📘 Class 9 Maths Chapter 1

📝 End-of-Chapter Exercises – Solutions

Orienting Yourself: The Use of Coordinates

These are the **actual 16 end-of-chapter questions** from the new *Ganita Manjari* Chapter 1. Questions marked * are starred problems in the textbook.

🟢 Q1. Point of Intersection of the Axes

Question: What are the x-coordinate and y-coordinate of the point of intersection of the two axes?

Solution:

The x-axis and y-axis intersect at the **origin**.

Therefore:

x-coordinate = 0
y-coordinate = 0

✅ Answer: (0, 0)

🟢 Q2. Point on a Line Parallel to the y-axis

Point `W` has x-coordinate `−5`. Point `H` lies on the line through `W` parallel to the y-axis.

Solution:

A line parallel to the y-axis has the **same x-coordinate**.

Therefore:

H = (−5, y)

- If `y > 0`, H lies in **Quadrant II**.
- If `y < 0`, H lies in **Quadrant III**.
- If `y = 0`, H lies on the **x-axis**.

✅ Answer:

H = (−5, y)

H can lie in **Quadrant II, Quadrant III, or on the x-axis**.

🟡 Q3. Points R, A, M and P

Given:

`R(3, 0), A(0, -2), M(-5, -2), P(-5, 2)`

(i) Two perpendicular sides

- `AM` is horizontal.
- `MP` is vertical.

Therefore:

✅ AM ⊥ MP

(ii) A side parallel to an axis

`AM` is parallel to the **x-axis**.

✅ Answer: AM

(iii) Mirror images

Points `A(0,-2)` and `?` need to be compared carefully with the given points.

`M(-5,-2)` and `P(-5,2)` have the same x-coordinate and opposite y-coordinates.

Therefore they are mirror images about the **x-axis**.

✅ Answer:

M and P are mirror images in the x-axis.

🔵 Q4. Point Z(5, −6)

Plot:

Z = (5, −6)

Since `x` is positive and `y` is negative, Z lies in **Quadrant IV**.

To construct a right-angled triangle, one convenient choice is:

- `I = (5, 0)`
- `N = (0, -6)`

Then:

`ZI = 6 units`

`ZN = 5 units`

Using Pythagoras:

`IN = √(5² + 6²)`

`IN = √61 units`

✅ Answer:

The three side lengths are:

5 units, 6 units and √61 units

The exact coordinates of the auxiliary points can vary, as the textbook notes.

🟣 Q5. What if Negative Numbers Did Not Exist?

Without negative numbers, coordinates would only allow us to represent positions:

- to the **right** of the origin, and
- **above** the origin.

We would not be able to represent positions to the left or below the origin.

Therefore, we could not locate all points in a 2-D plane.

✅ Answer:

No. Without negative numbers, we could not locate all points on a 2-D plane.

🔴 Q6. Are M, A and G Collinear?

Given:

$M(-3,-4),\ A(0,0),\ G(6,8)$

Use distances:

$MA = \sqrt{[(0+3)^2 + (0+4)^2]}$

$= \sqrt{(9+16)}$

$= 5$

Similarly,

$AG = \sqrt{[(6-0)^2 + (8-0)^2]}$

$= \sqrt{(36+64)}$

$= 10$

And:

$MG = \sqrt{[(6+3)^2 + (8+4)^2]}$

$= \sqrt{(81+144)}$

$= 15$

Since:

$MA + AG = MG$

$5 + 10 = 15$

✅ **Answer:**

Yes, M, A and G lie on the same straight line.

🔴 Q7. Check R, B and C

Given:

$R(-5,-1),\ B(-2,-5),\ C(4,-12)$

Calculate:

$RB = \sqrt{[(-2+5)^2 + (-5+1)^2]}$

$= \sqrt{(9+16)}$

$= 5$

$BC = \sqrt{[(4+2)^2 + (-12+5)^2]}$

$= \sqrt{(36+49)}$

$= \sqrt{85}$

$RC = \sqrt{[(4+5)^2 + (-12+1)^2]}$

$= \sqrt{(81+121)}$

$= \sqrt{202}$

Since:

$RB + BC \neq RC$

✅ **Answer:**

R, B and C are not collinear.

⭐ Q8. Constructing Triangles

(i) Right-angled isosceles triangle

One possible answer using the origin:

`O(0,0), A(4,0), B(0,4)`

Here:

`OA = OB = 4`

and

`OA ⊥ OB`

✅ Answer:

`O(0,0), A(4,0), B(0,4)`

(ii) Isosceles triangle

One possible example:

`O(0,0)`

`A(-3,-3)` → Quadrant III

`B(3,-3)` → Quadrant IV

Then:

`OA = OB`

Therefore it is an isosceles triangle.

✅ One possible answer:

O(0,0), A(−3,−3), B(3,−3)

Other valid coordinate choices are possible.

🟠 Q9. Checking the Midpoint

S	M	T	Is M midpoint?	Reason
`(-3,0)`	`(0,0)`	`(3,0)`	✅ Yes	M is halfway
`(2,3)`	`(3,4)`	`(4,5)`	✅ Yes	M is average of coordinates
`(0,0)`	`(0,5)`	`(0,-10)`	❌ No	Midpoint is `(0,-5)`
`(-8,7)`	`(0,-2)`	`(6,-3)`	❌ No	Midpoint is `(-1,2)`

🔑 Connection:

If `M` is the midpoint of `ST`:

$M = ((x_1+x_2)/2, (y_1+y_2)/2)$

So each coordinate of M is the **average of the corresponding coordinates of S and T**.

