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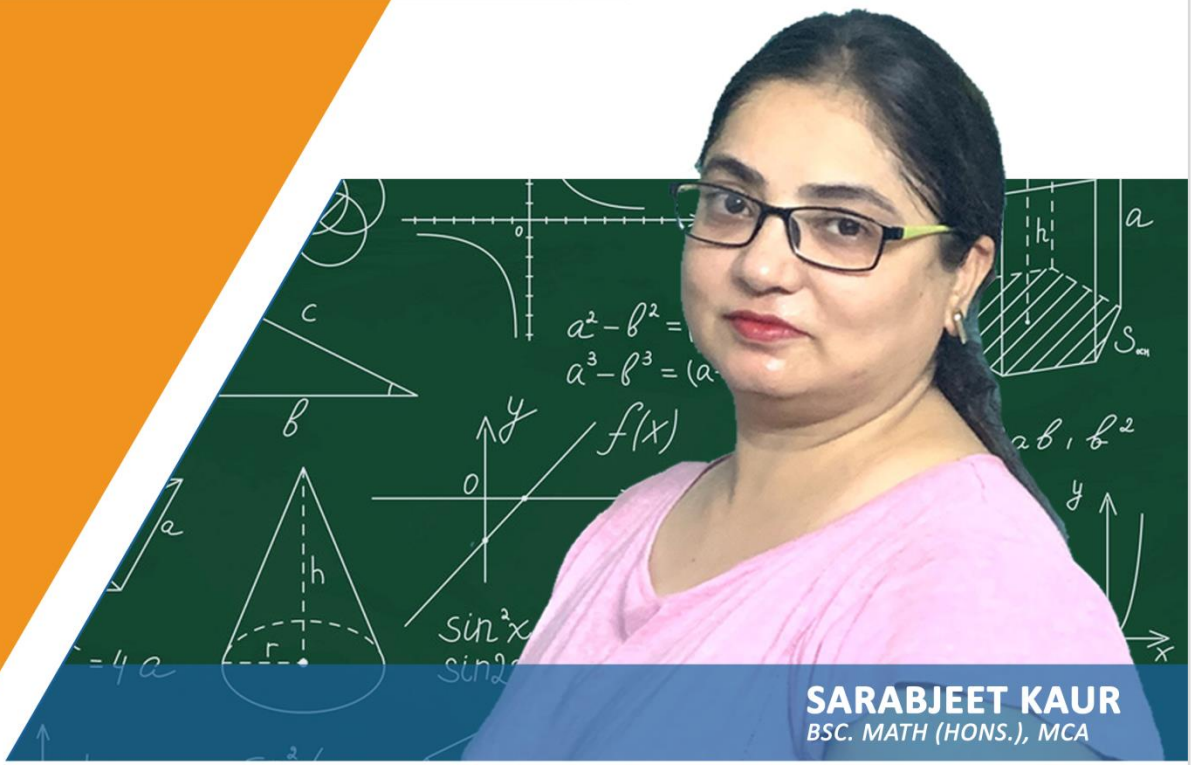

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BSC. MATH (HONS.), MCA

GRADE 9TH MATHS

CBQ

Case Based Questions

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Visual Case Based Questions

(4 marks each)

Attempt any four sub-parts from each questions.

1. Democracy has given people a powerful right- that is to VOTE. In India, every citizen over 18 years of age has the right to vote. Instead of enjoying it as a holiday, one must vote if he/she truly wants to contribute to the nation-building process and bring about a change.

A survey was done in a small area in which $\sqrt{9+2x}-\sqrt{2x}$ voters were men and $\frac{5}{\sqrt{9+2x}}$ voters were women.

Read the above statement carefully and answer the following :

(A) Find x, if number of men is equal to number of women. 1

(a) 6 (b) 5

(c) 8 (d) 9

(B) Which mathematical concept is used here ? 1

(a) Number system (b) Circle

(c) Area (d) Statistics

(C) $a^p \cdot a^q =$ 1

(a) a^{p+q} (b) a^{p-q}

(c) a^{pq} (d) $(pq)^a$

(D) $\frac{7^{\frac{1}{5}}}{7^{\frac{1}{3}}} =$ 1

(a) $\frac{-2}{7^{15}}$ (b) $\frac{-1}{7^{15}}$

(c) $\frac{2}{7^{15}}$ (d) $\frac{-4}{7^{15}}$

(E) If r is rational and s is irrational, then which statement is false? 1

(a) $r+s$ is irrational number.

(b) $r-s$ is rational number.

(c) rs is irrational number.

(d) $\frac{r}{s}$ is irrational number.

Ans. (A) (c) 8

$$\therefore \quad \sqrt{9+2x}-\sqrt{2x} = \frac{5}{\sqrt{9+2x}}$$

$$\Rightarrow \quad \sqrt{9+2x}[\sqrt{9+2x}-\sqrt{2x}] = 5$$

$$\Rightarrow (\sqrt{9+2x})^2 - \sqrt{2x(9+2x)} = 5$$

$$\Rightarrow \quad 9+2x-5 = \sqrt{2x(9+2x)}$$

$$\Rightarrow \quad 4+2x = \sqrt{2x(9+2x)}$$

Squaring both sides,

$$(4+2x)^2 = \left(\sqrt{2x(9+2x)}\right)^2$$

$$\Rightarrow \quad 16+4x^2+16x = 18x+4x^2$$

$$\Rightarrow \quad 16 = 2x$$

$$\Rightarrow \quad x = 8$$ 1

(B) (a) Number system 1

(C) (a) a^{p+q}

$$a^p \cdot a^q = a^{p+q}$$

(D) (a) $\frac{-2}{7^{15}}$

$$\frac{7^{\frac{1}{5}}}{7^{\frac{1}{3}}} = 7^{\frac{1}{5}-\frac{1}{3}} = 7^{\frac{3-5}{15}} = 7^{\frac{-2}{15}}$$

(E) (b) $r-s$ is rational number. 1

2. In a school 5 out of every 7 children participated in 'Save wild life' campaign organised by the school authorities.

(A) What fraction of the students participated in the campaign. 1

(a) $\frac{2}{7}$ (b) $\frac{5}{7}$

(c) $\frac{4}{7}$ (d) $\frac{7}{7}$

(B) What is the value of $\frac{5}{7}$? 1

(a) $0.\overline{714285}$ (b) 1.4

(c) 1.414 (d) 1.7142

(C) What kind of decimal expansion it has. 1

(a) Terminating

(b) non terminating

(c) terminating repeating

(d) non terminating repeating

(D) How many rational numbers are there between 5 and 7. 1

(a) 0 (b) 1

(c) 2 (d) infinite

(E) Every rational number is a ..... number. 1

(a) Prime (b) Composite

(c) real (d) even.

