nexamind EDUCATION

Name _____ Date _____

14.1 Coordinates and distance — worksheet

Read and write coordinates in all four quadrants, and find the distance between two points that share an x- or a y-coordinate, without a grid. · 66 questions · Show your working.

Remember

- Coordinates are written **(x, y)** — across first, then up. (3, 1) and (1, 3) are different points.
- The **origin** is (0, 0), where the axes cross.
- The four **quadrants** are numbered **anticlockwise from the top right**: 1 (+, +), 2 (−, +), 3 (−, −), 4 (+, −).
- A point on an axis is in **no quadrant**.
- If two points share a **y**-coordinate the line is **horizontal**: subtract the x-coordinates.
- If two points share an **x**-coordinate the line is **vertical**: subtract the y-coordinates.
- A distance is never negative — take the size of the subtraction.
- The **midpoint** of such a line is the average of the two coordinates.
- None of this needs a grid; it is arithmetic on the coordinates.

A · Fluency — Quadrants, distances, points and midpoints.

1 In which quadrant is the point (3, 4)?

- ☐ quadrant 1
- ☐ quadrant 2
- ☐ quadrant 3
- ☐ quadrant 4

2 In which quadrant is the point (−2, 5)?

- ☐ quadrant 1
- ☐ quadrant 2
- ☐ quadrant 3
- ☐ quadrant 4

3 In which quadrant is the point (−4, −3)?

- ☐ quadrant 1
- ☐ quadrant 2
- ☐ quadrant 3
- ☐ quadrant 4

4 In which quadrant is the point (5, −1)?

- ☐ quadrant 1
- ☐ quadrant 2
- ☐ quadrant 3
- ☐ quadrant 4

5 In which quadrant is the point (1, 6)?

- ☐ quadrant 1
- ☐ quadrant 2
- ☐ quadrant 3
- ☐ quadrant 4

6 In which quadrant is the point (−6, 2)?

- ☐ quadrant 1