🔴 Q10. Find B

Given:

`M(-7,1)`

is the midpoint of:

`A(3,-4)` and `B(x,y)`.

Using the midpoint formula:

```
-7 = (3+x)/2
```

```
-14 = 3+x
```

```
x = -17
```

For y:

```
1 = (-4+y)/2
```

```
2 = -4+y
```

```
y = 6
```

✅ Answer:

B = (−17, 6)

🔴 Q11. Points of Trisection

Given:

`A(4,7)` and `B(16,-2)`

The total change is:

```
Δx = 16-4 = 12
```

```
Δy = -2-7 = -9
```

Divide each by 3:

```
Δx/3 = 4
```

```
Δy/3 = -3
```

Therefore:

Point P:

```
P = (4+4, 7-3)
```

P = (8,4)

Point Q:

```
Q = (8+4, 4-3)
```

Q = (12,1)

✅ Answer:

P = (8,4)
Q = (12,1)

🔵 Q12. Points on a Circle

Given:

```
A(1,-8), B(-4,7), C(-7,-4)
```

The centre is:

O(0,0)

Calculate:

```
OA = √(1² + (-8)²)
```

```
= √65
```

```
OB = √((-4)² + 7²)
```

```
= √65
```

```
OC = √((-7)² + (-4)²)
```

```
= √65
```

Therefore all three points are at the same distance from O.

✅ (i) Answer:

They lie on the same circle.

Radius = √65 units

(ii) Check D and E

`D(-5,6)`

`OD = √(25+36) = √61`

Since:

`√61 < √65`

D lies inside the circle.

For:

`E(0,9)`

`OE = 9`

Since:

`9 > √65`

E lies outside the circle.

✅ Answer:

- **D → Inside the circle**
- **E → Outside the circle**

🟣 Q13. Find A, B and C

Midpoints are:

`D(5,1), E(6,5), F(0,3)`

Using the midpoint relationships between the vertices:

Coordinate results:

A = (−1, −1)

B = (11, 7)

C = (1, 7)

✅ Answer:

A(−1,−1), B(11,7), C(1,7)

🟢 Q14. City Street Coordinate Model

The city has:

- N–S roads
- E–W roads
- roads spaced **200 m apart**
- 10 streets in each direction

Scale:

1 cm = 200 m

(i)

Draw a grid representing the city with the given scale.

(ii)

An intersection is named using:

(N–S street number, E–W street number)

Therefore:

(a) `(4,3)`

There is **1 intersection** corresponding to the fourth N–S street and third E–W street.

(b) `(3,4)`

There is also **1 intersection** corresponding to the third N–S street and fourth E–W street.

✅ Answers:

(a) 1

(b) 1

🟠 Q15. Computer Graphics

Screen:

800 pixels × 600 pixels

Circle A:

Centre `A(100,150)`

Radius = **80 pixels**

Circle B:

Centre `B(250,230)`

Radius = **100 pixels**

(i) Do the circles extend outside the screen?

For A:

- x-range = `100-80` to `100+80`
- = **20 to 180**
- y-range = `150-80` to `150+80`
- = **70 to 230**

So A is completely inside.

For B:

- x-range = `250-100` to `250+100`
- = **150 to 350**
- y-range = `230-100` to `230+100`

- = **130 to 330**

So B is also completely inside.

✅ Answer:

Neither circle lies outside the screen.

(ii) Do the circles intersect?

Distance between centres:

```
AB = √[(250-100)² + (230-150)²]
```

```
= √(150² + 80²)
```

```
= √28900
```

```
= 170 pixels
```

Sum of radii:

```
80 + 100 = 180
```

Difference:

```
100 - 80 = 20
```

Since:

```
20 < 170 < 180
```

✅ Answer:

Yes, the two circles intersect.

⭐ Q16. Is ABCD a Square?

Given:

```
A(2,1)
B(-1,2)
```

$C(-2,-1)$
$D(1,-2)$

Calculate:

$AB = \sqrt{[(-1-2)^2 + (2-1)^2]}$

$= \sqrt{10}$

Similarly:

$BC = \sqrt{10}$

$CD = \sqrt{10}$

$DA = \sqrt{10}$

All four sides are equal.

Now check a diagonal:

$AC = \sqrt{[(-2-2)^2 + (-1-1)^2]}$

$= \sqrt{20} = 2\sqrt{5}$

and:

$BD = \sqrt{[(1+1)^2 + (-2-2)^2]}$

$= \sqrt{20} = 2\sqrt{5}$

The diagonals are equal and the sides are equal, so ABCD is a square.

Area:

Side²:

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

✅ Answer:

ABCD is a square.

Area = 10 square units

📋 END-OF-CHAPTER QUICK ANSWER KEY

Q	Answer
1	$(0,0)$
2	$H = (-5, y)$; Quadrants II/III or x-axis
3	$AM \perp MP$; AM // x-axis; M & P mirror in x-axis
4	Possible sides: $5,\ 6,\ \sqrt{61}$ units
5	No; negative coordinates are needed for the entire plane
6	Yes, collinear
7	No, not collinear
8	Multiple valid coordinate answers
9	Yes, Yes, No, No
10	$B = (-17, 6)$
11	$P = (8,4),\ Q = (12,1)$
12	Radius $\sqrt{65}$; D inside, E outside
13	$A(-1,-1),\ B(11,7),\ C(1,7)$
14	$(4,3) \to 1$; $(3,4) \to 1$
15	Both inside; circles intersect
16	Square; area = **10 sq units**

Important: Questions **8** and parts of **4** allow multiple valid coordinate constructions, so the answer shown is **one possible correct answer**, consistent with the textbook's note that answers may differ.