Ans. (A) (b) $\frac{5}{7}$

(B) (a) $5 \div 7 = 0.\overline{714285}$

(C) (d) non terminating repeating

(D) (d) infinite

(E) (c) Real.

Visual Case Based Questions

(4 marks each)

Attempt any four sub-parts from each question.

1. National Association For The Blind (NAB) aimed to empower and well-inform visually challenged population of our country, thus enabling them to lead a life of dignity and productivity.

Ravi donated ₹ $\left(x^3+\frac{1}{x^3}\right)$ to NAB. When his cousin asks to tell the amount donated by him, he just gave the below hint.

$$x+\frac{1}{x}=10$$

Answer the following questions :

(A) $(x + a)(x + b) = x^2 +$ ..... $x + ab$ 1

(a) $a + b$ (b) ab

(c) $a - b$ (d) $\frac{a}{b}$

(B) $(x - y)^3 =$ 1

(a) $x^3 - y^3 - 3xy$ (b) $x^3 - y^3 - 3xy(x - y)$

(c) $x^3 - y^3 - 3xy(x + y)$ (d) $x^3 - y^3$

(C) Which mathematical concept is involved in the above situation ? 1

(a) Polynomial (b) Circle

(c) Lines and angles (d) Triangle

(D) Find the amount donated by Ravi. 1

(a) ₹ 1000 (b) ₹ 850

(c) ₹ 970 (d) ₹ 900

(E) Find the amount donated by Ravi if $x+\frac{1}{x}=7$. 1

(a) ₹ 522 (b) ₹ 422

(c) ₹ 222 (d) ₹ 322

Ans. (A) (a) $a + b$ 1

(B) (b) $x^3 - y^3 - 3xy(x - y)$ 1

(C) (a) Polynomial 1

(D) (c) ₹ 970

$$x^3 + \frac{1}{x^3} + 3x\frac{1}{x}\left(x + \frac{1}{x}\right) = 1000$$

$$(x^3 + \frac{1}{x^3}) + 3(10) = 1000$$

$$(x^3 + \frac{1}{x^3}) = 1000 - 30 = 970 \quad 1$$

(E) (d) ₹ 322

$$x^3 + \frac{1}{x^3} + 3x\frac{1}{x}(x + \frac{1}{x}) = 343$$

$$(x^3 + \frac{1}{x^3}) + 3(7) = 343$$

$$(x^3 + \frac{1}{x^3}) = 343 - 21 = 322. \quad 1$$

2. Beti Bachao, Beti Padhao (BBBP) is a personal campaign of the Government of India that aims to generate awareness and improve the efficiency of welfare services intended for girls.

In a school, a group of $(x + y)$ teachers, $(x^2 + y^2)$ girls and $(x^3 + y^3)$ boys organised a campaign on Beti Bachao, Beti Padhao.

(A) Which mathematical concept is used here? 1

(a) Linear equations **(b)** Triangles

(c) Polynomials **(d)** Area

(B) Which is the correct identity? 1

(a) $(a + b)^2 = a^2 + b^2 - 2ab$

(b) $(a + b)^2 = a^2 + b^2 + 2ab$

(c) $(a + b)^2 = a^2 - b^2 - 2ab$

(d) All are correct.

(C) $(x - y)^3$ = 1

(a) $(x^2 - y^2 - 3xy(x - y))$ **(b)** $(x^3 - y^3 - 3xy(x - y))$

(c) $(x^3 - y^3 - 2xy(x - y))$ **(d)** $(x^3 - y^3 - 3xyx - y)$

(D) If in the group, there are 10 teachers and 58 girls, then what is the number of boys? 1

(a) 300 **(b)** 360

(c) 350 **(d)** 370

(E) Using part (D), find $(x^2 - y^2)$ if $x - y = 23$. 1

(a) 200 **(b)** 330

(c) 120 **(d)** 230

Ans.(A) (c) Polynomials 1

(B) (b) $(a + b)^2 = a^2 + b^2 + 2ab$ 1

(C) (b) $(x^3 - y^3 - 3xy(x - y))$ 1

(D) (d) 370

No. of teachers $= x + y = 10$

$\Rightarrow (x + y)^2 = (10)^2$

$\Rightarrow x^2 + y^2 + 2xy = 100$

[Since $(a + b)^2 = a^2 + b^2 + 2ab$]

No. of students $= (x^2 + y^2) = 58$

$\Rightarrow 58 + 2xy = 100$

$\Rightarrow 2xy = 100 - 58$

$\Rightarrow 2xy = 42$

$\Rightarrow xy = \frac{42}{2}$

$\Rightarrow xy = 21$ ½

Now, since $(x + y)^3 = [x^3 + y^3 + 3xy(x + y)]$

$\Rightarrow (10)^3 = [x^3 + y^3 + 3 \times 21(10)]$

$\Rightarrow 1000 = (x^3 + y^3 + 630)$

$\Rightarrow 1000 - 630 = (x^3 + y^3)$

$\Rightarrow (x^3 + y^3) = 370$ ½

(E) (d) 230

Given $x - y = 23$

Also, $x + y = 10$

$x^2 - y^2 = (x + y)(x - y)$ ½

$= 10 \times 23$

$= 230$ ½

Visual Case Based Questions

(4 marks each)

Attempt any four sub-parts from each questions.

1. Prime Minister's National Relief Fund (also called PMNRF in short) is the fund raised to provide support for people affected by natural and man-made disasters. Natural disasters that are covered under this include flood, cyclone, earthquake etc. Man-made disasters that are included are major accidents, acid attacks, riots, etc.