- ☐ quadrant 2
- ☐ quadrant 3
- ☐ quadrant 4

7 In which quadrant is the point (−1, −1)?

- ☐ quadrant 1
- ☐ quadrant 2
- ☐ quadrant 3
- ☐ quadrant 4

8 In which quadrant is the point (2, −5)?

- ☐ quadrant 1
- ☐ quadrant 2
- ☐ quadrant 3
- ☐ quadrant 4

9 In which quadrant is the point (4, 4)?

- ☐ quadrant 1
- ☐ quadrant 2
- ☐ quadrant 3
- ☐ quadrant 4

10 In which quadrant is the point (−3, −6)?

- ☐ quadrant 1
- ☐ quadrant 2
- ☐ quadrant 3
- ☐ quadrant 4

11 In which quadrant is the point (6, −2)?

- ☐ quadrant 1
- ☐ quadrant 2
- ☐ quadrant 3
- ☐ quadrant 4

12 In which quadrant is the point (−5, 3)?

- ☐ quadrant 1
- ☐ quadrant 2
- ☐ quadrant 3
- ☐ quadrant 4

13 How far apart are (1, 3) and (7, 3)?

14 How far apart are (−4, 2) and (2, 2)?

15 How far apart are (−6, −1) and (−1, −1)?

16 How far apart are (0, 5) and (8, 5)?

17 How far apart are (−3, 4) and (5, 4)?

18 How far apart are (2, −6) and (9, −6)?

19 How far apart are (−7, 0) and (−2, 0)?

20 How far apart are (−5, −4) and (6, −4)?

21 How far apart are (2, 1) and (2, 8)?

22 How far apart are (−3, −2) and (−3, 5)?

23 How far apart are (4, −6) and (4, −1)?

24 How far apart are (0, −4) and (0, 3)?

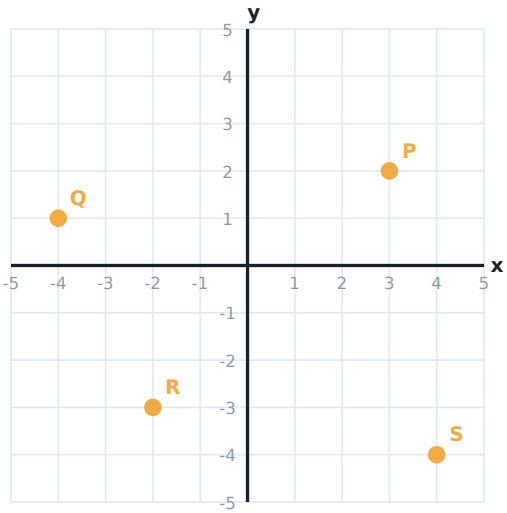
25 How far apart are (−5, 2) and (−5, 9)?

26 How far apart are (6, −7) and (6, 2)?

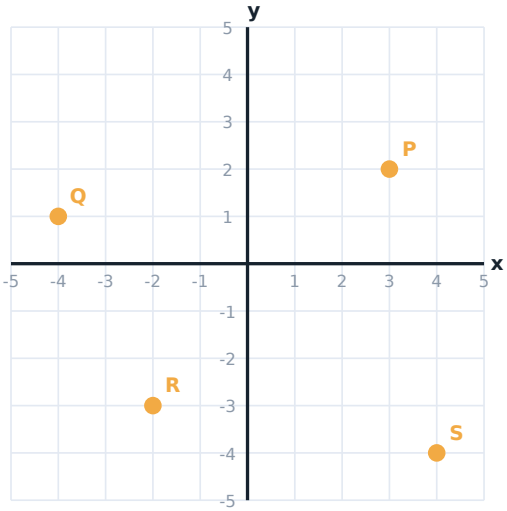
27 How far apart are (−1, 0) and (−1, 6)?

28 How far apart are (3, −3) and (3, −9)?

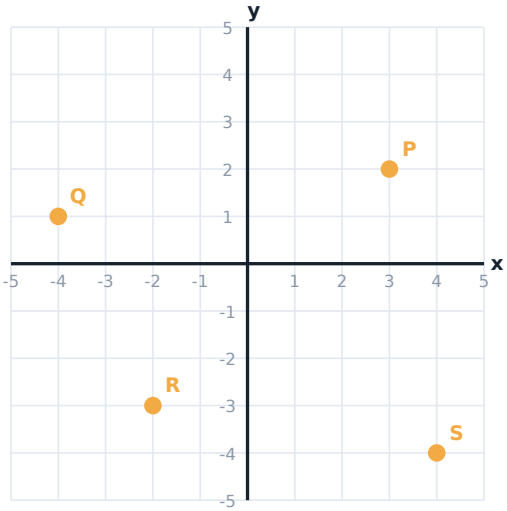
29 Write down the coordinates of point **P**.



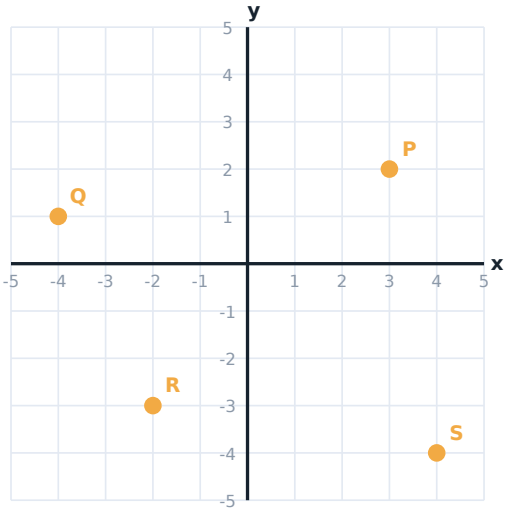
30 Write down the coordinates of point **Q**.



