\text{Total No. of Outcomes}}$

$= \frac{32}{80} = \frac{2}{5}$ **1**

(c) Since there is no teacher available above 60 years

So, No. of favourable outcomes = 0

Probability of teachers above 60 years

$= \frac{\text{Favourable No. of Outcomes}}{\text{Total No. of Outcomes}}$

$= \frac{0}{80} = 0$ **1**

(d) Probability of teachers of 40 or more than 40 years

$= \frac{\text{Favourable No. of Outcomes}}{\text{Total No. of Outcomes}}$

$= \frac{30+7}{80} = \frac{37}{80}$ **1**

ANSWERING TIPS...

It is necessary to learn three basic steps of probability sum :

(i) Listing the total outcomes and favourable outcomes.

(ii) Finding probability by using

$$\mathcal{P}(\mathcal{E}) = \frac{\text{No. of favourable outcomes}}{\text{Total no. of outcomes}}$$

(iii) Writing the final answer in the simplest form.