Two friends Sita and Gita, together contributed ₹ 200 towards Prime Minister's Relief Fund. Answer the following :

(A) Which out of the following is not the linear equation in two variables ?

(a) $2x = 3$ (b) $4 = 5x - 4y$

(c) $x^2 + x = 1$ (d) $x - \sqrt{2}y = 3$

(B) How to represent the above situation in linear equations in two variables ?

(a) $2x + y = 200$ (b) $x + y = 200$

(c) $200x = y$ (d) $200 + x = y$

(C) If Sita contributed ₹ 76, then how much was contributed by Gita ?

(a) ₹ 120 (b) ₹ 123

(c) ₹ 124 (d) ₹ 125

(D) If both contributed equally, then how much is contributed by each?

(a) ₹ 50, ₹ 150 (b) ₹ 100, ₹ 100

(c) ₹ 50, ₹ 50 (d) ₹ 120, ₹ 120

(E) Which is the standard form of linear equation $x = -5$?

(a) $x + 5 = 0$ (b) $1x - 5 = 0$

(c) $x + 0.y + 5 = 0$ (d) $1x + 0.y = 5$

Ans. (A) (c) $x^2 + x = 1$

$x^2 + x = 1$ is not linear as highest power is 2. Also, it is an equation in one variable.

Thus, it is not a linear equation in two variables. 1

(B) (b) $x + y = 200$

Here, x represents Sita's contribution and y represents Gita's contribution. 1

(C) (c) ₹ 124

If $x = 76$ then $76 + y = 200$ ½

$y = 200 - 76$

$y = 124$ ½

(D) (b) ₹ 100, ₹ 100

If $x = y$ then $x + x = 200$ ½

$2x = 200$

$x = \frac{200}{2} = 100$ ½

Thus, each contributed is ₹ 100.

(E) (c) $1x + 0.y + 5 = 0$

Since, $x = 5$

$\Rightarrow$ $x + 5 = 0$

Thus, standard form of $x = -5$ is $1.x + 0.y + 5 = 0$. 1

2. Rainwater harvesting system is a technology that collects and stores rainwater for human use.

Anup decided to do rainwater harvesting. He collected rainwater in the underground tank at the rate of 30 cm^3/sec.

Answer the following questions :

(A) What will be the equation formed if volume of water collected in x seconds is taken as y cm^3 ? 1

(a) $30x = y$ (b) $x = 30y$

(c) $30 - x = y$ (d) $30 + y = x$

(B) What is the type of solution of the equation formed? 1

(a) a unique solution

(b) only two solutions

(c) no solution

(d) infinitely many solutions

(C) Write the equation in standard form. 1

(a) $30x - y + 0 = 0$ (b) $30x + y + 0 = 0$

(c) $30x - y - 0 = 0$ (d) $30x - y = 0$

(D) How much water will be collected in 60 sec? 1

(a) 1500 cm^3 (b) 2 cm^3

(c) 1800 cm^3 (d) 1 cm^3

(E) How much time will it take to collect water in 900 cm^3 ? 1

(a) 20 sec (b) 50 sec

ns. (A) (a) $30x = y$ 1

(B) (d) Infinitely many solutions

Because for every value of x, there is a corresponding value of y and vice versa. 1

(C) (a) $30x - y + 0 = 0$

Standard form of a linear equation in two variables is $ax + by + c = 0$. 1

(D) (c) 1800 cm^3

Since $y = 30x$

If $x = 60$, then, $y = 30 \times 60 = 1800$

Required volume is 1800 cm^3 1

(E) (d) 30 sec

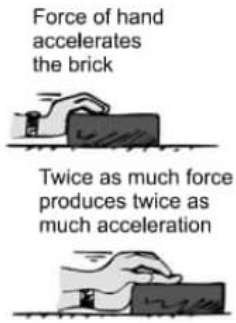
Since $y = 30x$

If $y = 900$, then, $900 = 30x$

$x = \frac{900}{30} = 30$

Required time is 30 sec. 1

3. **The force applied on a body is directly proportional to the acceleration produced in the body. Assume x be acceleration produced in the body and y be the force. Take constant as 10.(S.I unit of force is Newton and S.I. unit of acceleration is m/s^2.**



Answer the following :

(A) Write an equation to express the above situation. 1

(a) $y = cx$ (b) $y = \frac{c}{x}$

(c) $y = c + x$ (d) $y = c - x$

(B) Name the type of equation formed in part(A). 1

(a) Quadratic equation

(b) Cubic equation

(c) Zero equation

(d) Linear equation

(C) Equation formed on above situation has _____ solution(s). 1

(a) Unique (b) Infinite many

(c) No (d) Only two solutions

(D) Find acceleration produced in the body, if force applied is 10 newtons. 1

(a) 1 m/s^2 (b) 2 m/s^2

(c) 3 m/s^2 (d) 4 m/s^2

(C) (b) Infinitely many

A linear equations has infinitely many solutions. 1

(D) (a) 1 m/sec^2

Given,

Force applied = 10 newtons

$c = 10$

Since, $y = cx$

$\Rightarrow 10 = 10x$

$\Rightarrow x = 1$

Thus, acceleration produced = 1 m/s^2 1

(E) (c) 25 newtons

Given, acceleration produced = 2.5 m/s^2

$y = cx$,

$y = 10 \times 2.5 = 25$ newtons 1

4. **Temperature is a measure of the warmth or coldness of an object or substance with reference to some standard value.**

In countries like USA and Canada, temperature is measured in Fahrenheit, whereas in countries like India, it is measured in Celsius.

An equation that converts Fahrenheit to Celsius is:

$$F = \left(\frac{9}{5}\right)C + 32$$

On reading the above information, some queries come in Aman's mind. Help him to resolve his following queries:

Answer the following :

(A) What is the type of equation, $F = \left(\frac{9}{5}\right)C + 32$? 1

(a) Cubic equation

(b) Quadratic equation

(c) Linear equation

(d) None of above

(B) How many variables are there in the equation,

(E) Find force applied, if acceleration produced is $2.5 m/sec^2$. 1

(a) 20 newtons (b) 30 newtons
(c) 25 newtons (d) 35 newtons

Ans. (A) (a) $y = cx$
y is directly proportional to x.
$\Rightarrow y = cx$ where c is a constant. 1

(B) (d) Linear equation
$y = cx$ is a linear equation as highest power of x is 1.