31 Write down the coordinates of point **R**.



32 Write down the coordinates of point **S**.



33 What is the midpoint of (1, 3) and (7, 3)?

34 What is the midpoint of (−4, 2) and (2, 2)?

35 What is the midpoint of (2, 1) and (2, 9)?

36 What is the midpoint of (−3, −6) and (−3, 0)?

37 What is the midpoint of (−5, 4) and (5, 4)?

38 What is the midpoint of (6, −8) and (6, −2)?

B · Reasoning — Why the subtraction rule works, and when it does not.

39 Why is the distance between (2, 5) and (9, 5) just 9 − 2?

- ☐ Because 5 is odd
- ☐ Because both points have the same y, so the line is horizontal
- ☐ Because 9 is bigger than 2
- ☐ It is a coincidence

40 Why can you not find the distance between (1, 2) and (5, 7) the same way?

- ☐ The numbers are too large
- ☐ Both coordinates change, so the line is sloping
- ☐ They are in different quadrants
- ☐ You can

41 In which order are coordinates written?

- ☐ (y, x)
- ☐ (x, y)
- ☐ either way
- ☐ largest first

42 Which quadrant has both coordinates negative?
- ☐ quadrant 1
- ☐ quadrant 2
- ☐ quadrant 3
- ☐ quadrant 4

43 Is the point (0, −4) in a quadrant?
- ☐ Yes
- ☐ No

44 Can a distance between two points be negative?
- ☐ Yes
- ☐ No

45 The points (−3, 2) and (−3, 9) are joined. What kind of line is it?
- ☐ horizontal
- ☐ vertical
- ☐ sloping up
- ☐ sloping down

46 Where is the point (0, 0)?
- ☐ quadrant 1
- ☐ the origin
- ☐ on the x-axis only
- ☐ nowhere

47 Two points have the same x-coordinate. To find the distance between them you …
- ☐ add the y-coordinates
- ☐ subtract the y-coordinates
- ☐ subtract the x-coordinates
- ☐ multiply them

48 Do you need a grid to find the distance between (4, 1) and (4, 8)?
- ☐ Yes
- ☐ No

C · Challenge — Rectangles, perimeters and areas from coordinates alone.

49 Three vertices of a rectangle are (1, 1), (6, 1) and (6, 4). What is the fourth?

50 Three vertices of a rectangle are (−3, 2), (2, 2) and (2, 6). What is the fourth?

51 Three vertices of a rectangle are (−5, −1), (−1, −1) and (−1, 3). What is the fourth?

52 Three vertices of a rectangle are (0, −4), (5, −4) and (5, 0). What is the fourth?

53 A rectangle has vertices (2, 1), (8, 1), (8, 5) and (2, 5). What is its perimeter?

54 A rectangle has vertices (−3, −2), (4, −2), (4, 3) and (−3, 3). What is its area?

55 A square has one side joining (−1, 2) to (5, 2). What is the length of a side?

56 The points (−4, 3) and (7, 3) are the ends of a horizontal line. How long is it?

57 A vertical line runs from (2, −6) to (2, 9). How long is it?

58 A rectangle has vertices (0, 0), (9, 0), (9, 4) and (0, 4). How much longer is its length than its width?

D · Word problems — Maps, ships, gardens and drones.

59 On a town map, the library is at (2, 7) and the school is at (2, 1). Each unit is 1 km. How many kilometres apart are they?

60 A ship sails from (−5, 4) to (6, 4). Each unit is 1 nautical mile. How far does it sail?

61 A chess-style grid has a rook at (3, 8). It moves to (3, 2). How many squares does it move?

62 A garden is a rectangle with corners at (0, 0), (12, 0), (12, 5) and (0, 5), in metres. What is its perimeter, in metres?

63 A drone flies from (−2, −3) to (−2, 6). Each unit is 10 m. How many metres does it climb?

64 A footpath runs straight from (−4, 5) to (8, 5). Where is the halfway point?

65 A field is a rectangle with corners (1, 2), (11, 2), (11, 8) and (1, 8), in units of 10 m. What is its area, in square metres?

66 Two lamp posts stand at (7, −3) and (7, 9) on a plan where one unit is 5 m. How many metres apart are they?