(D) If the temperature is 95°F, what is the temperature in Celsius ? 1

(a) 35°C (b) 30°C
(c) 25°C (d) 36°C

(E) What is a temperature which is numerically the same in both Fahrenheit and Celsius ? 1

(a) 40 (b) – 40
(c) 30 (d) – 20

Ans. (A) (c) Linear equation
As its highest power is 2. Thus, it is a linear equation. 1

(B) (c) 2
There are two variables, C and F. 1

(C) (c) 86°F

$$F = \left(\frac{9}{5}\right)30 + 32$$
$$= 54 + 32$$
$$= 86$$

(D) (a) 35°C

$$F = \left(\frac{9}{5}\right)C + 32$$

$$F = \left(\frac{9}{5}\right)C + 32 \ ?$$ 1

(a) 0 (b) 1
(c) 2 (d) 3

(C) If the temperature is 30°C, what is the temperature in Fahrenheit ? 1

(a) 80°F (b) 82°F
(c) 86°F (d) 90°F

$$95 = \left(\frac{9}{5}\right)C + 32$$
$$95 \times 5 = 9C + 160$$
$$475 = 9C + 160$$
$$9C = 475 - 160$$
$$9C = 315$$
$$C = \frac{315}{9}$$
$$C = 35°$$

(E) (b) – 40

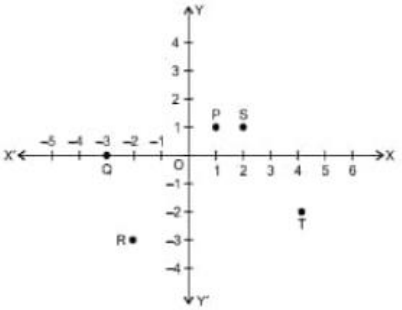
$$F = \left(\frac{9}{5}\right)x + 32$$
$$x = \left(\frac{9}{5}\right)x + 32$$
$$5x = 9x + 160$$
$$5x - 9x = 160$$
$$-4x = 160$$
$$x = -40$$ 1

Visual Case Based Questions

(4 marks each)

Attempt any four sub-parts from each questions.

1. Five friends playing a game in which they are standing at different positions, P, S, T, R and Q.



Rohan is watching them playing. Few questions came to Rohan's mind while watching the game. Give answer to his questions by looking at the figure.

(A) What are the co-ordinates of P? 1

(a) $(-1, 1)$ (b) $(1, -1)$
(c) $(1, 1)$ (d) $(-1, -1)$

(B) Name the point whose y-co-ordinate is zero : 1

(a) P (b) Q
(c) R (d) S

(C) Name the polygon formed on joining all these five points in an order. 1

(a) Quadrilateral (b) Hexagon
(c) Pentagon (d) Triangle

(D) Name the point lying in the third quadrant. 1

(a) R (b) P
(c) Q (d) T

(E) $(x, y) = (y, x)$, if : 1

(a) $x > y$ (b) $x < y$
(c) $\frac{x}{y} = 1$ (d) $x = \frac{1}{y}$

Ans. (A) (c) (1, 1) 1

(B) (b) Q

As point Q lies on x-axis. Therefore, its y-co-ordinate is zero. 1

(C) (c) Pentagon (5 sided polygon). 1

(D) (a) R

In third quadrant, both x-co-ordinate and y-co-ordinate are negative. 1

(E) (c) $\frac{x}{y} = 1$

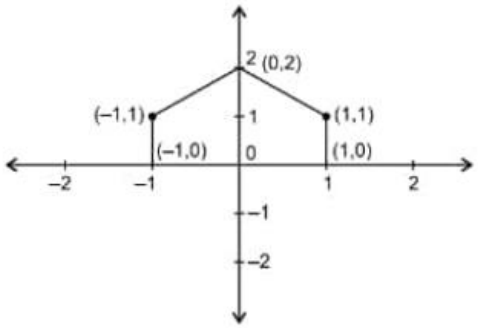
Since, $\frac{x}{y} = 1$

$\Rightarrow \quad x = y$ ½

Also, $(x, y) = (y, x)$, if $x = y$ ½

2. Sohan draws a gate of a temple on the graph paper. He has following points :

(– 1, 0), (1, 0), (1, 1), (– 1, 1) and (0, 2)



Answer the questions below:

(A) Name the closed figure obtained. 1

(a) Triangle **(b)** Quadrilateral

(c) Pentagon **(d)** Hexagon

(B) In which quadrant (– 1, 1) lies ? 1

(a) 1st quadrant **(b)** 2nd quadrant

(b) 3rd quadrant **(d)** 4th quadrant

(C) Write the ordinate of the point (1, 0). 1

(a) 1 **(b)** 0

(c) 2 **(d)** – 1

(D) Write the abscissa of the point (0, 2). 1

(a) 0 **(b)** 2

(c) – 2 **(d)** 1

(E) Which point from the following lies on Y-axis? 1

(a) (1, 1) **(b)** (1, 0)

(c) (0, 2) **(d)** (– 1, 1)

Ans. (A) (c) pentagon

A pentagon has five sides. 1

(B) (b) 2nd quadrant

In 2nd quadrant, x-co-ordinate is negative and y-co-ordinate is positive. 1

(C) (b) 0

y-co-ordinate of a point also called ordinate. 1

(D) (a) 0

x-co-ordinate of a point also called abscissa. 1

(E) (c) (0, 2)

On Y-axis, x-co-ordinate is zero. 1

Visual Case Based Questions

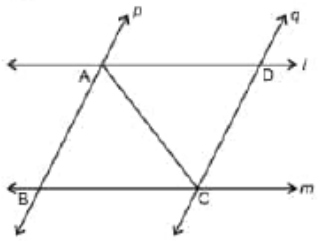
(4 marks each)

Attempt any four sub-parts from each questions.

1. BSE stands for a disease called Bovine Spongiform Encephalopathy. "Bovine" means that the disease affects cows, "spongiform" refers to the way the brain from a sick cow looks spongy under a microscope, and "encephalopathy" indicates that it is a disease of the brain. This disease is commonly called "mad cow disease."

A farmer has a field $ABCD$ formed by two pair of parallel roads as shown below in which $l \| m$ and

$p \| q$. His four cows suffering from BSE. Thus, he tied them at four corners of the field $ABCD$.



Answer the following questions :

(A) If $\angle BAC = 30°$, find $\angle ACD$. 1

(a) 60° (b) 90°
(c) 30° (d) 20°

(B) $\angle ABC + \angle BCD = 180°$ as : 1

(a) Corresponding angles are supplementary.
(b) Alternate interior angles are supplementary.
(c) Alternate exterior angles are supplementary.
(d) Angles on the same side of a transversal are supplementary.

(C) If cow at C and cow at D is 2 km apart, then what is the distance between cow at A and cow at B? 1

(a) 1 km (b) 2 km
(c) 3 km (d) 4 km

(D) If $\angle B = 45°$, then $\angle D =$ _____. 1

(a) 50° (b) 40°
(c) 45° (d) 55°

(E) If we join BD such that BD meet AC at O and $\angle BOC = 30°$, then what is the measure of $\angle AOD$? 1

(a) 90° (b) 60°
(c) 45° (d) 30°

Ans. (A) (c) 30°

$p \| q$ and AC is a transversal. Thus, ΔBAC and $\angle ACD$ are alternate interior angles. Therefore, $\angle BAC = \angle ACD = 30°$ (alternate interior angles are equal) 1

(B) (d) Angles on the same side of a transversal are supplementary. 1

(C) (b) 2 km

Since, $p \| q$ and $l \| m$ thus, $ABCD$ is a parallelogram.

Also, since opposite sides of a parallelogram are equal.

So, $AB = CD$ ½

Given, distance between cow at C and cow at $D = CD = 2$ km

$\Rightarrow$ $AB = 2$ km

Hence distance between cow at A and cow at B is 2 km. ½

(D) (c) 45°

Since, $\angle B = 45°$

$\Rightarrow$ $\angle D = 45°$

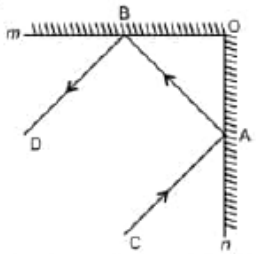
(opposite angles of a parallelogram are equal)1

(E) (d) 30°

$\angle BOC = \angle AOD = 30°$

(vertically opposite angles are equal) 1

2. A plane mirror is a mirror with a flat reflective surface.



An incident ray is a ray of light that strikes a surface. The reflected ray corresponding to a given incident ray, is the ray that represents the light reflected by the surface.

In figure, m and n are two plane mirrors perpendicular to each other.

Answer the following questions :

(A) Parallel lines : 1

(a) meet at a point
(b) never meet
(c) sometimes meet
(d) meet at right angle

(B) Which statement is incorrect ? 1

(a) Corresponding angles formed at corresponding corners.
(b) Alternate interior angles are equal
(c) Angles on the same side of the transversal are complementary
(d) Vertically opposite angles are equal

(C) Incident ray CA is : 1

(a) parallel to AB
(b) perpendicular to BD
(c) parallel to BD
(d) perpendicular to AO

(D) $\angle DBA + \angle BAC$ 1

(a) $<60°$ (b) $= 90°$
(c) $= 180°$ (d) $> 270°$

(E) If $BO = 3$ cm, $AB = 5$ cm then, $AO =$ 1

(a) 3 cm (b) 2 cm
(c) 4 cm (d) 6 cm

Ans. (A) (b) never meet 1

(B) (c) angles on the same side of the transversal are complementary. 1

(C) (c) parallel to BD 1

(D) (c) $= 180°$ 1

Since, AC is parallel to BD. Also, $\angle DBA$ and $\angle BAC$ are on same side of transversal AB.

Therefore, they are supplementary.

Hence, $\angle DBA + \angle BAC = 180°$

(E) (c) 4 cm 1

m and n are two plane mirrors perpendicular to each other.

So, AO is perpendicular to BO.

Thus, triangle AOB is a right-angled triangle.

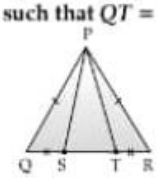
$$OA^2 + OB^2 = AB^2$$
$$OA^2 + 3^2 = 5^2$$
$$OA^2 + 9 = 25$$
$$OA^2 = 25 - 9 = 16$$
$$OA = 4 \text{ cm}$$

Visual Case Based Question

(4 marks each)

Attempt any four sub-parts from each questions.

1. A children's park is in the shape of isosceles triangle said PQR with $PQ = PR$, S and T are points on QR such that $QT = RS$.



(A) Which rule is applied to prove that congruency of ΔPQS and ΔPRT. 1

(a) SSS **(b)** SAS

(c) AAS **(d)** RHS

(B) In RHS rule 'H' stands for : 1

(a) Height **(b)** Hypotenuse

(c) Heron's formula **(d)** Highest

(C) An isosceles triangle has 1

(a) 3 sides equal

(b) 2 sides equal

(c) None of these sides equal

(d) All angles equal

(D) If $PQ = 6$ cm and $QR = 7$ cm, then perimeter of ΔPQR is : 1

(a) 19 cm **(b)** 20 cm

(c) 13 cm **(d)** 18 cm

(E) If $\angle QPR = 80°$. find $\angle PQR$? 1

(a) 20° **(b)** 100°

(c) 50° **(d)** 40°

Ans. (A) (b) In ΔPQS and ΔPRT

$PQ = PR$ (Given)

$QS = TR$ (Given)

$\angle PQR = \angle PRQ$ (corresponding angles of an isosceles Δ)

By SAS congmency

$\Delta PQS \cong \Delta PRT$

(B) (b) 'H' stands for hypotenuse 1

(C) (b) An isosceles Δ has 2 sides equal 1

(D) (a) Perimeter = sum of all 3 sides 1

$PQ = PR = 6$ cm,

$QR = 7$ cm

So $P = (6 + 6 + 7)$ cm

$= 19$ cm 1

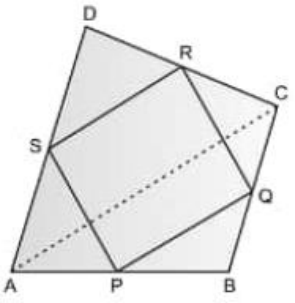
(E) (c) let $\angle Q = \angle R = x$ and $\angle P = 80°$

In ΔPQR, $\angle P + \angle Q + \angle R = 180°$ (Angle sum property of Δ)

$$80° + x + x = 180°$$
$$2x = 180° - 80°$$
$$2x = 100°$$
$$x = \frac{100°}{2}$$
$$x = 50° \quad 1$$

Attempt any four sub-parts from each questions.

1. Maths teacher of class 9th gave students coloured paper in the shape of quadrilateral and then ask the students to make parallelogram from it by using paper folding.



(A) How can a parallelogram be formed by using paper folding ? 1

(a) By joining any two vertices

(b) By joining one pair of opposite vertices.

(c) By joining mid points of sides of a quadrilateral

(d) None of the above

(B) If $\angle RSP = 30°$, then $\angle RQP =$ 1

(a) 150° (b) 80°

(c) 50° (d) 30°

(C) If $\angle RSP = 50°$, then $\angle SPQ =$ 1

(a) 130° (b) 120°

(c) 110° (d) 100°

(D) If $SP = 3$ cm, then $RQ =$ 1

(a) 4 cm (b) 2 cm

(c) 3 cm (d) 5 cm

(E) Which statement is incorrect about the parallelogram ? 1

(a) Consecutive angles are supplementary

(b) Opposites sides are parallel

(c) Diagonal bisects each other

(d) Diagonals are equal in length.

Ans. (A) (c) By joining mid points of sides of a quadrilateral. 1

(B) (d) 30° 1

Opposite angles of a parallelogram are equal.

(C) (a) 130° 1

Adjacent angles of a parallelogram are supplementary.

Thus, $\angle RSP + \angle SPQ = 180°$

$50° + \angle SPQ = 180°$

$\angle SPQ = 180° - 50°$

$= 130°$

(D) (c) 3 cm 1

Opposite side of a parallelogram are equal.

(E) (d) Diagonals are equal in length. 1

2. During maths lab activity, teacher gives four sticks of lengths 6 cm, 6 cm, 4 cm and 4 cm to each student to make different types of quadrilateral.

She asks following questions from the students:

(A) How many types of quadrilaterals can be possible?

(a) 3 (b) 4

(c) 5 (d) 6 1

(B) Write the name of quadrilateral that can be formed with these sticks.

(a) Kite, rectangle, rhombus

(b) Parallelogram, rectangle , trapezium

(c) Kite, rectangle, parallelogram

(d) **Square, rectangle, kite** 1

(C) Which statement is incorrect ?

(a) Opposite sides of a parallelogram are equal

(b) A kite is not a parallelogram

(c) Diagonals of a parallelogram bisect each other

(d) A trapezium is a parallelogram. 1

(D) A student formed a rectangle with these sticks. What is the length of the diagonal of the rectangle formed by the student ?

(a) $6\sqrt{13}$ cm (b) $3\sqrt{13}$ cm

(c) $\sqrt{13}$ cm (d) $2\sqrt{13}$ cm 1

(E) A diagonal of a parallelogram divides it into two _____ triangles.

(a) Similar (b) Congruent

(c) Equilateral (d) Right angled

Ans. (A) (a) 3 1

(B) (c) Kite, rectangle, parallelogram

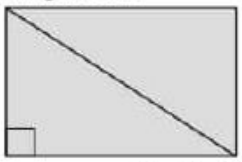
Opposite sides of a parallelogram and a rectangle are equal. Also, adjacent sides of kite are equal. Thus, kite, rectangle and parallelogram can be formed with the sticks of lengths 6 cm, 6 cm, 4 cm and 4 cm. Hence, option (c) is correct. 1

(C) (d) A trapezium is a parallelogram

A trapezium has only one pair of parallel sides. Thus, it cannot be a parallelogram. 1

(D) (d) $2\sqrt{13}$ cm

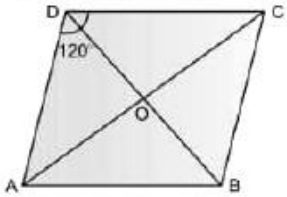
All the angles of a rectangle are right angle. So, diagonal of a rectangle divides it into two right-angled triangles. Thus,



$$6^2 + 4^2 = l^2$$
$$36 + 16 = l^2$$
$$l^2 = 52$$
$$l = 2\sqrt{13}\text{ cm} \quad 1$$

(E) (b) Congruent 1

3. ABCD is an area in the shape of rhombus in which $\angle ADC = 120°$. Samay and Tarun lived at D and C and their school located at O.



Answer the following questions:

(A) Measure of $\angle DCB$ is : 1

(a) 120° **(b)** 60°

(c) 30° **(d)** 240°

(B) Measure of $\angle CDO$ and $\angle DCO$ are _____ and _____ respectively. 1

(a) 120°, 60° **(b)** 30°, 60°

(c) 60°, 30° **(d)** 120°, 60°

(C) Which statement is incorrect? 1

(a) A rhombus has all the properties of a parallelogram.

(b) Diagonals of the rhombus are angle bisectors.

(c) Sum of consecutive angles of a rhombus is 180°.

(d) Diagonals of a rhombus are not perpendicular bisectors.

(D) Who can reach school early? 1

(a) Samay

(b) Tarun

(c) Both will reach at same time

(d) Cannot say

(E) Measure of $\angle BAC$: 1

(a) 30° **(b)** 60°

(c) 90° **(d)** 120°

Ans. (A) (b) 60°

$ABCD$ is a rhombus and adjacent angles of a rhombus are supplementary.

Thus, $\angle CDA + \angle DCB = 180°$ ½

$\Rightarrow 120° + \angle DCB = 180°$

$\Rightarrow \angle DCB = 180° - 120° = 60°$ ½

(B) (c) 60°, 30°

Diagonal of a rhombus bisects the angles is passing from.

So, $\angle CDO = \frac{1}{2}\angle CDA$

$= \frac{1}{2}(120)° = 60°$ ½

$\angle ADC + \angle DCB = 180°$

$120° + \angle DCB = 180°$

$\Rightarrow \angle DCB = 180° - 120° = 60°$

$\angle DCO = \frac{1}{2}\angle DCB$

$= \frac{1}{2}(60°) = 30°$ ½

(C) (a) Samay

Diagonals of a rhombus are not perpendicular bisectors.

Diagonals of a rhombus are perpendicular bisectors. 1

(D) (c) $\angle CDO = 60°$ and $\angle DCO = 30°$

Since, $\angle CDO > \angle DCO$

$\Rightarrow CO > DO.$

(side opposite to greater angle is greater.)

$\Rightarrow$ Samay will reach school early. 1

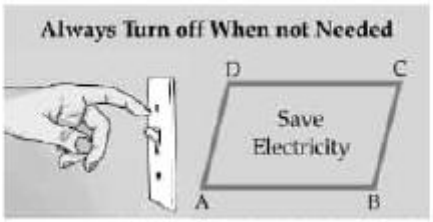
(E) (a) 30°

Since, $ABCD$ is a rhombus. So, $AB \| CD$ and AC is a transversal. ½

Thus, $\angle BAC = \angle DCA = 30°$

(alternate interior angles) ½

4. Harish makes a poster in the shape of a parallelogram on the topic SAVE ELECTRICITY for an inter school competition as shown in the follow figure.



Answer the following questions:

(A) If $\angle A = (4x + 3)^\circ$ and $\angle D = (5x - 3)^\circ$, then find the measure of $\angle B$ **1**

(a) 83° (b) 97°
(c) 76° (d) 43°

(B) If $\angle B = (2y)^\circ$ and $\angle D = (3y - 6)^\circ$, then find the value of y. **1**

(a) 3 (b) 2
(c) 6 (d) 5

(C) If $\angle A = (2x - 3)^\circ$ and $\angle C = (4y + 2)^\circ$, then find how x and y relate. **1**

(a) $x = 2y + 3$ (b) $x = 2y$
(c) $x = 2y + \frac{5}{2}$ (d) $x = y - 7$

(D) If $AB = (2y - 3)$ and $CD = 5$ cm then what is the value of y ? **1**

(a) 4 (b) 5
(c) 3 (d) 9

(E) Which mathematical concept is used here?1

(a) Co-ordinate geometry
(b) Surface area and volume
(c) Properties of a parallelogram
(d) Probability

Ans. (A) (b) 97°

Since, $ABCD$ is a parallelogram.

$$\angle A + \angle D = 180^\circ$$

(adjacent angles of a quadrilateral are equal)

$$(4x + 3)^\circ + (5x - 3)^\circ = 180^\circ \quad ½$$

$$9x = 180^\circ$$

$$x = 20$$

$$\angle D = (5x - 3)^\circ = 97^\circ$$

$$\angle D = \angle B$$

(opposite angles of a parallelogram are equal)

Thus, $\angle B = 97^\circ$ ½

(B) (c) 6

$$\angle B = \angle D$$

(opposite angles of a parallelogram are equal)

$\Rightarrow$ $2y = 3y - 6$ ½

$\Rightarrow$ $2y - 3y = -6$

$\Rightarrow$ $-y = -6$

$\Rightarrow$ $y = 6$ ½

(C) (c) $x = 2y + \frac{5}{2}$

$$\angle A = \angle C$$

(opposite angles of a parallelogram are equal)

$\Rightarrow$ $2x - 3 = 4y + 2$ ½

$\Rightarrow$ $2x = 4y + 5$

$\Rightarrow$ $x = 2y + \frac{5}{2}$ ½

(D) (a) 4

$$AB = CD$$

$\Rightarrow$ $2y - 3 = 5$ ½

$\Rightarrow$ $2y = 8$

$\Rightarrow$ $y = 4$ ½

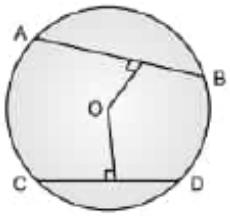
(E) (c) Properties of a parallelogram **1**

Visual Case Based Question

(4 marks each)

Attempt any four sub-parts from each questions.

1. Rohan draws a circle of radius 10 cm with the help of compass and scale. He also draws two chords, AB and CD in such a way that AB and CD are 6 cm and 8 cm from the centre O. Now, he has some doubts that are given below. Help him out by answering these questions:



(A) What is the length of AB ? 1

(a) 12 cm (b) 11 cm

(c) 16 cm (d) 8 cm

(B) What is the length of CD ? 1

(a) 10 cm (b) 12 cm

(c) 16 cm (d) 21 cm

(C) A circle divides the plane, on which it lies, in _____ parts 1

(a) 1 (b) 2

(c) 3 (d) 4

(D) A quadrilateral is called cyclic if all the four vertices of it lie on a _____ 1

(a) Circle (b) Quadrilateral

(c) Pentagon (d) Triangle

(E) Which statement is not true ? 1

(a) Equal chords of a circle subtend equal angles at the centre

(b) The perpendicular from the centre of a circle to a chord bisects the chord.

(c) Angles in the same segment of a circle are equal.

(d) The sum of each pair of opposite angles of a cyclic quadrilateral is 90°.

Ans. (A) (c) 16 cm

Length of AB = 16 cm

$h^2 = p^2 + b^2$

$10^2 = 6^2 + b^2$

$100 = 36 + b^2$

$b = \sqrt{64}$

$= 8$ cm

$AB = 8 + 8$

$= 16$ cm 1

(B) (b) 12 cm

Length of CD = 12 cm

$h^2 = p^2 + b^2$

$(10)^2 = 8^2 + b^2$

$b^2 = 100 - 64$

$= \sqrt{36}$

$b = 6$ cm

$CD = 6 + 6$

$= 12$ cm 1

(C) (c) 3 parts (inside, outside and on the circle) 1

(D) (a) Circle 1

(E) (d) The sum of each pair of opposite angles of a cyclic quadrilateral is 90°. 1

Visual Case Based Question

(4 marks each)

Attempt any four sub-parts from each questions.

1. An architect was asked to make a triangular portico with a base 7 m and the angle to its base should be tilted 75° and the sum of other two sides of the portico be 13 m.

(A) What should be known by the architect to justify the construction :

(a) Ruler

(b) Compass

(c) Properties and theorems

(d) Measurement 1

(B) Will the architect the able to draw an angle of 75° with ruler and compass only

(a) Yes (b) No

(c) Not sure (d) None of these 1

(C) What will be the measure of each angle of 75° angle is bisected once :

(a) 75°, 75° (b) 150°, 150°

(c) 38°, 37° (d) $37\frac{1}{2}^\circ, 37\frac{1}{2}^\circ$ 1

(D) If the other base angle is 60°, what will be the measure of the third angle :

(a) 55° (b) 45°

(c) 30° (d) 60° 1

(E) Which of the following sets of angles can be angle of triangle :

(a) 30°, 60°, 80°

(b) 40°, 60°, 70°

(c) 50°, 30°, 100°

(d) None of the above 1

Ans. (A) (c) Properties and theorems 1

(B) (a) yes 1

(C) (d) $37\frac{1}{2}^\circ$, $37\frac{1}{2}^\circ$ 1

Half of 75° is 37° or $37\frac{1}{2}^\circ$.

(D) (b) 45°

Third angle $= x$

$\therefore$ $60^\circ + 75^\circ + x = 180^\circ$ (Angle sum property of triangle)

$x = 180 - 135$

$x = 45^\circ$

(E) (c) 50°, 30°, 100°

The sum of all 3 angles of a $\Delta = 180^\circ$

$\therefore$ $50^\circ + 30^\circ + 100^\circ = 180$

Visual Case Based Questions

(4 marks each)

Attempt any four sub-parts from each questions.

1. Isosceles triangles were used to construct a bridge in which the base (unequal side) of an isosceles triangle is 4 cm and its perimeter is 20 cm.

(A) What is the measurement of equal sides ? 1

(a) 2 cm (b) 3 cm

(c) 8 cm (d) 10 cm

(B) What is the Heron's formula for the area of? 1

(a) $|\sqrt{s(s+a)(s-b)(s-c)}|$

(b) $|\sqrt{s(s+a)(s+b)(s+c)}|$

(c) $|\sqrt{s(s-a)(s-b)(s-c)}|$

(d) $|\sqrt{s(s.a)(s.b)(s.c)}|$

(C) What is the semi perimeter of the highlighted triangle ? 1

(a) 30 cm (b) 40 cm

(c) 10 cm (d) 50 cm

(D) What is the area of highlighted triangle ? 1

(a) $4\sqrt{15}$ cm^2 (b) 4 cm^2

(c) $\sqrt{15}$ cm^2 (d) 20 cm^2

(E) If the sides of a triangle are in the ratio 3 : 5 : 7 and its perimeter is 300 m. Find its area. 1

(a) $100\sqrt{2}$ m^2 (b) $500\sqrt{2}$ m^2

(c) $1500\sqrt{3}$ m^2 (d) $200\sqrt{3}$ m^2

Ans. (A) (c) 8 cm

Let x cm be the length of equal sides of the isosceles triangle.

So, $x + x + 4 = 20$ ½

$2x + 4 = 20$

$2x = 20 - 4$

$2x = 16$

$x = \frac{16}{2} = 8$ cm ½

(B) (c) $\sqrt{s(s-a)(s-b)(s-c)}$ 1

(C) (c) 10 cm

Required semi perimeter $= \frac{\text{Perimeter}}{2} = \frac{20}{2}$

$= 10$ m 1

(D) (a) $4\sqrt{15}$ cm^2

Since, semi perimeter,

$s = 10$ cm

Thus, area of the triangle

$\sqrt{s(s-a)(s-b)(s-c)} = \sqrt{10(10-8)(10-8)(10-4)}$ ½

$= \sqrt{10(2)(2)(6)}$

$= 4\sqrt{15}$ cm^2 ½

(E) (c) $1500\sqrt{3}$ cm^2

Let the sides of a triangle are

$a = 3x, b = 5x, c = 7x$

then $a + b + c = 300$

$3x + 5x + 7x = 300$

$15x = 300$

$x = 20$

So, $a = 60, b = 100, c = 140$

$s = \frac{a+b+c}{2}$

$= \frac{300}{2}$

$= 150$ ½

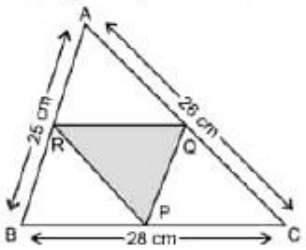
Area of triangle $= \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{150(150-60)(150-100)(150-140)}$

$= \sqrt{150 \times 90 \times 50 \times 10}$

$= 1500\sqrt{3}$ cm^2 ½

2. **Shakshi prepared a Rangoli in triangular shape on Diwali. She makes a small triangle under a big triangle as shown in figure.**



Sides of big triangle are 25 cm, 26 cm and 28 cm. Also, ΔPQR is formed by joining mid points of sides of ΔABC.

Use the above data to help her in resolving below doubts.

(A) **What is the semi-perimeter of ΔABC ?** 1

(a) 39 cm (b) 39.5 cm

(c) 40 cm (d) 40.5 cm

(B) $\frac{1}{2}$ **of AB =** 1

(a) QR (b) RP

(c) QP (d) QC

(C) **What is the length of RQ ?** 1

(a) 16 cm (b) 15 cm

(c) 13 cm (d) 14 cm

(D) **If colourful rope is to be placed along the sides of small ΔPQR. What is the length of the rope ?** 1

(a) 34.5 cm (b) 39.5 cm

(c) 32.5 cm (d) 31.5 cm

(E) **Area of ΔPQR =** 1

(a) $\left|\sqrt{s(s-12.5)(s-13)(s-14)}\right|$ cm^2

(b) $\left|\sqrt{s(s-25)(s-26)(s-28)}\right|$ cm^2

(c) $\left|\sqrt{s(s+12.5)(s+13)(s+14)}\right|$ cm^2

(d) $\left|\sqrt{s(s+25)(s+26)(s+28)}\right|$ cm^2

where s is the semi-perimeter of ΔPQR.

Ans. (A) (b) 39.5 cm

P = sum of all 3 sides